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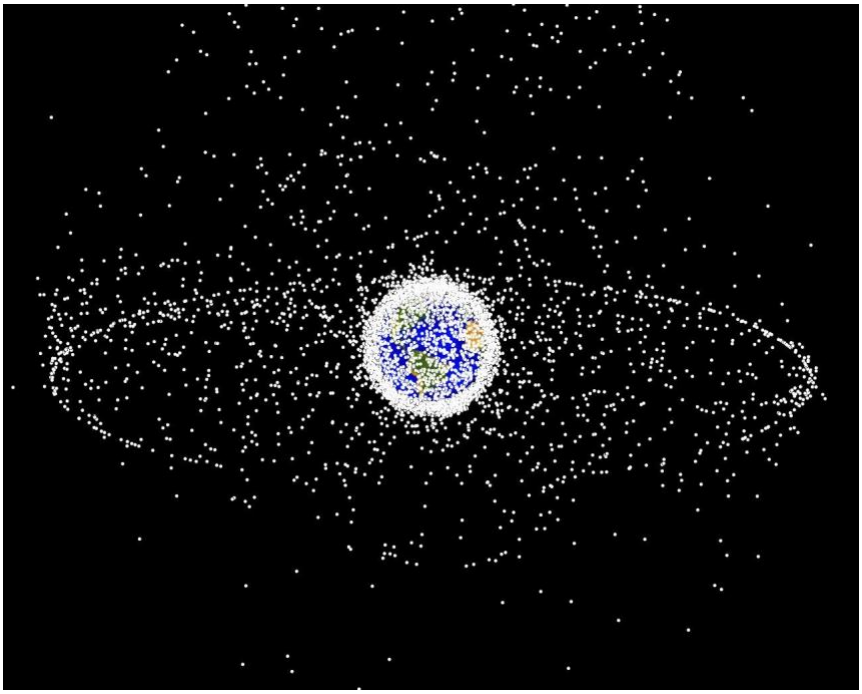
International Rules and Norms: Constraints on Space Operations

A Virtual Think Tank (ViTTa)® Report



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Author

Belinda Bragg

Please direct inquiries to George Popp at **bbragg@nsiteam.com**

ViTTa® Project Team

Dr. Allison Astorino-Courtois
Executive VP

Weston Aviles
Analyst

Dr. Belinda Bragg
Principal Research Scientist

Sarah Canna
Principal Analyst

Dr. Larry Kuznar
Chief Cultural Sciences Officer

Dr. Sabrina Pagano
Principal Research Scientist

Nicole Peterson
Associate Analyst

George Popp
Senior Analyst

Dr. John A. Stevenson
Principal Research Scientist

Interview Team[1]

Weston Aviles
Analyst

Sarah Canna
Principal Analyst

Nicole Peterson
Associate Analyst

George Popp
Senior Analyst

What is ViTTa®?

NSI's **Virtual Think Tank (ViTTa®)** provides rapid response to critical information needs by pulsing our global network of subject matter experts (SMEs) to generate a wide range of expert insight. For this SMA Contested Space Operations project, ViTTa was used to address 23 unclassified questions submitted by the Joint Staff and US Air Force project sponsors. The ViTTa team received written and verbal input from over 111 experts from National Security Space, as well as civil, commercial, legal, think tank, and academic communities working space and space policy. Each Space ViTTa report contains two sections: 1) a summary response to the question asked; and 2) the full written and/or transcribed interview input received from each expert contributor organized alphabetically. Biographies for all expert contributors have been collated in a companion document.

[1] For access to the complete corpus of interview transcripts and written subject matter expert responses hosted on our NSI SharePoint site, please contact **gpopp@nsiteam.com**

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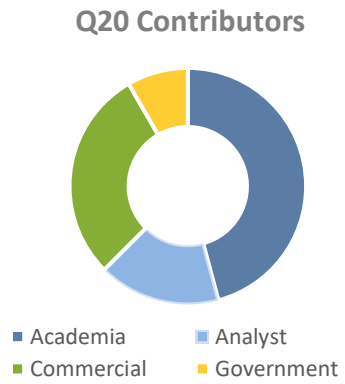
Question of Focus

[Q20] What are the current international agreements, treaties, conventions, etc., governing the use of space, and what specific limitations and constraints are placed on space operations?

Expert Contributors



Major General (USAF ret.) James Armor[2] (Orbital ATK); **Marc Berkowitz** (Lockheed Martin); **Dr. P.J. Blount** (University of Luxembourg); **Faulconer Consulting Group**; **Joanne Gabrynowicz** (University of Mississippi School of Law); **Dr. Peter L. Hays** (George Washington University); **Dr. Henry R. Hertzfeld** (George Washington University); **Theresa Hitchens** (Center for International and Security Studies at Maryland); **Christopher Johnson** (Secure World Foundation); **Jonty Kasku-Jackson** (National Security Space Institute); **David Koplow** (Georgetown University Law Center); **Sergeant First Class Jerritt A. Lynn** (United States Army Civil Affairs); **Tanja Masson-Zwaan** (Leiden University, Netherlands); **Dr. George Nield** (Federal Aviation Administration); **Dr. Xavier Pasco** (Fondation pour la Recherche Stratégique, France); **Dr. Luca Rossettini** (D-Orbit, Italy); **Matthew Schaefer and Jack M. Beard** (University of Nebraska College of Law); **Dr. Michael K. Simpson** (Secure World Foundation); **Spire Global Inc.**; **Dr. Cassandra Steer** (Women in International Security-Canada, Canada); **Dr. Mark J. Sundahl** (Cleveland-Marshall College of Law); **ViaSat, Inc.**; **Dr. Frans von der Dunk** (University of Nebraska College of Law); **Joanne Wheeler** (Bird & Bird, UK)

Summary Response

The expert contributors identified 26 separate international agreements, treaties, and resolutions (legal codes) that have implications for space operations (Figure 1). The core of the legal space regime is composed of five UN-sponsored space treaties[3] centering around the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (OST). Subsequent non-binding resolutions, and the ITU Treaty, reflect the evolving nature of space operations, and the perceived need for legal codes to develop in response.

Not all the legal codes that have implications for space operations are specific to space, however. UN general treaties, in particular regimes governing the use of force by states and the right to self-defense, inform space-specific legal codes. Furthermore, Article III of the OST states that all activities in space must be carried out "in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security" (Steer).

[2] Armor's personal views, and not those of his organization, are represented in his contribution to this report.

[3] 1967 Outer Space Treaty; 1968 Rescue Agreement; 1972 Liability Convention; 1975 Registration Convention; 1975 Moon Agreement. Many experts noted that, of all these treaties the Moon Agreement is by far the least influential as it has been signed by only 16 states and neither Russia nor the US are parties to the treaty (Blount; Gabrynowicz; Hays; Kasku-Jackson; Koplow; Masson-Zwaan; Spire Global Inc.; Schaefer; Steer; Sundahl).

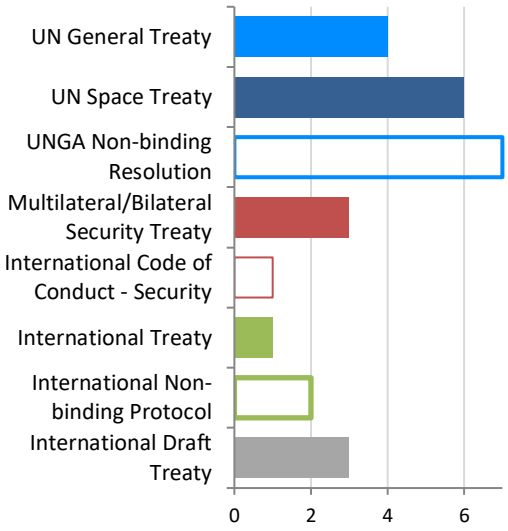


Figure 1: Expert-Identified Legal Codes

Multilateral and bilateral security agreements (NTBT, START I, New START) place restrictions on the placement, testing, and use of weapons in space by signatory states, and efforts are underway through the UN to prevent all states placing weapons in space. Some experts also argue that the laws of armed conflict (LOAC) are applicable to space operations (Hitchens; Kasku-Jackson; Steer).

Figure 2 provides a timeline of all legal codes identified by the expert contributors, and any identified constraints they discussed. Full details of all legal codes and links to the documents are provided in Table 1. The majority of the constraints identified (21 of 40) deal with the placement, testing, or use of weapons in space, which are present in eight of the legal codes. The remaining constraints and limitations identified are, for the most part, not focused on placing prohibiting or limiting specific activities. Rather, they are designed to regulate and reduce interference in the activities of others, create accountability and transparency in space activities, and encourage compliance with international law. One exception to this is the 1978 Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (ENMOD), which Dr. Cassandra Steer of Women in International Security-Canada suggests could provide a legal basis for prohibiting the use of kinetic ASATs.

Bottom Line

Overall, the expert contributors do not view the existing legal regime in space to be overly burdensome or restrictive. Starting from the basic tenets of international law—sovereign equality, non-interference, prohibition on the use of force, right of self-defense, peaceful dispute resolution—it explicitly applies these to activities in space (Steer). The emphasis on accountability, transparency (Blount), and coordination of activities reflect the underlying principles of the OST.

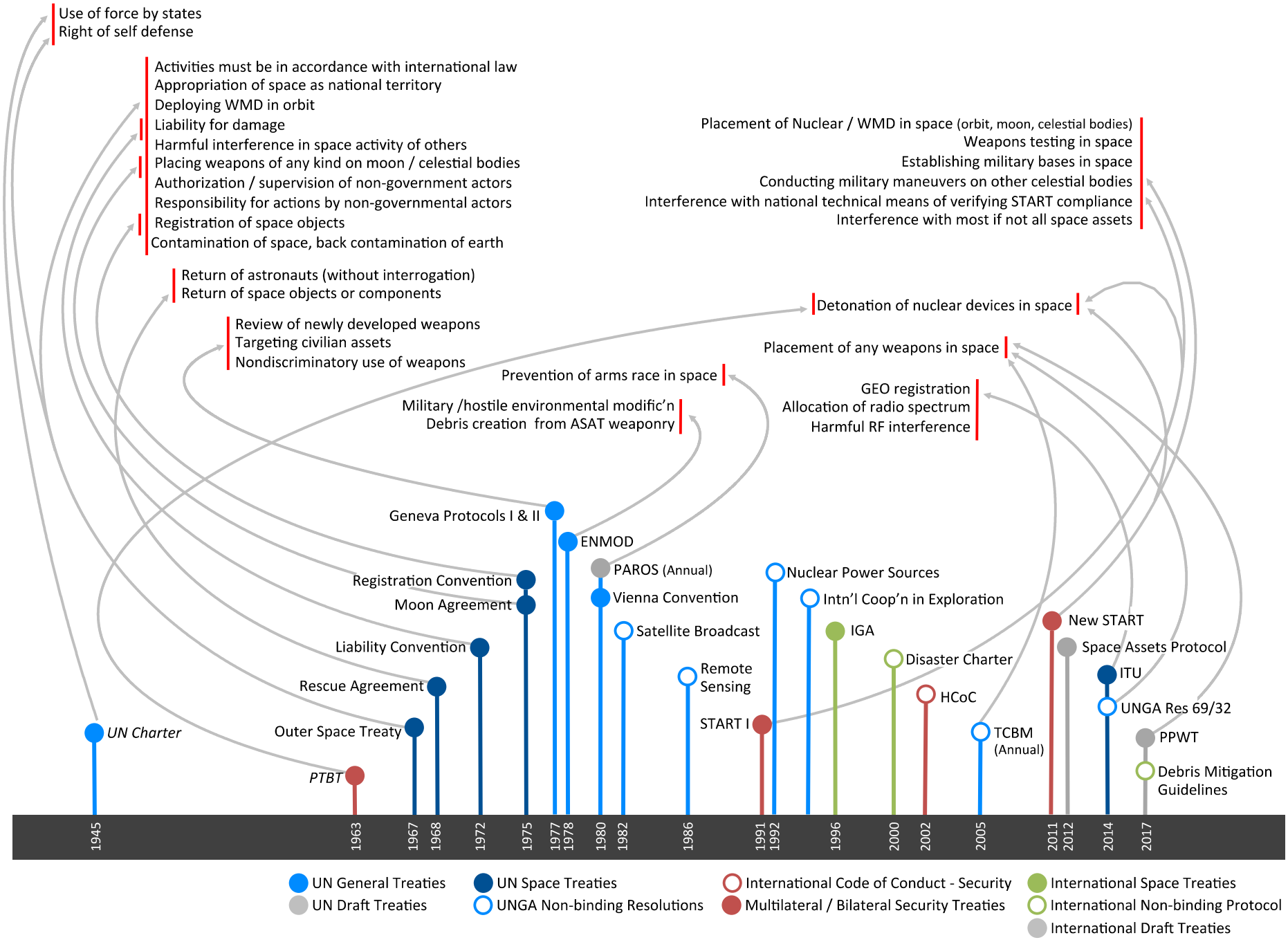


Figure 2: Expert-Identified Legal Codes and their Associated Constraints on Space Activities

Table 1: International Space Regime: Expert Identified Legal Codes Relevant to Space Activities

Date	Legal Code	Full Name	Mechanism	Legally Binding
1945	Charter of UN	Charter of the United Nations and Statute of the International Court of Justice	UN General Treaty	Yes
1963	PTBT	Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water	Multilateral/Bilateral Security Treaty	Yes
1967	Outer Space Treaty	Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies	UN Space Treaty	Yes
1968	Rescue Agreement	Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space	UN Space Treaty	Yes
1972	Liability Convention	Convention on International Liability for Damage Caused by Space Objects	UN Space Treaty	Yes
1975	Registration Convention	Convention on Registration of Objects Launched into Outer Space	UN Space Treaty	Yes
1975	Moon Agreement	Agreement Governing the Activities of States on the Moon and Other Celestial Bodies	UN Space Treaty	Yes
1977	Geneva Protocols I (1925) and II (1977)	Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or other Gases, and of Bacteriological Methods of Warfare	UN General Treaty	Yes
1978	ENMOD	Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques	UN General Treaty	Yes
1980	Vienna Convention	Vienna Convention on the Law of Treaties	UN General Treaty	Yes
1980	PAROS	Prevention of an Arms Race in Outer Space	UN Draft Treaty	Draft
1982	Resolution 37/92	Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting	UNGA Non-binding Resolution	No
1986	Remote Sensing	Principles Relating to Remote Sensing of the Earth from Outer Space	UNGA Non-binding Resolution	No
1991	START I	Treaty Between the United States of America and the Union of Soviet Socialist Republics on Strategic Offensive Reductions	Multilateral/Bilateral Security Treaty	Yes
1992	Nuclear Power Sources	Principles Relevant to the Use of Nuclear Power Sources In Outer Space	UNGA Non-binding Resolution	No
1996	International Cooperation in Exploration and Use	Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries	UNGA Non-binding Resolution	No

Date	Legal Code	Full Name	Mechanism	Legally Binding
1998	IGA	International Space Station Intergovernmental Agreement	International Treaty	Yes
2000	Disaster Charter	Disaster Charter	International Non-binding Protocol	No
2002	HCoC	International Code of Conduct against Ballistic Missile Proliferation	International Code of Conduct - Security	No
2005	Annual TCBMs	Transparency and Confidence-building Measures (TCBMs) in Outer Space Activities	UNGA Non-binding Resolution	No
2011	New START	Treaty between the United States of America and the Russian Federation on Measures for the Further Reduction and Limitation of Strategic Offensive Arms	Multilateral/Bilateral Security Treaty	Yes
2012	Space Assets Protocol	Protocol to the Convention on International Interests in Mobile Equipment on Matters Specific to Space Assets	International Draft Treaty	No
2014	ITU	Constitution and Convention of ITU, Radio Regulations	UN Space Treaty	Yes
2014	UNGA Res 69/32	No First Placement of Weapons in Outer Space	UNGA Non-binding Resolution	No
2017	Debris Mitigation Guidelines	Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space	UNGA Non-binding Resolution	No
2017	PPWT	Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force Against Outer Space Objects	International Draft Treaty	Draft

Subject Matter Expert Contributions

Major General (USAF ret.) James B. Armor Jr.[4]

Staff Vice President, Washington Operations (Orbital ATK)
7 August 2017

WRITTEN RESPONSE

- Outer Space Treaty (OST) – Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies
- Agreement on the Rescue of Astronauts & the Return of Space objects
- Convention on the Registration of Space Objects
- Liability Convention – Convention on the International Liability for Damage Caused by Space Objects
- Debris Mitigation Guidelines – UN Committee on the Peaceful Uses of Outer Space (COPUOS). Compendium published by UN Office for Outer Space Affairs (UNOOSA)

Marc Berkowitz

Vice President, Space Security (Lockheed Martin)
12 June 2017

WRITTEN RESPONSE

The international legal regime governing the conduct of space activities includes: the 1967 Outer Space Treaty; 1968 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space; 1972 Convention on International Liability for Damage Caused by Space Objects; 1975 Convention on Registration of Objects Launched into Outer Space; and 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies. The Constitution and Convention of the International Telecommunication Union as amended in 2014 is another pertinent international treaty.

There are also bilateral and multilateral arms control treaties and agreements between the United States and Russia (e.g., strategic arms reduction treaty) that impose prohibitions or limitations on military activities in space. The limitations and constraints imposed by the aforementioned treaties and agreements include: nuclear or other weapons of mass destruction may not be placed into orbit, installed on other celestial bodies, or stationed in space; detonation of nuclear weapons in space are prohibited; testing any kind of weapons, establishing military bases, and conducting military maneuvers on other celestial bodies are prohibited; and interference with national technical means of verifying compliance with strategic arms reduction treaties is prohibited.

In addition, the United Nation's General Assembly has adopted non-binding resolutions that are generally followed by the international community. These resolutions include: the 1982 Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting; 1986 Principles Relating to Remote Sensing of the Earth from Outer Space; 1992 Principles Relevant to the Use of Nuclear Power Sources In Outer Space; and 1996 Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries. Given common misconceptions, it is important to note that: the Outer Space Treaty extended the UN Charter and

[4] The response here represents the sole views of Armor, and are not intended to represent the position of Orbital ATK.

thereby its principle of the inherent right of self-defense to outer space; interference with ISR space assets employed for targeting or other military applications is permitted if they are not monitoring treaty compliance; and there are no legal prohibitions against weapons in space (except for mass destruction weapons and nuclear detonations in space).

Dr. P.J. Blount

Postdoctoral Researcher (University of Luxembourg)

7 August 2017

WRITTEN RESPONSE

The space treaty regime places minimal direct restrictions on the use of outer space, and these restrictions were designed to create a security regime in space without destabilizing the Cold War rivalry. These minimal restrictions still apply in the post-Cold War environment, and still provide a stable regime for space operations despite the giant leaps in technology. Rather than repeat this previous discussion, this section will discuss the various legal regimes that touch on space operations.

A. International Space Law

The first relevant body of law is international space law itself. This body of law is made up of five treaties, a number of United Nations General Assembly resolutions, as well as various other documents that contain norms that manifest in a variety of standards that range from binding to nonbinding. The Treaties are:

i. Outer Space Treaty - Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, entered into force on 10 October 1967 – Discussed above.
ii. Rescue and Return Agreement - Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, entered into force on 3 December 1968 – Establishes a regime for the return of astronauts and space objects in the case of an accident. This treaty pursues both humanitarian treatment of astronauts and national security goals by requiring return of both astronauts (without interrogation) and space objects.
iii. Liability Convention - Convention on International Liability for Damage Caused by Space Objects, , entered into force on 1 September 1972 – Discussed above.
iv. Registration Convention - Convention on Registration of Objects Launched into Outer Space, entered into force on 15 September 1976 – Discussed above.
v. Moon Agreement - Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, entered into force on 11 July 1984 – Treaty establishes a legal regime specific to celestial bodies. It has a low number of signatories, none of which are space powers, and the United States is not a party to the treaty.

The UN General Assembly has passed numerous nonbinding resolutions on Outer Space. Some of these have been adopted by the UN General Assembly as “principles,” which indicates that, despite the non-legally binding nature of UNGA resolutions, states voting in favor of these resolutions are acknowledging that some level of normative behavior is expressed in the document. This is bolstered by the fact that these resolutions are usually adopted by consensus. The six declarations and legal principles are:

i. Resolution 1962 (XVIII): Declaration of Legal Principles Governing the Activities of States in the Exploration and Uses of Outer Space (1963)– Established the core principles that were later the basis for the Outer Space Treaty. This resolution is considered by most jurists to express customary international law.

ii. Resolution 37/92: The Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting, (1982) – This is the only principles resolution not adopted by consensus, thus it is the most controversial of the principles. It sought to establish norms for the direct broadcasting of media into other countries. The United States voted against the adoption of this resolution.
iii. Resolution 41/65: The Principles Relating to Remote Sensing of the Earth from Outer Space (1986) – Establishes principles for remote sensing, including its use for disaster response and the sharing of data with a sensed state.
iv. Resolution 47/68: The Principles Relevant to the Use of Nuclear Power Sources in Outer Space (1992) – Sets out principles for the use of nuclear reactors onboard space craft.
v. Resolution 51/122: The Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries (1996) – Acknowledges that it is an international goal to extend the benefit of space activities to all humankind.

The UNGA also passes annual resolutions on space that express the goals of establishing transparency and confidence building measures (T/CBMs) and the prevention of an arms race in outer space (PAROS). The United States voted against these resolutions during the George W. Bush administration, establishing the US as a persistent objector to the establishment of new norms in outer space. The Obama administration abstained from votes on these resolutions, softening the US opposition, but not quite releasing the US claim to persistent objector status. The current US position is unclear, at best.

Other important documents include:

i. Protocol to the Convention on International Interests in Mobile Equipment on Matters Specific to Space Assets (2012) – Establishes a security interest register for space assets. Not in force and US not a signatory.
ii. Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force Against Outer Space Objects (PPWT) – Draft treaty introduced by China and Russia to the Conference on Disarmament (CD). It seeks to create a binding treaty on space weapons. It is opposed by the US. It should also be noted that China and Russia insist on the CD as the venue for any such negotiation, despite the CD's decade plus deadlock.
iii. Code of Conduct on Space Activities – European Union attempt at creating a nonbinding political agreement on responsible space activities. The United States took part in the consultation and negotiation of this instrument. The negotiation failed for a number of reasons. Many states, including Russia and China, felt like the ad hoc negotiation held by the EU was an improper venue. There was also much opposition to the inclusion of the "right of self-defense" in the agreement regardless of the fact that its omission or inclusion would do little to abrogate or augment a state's rights under the UN Charter's Article 51
iv. The Disasters Charter – This is a nonbinding agreement among space actors that details how space actors will use their assets to help mitigate disasters. The United States participation in the Charter is coordinated through the US Geological Service.

B. International Law

It may go without saying, but space law is part of the larger body international law. This is self-evident from the treaty form, but is made explicit in Article III of the Outer Space Treaty, which states that international law applies in Outer Space. The most relevant general international law documents for space are:

i. Charter of the United Nations (1945) – Establishes the UN system and the contemporary international legal order. Of specific importance to outer space is the regime governing the use of force by states.

ii. Draft Articles on State Responsibility – Never adopted as a formal treaty, but widely considered an articulation of customary international on when states are responsible for breaches of international law.
iii. Vienna Convention on the Law of Treaties (1980) – US not a party but likely considers the provisions on treaty interpretation as customary international law. This treaty is important due to the ambiguous language in the Outer Space Treaty.

C. Telecommunications Law

Numerous specialized bodies of international law also apply to space. The first of these is international telecommunications law. The primary documents here are those of the International Telecommunication Convention (ITU). This includes three important binding treaties: The Constitution of the ITU, the Convention of the ITU, and the Radio Regulations. Essentially, the ITU serves as a body that coordinates international telecommunications in order to avoid harmful interference among states. This includes the electromagnetic spectrum frequencies used to communicate with space objects. The ITU facilitates the framework through which states register claims slots in the Geosynchronous Earth Orbit (GEO), a valuable orbit for all types of telecommunications. The US military, as a global force, is dependent on electromagnetic spectrum, especially the spectrum that connects it through space assets, therefore, the work of the ITU is of considerable importance. The inter-state coordination that it facilitates helps maintain uncontested use of the electromagnetic spectrum. It should be noted that the ITU's ability to accomplish this in space is directly linked to the transparency and accountability regimes found in broader space law.

D. Disarmament Law

Space is both a key component in disarmament law as well as a subject of disarmament law. Space enabled verification of various disarmament mechanisms without onsite inspections, which allowed state parties to be confident in their agreements without using intrusive onsite inspections which can be a nonstarter for many states. These disarmament treaties, primarily those between the US and the USSR, usually refer to "national technical means of verification" (NTM), which is understood to include satellites. To be secure in their verification measures, states in disarmament treaties agree not to "interfere" with NTM. Due to the limitations of what a state may know about any given space object, it has been argued that NTM non-interference provisions create a blanket prohibition on interference with most if not all space assets.

TCBMs and PAROS are both attempts to maintain space as a weapons free domain, due to the destabilizing effects of weapons in space. Essentially, the introduction of weapons to space changes the assumptions that make deterrence regimes possible by affecting the power dynamics and by changing temporal elements. Verification in the space domain is very difficult, which makes concluding legally binding instruments problematic. Further, PAROS is considered to be part of the CD agenda, and the CD seems unable to proceed past the procedural hurdle of adopting a program of work.

Important disarmament texts include:

i. Partial Nuclear Test Ban Treaty (1963) – Prohibits the detonation of nuclear devices in the Earth's atmosphere and in Outer Space.
ii. New Strategic Arms Reduction Treaty (New START) (2010) – Most recent nuclear disarmament bilateral agreement between the United States and Russia. Prohibits interference with national technical means.
iii. International Code of Conduct against Ballistic Missile Proliferation (2002) – Nonbinding political agreement to which the United States is a signatory. Requires states to give notice of space launches and ballistic missile tests.

E. Law of Armed Conflict

If conflict were to break out in space, the international law of armed conflict or international humanitarian law (IHL) would apply in so much as it places limitations on a state's activities in armed conflict wherever those hostilities take place. Any application of IHL would require a state to take into account the specific physical characteristics of outer space to fully understand how a specifc rule functions in the space domain. Of specific importance to the space domain are IHL's provisions on weapons and targeting. The Department of Defense's *Law of War Manual* is a definitive guide to the documents and norms that establish IHL. Below are some specific treaties with important implications for space.

i. Geneva Protocols I and II – Through the United States is not a party to either of these treaties, they at numerous points codify customary international law. In particular, the requirements for a legal review of newly developed weapons, the limitations on targeting of civilian assets, and the limitations on the nondiscriminatory use of weapons are particularly pertinent for the space regime.
ii. Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (1978) – Prevents the use of environmental modification as a means of conducting hostilities. This treaty has important implications for the creation of space debris through ASAT weaponry.
iii. Tallinn Manual on the International Law Applicable to Cyber Warfare – This is an academic statement of the law of armed conflict applicable to cyber capabilities. It is a useful starting point for understanding how cyber capabilities may be used in the space segment.

Faulconer Consulting Group

Walt Faulconer
President

Mike Bowker
Associate

Mark Bitterman
Associate

Dan Dumbacher
Associate

15 August 2017

WRITTEN RESPONSE

Outer Space Treaty of 1967, recognizing potential modifications that grow from the Commercial Space Act of 2015, and other international laws. Belgium for instance is greatly interested. The other area we would recommend is revising space law akin to sea law with regards to salvage rights. Currently any debris in space still remains the property of the country that placed it into space. For example spent rocket bodies from a U.S. or Russian launch vehicle are still the property of the U.S. or Russia. By changing the law to similar sea laws with regards to salvage rights would pave the way for potential commercial space salvage and debris removal. Until that is changed it is technically an act of war to "touch" a country's space debris.

Joanne Gabrynowicz

Professor Emerita (University of Mississippi School of Law)
16 August 2017

WRITTEN RESPONSE

- Most important: Space Treaties
    - Outer Space Treaty of 1967 is the most important; functions like a constitution but is not one
        - Contains general principles which are intended to govern and guide the use of space
        - One of the most important treaties of the 20th century
            - Placing nuclear weapons and weapons of mass destruction in space was prohibited
            - Got that prohibition to avoid a nuclear confrontation in space
        - All nations have the right to use space; didn't deny anyone access
        - Article 6: non-governmental entities have the right to operate in space
            - Soviet position was only nation-states are legitimate actors in space; US did not agree to that. US positon was that private sector operators were also legitimate space actors
            - Art. 6 is the compromise between these two positions
            - Nongovernment space actors have to be authorized and supervised by their nation
            - If the private sector was prohibited from operating in space, there would be no need for authorization or supervision
        - Other things that are very important
    - 3 other treaties that are widely accepted, 1 is not (all based on the Outer Space Treaty)
        - Interrelated framework among these treaties
        - Liability Convention: speaks to who is responsible if space activities cause injury or harm in space and on Earth
            - Based on a principle in the Outer Space Treaty
        - Registration Convention: registering objects when they are put in space. They become the responsibility of the registering nation. (same rules apply to ships at sea)
        - Return and Rescue Agreement
            - Needs updating
            - Unintended Landing Principle
                - Needs updating (talking about Apollo-type missions, not long-term missions)
        - Moon Agreement
            - Notably, the US and Russia haven't agreed to it; still important to know about it though. US was a leader in its development and acceptance in the U.N.
            - Only 16 nations signed
- Part of international law as a whole (all international law is applicable to space)
- International Court of Justice rulings apply to space
- Law of Armed Conflict and Humanitarian Law are included

Dr. Peter L. Hays

Adjunct Professor of Space Policy and International Affairs, Space Policy Institute
(George Washington University)
19 July 2017

WRITTEN RESPONSE

The OST regime governs use of space; it consists of the OST (1967), rescue and return agreement (1968), liability convention (1972), and registration convention (1975). The moon treaty (1979) is not generally considered part of the OST regime because of the small number of signatories and its common heritage of mankind provisions that may conflict with the approach toward using space resources in the OST (although those are unclear)

Dr. Henry R. Hertzfeld

Research Professor of Space Policy and International Affairs
(George Washington University)
17 July 2017

INTERVIEW TRANSCRIPT EXCERPT

Interviewer: What international legal codes or norms are needed to govern the increasingly crowded space domain?

H. Hertzfeld: What we have, of course, and I'm sure you know, are a set of treaties. Parts of the Outer Space Treaty, are considered to be customary in our national law by some, but even that's not particularly clear. The treaties are, by their very nature, compromises and many provisions are subject to varying interpretations. Also as our technology changes, the practical application of treaty provisions may be different than it was 50 years ago when they were drafted. There's resistance to doing that in the law. Amending the treaties is not a simple, easy, or quick process. In fact, it's a very difficult one. In place of that, particularly in these days when treaties are a little bit more difficult to negotiate among 70 or 80 nations than when were when you had less than 20 nations in the 1960s involved in drafting the space treaties. We have developed various codes of conduct, proposals, or rules on the road that are in the category of soft law. It's something that you hope nations and eventually courts, if necessary, will uphold. But, soft law is not like a treaty where a treaty that has been ratified by a nation becomes the sovereign or the supreme law of the land. But even that is not enough. The space treaties are not self-executing, so each nation is obliged to interpret and enforce the provisions through specific national laws. There is no guarantee that these will be entirely consistent among all nations. So, we do need more definition for their activities as we have more private sector players and actors in space. Technically, nations are responsible for their activities in outer space and even liable for them. It's not quite the same as when the government owns and operate its assets. So, you got a whole set of commercial law that is not that precisely defined for space. It often involves dual-use technologies where there is both a national interest and a security/military interest. These affect terrestrial infrastructure such as navigation which is a prime example, but some telecommunications and remote sensing also are heavily dual-use. All of these are part of our critical technologies such as electricity and water supply. These sectors are now rapidly adjusting their equipment to be more efficient and more productive because of the inputs that we get from satellite data. If you want to include the entire infrastructure of the economy as space-related, then that also has a very significant national security as well as economic impact. In the

last 10 years, more than that, you've seen space move from just serving the military to a commercial and private sector adoption and usage for a whole long list of applications. The space component becomes very important, and therefore, the problem comes back to providing resilience. If things were interrupted, we need to have a way to keep it functioning, regardless of cost. The more competitive we are, the more productive we are, and more efficient we are, the more competitive we are internationally as well.

Going back to the essence of the question, the law is going to have to adapt to that because space law is currently more focused on inter-governmental actions than it is at private actions We need to focus on a lot on these laws because they expand security as well as the operation of the economy. Anyway, this is a long-winded way of saying that the governance and management of space assets is complex and difficult. Governance should not be defined as establishing a government of space or in space. It's finding mutual ways of solving common problems among many nations that involve commerce as well as government activities. It happens when there's a direct need. It happened with aviation, with formation of international organizations like ICAO for which almost every nation in the world has signed up. Even though it's hard to enforce international law, ICAO has been given certain powers such as to conduct audits of airports, which can have a major competitive effect on a nation whose airports are found to be substandard from a review by ICAO. We don't have anything like that in space. Even the treaties at most have been ratified by only 2/3 of all UN nations. The ITU is similar to ICAO in having almost all nations as members and it works by providing a place for nations to negotiate and ultimately allocate radio spectrum to minimize interference. Both ICAO and the ITU illustrate that when there have been specific global problems in human activities, people have worked to solve them so that all nations can benefit. We're not at that point yet in space. We may have partial solutions, but I don't see them as international agreement that have reached that level

Theresa Hitchens

Senior Research Associate (Center for International and Security Studies at Maryland)
19 July 2017

WRITTEN RESPONSE

I will attach overview of treaties/principles. I should note that there is no internationally agreed application of LoAC, IHL and Article 51 in the space domain. There is an effort to begin to rectify this led by McGill University (Canada) and Adelaide University (Australia) that brings together international legal scholars to create a so-called "black book" of law in this regard, called the MILAMOS Project.[5]

Christopher Johnson

Space Law Advisor (Secure World Foundation)
11 September 2017

WRITTEN RESPONSE

The sources of law applicable to space activities are various. International law has three main sources. International treaties, customary international law, and general principles of law. All provide laws applicable to

[5] See: https://www.mcgill.ca/milamos/home

space. In addition to treaties, which are binding, there are many sources of 'soft law', such as UN General Assembly resolutions, space debris mitigation guidelines promulgated through intergovernmental bodies, and documents from the United Nations Committee on the Peaceful Uses of Outer Space.

Starting with international treaties, there are the four major treaties on space: the 1967 Outer Space Treaty, the 1968 Astronaut Rescue and Return Agreement, the 1972 Liability Convention, and the 1975 Registration Convention[6]. There is also the Constitution and Convention of the International Telecommunications Union, along with the ITU Radio Regulations. There is also the 1963 Partial Test Ban Treaty, and the International Space Station (ISS) Intergovernmental Agreement.

These space-specific treaties are not the only ones applicable to outer space. Article III of the Outer Space Treaty makes it clear that general international law, including the UN Charter, applies to the activities of states in outer space. Additionally, Article 103 of the UN Charter states that the Charter prevails over any treaty obligations of states. Consequently, the UN Charter applies to outer space. Likewise, Article III of the Outer Space Treaty mentions general international law - and therefore both customary international law and general principles of law apply to outer space. This wider body of general international law does not apply *in toto*, but as it is found applicable and dispositive to the phenomena or subject matter in question. Nevertheless, general principles such as the 'precautionary principle' may be asserted to apply to outer space. This diverse body of laws may contain obligations which are framed as negative prohibitions ('shall not' or '… are prohibited') which obligate states and other actors to refrain from engaging in certain actions. Articles II, IV, and IX of the Outer Space Treaty all reflect negative obligations placed upon states, but this brief listing is far from comprehensive. It is becoming increasingly clear that international space law (whether framed narrowly to the treaties or more broadly) contains many gaps and instances of silence in its treatment of emerging activities. These gaps may be filled with recourse to general principles until it becomes necessary and feasible to develop more explicit and concise international norms for emerging and novel space activities.

Jonty Kasku-Jackson

Space 300 Geopolitical Lead (National Security Space Institute)
20 July 2017

WRITTEN RESPONSE

There are four major space treaties and a number of other treaties that impact US space operations. In general the constraints imposed by these instruments are relatively limited. Each specific treaty and its associated limitations to US space operations are listed below.

The 1967 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).

The Outer Space Treaty, the foundation of international space law, is generally quite permissive as it pertains to space operations. According to the Outer Space Treaty there are two major constraints on space operations. The first constraint, found in Article IV, prohibits placement of nuclear weapons or weapons of mass destruction in orbit around the Earth, on the Moon or any other celestial body or in outer space. It does not prevent placement or use of conventional weapons in space or their transit through space. Under this article ICBMs carrying nuclear weapons are permissible since they do not go into orbit. Recently China and Russia have proposed the Treaty on

[6] See generally United Nations Office for Outer Space Affairs, 3 United Nations Treaties and Principles On Outer Space, related General Assembly resolutions and other documents (2010); *Available at:* http://www.oosa.unvienna.org/pdf/publications/ST_SPACE_51E.pdf

the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force Against Outer Space Objects in order to prohibit the placement of non-WMD weapons in space.

The second constraint, also found in Article IV, states the Moon and other celestial bodies will be used for exclusively peaceful purposes and prohibits establishing military bases, testing weapons of any kind and conducting military maneuvers (Outer Space Treaty, 1967). Kasku-Jackson and Waldrop (2009) point out that peaceful purposes now routinely include use of satellites in support of direct military operations and that any military use of space is lawful so long as it does not violate either Article 2(4) of the United Nations Charter, which prohibits "the threat or use of force" or Article IV of the Outer Space Treaty. Additionally, US National Space Policy includes national and homeland security activities in "peaceful purposes" (National Space Policy, 2010). An argument could be made that Article IX of the Outer Space Treaty, which allows each state party to request consultation if it believes the space activities of another state might cause harmful interference to the peaceful use of space, could be used to challenge and constrain a particular military activity (Kasku-Jackson and Waldrop, 2009). However, that provision has never been invoked.

Derivative Treaties of the Outer Space Treaty

There are three additional space treaties that expand on the elements of the Outer Space Treaty. They are the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (Rescue and Return Agreement, 1968), the Convention on the International Liability for Damage Caused by Space Objects (Liability Convention), and the Convention on the Registration of Objects Launched into Outer Space (Registration Convention, 1975). There is a final space treaty, the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Moon Agreement, 1979) to which the US is not a party.

According to the Outer Space Treaty and the Liability Convention, states are responsible and liable for all national activities that occur in outer space, to include activities conducted by a state's private entities. The US fulfils this responsibility by licensing non-federal space activities and imposing insurance requirements to ensure safe operations. The Rescue and Return Agreement requires prompt, proactive and safe rescue and return of spacecraft personnel who land in international waters or in a foreign country. Presumably, "spacecraft personnel" would not cover combatants who would more likely be covered by the laws of war such as the Geneva Conventions (Kasku-Jackson & Waldrop, 2009). Neither of these treaties pose a significant constraint to US space operations.

The Registration Convention establishes a UN registry for space objects and requires countries to establish national registries. Military, civil and commercial satellites must all be registered. However, this registration requirement does not create a significant impact to US space operations for four reasons. First, states are not required to mark their space objects with a registration number so it is not necessarily obvious who owns the object. Second, states are required to notify the UN "as soon as practicable" after launch and "as soon as practicable" is not defined. That allows states to determine when they will notify the UN. Third, the Registration Convention only requires a very general description of the space object. Fourth, states are only required to provide initial orbital parameters of the space object so if the object is subsequently moved, there is no requirement to update the notification to the UN.

The United Nations Charter of 1945

Article III of the Outer Space Treaty explicitly makes the United Nations Charter applicable to outer space, which creates some limitations regarding the use of force and the right to self-defense against an armed attack in space. While Article 2(4) of the Charter prohibits "the threat or use of force against the territorial integrity or political independence of any state," Article 51 provides an exception to that prohibition. Article 51 states in part that "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" (UN Charter, 1945). Specific analysis on whether an action against US space capabilities is an armed attack that justifies self-defense must be made on a case-by-case basis.

Laws of Armed Conflict

Since international law applies to outer space according to Article III of the Outer Space Treaty, the laws of armed conflict (LOAC) must be considered when conducting space operations. The US applies LOAC during military operations involving armed conflict, regardless of how the conflict is characterized under international law. The LOAC principles of necessity, distinction, proportionality, humanity and chivalry as they apply to space are implemented by the US via the classified Standing Rules of Engagement.

The International Telecommunications Union Constitution and Convention

The International Telecommunications Union (ITU) is a UN specialized agency that governs the use of the radio frequency spectrum and geostationary satellite orbits. ITU member states have established a legal regime via the ITU Constitution and Convention and the ITU Radio Regulations to allocate global radio spectrum and any associated orbital positions in order to avoid harmful interference between ratio stations of different countries (ITU Constitution, 2014). The key constraint found in the ITU instruments concerns harmful interference. Article 45 of the ITU Constitution states that all stations must be established and operated in such a manner as not to cause harmful interference to the radio service of communications of other Members. This includes satellites. (ITU Constitution 1992). It should be noted that according to Article 48 of the ITU Constitution, the ITU has no jurisdiction over the use of spectrum for military purposes. However, the US implements ITU rules via domestic law and applies the rules to the military (Kasku-Jackson & Waldrop, 2009).

Convention on the Prohibition of Military or Any Other Use of Environment Modification Techniques (1980).

The Environmental Modification Convention prohibits the use of military or any other hostile use of environmental modification techniques having widespread, long-lasting or severe effects in the earth's atmosphere or outer space as the means of destruction, damage or injury to any state party to the treaty. (ENMOD, 1980). "Widespread," "long-lasting," and "severe" have not been more precisely defined which must be considered when contemplating activities that could cause significant debris or other interference.

Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water

The 1963 Limited Test Ban Treaty prohibits any nuclear weapon test explosion, or any other nuclear explosion in the atmosphere, underwater or in outer space. The intent of this treaty was to achieve the common goal of an "end to the contamination of man's environment by radioactive substances" (State Department, 2017). The last launch of a high altitude nuclear device occurred in 1962.

Bilateral Agreements Between the US and USSR

A series of bilateral agreements between the US and the former Soviet Union, (which are now binding on Russia), prohibit interference with early warning systems and National Technical Means (NTMs) of verification (reconnaissance and communications satellites) (Kasku-Jackson & Waldrop, 2009). This set of agreements might also be interpreted as reflecting a broader norm that NTMs in general are not to be interfered with.

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David Koplow

Professor (Georgetown University Law Center)
15 August 2017

INTERVIEW TRANSCRIPT EXCERPT

D. Koplow: If I could, I thought it might be better to start this conversation with me with one of the later questions. If I can make a contribution, it's on the law, so I'd like to begin by finding out from you how much you already know about the treaties and the other legal principles at stake, and then using that background to go back to the first couple of questions. If I could, I'd like to jump ahead to the third question, what are the current agreements and treaties and turn that back on you. How much have you guys already come to master the family of treaties and other international law or would it be helpful for me to give you a sort of background briefing on that stuff?

Interviewer: Sure. A background would be great. But if anyone else on the line wants to jump in with a specific area of agreements, treaties and conventions, we can also take it from there as well.

D. Koplow: Do you know about the small family of international agreements on outer space or is it worth going over that? I don't want to waste your time but I also don't want to presume that you already dived into all those documents. Tell me how much you already know.

Interviewer: Well, we started working here from the background of a complete novice in space and we want to sort of address the questions from that basis. We can flesh it out a bit. I'm sure my other colleagues on the line can give you more significant questions and expand on it, but as far as the

questions I sent you in the calendar invitation, we really want to start from the working assumption of almost complete ignorance of the matter.

D. Koplow: Okay fair enough. Then that is a good place to start this conversation on the legal aspects and I'll be giving the basic level and if it is either too basic or too advanced, let me know because I want to make this conversation as useful to you as it could be. The starting point for this is that, from the legal perspective, the starting point is that international law was amazingly rapid in its evolution at the beginning of the space age. Ordinarily, international law is a very slow and cumbersome creature, and it takes years if not decades to produce any fragments of international law. Outer space is, I think, the best example of an area in which technology and human activity evolved very quickly. International law developed at a drastically rapid pace. There are four key treaties that were created within only a very few years that continue to characterize or continue to be the leading instruments in the field. The first is the Outer Space Treaty of 1967 which is only ten years after Sputnik, only ten years after the beginning of the space age, we'd already developed what is still the leading instrument in the field. The Outer Space Treaty is often referred to as the Magna Carta of outer space. It's the key instrument that's been joined by just about all the space faring countries in establishing the key principles that continue to govern international law on space activities and each of these articles have been flushed out with subsequent lawmaking for national security purposes.

The key article, the, key provision of the Outer Space Treaty is Article 4. You can spend some time taking a look at exactly what Article 4 prohibits and what it permits in the national security sector. After the Outer Space Treaty, new additional treaties elaborated provisions that had been introduced in the Outer Space Treaty, but needed additional development in separate instruments One of those is the Liability Convention that talks about financial responsibility for accidents, collisions, between spacecraft and other spacecraft or damage done by a spacecraft when they fall to the earth. The rescue and return of astronauts agreement tells what to do what to do with people and their vehicles that fall out of space, or need assistance. The third is the Registration Convention that creates a responsibility for countries to identify and accept responsibility for the spacecraft that they launch and as I said, there's also this Moon Treaty that many people considered the fifth. It is by far the least of the five. The Moon Treaty deals with mining and other activities on the moon has been joined by only a small number of countries, not including the United States. The other four have been quite successful—joined by the United States, Russia, China, and all the other leading space countries and have, together become accepted as the key corpus of international law in space. So, within a relatively few years, very rapid progress by international standards in articulating the international law on space.

The second counterpoint to that however is that the process of developing international law for outer space basically stopped at that at that point. After those four key treaties, there have not been other treaties that have been accepted and have attracted much international support. At the beginning of the process of, in particular, international space law was very rapid, for the last 30 years, the process has basically been frozen. That, I think, explains why some of the questions and concerns that are on your list presented is because the world has had for some decades, the key principles, but have not have much success in elaborating beyond them in the last several decades. We talk about the two current pending proposals for international law on space, the Russia-Chinese proposed treaty on prohibiting the placement of weapons in space and the European Union Code of Conduct, both of which gotten a fair bit of international attention, and both of which I think are basically dead in the water at this point. But that's why there's so much interest now in trying to develop new international law because the process has basically broken down. Does that tell you things you didn't already know or does that just repeat stuff you already did know?

Sergeant First Class Jerritt A. Lynn

Civil Affairs Specialist (United States Army Civil Affairs)
7 August 2017

WRITTEN RESPONSE

One may reasonably postulate that there are a plethora of laws and regulations governing space activities. Surprisingly, that is not the case. Domestically the United States has space laws that cover the civilian, military, commercial, and international sectors. As far as the United Nations is concerned, there are only five international treaties and five sets of principles governing outer space (United Nations Office for Outer Space Affairs 2017). These agreements are commonly referred to as the "five United Nations treaties on outer space":

- The "Outer Space Treaty."
    - Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies.
    - Adopted by the General Assembly in its resolution 2222 (XXI), opened for signature on 27 January 1967, entered into force on 10 October 1967.

- The "Rescue Agreement."
    - Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space.
    - Adopted by the General Assembly in its resolution 2345 (XXII), opened for signature on 22 April 1968, entered into force on 3 December 1968.

- The "Liability Convention."
    - Convention on International Liability for Damage Caused by Space Objects.
    - Adopted by the General Assembly in its resolution 2777 (XXVI), opened for signature on 29 March 1972, entered into force on 1 September 1972.

- The "Registration Convention."
    - Convention on Registration of Objects Launched into Outer Space.
    - Adopted by the General Assembly in its resolution 3235 (XXIX), opened for signature on 14 January 1975, entered into force on 15 September 1976.

- The "Moon Agreement."
    - Agreement Governing the Activities of States on the Moon and Other Celestial Bodies.
    - Adopted by the General Assembly in its resolution 34/68, opened for signature on 18 December 1979, entered into force on 11 July 1984 (United Nations Office for Outer Space Affairs 2013).

Of note are the “Outer Space Treaty” and the “Moon Agreement.” The former because it has been the northern star that guides a state’s space activities and stems from diplomatic efforts by the Soviet Union to curb U.S. space ambitions while developing their capabilities in secrecy. This is a policy that has transitioned from the Soviet Union to the current Russian regime. The latter is also of note because the United States, Russia, and China are not signatories. This begs the question, who has what plans for the Moon? While interesting, that is a question not tackled here, but it stands as a reminder that states often keep their cards held close in regards to international space relations. Alongside the treaties are numerous declarations and guiding principles that the UN General Assembly has recognized within passed resolutions, but are not legally binding. Therefore, resolutions such as the

one endorsing the Space Debris Mitigation Guidelines may serve as a political tool of condemnation, whereas breaking with a ratified treaty entails legal ramifications for the actor at fault.[7]

Key implications for the United States are in the realm of international norms (i.e. informal rules, laws (i.e. formal rules), and resolutions (i.e. prescribed rules). With the increase of actors in space, so too has there been a greater demand for international norms to safeguard the domain. Beginning in 2003, the Russian Federation, with support from China, introduced draft treaties at the Conference on Disarmament (CD) for the Prevention of Arms Race in Outer-Space (PAROS). With abstentions from the United States, Israel, the Marshall Islands, and Micronesia, the First Committee of the General Assembly adopted the United Nations PAROS document A/RES/58/36 (UN General Assembly 2004). Annually, the Russians have continued to submit meetings and resolutions on the matter before the CD. All European Union and European Space Agency member states supported the measure to prevent the militarization of space. In addition to the EU and ESA, all UN members agreed to the resolution, except for abstentions from the United States and Israel. In 2008, Russia submitted for the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force Against Outer Space Objects (PPWT). The treaty reaffirmed that outer space plays a huge role in human development and it is in the best interest of everyone for it to remain open and free of militarization (Dunk 2008).

At face value, it may look as though the Russia and China are attempting to act as the vanguards of a free space. However, from another perspective, the submittal of Resolution A/RES/58/36 by Russia and China seems to merely be a diplomatic ploy to cast the United States in a disparaging light, while simultaneously looking to gain a military advantage in space. The United States abstained from the vote, but the U.S. representative, Ambassador Christina B. Rocca responded with a rebuttal to the resolution and a line-by-line account of why the United States could not support the agreement. She concluded:

> …the draft treaty only bans the placement of weapons in space, therefore a Party could build a breakout capability…and the United States does no support in which key legally-binding provisions required for operation, viability, and effectiveness of an agreement would only be determined through subsequent negotiations (Rocca 2008).

Her response highlights the difficulties in creating international norms as states are apprehensive about relinquishing options to an international body, which in turn limits their capabilities and future actions. A simple cost-benefit analysis usually concludes with the state declining to endorse further regulatory guidance. In addition to Ambassador Rocca's concerns over the resolution, the PRC increased their military capabilities and have since launched 142 satellites capable of providing intelligence, navigation, communications, and weather forecasting that can limit or prevent the use of space assets by their adversaries. All the while China called for the prevention of a space arms race (Broder 2016). A brief historical inquiry shows this to be a reoccurring policy used by Soviet and Russian leaders alike to subvert the U.S. on the international stage. From the Nuclear Test Ban Treaty in 1963 to their attempts to pass international laws when they were concerned in 1983 over President Reagan's Strategic Defense Initiative (SDI) (i.e. Star Wars defense program). There is no doubt that Americans, Russians and Chinese are all genuinely concerned with the openness and protection of space for all (as it ultimately means openness for themselves in the context of self-interest) However, the anarchic international state system still has its influence in pushing states to seek power and an asymmetrical advantage in international space relations.

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Tanja Masson-Zwaan

Assistant Professor and Deputy Director
(International Institute of Air and Space Law at Leiden University)
13 July 2017

INTERVIEW TRANSCRIPT EXCERPT

Interviewer: What are the current international agreements, treaties, or conventions (you mentioned a few) governing the use of space, and are there any others aside from the treaty that you mentioned (the UN Space Treaty and the guidelines of use of outer space)?

Masson-Zwaan: Yes, so the body of law governing space activities consists of several categories, and we have the five UN Space Treaties which include the Outer Space Treaty of 1967 and is in its 50th anniversary, but we have a special question about that I think later on. It has often been referred to as the Constitution of Outer Space. And then the four other treaties elaborate on that with the Moon Treaty only having 17 states as parties as opposed to the Space Treaty which has 105 states as parties and could even be argued to have evolved into customary international law. After the treaties, there is a series of UN resolutions which are not legally binding per se but can contain elements of customary law or can become binding in the realm of national law, and in that sense, you have the Nuclear Power Source Principles and the Remote Sensing Principles and so on. You have a couple of resolutions that try to clarify concepts that are contained in the outer space treaties, for instance about the concept of the launching state, to which liability is attached in outer space law, or the subject of registration which is something also, in relation to your previous question about congestion. It is becoming more and more important to have a solid registration practice that states adhere to. Then, you have the guidelines like the debris guidelines that we mentioned, the long-term sustainability guidelines, which will probably also become a set of non-legally binding guidelines.

There, the question is what is their legal effect if they are not legally binding, because they all contain provisions explicitly saying that they are not legally binding. As I said, these are usually based on concepts that states consider important enough to agree on, even in non-legally binding documents, because they are quite essential to the future sustainable use of outer space. If they are violated, you can probably not present a claim for violation of the principles but it is more perhaps a moral pressure that states follow these because it also makes their sustained use of space safe and secure. Then there is also a growing body of national law which you have in the

United States of course, a lot as well. But it is also really evolving in many other countries, and that is directly related to the trend of privatization and commercialization of outer space.

Under the UN treaty, states are responsible for national activities in space, and they have to authorize and supervise these activities, and that is Article 6 of the Outer Space Treaty. States need to do that with an increasing number of companies in their jurisdiction that want to carry out space activities. It is preferable for them to have national law so that they can oversee those activities and license them and ask these companies to get insurance in case there is a damage and to make sure that the companies do not violate the principles that the state has adhered to under the UN treaty. So, the body of binding treaties, non-legally binding, soft law as well as national law and regulations, I would say.

Dr. George Nield

Associate Administrator, Office of Commercial Space Transportation (Federal Aviation Administration)
1 August 2017

INTERVIEW TRANSCRIPT EXCERPT

Interviewer: Are there certain examples of those agrees, treaties, conventions, etc. that you would like to speak specifically to?

G. Nield: We do not have to make it too complicated. I am certainly not a space lawyer, but the document that we look to all the time is the Outer Space Treaty, it has a lot of good stuff in it. Some other documents of course are the US Government Orbital Debris Mitigation Standard Practices and the Interagency Space Debris Coordination Committee Space Debris Mitigation Guidelines, which are certainly worthy of note, but from a legal or a regulatory perspective there really are very few limits on how people can use space, especially non-government operators. It's one thing to have those guidelines and tell government programs like NASA and DOD "You need to follow this." There are no regulations for US commercial tugs in space. It's really a wild west. I mean the FAA has responsibility to regulate launches and reentries. What happens in-between is whatever they want to do.

Dr. Xavier Pasco

Director (Fondation pour la Recherche Stratégique Paris)
31 August 2017

WRITTEN RESPONSE

One can think to the five "classics" (Outer space treaty, Moon convention, etc) as representing the central body of law governing space. Some other treaties and conventions may also have incidental effects on the uses of space (Environment protection treaties, etc.).

A list of such texts can be sent.

Dr. Luca Rossettini

CEO and Founder (D-Orbit)

16 August 2017

WRITTEN RESPONSE

D-Orbit is recognized as one of the few worldwide experts on proper use of space and related regulations. We produced a quite comprehensive report we keep updated on a yearly basis listing all the international agreements, treaties, conventions and national laws on the use of space.

I will provide here just a summary:

- United Nations and COPUOS: in general, considering the different conventions and treaties, the Guidelines are not legally binding under public international law. Through resolution 62/217, the UNGA invited UN Member States to implement those voluntary guidelines through relevant national mechanisms "to the greatest extent feasible", through space debris mitigation practices and procedures;
- IADC: the IADC Space Debris Mitigation Guidelines are non-binding and as such applicable to mission planning and the design and operation of spacecraft and orbital stages that will be injected into Earth orbit. Organizations are encouraged to use these guidelines in identifying the standard that they will apply when establishing the mission requirements for planned spacecraft and orbital stages. Operators of existing spacecraft and orbital stages are encouraged to apply these guidelines to the greatest extent possible.
- ITU: ITU-R S.1003.2 is addressed to member states of the ITU and applies to the operation of satellites in the GSO. Due to its character as a recommendation of the ITU Radiocommunication Assembly, it is not legally binding.
- ISO Standard: Applicable worldwide but on voluntary basis.
- European Space Agency: The application of the Code is on voluntary basis. The agencies having adopted it recommend its application "by any other space project conducted in Europe, or by a European entity acting outside Europe, including operators" (Article 2.2 of the Code). The Code contains provisions that "may be given binding effect by means of legal instruments between contracting parties".
- NASA: the Standard Practices are intended for government-operated or -procured space systems, including satellites as well as launch vehicles.
- Nations worldwide with relevant laws or treaties or document regarding the use of space: Australia, Austria, Belgium, Canada, France (the most complete and binding law so far), Germany, Japan, Nigeria, Ukraine, United Kingdom, an others.
- USA: NOAA, FCC, FAA, DoD (Applies to all military or military-affiliated satellites operating under the Department of Defense and the US Air Force).

As a general resume, the vast majority of the measures proposed by all these documents is not binding or only binding for government space assets. However, even in the case of government space assets most of the time they are not implemented and waivers are granted for the new satellites under constructions.

Matthew Schaefer and Jack M. Beard

University of Nebraska College of Law

Matthew Schaefer
Professor of International Trade Law and Co-Director of Space, Cyber, and Telecom Law Program

Jack M. Beard
Associate Professor of Law

16 August 2017

INTERVIEW TRANSCRIPT EXCERPT

M. Schaefer: How about we start with the first question you sent us: What are the current international agreements, treaties, conventions, etc. governing the use of space, and what specific limitations and constraints are placed on space operations? So, you have probably received a lot of response from others already on this one, so maybe we can fill some gaps.

Basically, there are five core treaties: 1) the Outer Space Treaty (OST), 2) Return and Rescue, 3) Liabilities, 4) Registration, and 5) the Moon Agreement. The US is not a party to the Moon Agreement, and no major space power is—there are only about 15 countries that are parties to the Moon Agreement. So, it's really the first four (OST, Return and Rescue, Liability, and Registration) that are of relevance to the United States—the US is a party to those first four.

J. Beard: I'd also add, of course, that the US is a party to the UN charter, which, by definition, tends to space because international law is applicable.

Then we also have the Law of Armed Conflict too. One of the great debates going on right now between space law people and other people is whether or not the law of armed conflict trumps space laws. Those are lex specialis—they are subsets of international law—but almost everyone practicing in the law of armed conflict field believes that when there's an armed conflict, it trumps space law and every other law during the armed conflict. But that is a contentious point with some space people.

Then, of course, there are also some international agreements that extend to space, like the Partial Test Ban Treaty, which would ban nuclear explosions in space.

So, there are the big space treaties that Matt mentioned, and then there are others that also apply, but then the question is when do they apply and how do they apply? The big question there, when talking about aggression in space, is what constitutes an "armed attack" or "the use of force" in space? Whether it's certain temporary disabling of satellites or interference with satellites, the idea of large levels of armed attack justifying an armed response is a really controversial topic.

In fact, each one of your questions could fill large amounts of paper with the expansive responses that could be written about them, so I will try to provide you with some short answers today, but boy there is a can give you short answers on it, but boy there is a lot behind the answers to some of your questions.

M. Schaefer: So, the other half to your question is, what specific limitations and constraints are placed on space operations? If I stick to the four space law treaties that the US is party to (OST, Return and Rescue, Liability, and Registration), there's not really a ton of constraints in those. OST starts by maintaining freedom of exploration and use of outer space. There's some basic principles and

norms like "show due regard" in Article 9, and "consult in advance if an activity you're planning would cause potentially harmful interference"—which doesn't necessarily mean to not go ahead with it, but just consult in advance.

J. Beard: And "interference" is not defined there. "Interference" is a hugely debated and controversial term because it appears to be prohibited, but there is no definition of it—there is no authoritative definition of "interference" in any international agreement. And there's a real problem between where interference ends and something allowing an armed response occurs. So, that's a problem to.

M. Schaefer: Yeah, there are other constraints in OST as well. You have to allow free access to all areas of celestial bodies. And then when we talk about some of the commercial activities with respect to some of the basic OST norms, there are a couple on one side and there are a couple on the other side.

In short, the Liability Convention is only going to apply when you have a space asset of one country landing in the territory of another or harming the nationals of another or colliding with another space object. There hasn't really ever been a claim under the Liability Convention—although this is a little bit debated because in the late 1970s when the Russian nuclear powered satellite crashed in Canada, part of Canada's diplomatic note to Russia did mention the Liability Convention, but that doesn't come up very much.

Return and Rescue doesn't come up very often either. There have been cases where, I think a US government satellite or portion of a massive satellite crash landed in South Africa, and the satellite was eventually allowed to be put in a South African museum rather than be returned. But those issues don't crop up very much.

The shorter story from the point of view of the four space treaties is that we have some pretty basic norms in the OST, but there's not significant limitations—they're not overly constraining, and, in other words, they're minimally burdensome.

J. Beard: Well, let me also add that a key term in the Outer Space Treaty is referring to "peaceful uses" of outer space. "Peaceful uses" is not defined. Originally, the United States took a broad approach and the Soviets took a narrow approach; however, as time has passed on, the major powers have all agreed that "peaceful uses" has one definition, yet there are others who suggest that it's neither the US nor Russian definition, but rather that "peaceful uses" means you can do anything in space as long as it's not aggressive. There's even another definition that has all sorts of advocates that would suggest "peaceful uses" means non-military activity, but that isn't really a good position inside the Outer Space Treaty because it specifically makes allowance for military activities as long as they are peaceful.

So, the Outer Space Treaty, and in effect the four treaties that Matt has mentioned, really don't do much to regulate military activity in space. And lease, please, please don't for a moment think that any of the non-binding, so-called "Codes of Conduct" have any legal applicability to US space activity—they don't. Advocates are always trying to say that there are all sorts of norms of behavior, but they are arguing for norms—the norms are not legally binding in that case. And, there is currently a European Union effort to create an International Code of Conduct for Outer Space Activity, but it is pretty much going nowhere right now. Advocates are always trying to make the point that the norms are binding, they are good, and they are what civilized countries should do, but they are simply not legally binding on the United States.

M. Schaefer: I'll add one other point before we move on to the next question. As you talk about topics like a crowded space and space debris, you have to respect the ownership rights of others' space assets. The majority view is that the Outer Space Treaty creates indefinite ownership. So, a lot of

people would like to see a Law of Salvage in outer space, like in the maritime domain; however, a Law of Salvage doesn't really work if applied directly to space. For example, if we're talking about saving a ship, we're talking about saving some value in the ship. Space debris, most of it, is of little value. You might say, "Well, what about a new satellite with very recent technology." Well, yes, that would be an exception. But, old Russian rocket bodies, lenses caps, parts of 15-25-year-old satellites, etc. are pretty much worthless. So, you're not saving any value.

The real idea is that space debris is becoming an increasing problem. By the way, there's no hard and fast legal requirement not to create debris. There is an Inter Agency Debris Coordinating Committee (IADC) agreement that is legally non-binding amongst the 14 major space powers that has a set of principles—these principles were inspired by US space principles, and then the IADC principles were adopted by UN Committee on Peaceful Uses of Outer Space (COPUOUS). These principles for mitigating space debris are all very similar, but, again, they are non-legally binding. These principles have had some effect. The US continues to be disappointed some nations don't implement them as good as it would in its national licensing criteria for space activities, so the US would like to see stepped-up efforts in implementation at the national level of these non-binding international norms. But, in the OST, it's not just the mitigation part that comes up, but also the issue of remediation. Some in the scientific community would like to see sustainable space, particularly in LEO where you can actually remediate some of the debris (i.e., take it out, get the largest mass objects out first, etc.), but then the problem is that most of the large mass objects are Soviet in origin, so the question is, "Can you legally start removing Russian rocket bodies, the largest mass objects in LEO, without their consent?" The general thought—and, again, there's a lot of nuance and some arguments that can be made—is that they have a definite ownership so you need their consent. You could play with ideas though. For example, what if you say, "Hey, you have a due regard obligation from Article 9. We have volunteered to take out your debris, your large mass objects, to keep LEO sustainable, and you've refused time and time again. We, the US, have actually removed some of our large mass objects from LEO, so at this point we're going to step in and start removing yours." Obviously, that would be highly controversial, and that indefinite ownership rule in the OST would come into play, but it is something to consider.

Dr. Michael K. Simpson

Executive Director (Secure World Foundation)
23 August 2017

WRITTEN RESPONSE

The primary international agreement impacting operations in space is the Outer Space Treaty adopted in 1967. Although it imposes limits on national sovereignty in space by banning claims of territorial sovereignty, it places no limits on ad personam jurisdiction. In fact by requiring states to be responsible for the actions of their citizens it elevates ad personam jurisdiction to the primary vehicle for state control in space. The OST also provides that operations in space pay due regard to the interests of others and advance the benefit of all countries irrespective of their state of economic and social development. The full implications of these obligations are still being debated, but numerous uses of space have been pursued including for profit without being broadly challenged for violating them.

Spire Global Inc.

Peter Platzer
Chief Executive Officer

Dr. Alexander E. (Sandy) MacDonald
Director of Global Validation ModBD

Jonathan Rosenblatt
General Counsel

15 August 2017

WRITTEN RESPONSE

Current agreements consist of United Nations (UN) treaties that date to the 1960s and 1970s, as well as customs such as the IADC 25-year de-orbit debris mitigation guideline. (The list of UN treaties includes: Outer Space Treaty, Rescue and Return Agreement, Liability Convention, Registration Convention, and Moon Treaty. It should be noted, though, that the U.S. is not a signatory to all of those treaties.

What is most important is the manner in which national regulators carry out what they believe to be their respective country's treaty obligations. Some are highly restrictive - for example, the UK and how it deals with insurance. Others are very flexible. Some have processes that are extremely protracted - for example, in the U.S. where an FCC license, a NOAA Commercial Remote Sensing Regulatory Affairs (CRSRA) remote sensing license, or U.S. Federal Agency spectrum coordination can take years. Others are fairly quick - in one jurisdiction Spire was able to get a spectrum license in a few months. We believe it is important for the U.S. to accelerate these processes, allowing for more flexibility in accommodating new technology.

Additionally, the International Telecommunication Union (ITU) Radio Regulations are also somewhat antiquated. Most of the current Advance Publication Information, Notification, Bringing Into Use, and Coordination procedures were originally created to help mitigate potential radio frequency interference and orbital conjunction issues among geostationary satellite orbit systems. But, at present, there are commercial operators proposing constellations of non-geostationary satellite orbit systems with hundreds to thousands of satellites operating at one time. Many of the ITU filings require information that is not readily available to these new operators, which are secondary payload and continuously coordinating frequency bands. These "new space" companies lose priority in certain frequency bands if they do not make filings early enough and/or modify their filings at a later date. Additionally, filing fees may be too costly for early-stage startups. Finally, incumbent or cash-rich operators may be able to take advantage of current rules to keep out other potential industry entrants.

In addition to the treaties above, there are a number of declarations and legal principles related to the space domain. These include:

- Declaration of Legal Principles Governing the Activities of States in the Exploration and Uses of Outer Space (succeeded by the Outer Space Treaty).
- The Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting.
- The Principles Relating to Remote Sensing of the Earth from Outer Space.
- The Principles Relevant to the Use of Nuclear Power Sources in Outer Space.
- The Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries.

The latter three are of particular interest and, if followed by all, will allow for equal access to space, security assurances, and less-cluttered orbits.

Dr. Cassandra Steer

Executive Director (Women in International Security Canada Inc.)
Interim Executive Director, Center for Ethics and Rule of Law (University of Pennsylvania)
1 September 2017

WRITTEN RESPONSE

Current International Space Law

What are the current international agreements, treaties, conventions, etc., governing the use of space, and what specific limitations and constraints are placed on space operations?

1. The Outer Space Treaty

The governing framework treaty for outer space is the 1967 Outer Space Treaty (OST), which in many ways is a product of the Cold War. It is considered by some to have been driven primarily by the concern for a potential arms race in space, and by the overall concern for the maintenance of international peace and security, given the geopolitics of the time.

Article I of the OST states that there is freedom of access to and use of space, and freedom of scientific exploration in space. This has often been likened to the legal regime of the High Seas, in that no permission is needed to sail the High Seas nor to access space (e.g. Hobe, Schmidt-Tedd, Schrogl, & Goh, 2009, p. 28). It is also generally agreed that, as a matter of customary international law, the freedom of access to space means no permission need be sought, even when a launch enters the sovereign airspace of another State (Lachs, 1969, p. 230; Ram Jakhu & Steven Freeland, 2013, p. 3).

These freedoms are, however limited. In the first place, in Article III of the OST provides that all activities must be carried out "in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security..." This article is based on the very first UN General Assembly resolutions that were adopted relating to space activities in the early 1960s, following the Soviet launch of Sputnik in 1957, and on proposals made by the USSR, the United Kingdom and the United State in preparations leading up to the drafting of the treaty (UN Doc A/6352, 16 June 1962; Jasentuliyana & Lee, 1979, p. 102). It represents one of the most important limitations on all space activities. Although there are some aspects of the UN Charter, and of public international law in general, which will not be applicable to space due to their specificity, at the same time there is no doubt that the basic and explicit tenets of international law do apply to all space activities, including the sovereign equality of all States and the principle of non-intervention, the prohibition on the use of force, the right of self-defense, and the obligation to settle disputes peacefully.

A) Law of Armed Conflict and Use of Force

One of the more challenging questions with respect to the law on the use of force, is what exactly amounts to use of force in outer space? Similarly, under the law of armed conflict (LOAC), how should a dual-use satellite be assessed as a potential target, given the high level of dependency civilians may have on the services being rendered? These questions cannot be dealt with in detail here, however I would be happy to provide a more specific assessment should this be desired. Moreover, currently work is being done by a group of international, independent experts to draft a Manual on International Law Applicable to Military Activities in Outer Space (MILAMOS)[8] which would clarify the specific rules of LOAC and the use of force as they apply to space. This Manual will be a non-binding restatement of the law, aimed at providing clarity to operational lawyers in much the same way as the Tallin Manual on Cyber Warfare (Schmitt, 2013), the Harvard Manual on Air and Missile Warfare,[9] and

[8] http://www.mcgill.ca/milamos/

[9]https://www.redcea.com/cealegal/Peacekeeping%20Operations%201st%20Generation%20Internation/International%20Law/(ENG-Manual)%202010%20HPCR%20Manual.pdf

the San Remo Manual on Armed Conflicts at Sea.[10] While it is clear that LOAC applies in outer space, since it applies to conflicts regardless where they take place (Ramey, 2000; Freeland, 2011; Stephens & Steer, 2015), the specificities may be harder to discern. There is – thankfully – no State practice to date. However it can be said that the principles of distinction, proportionality and precaution in attack are all highly relevant. Together with the Editor in Chief of the MILAMOS, Professor Dale Stephens CSM, I have authored an article that provides a fuller discussion on how these principles apply in space (Stephens & Steer, 2015).

Article IV of the OST is also relevant for the question of legality of specific weapons, since it prohibits the placement of nuclear weapons or "other weapons of mass destruction" in Earth orbit, on any celestial body (meaning the Moon, planets, asteroids, any other naturally occurring body in space), or stationed in space in any other way. While this is a blanket prohibition on nuclear weapons and WMDs, there is no legal definition of WMDs in international law. Furthermore, other types of weapons are not prohibited by this clause. However they are likely prohibited under the next clause of Article IV, that the Moon and other celestial bodies "shall be used...exclusively for peaceful purposes". There is universal agreement that the "peaceful purposes" principle does not outlaw non- aggressive military operations, such as ISR (Hobe et al., 2009, p. ...). However the placement, testing or use of any kinds of weapons on celestial bodies is prohibited. Furthermore, Article IV forbids "[t]he establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military maneuvers on celestial bodies".

B) Other Branches of International Law

Outside of LOAC and the use of force, the broader effect of Article III of the OST is that there are many principles from other branches of international law which will also apply in space, and have some limiting effect on military activities. One example is the precautionary principle under international environmental law, which states: "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation" (Principle 15 of the Rio Declaration on Environment and Development, 1992). Given the known widespread and long term effects of space debris, any activity which can be expected to add to existing space debris should therefore be avoided, whether or not there is scientific certainty as to the exact scale or effect.

Other branches of international law which may limit activities in outer space include international human rights law, especially with respect to human space flight, but also with respect to the effects of interrupting or damaging certain critical services dependent on satellites; and international criminal law, when considering the responsibility of those in a chain of command with respect to proper conduct during times of hostility or conflict.

C) State Responsibility

Another important limit on space operations is the requirement under Art VI OST that a State maintains international responsibility for all operations which take place under its jurisdiction, whether governmental or not. This is a kind of strict liability provision, and the question of attribution does not need to be proven in the same way as it does under the general international law of State Responsibility (Articles 4 - 11, Draft Articles on State Responsibility; Crawford, 2002, pp. 94– 106). For any activities undertaken by non-government entities, the State must provide "authorization and continuing supervision", that is, all commercial activities must have a license under U.S. laws, regardless of whether the services are being provided to the government or to civilians.

D) Province of Mankind

A further limitation on the freedoms guaranteed in Article I OST is in the text of Article I itself, which states that exploration and use of space shall be "for the benefit and in the interests of all countries" and "shall be the province of all mankind". While there is no real certainty as to the meaning of the latter term, there is general agreement that it links strongly to the prohibition on national appropriation in Article II, and to the general

[10] https://ihl- databases.icrc.org/ihl/INTRO/560?OpenDocument

intention at the time of treaty negotiations that there be an equitable and cooperative approach to space exploration and use (Lachs, 1972; Cheng, 1983; Hobe et al., 2009).

This may be counter-intuitive with respect to military operations, however it is a useful principle to keep in mind when considering transparency and confidence-building measures (TCBMs, discussed below under "International Norms for Governing Space"). Even when attempting to protect one's own assets, it is incumbent on all States to act in such a way as to ensure there is no disproportionate impact on the space environment, and on other States' ability to exercise their freedom of access to and use of space.

2. Other Core Space Treaties

Aside from the OST there are four other "core" space treaties. All of them were successfully negotiated during the Cold War period, in a short span of years, under the auspices of the UN Committee on Peaceful Uses of Outer Space (COPUOS). Each of them was negotiated in response to the rapid increase in launches and development of space technology by the two super powers, and by the addition of more States with space technologies and interests in maintaining access to and use of space.

A) The 1968 Agreement on the Rescue of Astronauts, Return of Astronauts and the Return of Objects Launched into Space

The "Rescue and Return" Agreement, or the "Astronaut Agreement", has as its central aims the protection of the livelihood of astronauts, and of the technology that each State has developed, in the case of a crash landing or pieces of debris landing in the territory of another State.

Already under Article V of the OST, astronauts are granted the special status of being "envoys of mankind", and States are obliged to rescue astronauts in distress, whether they are in the territory of that State, or on the High Seas. States must return astronauts to the State of registry of their space vehicle, and any activity which would constitute a danger to the health or lives of astronauts must be reported to other State parties and to the UN. However there was a need for further development of these obligations, which led to the Rescue and Return Agreement.

The core principles remain the obligation to assist and repatriate astronauts in distress (Articles 2 and 4), obligations to notify other States and the UN Secretary General of information regarding such situations (Articles 1 and 3). In addition to this there is an obligation to return space objects or component parts to the State under whose jurisdiction they fall, when they have landed on the territory of one's own State (Articles 5 and 6).

It is unclear whether the OST and the Return and Rescue Agreement form a *lex specialis* with respect to LOAC when it comes to astronauts who are members of a State's military. Under LOAC, combatants are lawful targets, and it could be assumed that if two States were in an armed conflict, an astronaut serving in the military could become a lawful target. However, there are those who argue that space law is the *lex specialis,* and the special status given to astronauts, due to the risks they undertake in space flight, would render them protected persons. The very existence of the Rescue and Return Agreement demonstrates that even during the Cold War period there was willingness between adversary States to offer protections to individual astronauts regardless of their nationality (Stephens & Steer, 2015).

B) The 1972 Convention on International Liability for Damage Caused by Space Objects

This treaty was also negotiated to extend and clarify the existing obligations under the OST, specifically the strict liability for States under Article VI and the liability of the launching State for any damages under Article VII.

The Liability Convention defines the launching State in Article I (c) as "(i) A State which launches or procures the launching of a space object; (ii) A state from whose territory or facility a space object is launched". This broad definition must be kept in mind for both government and commercial activities. A definition is also given for a space object, which is relevant for all space operations, as it includes component parts of a space object, its launch

vehicle, and component parts of that launch vehicle. When more than one State falls under the definition of launching State, they are jointly and severally liable.

Article II determines absolute liability for damage caused by a space object on Earth or to an aircraft in flight, and Article III determines liability only where there is fault for damage caused "elsewhere than on the surface of the Earth" to another space object, to persons or property on board that space object.

This treaty has been triggered once internationally, when a piece of Cosmos 958 landed on Canadian territory in 1978. Canada made a direct claim to the Soviet Union based on the treaty, but settled for an amount offered by the Soviet Union without litigating (Cosmos 954, 1981).

C) The 1974 Convention on Registration of Objects Launched into Outer Space

The Registration Convention was designed as a measure to be able to keep track of the number and type of launches, which had already increased significantly by 1974 to be of concern in terms of space traffic management and space situational awareness (SSA).

The treaty obliges States to maintain a national registry of all objects launched into space under its jurisdiction (Article II) and with the UN in an international registry (Article III). It is the UN Office of Outer Space Affairs (UNOOSA) which maintains and administers this registry. The information registered is general in nature, requiring a designator or identification number, orbital parameters and general function of the object. No details need be divulged about government satellites other than their general function.

D) The 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies

Broadly considered to be a failed treaty, the Moon Agreement has only 16 signatories, none of whom are space faring nations. It was drafted in part due to the rising concern that commercial activity would proliferate in the near future, and that developing nations would be cut off from the economic benefits of this activity. The notion of "province of mankind" is repeated, and due regard must be given to inter-generational and long-term interests.

The treaty highlights many of the principles of the OST, such as freedom of access and us of space and the Moon for all nations without discrimination and the "peaceful purposes" clause, and intends to build upon these with more specific protections. It also provides for protection of the "existing balance of [the] environment" of the Moon and other celestial bodies, based on the precautionary principles. Finally, it aims to build upon the implement stronger prohibitions on military activities on the Moon and other celestial bodies, the placement of weapons of mass destruction in orbit around the Moon, the testing of weapons on the Moon, or the use of the Moon for the threat or use of force. This final clause may be considered unnecessary, since the prohibition on the threat or use of force under Article 2(4) of the UN Charter already operates in space by virtue of Article III OST. While the principles are laudatory, there are no limiting effects of this treaty other than for the 16 State parties.

3. Other Applicable Treaties

It is mentioned above that Art III of the OST means that there are many branches of international law which apply in space, where relevant. However it is worth noting a number of treaties which specifically apply to space, and to military uses of space.

A) Arms Control

- The 1963 Partial Test Ban Treaty, which prohibits the testing of nuclear weapons and any other nuclear explosions in outer space, and obliges States to prevent such tests taking place in outer space (Article I)
- 1968 Treaty on the Non-Proliferation of Nuclear Weapons (NPT), which recalls the PTBT's reference to banning the testing of weapons in outer space, and places a blanket ban on the further development of nuclear weapons and transfer of technology that would allow such development

B) Methods and Means of Warfare

- Most weapons treaties are not written with any limitations as to a specific domain, and apply to space by virtue of Article III of the OST. They also apply as a matter of the applicability of LOAC to "all forms of warfare and to all kinds of weapons, those of the past, those of the present and those of the future", as stated by the International Court of Justice (Legality of the Threat or Use of Nuclear Weapons, 1996).
- The effects of the 1978 Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (ENMOD) treaty should be highlighted in particular. Article I prohibits "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", and Article II defines environmental modification techniques as "any technique for changing - through the deliberate manipulation of natural processes - the dynamics, composition or structure of the Earth ... or of outer space". Since it is known that use of kinetic ASATs will cause widespread, long-lasting *and* severe effects, impacting the dynamics of near-Earth orbits, it could be said that such ASATs are in fact prohibited under the ENMOD treaty. The use of any other methods impacting outer space would also be prohibited.

C) Space Governance

- The 2010 Constitution and Convention of the International Telecommunications Union are two important instruments for space traffic management, since the ITU regulates the distribution of orbital slots and the use of radio frequencies. Questions of harmful interference fall under the ITU's responsibility, however the ITU's ability to respond or enforce against misuses or intentional interference are extremely limited.
- The International Agreement on the Legal Status of the International Space Station forms a key instrument of international cooperation between all the States participating in the ISS. It is heralded by some commentators as an example of cooperation, even among States among whom there are existing tensions (Freeland, 2015)

Dr. Mark J. Sundahl

Charles R. Emrick Jr.- Calfee, Halter & Griswold Professor of Law; Director, Global Space Law Center
(Cleveland-Marshall College of Law, Cleveland State University)
19 July 2017

INTERVIEW TRANSCRIPT EXCERPT

Interviewer: What are the current international agreements, treaties, conventions, etc. governing the use of space, and what specific limitations and constraints are placed on space operations?

M. Sundahl: There are five UN treaties: 1) the Outer Space Treaty, 2) the Rescue and Return Treaty, 3) the Liability Convention, 4) the Registration Convention, and 5) the Moon Agreement.

The Moon Agreement, the fifth one, has not been ratified by any major space powers. For those 13 states that have signed the agreement are subject to some different rules about exploitation of natural resources. That's the core issue there.

But setting the Moon Agreement aside, the Rescue and Return Agreement elaborates on Article V of the Outer Space Treaty regarding the duty to rescue astronauts and return space objects, I think that's not worthy of a lot of discussion from a military perspective, except to say that governments should recognize that these duties apply even in time of war.

The Liability Convention focuses on who is liable if something happens, either on the ground, in the air, or in space. The basic rule regarding liability is that you're strictly liable if your spacecraft

destroys anything on the Earth or in air space, and if your spacecraft hits anything in space, then it's a question of fault. That's a big question, what does "fault" mean? I think that's an interesting question. Like when the Chinese blew up their own weather satellite, which created massive clouds of debris that are going to be in orbit for 500 years and may destroy untold numbers of satellites over the 500-year span, are the Chinese at fault? No one has really answered that question. I'd venture to say no even though it was an intentional act.

The Registration Convention is maybe the most used and successful space law convention because it's all about registering your space objects and describing where they're going to be and what they are so that the world can have some kind of space traffic management and be aware of what people are doing at space. On this issue, I would encourage the US government to continue to encourage others to comply with the Registration Convention and provide accurate information about what they're putting into orbit, because this really helps with transparency.

But the big one, the big convention is the Outer Space Treaty. You asked about the constraints on countries. So, the starting point is the free use—that we're allowed to use space freely, and we see that when we fly over other countries with no restrictions. So, what are the restrictions? Well, you can't put weapons of mass destruction in orbit. You can't be militarily aggressive in orbit—you've got to be peaceful, although that includes operations for self-defense. I don't think anyone believes that all weapons are banned from space, but no nuclear weapons, you can't be aggressive, and you have to avoid harmful interference with the activities of other countries and their nationals. That is a rather soft prohibition on interference because all it really requires is that if you are going to harmfully interfere with the operations of others, then the governments have to consult with each other. It doesn't say that interference is outright prohibited, only that there have to be consultations. You have to operate with due regard for the activities of others, and this kind of goes hand-in-hand with avoiding harmful interference. You also have to avoid harmful contamination of outer space and back contamination of the Earth—that's why we clean and sanitize the spacecraft before they are sent anywhere. That's good too so that we don't introduce Earth bodies and Earth organisms to other celestial bodies. Another restriction is the prohibition of appropriation—you can't go to the moon and plant a flag on it and claim it as the territory of the United States. We did plant a flag there, but we did so explicitly that it was not for any purpose of appropriation, but instead it was just a symbol of peace on our arrival on the moon. So, you can't claim the moon, but can you occupy it? Are there any rights that a private entity or a government can assert over part of a celestial body that is short of appropriation? Could you issue temporary licenses to mining companies to use for part of the celestial body or for the government to mine a celestial body, and therefore exclude others from that mine because it would constitute harmful interference or a lack of due regard? So, is there something short of appropriation that would allow the permanent use of a celestial body? That's kind of an open question. I believe, yes, we can do that, otherwise we should all just pack it and go home if we can't establish a base on the moon.

Another limitation on space activity that comes to mind concerns telecommunications, particularly regarding the use of a certain orbits, geo-synchronous orbits. You need to go through the ITU and FCC to get one of those orbits, which are limited in number to 180 due to a requirement of two degrees of separation between every satellite. The use of frequencies is also regulated by the FCC and the ITU.

So, those are some of the restrictions that come to mind.

ViaSat, Inc.

Richard A. VanderMeulen
Vice President of Space and Satellite Broadband

Ken Peterman
President - Government Systems

Shannon Smith
Executive Director of Strategic Initiatives

Fred Taylor
Vice President - Space and Cyber Applications at ViaSat – Government Systems

Bruce Cathell
Vice President - Government Operations

15 August 2017

WRITTEN RESPONSE EXCERPT

We would recommend this as a topic for a thoughtful discussion. Our expertise will be from a Satcom regulatory perspective. We also have thoughts on this topic form an SSA perspective.

Dr. Frans von der Dunk

Professor (University of Nebraska College of Law)
25 July 2017

INTERVIEW TRANSCRIPT EXCERPT

Interviewer: What are the current international agreements, treaties, conventions, etc., governing the use of space, and what specific limitations and constraints are placed on space operations?

F. von der Dunk: The first thing we should note when we talk about space and the legal regimes is that the international agreements come from various angles.

I always start with the UN space treaties. I already mentioned the Outer Space Treaty, and there are a handful of these that were by-and-large drafted in the 1960s and 1970s with the agreement of all space faring nations. These UN space treaties set out the basic regime for all space activities and for all activities in outer space, even—although to a very limited extent—regarding military use because there is the reference to peaceful purposes, and if you talk about constraints, there are no very solid or very major constraints that the Outer Space Treaty puts on the military use of outer space and military space operations, other than, of course, the prohibition of the stationing and orbiting of weapons of mass destruction. But that's only one part of the analysis.

What you see when you look at the legal aspect and legal regime for space activities is that, of course, space is also a domain for all sorts of operations, which can also be limited in other contexts to more terrestrial operations. If you look at it from that angle, you will find that there are a number of areas where treaties that have been developed for purely terrestrial purposes also can be applied to space activities. The best example I could give is the ITU, the International

Telecommunication Union, which for about a century and a half has been regulating international use of frequencies. Originally, of course, that regulation was all about wires and terrestrial radio because nobody thought about satellites being used for telecommunications a century and a half ago. But, in the 50s when it became clear that this opportunity was to be taken seriously, the ITU extended its system for coordinating international frequency usage to outer space. So, from that perspective, for any use of space frequencies, if you want to look at the legal regime applicable, you don't primarily go through the space treaties, you go to the ITU.

There are many more examples. For the military field, for example, it's important to realize that there is a partial test ban treaty from the 1960s, which prohibits the testing of nuclear weapons on the Earth, on the ocean, and in outer space. So, outer space is just part of the coverage of that agreement.

So, it is a very multifaceted legal regime, but if you look in particular at the limitations to military space operations, I think those two treaties—the Outer Space Treaty and the Nuclear Test Ban Treaty—are the first two important ones when it comes to space.

Again, if you go back to what I said earlier about the definition of outer space as a province of all mankind and a global commons, the baseline is that everything is allowed there, unless it is one way or another prohibited. One prohibition I mentioned before is on the orbiting of nuclear weapons in the space, which comes from the Outer Space Treaty, and then the other prohibition mentioned stemming from the Nuclear Test Ban Treaty.

The third important legal regime and legal treaty that limits space operations is the UN Charter, which imposes a general ban on the use of force—except in fairly limited circumstances—and that ban on the use of force also applies to outer space, or to the use of space in the context of the use of force.

So, unless it is basically prohibited or conditioned by any of those three primary treaties, countries are able to do what they want because space is a global commons. A very clear example is, of course, the ASAT test that the Chinese performed a number of years ago where they shot their own satellite as a matter of target practicing. Strictly speaking, the only obligation, the only international obligation that they violated by doing that was not informing the rest of the international community in advance and then allow them a chance to say something like, "well, please don't do that because it creates 30% additional space debris." So, the mere fact is that China target practicing in outer space on its own satellite was not something that was actually against international law at the time.

Interviewer: With the rapid development of technologies, which is helping to allow more and more actors to get involve space and space operations, it seems like the space realm is rapidly advancing. So, I'm wondering, do you think that these existing legal treaties and norms are well-position to govern this rapidly changing domain? Or, do you think that advancements and/or updates to the laws are needed?

F. von der Dunk: That's an excellent question, and this is one of the leading questions right now that space lawyers are discussing all of the time. I think the answer is a bit of both.

I think that most space lawyers and also most nations agree that the space treaties and the ITU and some of the other stuff are too worthwhile to simply throw away, but, on the other hand, could do well with some remediation. Overall, though, the general consensus is that while we currently fall short and do need certain additional legal regimes or requirements to address for the new technical and operational developments, the best approach is NOT to start from zero

again because we would throw away too much of the baby with the bathwater, and it is preferable to just work with the Outer Space Treaty and some of the other treaties and just try to enhance them wherever possible—whether this be by new treaties or by more fluid, less formal ways of lawmaking (i.e., in particular, customary international law).

One example, for instance, is going back to what I've just said about the Chinese ASAT test. When China did its ASAT testing, there was no prohibition, as such, on the creation of space debris, which is basically what China did, of course. Now, over the last few decades, increasingly countries and operators are coming to the conclusion that this is not a good thing—that we should establish some way to limit the random creation of space debris, because at the end, everyone will be worse off if space becomes a complete junkyard or if specific orbits become complete junkyards.

So, we do see a move towards trying to establish rules, binding rules, on the prevention of space debris, the mitigation of space debris, and perhaps even on taking out different satellites that run the risk of creating space debris by banging into other stuff. Given the political environment, which is pretty dispersed, I don't think it's realistic to accept that there will be another treaty that can stand a chance of success of being globally ratified, at least by the major space faring countries. But, there might be a more bottom-up approach in which states increasingly behave according to a certain matter, and then that behavior at some point in the future becomes effectively customary international law. This is an example where we certainly do need to do something because, again, if we go on the way we have behaved towards space over the last decade, then sooner or later space will be inaccessible or simply not safe to use anymore, and ultimately that will be to the detriment of everyone.

Joanne Wheeler

Partner, Technology and Communications Group (Bird & Bird)
19 July 2017

WRITTEN RESPONSE EXCERPT

- UN Treaties: Outer Space Treaty, Liability Convention, Registration Convention, Rescue and Return Agreement, Moon Agreement.
- Nuclear Principles, Remote Sensing Principles
- UN Resolutions
- Bilateral state agreements
- Customary international law
- International guidelines; IADC; UN; ITU; ISO (including space debris guidelines)
- Regional agreements
- National laws and regulations - an increasing number and licensing systems.
- ITU Radio Regulations and ITU Convention
- Regional agreements
- European regulations and directives
- National laws, regulations and filing procedures
- National frequency allocation tables.
- Some of the specific limitations and constraints:
    - "peaceful use"
    - activities are to be conducted for the benefit and in the interests of all countries
    - freedom of exploration, use and scientific investigation

- international cooperation
- prohibition of national appropriation
- compliance with international law
- prohibition of WMD in space
- ensuring efficient use of spectrum and minimize harmful interference
- activities to take due account of the corresponding interests of other states
- activities to avoid harmful contamination and avoid adverse changes in the environment of the Earth