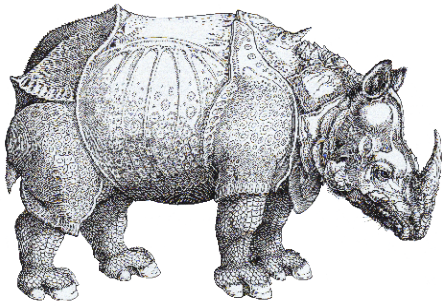
Non multa, sed multum

SECURITY INDEX №7 (34) | 2022

OCCASIONAL PAPER SERIES

Global Edition



Sarah Erickson

Prospects for preventing an Arms Race in Outer Space: Political and Legal Aspects

PIRPRESS

MOSCOW, 2022

Prospects for preventing an Arms Race in Outer Space: Political and Legal Aspects / Sarah Erickson. M.: PIR Press, 2022. – 94 p. – (*Security Index* Occasional Paper Series).

ISBN 978-5-6048679-5-2

This paper addresses the issue of preventing an arms race in outer space. Outer space systems are crucial in supporting the infrastructure of the modern civilization. The global community has a shared goal to protect the sustainability, safety, and security of outer space to preserve outer space functionality for continued human prosperity.

The increasing military activity and explicit dedication of outer space as a military domain in a growing number of national and regional defense policies threatens the sustained use of outer space. In addition, emerging technologies and outer space weapons capabilities threaten peaceful human exploration of outer space. Through analysis of the existing governance regime, this article proves that the system is inadequate in achieving a complete de-weaponization of outer space. The deficiencies of the existing framework allow a legal pathway for the development and deployment of any weapon type apart from weapons of mass destruction.

This analysis of the existing legal regime shows that substantial additional measures are needed to ensure the security of outer space. The study highlights a number of possibilities to overcome the political stagnation on the issue of outer space security. Those include pursuing nuanced technical agreements, applying an inclusive approach of binding and non-binding mechanisms, diversifying negotiating participants to include industry and civil society, and utilizing modern incentives to move the conversation forward on outer space security.

This occasional paper was produced within *The Evstafiev Series* (see page 94).

This occasional paper and other materials are available at:
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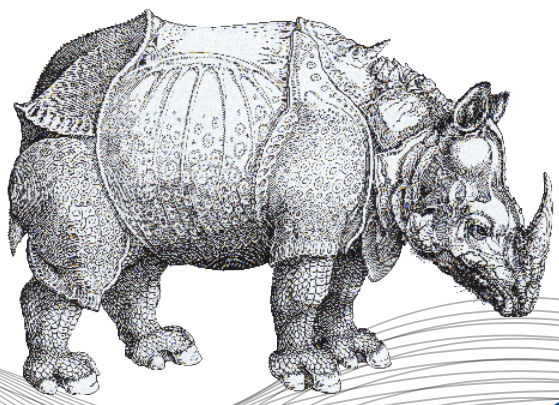


Contents

Highlights

- The significance of outer space systems and resources to the infrastructures of modern-day life cannot be understated. These outer space systems and the quality of life they enable for us all are in jeopardy and would be rendered completely unusable if even one conflict took place in outer space. If outer space is weaponized the possibility of such a conflict grows exponentially.

- The rapid expansion of new capabilities and the rate at which emerging technologies outpace the efforts of the global community to regulate them, complicates the process even more. However, despite these challenges there exists no ambiguity on the need to ensure the protection and access to outer space.

- The existing legal framework has acted as a corner stone on the expectations and guidelines for outer space activity. It has become necessary to augment the existing legal framework through a variety of approaches and initiatives to ensure that the weaponization of outer space does not happen.

- The global community must consider it an absolute necessity to incorporate the participation of industry, civil society, academia, and the non-governmental sector at large.

- It is crucial to consider the new incentives of the commercial industry and how such incentives can be capitalized to encourage strong and immediate action. Only with the contribution of the largest stakeholders in outer space will the global community be able to implement a robust and long-lasting global outer space governance. By pursuing inclusive approaches in good faith by a diverse set of actors, the global community can ensure that outer space be unequivocally sanctioned a domain of peace for the advancement of humanity.

Prospects for preventing an Arms Race in Outer Space: Political and Legal Aspects[1]

Sarah Erickson

INTRODUCTION

Outer space is increasingly becoming critical to modern life on Earth. As space systems become integral to advancing economic, civilian, and strategic infrastructure across the globe, there is growing concern that Earth based geopolitical disputes and terrestrial conflicts could proliferate into outer space. Such a conflict would have catastrophic human consequences and potentially deny the use of outer space to humanity ad infinitum. In order to ensure such events do not unfold, the global community has been engaging in the process of preventing the weaponization of outer space and seeking to strengthen a global outer space governance structure. However, as space becomes more congested and contested with a growing diversity of stakeholders and perspectives, the global community has been met with the challenge of reaching consensus on common understandings and concrete action steps forward. The reality is the international outer space governance has only achieved a partial de-weaponization of outer space, prohibiting the deployment or placement of WMDs in outer space. The possibility of any other type of non-WMD arms proliferation into outer space is currently legal, jeopardizing one of the most critical environments to modern human life.

This occasional paper asks what obstacles exist to achieving the complete assurance of non-weaponization of outer space. It pursues the question of whether the prevention of an arms race can be achieved diplomatically, politically, and legally. It seeks to address these questions by identifying the vulnerabilities through a comparative historical and contemporary analysis of the outer space regime. Also, by exposing obstacles to global consensus within negotiating bodies through quantitative data analysis of voting participation and contemporary satellite operation and ownership.

The paper utilizes an array of sources consisting of primary legal texts and treaties, national documents and political statements, academic literature and reports, industry materials, and historical political correspondence. There exists a robust academic corpus on

[1] The author thanks Mikhail N. Lysenko, Ph.D. in Law, Ambassador Extraordinary and Plenipotentiary, Deputy Head of the Department of International Law of MGIMO, member of the Advisory Board of PIR Center, for the assistance and invaluable contribution in writing this paper.

outer space security, however, due to its timeframe the information and analysis is dated, missing key developments to outer space security. This research includes the most current developments in outer space military activity and emerging technologies and applies its consequences to outer space security. This work also considers the most current international efforts and political activity towards outer space taking stock of novel approaches and methodologies to solving outer space security issues. Finally, this article accounts for the changing role of major stakeholders in outer space activity and assets, including key efforts from industry for consideration.

The Expedition 7 crew photo of the Pacific Ocean visible below the clouds from the International Space Station in 2003

Source: www.nasa.gov

CHAPTER 1. A BRIEF HISTORY OF OUTER SPACE LAW

Outer space law is commonly understood as the corpus of law governing all outer space-related activity. Outer space law consists of international treaties, domestic laws, and resolutions from international organizations. There are five basic international treaties and five sets of UN recommended Principles which seek to ensure the responsible exploration and use of outer space. This shared understanding of outer space law and its associated goals is a comparatively recent development, taking place almost entirely within the previous century. The timeline of space law development may be simplified for the purposes of this brief historical overview into two main time periods, that one before the launch of Sputnik and the post-Sputnik space race era.

PRE-SPUTNIK CONCEPTS IN OUTER SPACE LAW

Outer space law inception is commonly attributed to the beginning of human exploration in space, namely the successful launching of Sputnik on October 4, 1957. However, the concept and discussion surrounding the need for a framework governing outer space existed well before the displays of scientific progress during the space race. Even though pre-sputnik conventional wisdom primarily drew upon the assumptions that the developing body of airspace law would simply extend vertically to outer space if humanity should so begin operating within that domain, there were those who saw the eventual need to separate the domains and govern outer space by its own unique set of principles.

The first iteration of space law in the 20th century was written in 1910 by Emile Laude, a Belgian lawyer accredited by the University of Brussels. In his omnastic commentary on the development of aerial law, Laude understood that the conventional knowledge of the time was insufficient. He hypothesized that aerial law would be confined to the *layer of breathable gas*[2], while the *Law of Space* would eventually be created to govern the extended *layer of ether*.[3]

The following discussion surrounding space law would not occur until after the World War I in 1926. At the conference of the air law section of the USSR's Aviakhim Union (The Society of Friends of Aviation and Chemical Defense and Industry of the USSR), Valentin A. Zarzar, chief inspector of the ministry of aviation of the USSR, presented his paper wherein he explores the future possibility of an international space flight regime.[4] Similarly to Laude, Zarzar

[2] Quotations are translated from the French from NASA Technical Memorandum NASA TM – 77513, August 1984.
[3] Laude, E. (1910). Questions Practiques. *Revue Juridique Internationale de la Locomotion Aerienne*, 16-18.
[4] Zarzar, V. (1927). Mezhdunarodnoye Publichnoye Vozdushnoye Pravo. In *Voprosy Vozdushnogo Prava* (pp. 90-103). Moscow: SSSR i Aviakhim RSFSR.

distinguishes between differences in atmospheric layers, "This theory involves the fact that the atmosphere is divided into two concentric layers, of which the lower is subject to national control, and the second, which is international, so that the upper zone of air travel is free".[5] Both Laude and Zarzar recognized the need to differentiate between air space and outer space.

Although there were other papers that touched upon the legality of airspace and differentiation of zones[6], the first comprehensive survey of the anticipated field of space law came in 1932. Vladimir Mandl, a lawyer, pilot, and professor from Czechoslovakia published his thoughts on the legal implications of rocketry in his book, *The Problem of Interplanetary Transport* and continued in his monograph, *The Law of Outer Space, A Problem of Space Flight*. Mandl's previous experience with motor vehicle law and extensive study and publications on legal problems of aviation naturally led him to consider more advanced means of transport. Mandl himself was a rocket enthusiast, participating in the budding rocketry community by being a member of the *Verein für Raumschiffahrt* (Society for Spaceship Travel), the society that authored Germany's first periodical about rocketry, *Die Rakete*.[7]

Due to his technical interests in aeronautics, Mandl's first publication in the field, *The Problem of Interplanetary Transport*, had a scientific-based approach. The first portion was a survey on the developments in astronautics, which examined the works of pioneers in astronautic theory such as Prof. Hermann Oberth, Konstantin Tsiolkovsky, and Dr. Robert H. Goddard among others. The second portion of the book was dedicated to the mechanics and basic principles of rocketry, which even included Mandl's own drawing of a high-altitude rocket for which he applied for a Czechoslovakian patent.

However, it is in Mandl's, *The Law of Outer Space, A Problem of Space Flight*, that the concept of the law of outer space is considered as an independent legal branch with consideration to the specific mechanics of space flight and with differentiating principles than those applied to the law of air or sea. As Mandl himself explains:

> *For all problems of astronautics, the qualities of this outer space must be defined, whose dimensions, contents, temperature and suchlike are distinguished in the same way as the properties of sea or maritime navigation, and those of the air for aeronautics. Therefore, we consider it necessary to establish, besides maritime and air law, a law for outer space.*[8]

There are five basic international treaties and five sets of UN recommended Principles which seek to ensure the responsible exploration and use of outer space

[5] Quotations are translated from the Russian from NASA Technical Memorandum NASA TM-76913, June 1982.
[6] See for example: Pittard. (1927). Dominium Coeli. *Zeitschrift für das gesamte Luftrecht*, 13; and Pradelle, A. d. (1932). L'origine de la Maxime Cujus solum, ejus Coelum. *Revue Generale de Droit Aerien*, 294-302.
[7] Doyle, S. E. (2002). *The Origins of Space Law and the International Institute of Space Law*. San Diego: Univelt.
[8] Mandl, V. (1932). *Problem Mezihvezdne Dopravy*. Prague. Translation from the German

Mandl splits his work into two parts. The first part accounts for the then present time, discussing terminology, guidelines for legal judgment, and considers outer space law in the context of private, public, and international law. Examples of terms Mandl deems necessary to focus on the legal consideration of include: the difference between space and outer space law, spacecraft, space vehicle, spaceship, rocket, and which verb to designate movement in outer space.[9] Mandl's considerations of impact to private, public, and international law goes so far in-depth as to consider the legal liability of incidental space impact from reentry and rocket debris, right of launch, protection of air quality, the safety of ejection units such as auxiliary rockets, and spacecraft being subject to a nation's air sovereignty zone.

The second part of the book is dedicated to his conceptions of the future and theorizes issues that are still of relevance today. Mandl predicted the need for centralized authorities to be involved to assist with the massive costs associated with a launch, the need for qualified specialists to ensure maximum certainty, and centralized organization of launch sites to reduce disturbance of public order and ensure ideal environmental conditions for a successful and secure launch. Mandl also rejected the then-dominant idea of national air sovereignty extending upwards, but rather advocated for state sovereignty extending only to the adjacent atmospheric space from which beyond man applies the concept of *coelum liberum*.[10] An idea that would later take firmer footing as seen in the UN General Assembly resolution 1721 (XVI) when stated, "Outer space and celestial bodies are free for exploration and use by all States in conformity with international law and are not subject to national appropriation".[11] Both Mandl's legal and political exploration in the field was paramount in establishing the basis for outer space law.

Discussion of the field continued in Leningrad in 1933, at a conference wherein, Evgeny A. Korovin, considered by many to be the founder of Soviet outer space law and one of the USSR's most prominent and distinguished scholars, presented his report "The Conquest of the Atmosphere and the Law of the Air".[12] The article was influential in its nearly exhaustive compilation of harmful aspects of military over-flights as justification for the universal applicability of national sovereignty over the near adjacent atmosphere. With a security-focused perspective, Korovin turned to consider the important question of whether outer space is independent of terrestrial authority. After an analytical chronology of previous

comes from NASA Technical Memorandum NASA TM – 77760, December 1984.

[9] Ibid.

[10] Coelum liberum meaning free sky or heavens

[11] UNOOSA (2017). International Space Law: United Nations Instruments. Pp. 104. https://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/bi-multi-lateral-agreements.html

[12] Korovin, E. (1934). La conquête de la stratosphère et le droit international. *Revue Generale de Droit International Public*, 675-686.

scholarship in the field, Korovin concluded that security and safety will ultimately prevail over the ideal, and that each state retains an inalienable right to govern the superjacent airspace. In conclusion, Korovin writes:

> *The air will never really be free but through a humanity freed of the nightmare of war and the burned of armaments. As long as these scourges exist one will not contribute to human progress by confounding reality with the ideal; but through organizing a local and universal security on Earth, on the sea, and in the air.*13

Korovin created the cornerstone of Soviet jurisprudence on the subject that withstood for decades. He stood in opposition to the academic opinion of those like Laude and Mandl, by believing that any flight at any speed or altitude would still involve a threat to national security and that this consideration of security, should therefore determine what limits the right of national sovereignty in outer space.

The first commentary on the topic in the English Language did not appear until 1946. In the Journal of the British Interplanetary Society, Arthur Clarke published his paper, "The Challenge of the Spaceship".[14] Clark's conclusions on the limit of national sovereignty align more with the opinions of Laude and Mandl, as Clarke does not consider the principles of national security. Clarke suggests the issue should be modeled similarly to maritime law, with a created equivalent to the nautical mile limitation. Clarke further discusses the implications of sovereignty extended into outer space by foreseeing the risk of *interplanetary flag-waving* and *interplanetary imperialism* and stresses the important role of international organizations in securing global political agreements to prevent such action.[15]

Closely following in 1948, the United States Department of State released a press brief titled, "Discussions Asked on Territorial Problem of Antarctica", in which it was stated:

> *It is the viewpoint of the Department of State that the solution should be such as to promote scientific investigation and research in the area. The Department of State has suggested that this can perhaps be done most effectively and the problem of conflicting claims at the same time solved through agreement upon some form of internationalization.*[16]

Evgeny Alexandrovich Korovin (1892 – 1964), is "considered the founder of the Russian science of space law, in whose origin he played a singular role"

Source: www.isaran.ru

[13] Translation from French by Stephen Doyle in *The Origin of Space Law and the International Institute of Space Law*. San Diego, 2002.
[14] Clarke, A. C. (1946). The Challenge of the Spaceship. *Journal of the British Internplanetary Society*.
[15] Ibid.
[16] U.S. Department of State Bulletin (1948). Volume 19, Issue 1 pp. 301.

Seemingly at the time unrelated and irrelevant to the discourse of astronautics, it would prove to be influential for its future analogous relation to outer space.[17] Shortly after in 1949, appeared one of the most iconic phraseologies, which would remain at the center of outer space discourse until present day. In a letter from Ralph A. Smith, a British engineer, directed towards the United States government, he writes in defense of the moon – a protest in reaction to U.S. conversation of discharging a missile to make contact with the lunar surface.[18] He writes:

> *I would like to point out to the American government, and all other governments, that the Moon is not their property, and will not become so by right of bombardment. It is the common heritage of man, possibly, if otherwise untenanted, and although there is little we can do at the present to prevent the Americans or others from abusing their present position of technical advantage, they would be stupid to overlook the possibility that militaristic exhibitionism normally evokes unpleasant reactions – ultimately.*[19]

Smith in a more earnest manner echoed the sentiments of his predecessors Laude and Mandl, in expressing the frank belief that celestial bodies were not an object of national possession. In addition to this letter, Lionel Laming a French engineer, published in an introduction to the field of astronautics his observation that, "the conquest of space may mean that all solar system, and not only the Earth, deserves to be considered as the heritage of mankind".[20] The unassuming phrase *common heritage of man(kind)* would cement itself as a pillar of outer space law, emulating most precisely the sentiment of some early scholars who rejected the notion of nationalized sovereignty over the cosmos.

In 1951, a lecture delivered by American lawyer John Cooper, explored the legal issue surrounding the definition of the upper limit to national sovereignty. In it he considers the established

[17] The suggestions from the Department of State would eventually see the unprecedented agreement, the *Antarctica Treaty*. This treaty would inspire future analogy between outer space and Antarctica, which can be further explored in works such as Jessup and Taubenfield's *Control for Outer Space and the Antarctic Analogy*. Jessup, P. & Taubenfeld, H. (1959). *Controls for Outer Space and the Antarctic Analogy*. New York Chichester, West Sussex: Columbia University Press.

[18] In his letter, Smith refers to the statement of Professor Fritz Zwicky in his lecture "The Morphology of Astrology" in which he states visualizing the possibility of discharging a missile to the lunar surface. Smith also criticizes Dr. Robert Goddard for supporting the idea and suggesting to add an explosive load to advance such a display. After Goddard's publication of *A Method of Reaching Extreme Altitudes* in which he conjectured sending a small rocket to impact the moon, the Smithsonian Institution issued a short brief highlighting the speculation. This brief would sensationalize this concept, paving way for appearances in popular news sources such as *The Boston Herald*'s headlined report "New Rocket Devised by Prof. Goddard May Hit Face of Moon" or the *New York Time*'s piece "Believes Rocket Can Reach Moon".

[19] Italics added for emphasis. Smith, R. A. (1949). Correspondence. Journal of the British Interplanetary Society, 131-32.

[20] Lionel, L. (1950). L'Astronatique. Paris: Presses Universitaires de France. Translation from French by Stephen Doyle in *The Origin of Space Law and the International Institute of Space Law*. San Diego, 2002.

sovereignty of *airspace* as defined by the 1919 Paris Convention, Madrid Convention of 1926, Havana Convention of 1928, and Chicago Convention of 1944. Cooper came to the conclusion that, "scientific investigation and progress in known rocket flights have therefore demonstrated that none of the international legislative procedure set up in the Paris and Chicago Conventions applies in a very large part of the region which these rockets have already reached".[21] Cooper also discussed the problem artificial satellites would pose to the theory of national sovereignty, explaining the complication of a satellite multiple times a day entering and leaving the *sovereign space* of territories on its orbit. Although often mistakenly credited with being the primary paper on the subject due to its wide republication, translation, global receptibility, the paper still held significant importance for its distribution in several US Congress Sessions.[22]

The first doctoral dissertation concerning legal aspects of spaceflight was published in 1953, by Welf Heinrich. The dissertation, *Air Law and Space*, contained a historical survey of preceding thought leaders in the field such as Mandl and a comprehensive analogous analysis to air and maritime law.[23] Heinrich asserted there existed elements of air and maritime law from which a basis for outer space law could be formed, but he exposed the imperfections from the analogies and areas in need of specific consideration such as atmospheric marker of international or free territory, access and dominion of space stations, regulations of atmospheric flight, and so forth. Heinrich would embark upon a U.S. tour to lecture in universities, law schools, and specialist groups in 1957, when the prominent American lawyer in the field of space law, Andrew Haley, discovered the dissertation.

The early work on outer space governance initiated in academic circles. Although the academic community failed to come to a consensus on the boundary of air space and the limitations of sovereignty, their research and discussion laid a theoretical foundation for future legal negotiations. Furthermore, their contribution cemented an important precedent of academia being a significant contributor to the construction of international law. We see a reemergence of this practice in recent initiatives on outer space security, such as the *Open-Ended Working Group* on reducing space threats through norms, rules and principles of responsible behaviours, wherein a significant portion of the informal

[21] Cooper, J. (1951). High Altitude Flight and National Sovereignty. The International Law Quarterly, 411-18.

[22] US Congress appearances include: US Congress, Hearings on H.R. 11881 before the House Select Committee on Astronautics and Space Exploration, *Astronautics and Space Exploration*, 85th Cong,. 2d Sess., Washington DC (1958), US Congress, *Space Law: A symposium*, 85th Cong., 2d Sess, Washington DC (1959), US Congress, *Legal Problems of Space Exploration: A Symposium*, Senate Committee on Aeronautical and Space Sciences, 87th Cong., 1st Sess., Washington DC (1961).

[23] It is important to note that Heinrich did not include Soviet literature in its analysis, most likely due to lack of library/archive access in addition to a possible language barrier. Heinrich, W. (1958). Air Law and Space. Saint Louis University Law Journal, 11-69.

panelists were from academia.[24] Finally, even if their contribution was not comprehensive and failed to address the future of outer space security, the early academics and contributors still acted as bridges between science and legal communities, and made pulled valuable resources from neighboring domains of air and maritime.

EARLY INTERNATIONAL ACTIVITY IN THE FIELD OF ASTRONAUTICS

Early work in the field of outer space law had largely been the product of individual scholars and experts, writing independently of each other in the canals of their own national astronautic enthusiast circles. However, by the 1950s discourse between nations and academics would strengthen, resulting in the beginning of internationally organized bodies with dedicated efforts to the question of governing outer space.[25] The onslaught of technical advancements in rocketry brought on by the World War II inspired the feeling of necessity to enhance international cooperation for the sake of security.

The onslaught of technical advancements in rocketry brought on by the World War II inspired the feeling of necessity to enhance international cooperation for the sake of security

In the post-war reconstructed Germany, the Society for Space Research (*Gesellschaft für Weltraumforschung*), a newly created Western German society adopted a resolution encouraging international cooperation. The resolution called for aims such as emphasizing, "the peaceful possibilities of space travel" and recommending, "an international meeting of all societies for rocket development, interplanetary travel, and space research, to foster friendly relations, and a successful exchange of knowledge" and finally concluding with the possibility of, "forming an international association for astronautics".[26] After correspondence with the British Interplanetary Society and the Groupement Astronautique Francaise it was published in September of 1949 in the *Journal of the British Interplanetary Society*, that a provisional agreement had been made for an international conference to be held in London in 1951.[27] The first International Astronautical Congress met September 30, 1950 in Paris. In the following International Astronautical Congression in 1951, the stage was set for the juridical establishment of the International Astronautical Federation.

The International Astronautical Federation (IAF) was seminole in its being the first global non-governmental organization encouraging cooperation in international outer space law and fostering the

[24] UNGA. Indicative timetable. AC.294/2022/INF.1. https://meetings.unoda.org/section/oewg-space-2022_documents_17009/

[25] There naturally was a pre second world war development of rocketry concentrated societies. These groups endeavors were dedicated to the scientific advancements of rocketry, with occasional publications towards the legal and political implications. Some such groups have been mentioned like the Verein für Raumschiffahrt and British Interplanetary Society. For a focused pre second world war national survey of rocket societies see Winter, Frank H. (1983). *Prelude to the Space Age*. Smithsonian Institution Press.

[26] Schwartz, L. (1962). *International Organizations and Space Cooperation*. Durnham: World Rule of Law Center, Duke University.

[27] JBIS. (1950). Journal of the British Interplanetary Society, 137.

field of astronautics towards peaceful uses of outer space.[28] An example of such a work can be seen in the meeting of the Third Congress. Dr. Alex Meyer, founding director of the Air Law Insitute at Cologne, presented his paper, *Legal Problems of Spaceflight*, in which he discussed issues such as the upper limit of national soveriengty and the possibility of outer space for military purposes.[29] Meyer took an uncompromising stance on the militarization of outer space, believing that outer space should not become a theater for militaristic operations, and stressed the importance of restricting such usage via international agreements. In the 1955 Sixth Congress, C.E.S. Horsford presented his, *The Law of Space*, stating that not only was international cooperation paramount but that an international body would be essential to deal with the political consequences of spaceflight.[30] He believed that body could be modeled off existing frameworks, namely the United Nations Trusteeship System, and that when considering the problem of dispute settlement, he believed the existing regime of the International Court of Justice at the Hague would suffice.

Similarly to Horsford, at the 25th Anniversary Annual Meeting of the American Rocket Society in Chicago in 1956, Andrew Haley gave an address wherein he reccommended the UN establish a commission dedicated soley to the legal and juridiscial questions of outer space.[31] In this decade there would be a growing body calling upon the necessity for a power like the UN to exercise its ability to oversee exploration of outer space.

In September of 1956, the VII International Astronautical Congress in historic significance held a session completely dedicated to the emerging legal questions of outer space law.[32] Present in the session was Dr. Cacciapuoti, associate director of the Department of Physical and Natural Sciences of UNESCO, who served in a consultative position on behalf of UNESCO. Within the session were several papers presented including from Dr. Andrew Haley on his concept of metalaw, Eugene Pepin on the possible regulatiroy role of the International Civil Aviation Organization in the future of astronautics, Dr. Cocca on the implications of time factor of astronautical flight, a culminating address from Dr. Antonio Ambrosini with a step-by-step focused approach on launching regulations especially considering artificial satellites, and so forth. In an immersive discussion of these issues the session

[28] Current constitution of the IAF can be viewed at Federation, I. A. (n.d.). IAF Constitution and Bylaws. IAF. Retrieved February 19, 2022, from https://www.iafastro.org/about/governance/iaf-constitution-and-bylaws.html. Copy of the IAF constitution current at time of publication can be seen in Haley, A. (1963). *Space Law and Government*. Appleton-Century-Crofts, pp. 492.

[29] Meyer, A. (1952). Legal Problems of Spaceflight. *Annual Report of the British Interplanetary Society*, 353-354.

[30] Horsford, C. (1955). The Law of Space. Journal of the British Interplanetary Society, 144-50.

[31] Haley, A. (1956). Basic Concepts of Space Law. *Jet Propulsion*, 951-57.

[32] A comprehensive outline and analysis of the entire session can be read in Stephen Doyle's work, pp.61

concluded with a final reccomendation that the Congress should pass a resolution asking the United Nations for an international authority dedicated to the realm of outer space activity. Although the United Nations was organized 12 years prior to the launch of the first artifical satellite, activity concerning outer space would not take place until 1957.

SPUTNIK, THE SPACE RACE, AND ITS EFFECTS ON OUTER SPACE LAW

Soviet technician working on Sputnik-1

Source: www.roscosmos.ru

October 4, 1957, was the launch of the first artificial satellite to successfully orbit Earth. A project by the Soviet Union, *Sputnik 1*, launched from the Tyuratam launch base with an orbit of nearly three months before falling to the Earth's atmosphere in January of 1958. The launching of Sputnik was timed in conclusion of the first calendar quarter of the International Geophysical Year, an international collaborative scientific endeavor dedicated to this solar period in which the International Council of Scientific Unions stated would be optimal for launch of a satellite and study of Earth and the solar system.[33] Both the Soviet Union and the United States had dedicated satellite launch programs, *Sputnik* and *Explorer*, however it was the success of Sputnik as the first manmade artifact to orbit Earth that many consider as launching the space race.

The first U.S. satellite to successfully orbit the Earth, *Explorer*, was launched January 31, 1958. By this time the Soviet Union had already successfully launched the second satellite, *Sputnik 2* with its famous passenger, Laika the dog. Other scientific achievements of the Soviet Union which defined this era were the first man, Yuri Gagarin, in space, the first woman, Valentina Tereshkova, in space, the first spacewalk, the first spacecraft to impact the moon, first impact to Venus, and the first soft-landing on the moon. The United States most notable contribution was *the Apollo lunar mission*, successfully carrying out the first moon walk. The scientific leaps of progress were astounding during this era. What had once been science fiction had become science fact and the political and legal regimes which had been conceptualizing consequences of activity in outer space were struck with the burden of governing the new frontier of human exploration.

The need for political action was felt urgently across the globe, and only three days following the launch of Sputnik the Eighth Astronautical Congress met in Barcelona, on October 7, 1957. Andrew Haley in his delivery of his paper, *Space Law – The Development of Jurisdictional Concepts*, suggested that a committee be formed

[33] Nicolet, M. (1984). The International Geophysical Year (1957–1958): Great Achievements and Minor Obstacles. GeoJournal, 303-320.

and tasked with defining air space in distinction of outer space.[34] Also within this year's congregation, Andrew Haley was elected president, and there was a proposal put forward within the Ninth Congress for an international meeting of experts in space law to convene, marking the origin on the International Colloquium on the Law of Outer Space.

The following year in 1958, in the First Colloquium on Space Law, a resolution was unanimously approved in which a Permanent Legal Committee would be established within the framework of the IAF.[35] It was also agreed upon that open communication would be welcomed between the IAF and the Secretary General in regard to cooperation on any UN initiative in the field of astronautics. The First Colloquium saw a total of forty-four participants, with twenty-seven papers being presented in the distinct field of outer space law.[36] The exponential increase in participation compared to previous sessions made evident the growing interest in the field and in the Second Colloquium on the Law of Outer Space the Permanent Committee recognizing the importance of the work and need for organization moved to convert the IAF Permanent Committee into the International Institute of Space Law.[37]

UN CONTRIBUTION TO OUTER SPACE LAW

In the immediate aftermath of the launch of Sputnik, in November of 1957 the United Nations would for the first time in an official capacity address outer space. In the General Assembly Resolution 1148 (XII) *Regulation, Limitation and Balanced Reduction of All Armed Forces and All Armaments; Conclusion of an International Convention (Treaty) on the Reduction of Armaments and the Prohibition of Atomic, Hydrogen and Other Weapons of Mass Destruction* the following provision regarding outer space was included:

> *...1. Urges that the States concerned, and particularly those which are members of the Sub-Committee of the Disarmament Commission, give priority to reaching a disarmament agreement which, upon its entry into force, will provide for the following:*
> *... (f) The joint study of an inspection system designed to ensure that the sending of objects through outer space shall be exclusively for peaceful and scientific purposes...*[38]

[34] Hayley, A. (1958). Space Law - The Development of Jurisdictional Concepts. Proceedings of the Eighth International Astronautical Congress, 170-185.
[35] Pepin, E. (1982). History of International Institute of Space Law of the International Astronautical Federation. New York: AIAA.
[36] Ibid.
[37] Doyle, S. E. (2002). The Origins of Space Law and the International Institute of Space Law. San Diego: Univelt.
[38] UNGA. (1957). Regulation, Limitation and Balanced Reduction of All Armed Forces and All Armaments; Conclusion of an International Convention (Treaty) on the Reduction of Armaments and the Prohibition of Atomic, Hydrogen and Other Weapons of Mass Destruction Res 1148.

At the end of 1958, the United Nations again held into consideration outer space related activity, this time with a sole focus on facilitating a pathway to ensure peaceful uses of outer space. In a UN General Assembly Resolution 1348 (XIII) an *ad hoc* Committee on the Peaceful Uses of Outer Space (COPUOS) was established to foster international cooperation, organize mutual exchange of information, coordinate national research programmes for the study of outer space, and facilitate legal problems which could arise in the exploration of outer space. The following year COPUOS would be made a permanent committee by UN General Assembly Resolution 1472 (XIV) *International cooperation in the field of the use of outer space for peaceful purposes*, and would become the key international Outer Space instrument, composed of both a Legal and Technical subcommittee.

In the meantime, technological progress had also inspired bilateral and national actions. In response to the launch of *Sputnik* 1, Eisenhower realized the need for a specialized U.S. space program. In an effort to showcase U.S. leadership in an open and peaceful way, and so as not to enlarge what Eisenhower coined the military-industrial complex, he decided best to make a civilian based space agency upon the already existing National Advisory Committee for Aeronautics.[39] He signed the National Aeronautics and Space Act of 1958 establishing the National Aeronautics and Space Administration.

In a letter correspondence between U.S. President Eisenhower and Premier of USSR Nikolai Bulganin and later First Secretary Nikita Khrushchev, Eisenhower had made a proposal regarding outer space. In the letter from Eisenhower to Bulganin, Eisenhower writes:

> *I propose that we agree that outer space should be used only for peaceful purposes. We face a decisive moment in history in relation to this matter. Both the Soviet Union and the United States are now using outer space for the testing of missiles designed for military purposes. The time to stop is now.*[40]

In response to Eisenhower's plan for a peaceful use of outer space Khrushchev replied with a willingness to make outer space an area dedicated to scientific cooperation and peaceful uses. However, Khrushchev interprets a flaw in the proposal, pointing out that by calling for the prohibition of intercontinental ballistic rockets while not addressing the security issue posed by shorter ranged rockets placed on foreign military bases the United States was seeking a one-sided security privileged position.[41]

[39] Newell, H. E. (1980). Beyond the Atmosphere: Early Years of Space Science. Washington DC: NASA.
[40] Eisenhower, D. (1958). *Letter to Nikolai Bulganin, Chairman, Council of Ministers*, U.S.S.R. Retrieved from The American Presidency Project: https://www.presidency.ucsb.edu/documents/letter-nikolai-bulganin-chairman-council-ministers-ussr
[41] Khrushchev, N. (1958, April 24). Text of Latest Khrushchev Letter to President Eisenhow-

The momentum for the development of international government of outer space only grew more robust. President John F. Kennedy in his address to the UN General Assembly 16th Session said:

> *All of us salute the brave cosmonauts of the Soviet Union. The new horizons of outer space must not be driven by the old bitter concepts of imperialism and sovereign claims. The cold reaches of the universe must not become the new arena of an even colder war. To this end, we shall urge proposals extending the United Nations Charter to the limits of man's exploration of the universe, reserving outer space for peaceful use, prohibiting weapons of mass destruction in space or on celestial bodies, and opening the mysteries and benefits of space to every nation.*[42]

A couple months following this speech, the UN General Assembly would continue incremental steps to outer space organization by adopting Resolution 1721 (XVI) *International cooperation in the field of the use of outer space for peaceful purposes* wherein it is declared that International Law, including the Charter of the United Nations, is applicable to outer space and celestial bodies and that such terrains are free from the subject of national appropriation. The resolution further created a public registry in which States launching objects should share such information promptly with the registry.

It was not only to the United Nations which John F. Kennedy spoke to the spirit of international cooperation in outer space, but also in correspondence with Nikita Khrushchev. In his March 7, 1962, letter to Khrushchev, Kennedy outlined a proposal for a common action in space exploration.[43] A joint operating global weather satellite system was proposed, and it would be on this basis that later two scientists from the U.S. and USSR would serve as diplomats realizing this bilateral agreement. A.A. Blagonravov and H.L. Dryden after a series of meetings were able to successfully negotiate the first memorandum of understanding to implement a bilateral space agreement of 8 June 1962 between the U.S. and USSR.

Within this time frame the Soviet Union and United States would not only work on scientific cooperation but negotiate a test ban on nuclear weapons in the atmosphere, outer space, and sea. The early 60s negotiations largely done between U.S. diplomat Averell Harriman and Soviet diplomat Andrei Gromyko resulted in the 1963 signing of the Treaty Banning Nuclear Weapon Tests in the

er. The New York Times Digitized Archive, p. 2. https://www.nytimes.com/1958/07/04/archives/text-of-latest-khrushchev-message-to-eisenhower.html

[42] Kennedy, J. F. (1961, September 25). *Address before the General Assembly of the United Nations.* Retrieved from John F. Kennedy Presidential Library and Museum: https://www.jfklibrary.org/archives/other-resources/john-f-kennedy-speeches/united-nations-19610925

[43] Kennedy, J. F. (1962). *USSR: Kennedy - Khrushchev letters, 1962.* Retrieved from John F. Kennedy Presedential Library and Museum: https://www.jfklibrary.org/asset-viewer/archives/JFKPOF/126a/JFKPOF-126a-006

Atmosphere, in Outer Space and Under Water (Partial Nuclear Test Ban Treaty). The treaty was significant in advancing a peaceful precedent for the use of outer space.

Contemporaneously the work of the United Nations would support this precedent in its General Assembly adoption of the first legal principles governing outer space. Titled, *Declaration of Legal Principles Governing the Activities of States in the Exploration and Uses of Outer Space*, Resolution 1962 (XVIII), states solemnly declared that exploration and use of outer space should be guided by nine principles. The nine principles included concepts such as use of outer space for the benefit of all mankind, freedom for exploration by all States in accordance with international law, the lack of national appropriation of celestial bodies, the existence of international responsibility for national activity in outer space, the acknowledgement of astronauts as envoys of mankind with obliged assistance in the case of emergency.

Second session of the United Nations Committee on the Peaceful Uses of Outer Space, United Nations Headquarters, New York, 10 September 1962

Source: www.un.org

Building upon the momentum of the Partial Nuclear Test Ban Treaty, Foreign Minister Gromyko spoke to the UN General Assembly in September of 1963 expressing the Soviet Union's desire to conclude an agreement banning the orbiting of objects carrying nuclear weapons. This was met with a statement by Ambassador Adlai Stevenson declaring that the U.S. had no intentions for orbiting or installing on celestial bodies, weapons of mass destruction. The declarations were greatly welcomed by the UN in its 1884 (XVIII) resolution, and it would call further action upon such sentiment by states.

By 1966, substantial progress on a universal treaty for outer space could be seen. In the fifth session of the Legal Sub-Committee of COPUOS, both the USSR and the U.S. had submitted draft treaties on the exploration and use of outer space, the Moon, and other celestial bodies for consideration.[44] In addition to the draft treaties, the sub-committee had successfully been able to come to agreement on nine articles for a proposed treaty.

This progress would culminate to the December 19, 1966, General Assembly Resolution 2222 (XI) in which the general assembly adopted the 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) and requested the depository governments to open the treaty for signature as soon as possible. Shortly thereafter on January 27, 1967, The Outer Space Treaty was opened for signature by the Soviet Union, United Kingdom, and the United States. The treaty, consisting of seventeen articles, largely expanding on the principles drawn up in the UN General Assembly Resolution 1962 and the nine articles of agreement by the legal sub-committee, would consequently form the basis of international

[44] Completed copies of both draft treaties can be read in the appendices of the COPUOS Report of the Committee on the Peaceful Uses of Outer Space, A/6431.

space law and would enter into force later that year in October 10, 1967.[45]

In the 1967 sixth session of the Legal Sub-Committee two working groups would be established to work on drafting text for an agreement on liability of for damages caused by launching objects into outer space and a draft agreement on the assistance to and return of astronauts and space vehicles. Included in the meeting were introductions of revised draft agreement on the rescue of astronauts in the event of accident or emergency landing by the Soviet Union, Australia and Canada, with draft text proposed changes by countries such as Argentina, Italy, the U.S., and the U.K.[46] The work of this committee would be realized when the General Assembly would reach a consensus agreement in its Resolution 2345 (XXII) Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space in December of 1967. The agreement was a further elaboration of articles V and VIII of the Outer Space Treaty and would open for signature in April of 1968 and come into force the third of December 1968.

In 1968, COPUOS would center its focus around the first UN sponsored conference on outer space UNISPACE I. The conference advanced the conversation surrounding space science, technology, and international cooperation. The Legal Sub-Committee was tasked with setting the frameworks for an agreement concerning the liability for damage caused by objects launched into outer space. The Legal Sub-Committee would consequentially work on this text and in its tenth session in June of 1971 would adopt the draft Convention on International Liability for Damage Caused by Space Objects. The agreement which was an expansion on article seven of the Outer Space Treaty would reach consensus in the General Assembly's resolution 2777 (XXVI), and open for signature subsequentially in March of 1972 and come into force the first of September 1972. The next large legislative project to come to fruition would be the Registration Convention which was adopted by the UN General Assembly in its Resolution 3235 (XXIX). The convention would open for signing in January of 1975 and enter into force the following year in September of 1976.

In the meanwhile, outer space cooperation between the Soviet Union and United States would continue. A result from the 1972 *Agreement Concerning Cooperation in the Exploration and Use of Outer Space for Peaceful Purposes* signed by U.S. President Nixon and Soviet Chairman Alexei Kosygin was the historic handshake in outer space, *Apollo-Soyuz space mission*.[47] In the first crewed

[45] A comprehensive analysis of The Outer Space Treaty and subsequent UN treaties can be found in chapter 2.
[46] Comprehensive readings of the draft proposals and proposed amendments can be read in Doc A/6804, Report of the Committee on the Peaceful Uses of Outer Space, 27 September 1967.
[47] *Cooperation in Space.* (1972, May 24). Retrieved from National Archives: https://www.

international space mission the Apollo and Soyuz spacecraft docked to each other, successfully testing an air lock transfer corridor for cooperative space ventures.

As tangible progress kept apace, the Legal Sub-Committee kept hard at work considering the question of man activity on the moon and further guiding principles concerning Earth satellites for television broadcasting, remote sensing, and use of nuclear power sources in outer space. The field of outer space law had grown to a considerable size with the Legal Sub-Committee considering the drafts and work of both national and non-governmental organizations. Organizations such as the Committee on Space Research from the International Council for Science, the European Space Agency, the International Astronautics Foundation, INTERSPUTNIK: International Organization for Space Communications, and International Law Association had throughout these decades joined COPUOS as observer organizations.

Upon implementation of the previous treaties, focus would turn to mans activity on the moon and other celestial bodies. The UN General Assembly resolution 33/16 endorsed the efforts of the Legal Sub-Committee on its work concerning a draft treaty relating to the moon and highlighted this work as a matter of priority. The subsequent session of COPUOS in 1979, the Legal Sub-Committee were able to find compromise over the proposed Austrian draft and ultimately submitted to the General Assembly a draft text for consideration. In its thirty-fourth session by UNGA resolution 34/68 the draft treaty was adopted and called for to be opened to signature. In December of 1979, The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Moon Treaty) was opened for signing. Unlike the preceding four treaties however, the Moon Treaty would take longer to go into effect from a lack of global signatories and commitment to the Treaty. The treaty's more explicit expansion on the demilitarization of outer space, moratorium on exploitation, establishment of an international regime to oversee exploitation of outer space, and the common heritage doctrine drew criticism from both the Soviet Union and the United States which would prevent either country from signing the treaty. However, following the fifth required ratification which came from Austria, the Moon Treaty went into effect in 1984. The Moon Treaty would be the last of the UN's five main treaties governing activity in outer space, and in place of further treaty development the UN would adopt principles to continue shaping the international norms of outer space.

Beyond the first Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space adopted in 1962, the UN General Assembly would continue later to adopt four more sets of guiding principles to expand the legal regime of outer

archives.gov/presidential-libraries/events/centennials/nixon/exhibit/nixon-on-line-exhibit-agreement.html

space law. The Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting was adopted in 1982, UN General Assembly Resolution 37/92. The Principles Relating to Remote Sensing of the Earth from Outer Space was adopted in UNGA resolution 41/65 in 1986, followed by the 1992 UNGA resolution 47/68 which adopted the Principles Relevant to the Use of Nuclear Power Sources in Outer Space. The final principles adopted by UNGA resolution 51/122 in 1996 reiterated support of a peaceful and cooperative outer space regime but with a special consideration towards developing countries, 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.

As evident, the discussion of outer space law has far stretched roots with over a century of discourse and progress. Outer space law developed from academic concepts to actualized jurisprudence in international bodies by the collective work of experts, scientists, enthusiasts, and lawyers. The innate cooperative scientific environment which enabled rocket development inspired the foundation of outer space law as seen in the fundamental treaties and sets of guiding principles adopted by the United Nations.

As much as the peaceful and cooperative tenants are integral to the outer space international norm so are the questions of national interest and military defense in outer space. Despite the effort and collaboration, the framework produced was vague and ambiguous, due largely to its historical timeframe and limitation of foresight. This framework has proven to be insufficient and has prompted continuous issues over common understandings of terms, pathways for verification, and even at times universal support and cooperation on preventing the weaponization of outer space.

The historical security concern of the last century had a primary focus on the threat from nuclear weapons and WMDs. This context influenced the interpretation of security concerns for outer space, and in doing so comprehensively addressed the threat of nuclear weapons to and from outer space by prohibiting their testing, deployment, and orbit in outer space or on celestial bodies. However, in doing so the legal outer space regime only partially ensured the non-weaponization of outer space and failed to be foreword looking and inclusive of a diverse set of threats including conventional and other non-WMD weapons. The international framework of the last century proves to be insufficient when addressing contemporary threats and risks to outer space security.

The historical security concern of the last century had a primary focus on the threat from nuclear weapons and WMDs

1.1 THE CONCEPT OF MILITARY USES IN OUTER SPACE AND ITS IMPLICATIONS FOR OUTER SPACE SECURITY

Despite the global pressure to create an international norm for peaceful uses in outer space, the national motive pushing military activity in outer space persisted. The legal framework of outer space was ultimately constructed with these conflicting principles influencing its development as evident from early discussions regarding upper sovereignty of outer space for national security by experts such as Evgeny A. Korovin and John Cooper.

Dialogue prioritizing national security in outer space would be actualized through the early national reconnaissance programs. The United States Air Force, even before Sputnik in 1955, would commission the development of an advanced reconnaissance satellite. The program would eventually lead to the CORONA Project[48], the United States' strategic reconnaissance capability, which after trials conducted its first successful on-board camera mission in the fall of 1960.[49] The satellite, with an orbital path over the USSR and China, had its photographs successfully developed from the film retreived from its descent capsule. Similarly, the Soviet Union was running their reconnaissance Zenit program[50], which succesfully returned with photographs in 1962.

Further juxtaposition of creating a peaceful regime with considerations for national security could be seen during the time leading up to the Outer Space Treaty. While representatives of the Soviet Union and United States were submitting drafts of the Outer Space Treaty containing language regarding international cooperation and promises of peaceful applications to the Legal Sub-Committee for consideration, their national governments were conducting bombardment satellite testing, preliminary anti-satellite systems, and hosting policy debates around orbital weapon systems.[51]

The concept of military uses in outer space would only continue to expand. In the U.S., the Carter administration initiated the National Space Policy, wherein the militarization of outer space was cemented through the notion that, "the United States will pursue activities in space in support of its right of self-defense".[52] In addition, the following administration of Ronald Reagan continue would strengthen the U.S. military aspect by initiating the Strategic Defense Initiative an anti-ballistic missile program meant for shooting down nuclear missiles from space.

Contemporary political initiative has shown an increased

[48] CORONA Project went under the civilian name Discoverer.
[49] Hall, R. C., & Neufeld, J. (1998). *The U.S. Air Force in Space 1945 to the Twenty-first Century*. Washington D.C.: USAF History and Museums Program.
[50] Zenit program went under the civilian name Cosmos.
[51] Take for consideration the Bold Orion Program and project SAINT satellite interceptor of the Eisenhower administration.
[52] United States Presidential Directive/NSC-37. May 11, 1978

interest in outer space for defense and military use, as is especially evident by the creation of overt military space programs by multiple nations. The United States under Space Policy Directive-4 in 2019 initiated the United States Space Force with objectives such as, "projecting military power in, from, and to space in support of our Nation's interests". Within this France also in 2019, created its Space Command placed under its Air Force, later changing the name of its Air Force to Air and Space Force in 2020. Similarly, in 2020 Japan formed their own Space Operations Squadron housed as part of the Japanese Air Self-Defense Force. In addition, the 2021 Defense of Japan white paper has an entire dedicated portion to its objectives in space domain and security.[53] The United Kingdom in 2021 created its Space Command under the Royal Air Force, and Australia in January of 2022 unveiled its new Defense Space Command in tandem with its Defense Space Strategy. South Korea also in 2022, unveiled its new Military Space Branch and released its first defense space strategy. Nations such as China and Russia, who had existing robust space programs with already integrated military aspects continue to show high level support of their programs in alignment with their national security goals. Outer space defense strategy has even transcended national agendas, as NATO in 2019 adopted its strategic Space Policy and more importantly declared outer space as its fifth operational domain.[54]

Currently the number of military space programs as well as commercial, governmental, and private actors in outer space are growing. With this comes emerging technologies that challenge the *peaceful* principles of outer space and expose ambiguity in the existing legal regime. The Outer Space Treaty was a product of the Cold War environment and an attempt to contain military tension from sprawling into outer space. Although it showed great diplomatic cooperation between the Soviet Union and United States and undoubtedly provided outer space exploration with a solid framework of guiding principles, the Outer Space Treaty did not manage to prevent geopolitics nor the threat of space weaponry from entering outer space. Contemporary criticisms of the outer space legal regime point out that the Outer Space Treaty is largely technologically agnostic, without definitions of important terms such as *peaceful purposes* and with a significant allowance of freedom for space actors. The following is a concise survey of emerging technologies and their relative points of contention in the domain of outer space, which challenge the peaceful environment of outer space and exist in the grey areas allowed within the existing legal framework.

Currently the number of military space programs as well as commercial, governmental, and private actors in outer space are growing

[53] Japanese Department of Defense (2021). Defense of Japan 2021 [white paper].
[54] NATO. (2019, November 20). Foreign Ministers take decisions to adapt NATO, recognize space as an operational domain. Retrieved from North Atlantic Treaty Organization: https://www.nato.int/cps/en/natohq/news_171028.htm

DUAL USE NATURE OF SPACE ASSETS

It is necessary to outline the inherent dual-use nature of outer space assets. Since the technology of space launched vehicles was largely dependent on the developments of ballistic missile technology, it naturally ensues that the fruits of civilian space activity would also carry military value. Upon introduction satellites gave valuable reconnaissance data, communications capabilities, early ballistic missile warnings, weather data, and arms control verification. While satellites continue to provide this information, the scope of their data and function has integrated itself far more in the global economy and security spheres. Satellite data has proven itself essential to global civilian activities in applications such as NAVSTAR global positioning services (GPS). Geospatial datasets are increasingly more valuable to economies for enhancing the accuracy of estimation tools in stock markets. As satellite data enhances global civilian activity so can they act as a force multiplier, increasing a state's war-fighting potential. For example, missile defense systems offered from companies like ExoAnalytic Solutions, use satellite data to create algorithms capable of identifying targets for interception with increasing precision and predictability.[55] Advanced weather mapping and navigation satellites can be used for battle assessment, intelligence, surveillance, target acquisition, reconnaissance, increased situational awareness, and increased precision-guided munitions.[56] Satellites for civilian communications services may support high-volume military and battle management communications. The nature of dual-use capabilities also poses a unique threat to non-governmental actors in space. As humanitarian law does not explicitly reference dual-use assets, but rather categorically aligns them with military objects due to their purpose or use, non-governmental satellites may be vulnerable to military targeting in the event of conflict.[57]

However, it is not only satellite services and data which are capable of dual use. There is an emerging distinction between dual use and dual purpose. Dual use, like in the case of satellite services, is when the service or product itself may be used for different intentions while the service or data itself remains the same. Dual purpose on the other hand is when a space asset can be repurposed from one activity to another. For example, satellites like the Canada Arm, which provide space debris removal services have the ability to be repurposed for aggressive intent. One can imagine the space debris removal satellite using its capability in a military manner taking another satellite. Another example is

[55] ExoAnalytic Solutions. Missile Defense Technology. https://exoanalytic.com/missile-defense/

[56] Rajagopalan, R. P. (2019). Electronic and Cyber Warfare in Outer Space. Geneva. UNIDIR.

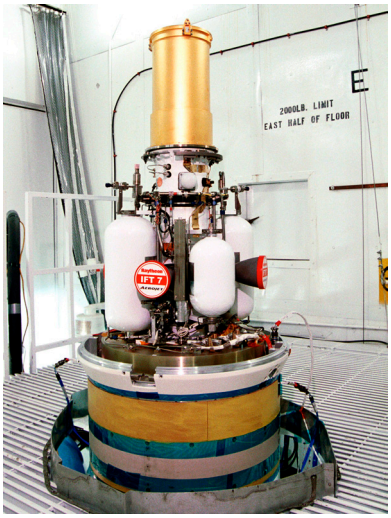
[57] In Article 52(2) of the 1977 Additional Protocol I to the 1949 Geneva Conventions relating to the Protection of Victims of International Armed Conflicts, military objects are "those objects which by their nature, location, purpose or use make an effective contribution to military action and whose total or partial destruction, capture or neutralization, in the circumstances ruling at the time, offers a definite military advantage".

rocket launch vehicles. Although launch vehicles have the inherent benign purposes of delivering space assets to orbit, there exists the possibility to repurpose their projection and convert them to anti-satellite missiles destroying a satellite. The dual purpose of these capabilities is also not addressed within outer space law.

The overall issue of dual use has raised questions as to what constitutes peaceful space activity since the inception of outer space activity. However, due to the immense and diverse wealth of abilities of these assets, current dialogue surrounding space security has acquiesced to the need to focus on state behaviors and actions directed toward these assets through arms control, rather than discuss limiting the hardware or capabilities of such assets which becomes increasingly difficult and nuanced.

KINETIC ENERGY AND CONVENTIONAL WEAPONS

Kinetic weapons can be any mass traveling at varying velocities, that converts either its entire or partial mass into energy upon impact with a target.[58] A kinetic weapon relies on the kinetic energy of an object, in comparison to the chemical or nuclear energy of WMDs, or the electromagnetic energy of directed energy weapons. Conventional weapons is a much broader term, which encompasses some kinetic weapons such as bullets and shrapnel, but also expands to missiles, bombs, rockets, and so forth. For the purposes of this research, kinetic is paired with conventional for their overlapping nature and implementation in outer space. Current existing kinetic weapons systems can be found with or without a payload. For example, the Exoatmospheric Kill Vehicle of the U.S. destroys long-rage ballistic missiles without explosives. The kill vehicle separate itself from the missile and via rockets and sensors, guides itself into the path of the targeted missile, destroying it on impact. Whereas the Russian co-orbital anti-satellite system equips a weapon with a conventional payload and launches it into the same orbit as the targeted satellite until it is guided to the satellite for detonation.



A prototype exoatmospheric kill vehicle is readied for launch from Meck Island at the Kwajalein Missile Range on December 3, 2001

Source: www.osd.dtic.mil

Within this category of weaponry exists anti-satellite weapons (ASAT). As was forementioned the value of satellites is insurmountable to civilian and military activity, and the concept of ASATs have existed since satellites themselves. The inception of ASAT activity dates back to 1968, when the Soviet Union successfully exploded satellite *Kosmos* 249 and *Kosmos* 252, while they were in the same orbital path as *Kosmos* 248, proving the possibility of satellite destruction.[59] In previous decades there existed cycles of ASAT testing and activity balanced with periods of cooperation and test moratoriums. In 1971, The Agreement on Measures to Reduce the Risk of Outbreak of Nuclear War was signed between the U.S.

[58] Sproull, D. (2017). Kinetic Energy Weapons The Beginning of an Interagency Challenge. InterAgency Journal, 62-68.
[59] Stares, P. (1985). The militarization of space: U.S. policy, 1945-1984. Ithica: Cornell University Press.

and U.S.S.R requiring an immediate notification to the other nation if signs of interference with missile warning systems were detected. Shortly following in 1972, The Treaty on the Limitation of Anti-Ballistic Missile Systems prohibited the interference of nations verification measures, which was understood to be reconnaissance satellites. Following these agreements however, ASAT testing resumed by both nations, with U.S. focusing more heavily on their Air-Launched Miniature Vehicle and the U.S.S.R. on their co-orbital system. The 1985 U.S. testing and destruction of the Solwind satellite proved the destructive consequences of ASAT technology, with the last piece of tracked debris not falling from orbit until 2002. The destruction of Solwind motivated a short period of parallel cooperation, namely the self-imposed voluntary testing moratorium by the Soviet Union and the U.S. congressional ban on ASAT weapons testing. Although nations continued to research and pursue ASAT technology, the 2007 direct-ascent ASAT testing by China ushered in a new wave of attention to space security for disrupting a 20-year period of non-destructive ASAT testing and creating more persistent space debris than any previous test before it. Since then, not only has there been introduction of new national ASAT programs with the successful Indian Mission Shakti testing in 2019, but continued ASAT testing has persisted with the most recent being the Russian testing of its direct-ascent ASAT in November 2021. This technology holds deep implications for the norms and safety of space. The consequences of space debris, as to be discussed, demands this issue be addressed promptly, especially as more nations express an interest in developing their own ASAT capabilities.

The consequences of space debris, as to be discussed, demands this issue be addressed promptly, especially as more nations express an interest in developing their own ASAT capabilities

It is not only ASAT systems, but also hypersonic weapons systems, which have been gaining global attention. According to an article in the Russian International Affairs Council the major defining characteristics of a *hypersonic weapon* is its ability to maneuver while traveling at speeds exceeding Mach 5.[60] Although their consideration may be more suited to the overall discussion of a contemporary arms race, there exists specific concern for their repercussions to outer space security norms. Space Force Lieutenant General Chance Saltzman, argues hypersonic weapons are categorically different than intercontinental ballistic missiles (ICBM) for having a fractional orbit, meaning they can orbit until the user de-orbits the weapon as part of its flight path, rather than being suborbital, or in other terms never reaching orbit.[61] Although important to consider, fractional orbit is not particular to just hypersonic missiles as space shuttles and launch vehicles could also be considered hypersonic objects with fractional orbit capabilities. In general, the disruptive impact of

[60] Stefanovich, D. (2020, April 6). Hypersonic Weapons and Arms Control. Retrieved from Russian International Affairs Council: https://russiancouncil.ru/en/analytics-and-comments/analytics/hypersonic-weapons-and-arms-control/

[61] Mitchell Institute for Aerospace Studies. (2021, November 29). Spacepower Forum: Lt Gen B. Chance Saltzman. Retrieved from Mitchell Aersospace Power: https://mitchellaerospacepower.org/event/spacepower-forum-lt-gen-b-chance-saltzman/

hypersonic weapons to stability is debated, as experts such as James Acton argue against the belief that they cannot be defended against and are therefore large disruptors to security balance.[62] Although the somewhat novelty of hypersonic weapons makes it difficult to prove that such systems are designed and capable of a protracted orbital period, the argument raises questions for the implications of hypersonic weapons to outer space and more broadly on the possibility to use different orbit capabilities in a future definition of space weapons.

DIRECTED-ENERGY WEAPONS

Directed-energy (DE) weapons can be characterized as the propagation of destructive electromagnetic energy at very high speeds. According to the United States Department of Defense, directed-energy weapon is used as an umbrella term for covering technologies which "produce a beam of concentrated electromagnetic energy or atomic or subatomic particles".[63] Since the electromagnetic spectrum includes energy from radio waves to higher frequency light energy, this class of weapons has a wide variety with corresponding levels of use and destruction. Such examples of DE weapons include, high-power radio or microwave frequency devices, electronic jammers, charged or neutral particle beams, and high-energy lasers.

The lethality or destructive power of DE weapons is tied to the amount of energy transferred to a target over time, the energy of the particle, and the type of particle itself. The incentive for their use and development is influenced by the speed of light engagement which cuts response times compared to kinetic or conventional weapons, the ability for stealth performance, the precision targeting for lethal and non-lethal applications, and their ability to deny, degrade, disrupt, or destroy weapons systems.[64] Examples of DE weapon applications includes the U.S. 30 kW class solid state laser weapon system (LaWS) deployed on the USS *Ponce*, the Russian Peresvet laser weapon system, or Chinese 33 kW Silent Hunter laser air defense system by Poly Technologies.

A report by RAND on the plausible development and analysis of space weapons concluded that the scaling up of power levels and component sizes needed for a space-based DE weapon with destructive capability would prove extremely challenging and costly, without any likely successful results in the foreseeable future.[65] Although an effective destructive space-based DE weapon may yet be out of reach, the prospect of using an Earth based DE weapon

[62] Acton, J. (2018). *Hypersonic Weapons Explainer.* https://carnegieendowment.org/2018/04/02/hypersonic-weapons-explainer-pub-75957
[63] United States Department of Defense (2012). Department of Defense Joint Publication 3-13.1, Electronic Warfare. Washington D.C.: Department of Defense.
[64] Obering, H. (2019). Directed Energy Weapons Are Real... And Disruptive. PRISM, 36-47.
[65] Bob Preston, D. J. (2002). Space Weapons Earth Wars. RAND Corporation.

for counter-space capability is gaining international traction. With the world increasingly dependent on the services of outer space satellites, the denying and disrupting of satellite systems through processes of jamming or spoofing could have great consequences and military advantage. Jamming interferes with communications by generating noise in the same frequency band and within the field of view of the antenna on the satellite or receiver it is targeting.[66] Whereas in the process of spoofing, an attacker attempts to trick a receiver into interpreting a fake signal, therefore injecting false or corrupted data to communication systems.[67] Further incentivizing the development of DE anti-satellite systems is the inherent difficulty of attribution due to the nonphysical nature of a DE denial attack. Additionally, the non-destructive outcome does not contribute to the issue of space debris, making it more optimal for preserving the use of outer space long term. It is not only via jamming and spoofing capabilities that DE weapons systems are being pursued, but DE laser-based systems could have the ability to blind reconnaissance satellites through a process called *dazzling*.[68]

CYBER

Cyber counter space capabilities rely on targeting data itself and the systems which use data. When considering the entire environment of satellites including, antennas on satellites and in ground stations, satellite user terminals, and landlines connecting the ground stations to the extra-terrestrial networks, the number of nodes vulnerable to cyber-attacks are apparent.[69] Similar to DE attacks, the deniability and difficulty of attribution propels the interest in cyber counter space use. However, even more incentivizing compared to previous attack systems is the relatively low barrier to entry. Although a high level of technological sophistication is needed, the resource requirement may not be as demanding, making basic cyber counter space capability more accessible to nations and non-state actors who can either work independently or under contract of a state.

Cyber-attack on space assets could include data monitoring, theft, denial, alteration, insertion of false and corrupted data, widespread disruption, data loss, and in a severe circumstance the loss of a satellite if the command-and-control center is compromised. The varying degrees of severity in conjunction with the wider accessibility, makes cyber counter space activities increasingly threatening to outer space assets and outer space data collection.

[66] T. Harrison, K. J. (2018). Space Threat Assessment 2018. Washington DC: Center for International and Strategic Studies.
[67] Ibid.
[68] Rajagopalan, R. P. (2019). Electronic and Cyber Warfare in Outer Space. UNIDIR.
[69] Rajagopalan, R. P. (2019). Electronic and Cyber Warfare in Outer Space. UNIDIR.

SPACE DEBRIS

Space debris refers to both human made artificial fragments and natural meteoroids. Natural meteoroids are in orbit around the sun, while most of the artificial debris is in orbit around the Earth. In comparison to each other, natural meteoroids do not represent as much of a danger to space assets due to their low impact probability.[70] The danger of natural debris is non-negligible, but artificial orbital debris is a growing concern for outer space politics and security due to its origins and increasing quantity being directly connected to human space activity.

Artificial orbital debris is any human made object in outer space that is no longer serving a function such as, nonfunctional spacecraft, abandoned launch vehicle stages, and fragmentation debris. Organizations such as the United States Department of Defense and the European Space Agency maintain catalogs of space debris in orbit ranging from five centimeters to one meter, with the current U.S. Department of Defense's Space Surveillance Network tracking nearly 30,990 objects. The threat of orbital debris on space assets comes from the inherent destructive nature of objects colliding at extremely high velocities in orbit, approximately 10km/s. With such dangerous velocities miniscule debris such as a paint chip can cause slight damages to the exterior of space assets while any object larger than 10cm has the potential to shatter and incapacitate a satellite or part of a spacecraft.

A collision of a space asset with space debris is not only problematic for the affected space asset but increases the danger for all other assets by raising the number of orbital debris. In 2009, a defunct Russian spacecraft collided with the U.S. Iridium commercial spacecraft, adding more than 2,300 large trackable debris, and even more fragments to the smaller debris category.[71] This cycle of debris generation and its increase to the probability of further collision can be considered the ultimate detriment of space debris to the continued use of outer space, as described by the Kessler Syndrome.[72]

The growing commercial space sphere and decreased costs of satellites will influence the future amount of space debris. To give an example, the United States Federal Communications Commission in 2018 granted the commercial enterprise SpaceX to deploy and operate nearly 12,000 satellites.[73] When compared to the entire

Although a high level of technological sophistication is needed, the resource requirement may not be as demanding, making basic cyber counter space capability more accessible to nations and non-state actors who can either work independently or under contract of a state

[70] Cevolani, L. F. (1997). Impact probabilities of meteoroid streams with artificial satellites: An Assessment. Il Nuovo Cimento, 211-215.
[71] NASA. (2021, May 26). Space Debris and Human Spacecraft. Retrieved from National Aeronautics and Space Administration: https://www.nasa.gov/mission_pages/station/news/orbital_debris.html
[72] Kessler, D. J., Cour-Palais, & Burton, G. (1978). Collision frequency of artificial satellites: The creation of a debris belt. Journal of Geophysical Research, 2637-2646.
[73] In March, 2018 the Federal Communications Commission approved the first 4,425 satellites by Memorandum Opinion, Order and Authorization BFS File No. SAT-LOA-20161115-00118 https://transition.fcc.gov/Daily_Releases/Daily_Business/2018/db0329/FCC-18-38A1.pdf, followed by a second Memorandum Opinion, Order and Au-

number of satellites launched to date, a total of 12,720 (nearly 2,000 of which have been SpaceX launches) according to the European Space Agency, we can anticipate the significance of commercial activity in outer space and its effects on space debris.[74] The initial launching of the SpaceX satellites was not without effect, as in 2019 the European Space Agency's Aeolus satellite had to perform an evasive maneuver to avoid collision with one of the SpaceX satellites.[75] The existing quantity of space debris in addition to the possible increase from expanding outer space enterprises and number of actors poses regulatory, communication, and security challenges to continued safe operations in outer space.

A SpaceX Falcon 9 rocket lifts off from Kennedy Space Center in February 2018.

Source: www.thehill.com

Upon assessing the varying threats of emerging technologies to a peaceful outer space it is important to distinguish between the militarization of outer space and the weaponization of outer space. As was clearly described through U.S. and Soviet outer space surveillance and reconnaissance programs, outer space activity has been militarized since its inception. Outer space is de facto a domain wherein national militaries have and will continue to operate. What is needed is a shared understanding between peaceful military uses and aggressive military uses. However, the dual use nature of space assets complicates this line. The global community must come to consensus on where they believe the threshold for peaceful use is breached when these systems are directly contributing to aggressive armed conflict on Earth.

Furthermore, it should be emphasized that although there are no attack systems specifically designed as space weapons currently deployed in outer space, this does not preclude their eventual deployment. The present status quo allows for space weapon testing and development. History has proven that with innovation comes more advanced weapon systems, and we should assume a similar trajectory for outer space. Therefore, the global community must capitalize on the current lack of deployed space-Earth and space-space weapons and forge agreements to ensure the prohibition of their development and deployment. Regarding Earth-space systems, the growing prevalence, testing, and development of these capabilities, such as ASATs, jamming, and spoofing have complicated international progress on their regulation and or prohibition. Yet these capabilities in some cases have lethal consequences not only to the space asset itself, but to critical human infrastructure on Earth, exponentially increasing their harmful consequences. The global

thorization approving the deployment and operations of 7,518 satellites. IBFS File No. SAT-LOA-20170301-00027, file:///C:/Users/User/Downloads/FCC-18-161A1_Rcd.pdf

[74] European Space Agency (2022). Space debris by the numbers. Retrieved from European Space Agency: https://www.esa.int/Safety_Security/Space_Debris/Space_debris_by_the_numbers

[75] Agency, E. S. (2019, March 9). ESA spacecraft dodges large constellation. Retrieved from European Space Agency: https://www.esa.int/Safety_Security/ESA_spacecraft_dodges_large_constellation

community cannot be satisfied with a status quo that supports technology development without regard for its implication and consequence if left to be used in or towards outer space. Especially given the fragility of the outer space environment. Outer space does not have the capacity to support weapons testing and development while we reach global consensus, as has been the case in adjacent arms control efforts. Even one conflict that we allow to break out in outer space could render the entire domain inaccessible, permanently affecting modern human life.

It is therefore, important to analyze the current legal framework and understand how the weaponization of space is made possible and to what extent it may allowed to expand. By a thorough analysis of the existing legal and political regime and the authoritative bodies in charge of outer space order, we may be able to best apply a strategy to preserve outer space as an environment conducive to international cooperation and progression of humankind.

CHAPTER 2. THE EXISTING OUTER SPACE GOVERNANCE REGIME

This chapter aims to analyze the existing regime which governs outer space. Included in this analysis are both binding and non-binding political and legal activity including, treaties, resolutions, international agreements, domestic law and policy, voluntary political action, principles, and established norms concerning outer space behavior. To consider just any one of these political processes would be insufficient as it is through the implementation of all these processes that establish a successful governing regime.

These legal and political processes will be analyzed at the international, regional, and national levels, considering the work of both governing bodies and organizations. Ultimately it is for the purpose of identifying vulnerabilities in the existing regime that allow for the potential weaponization of outer space and continued existence of outer space threats that such an analysis is necessary.

2.1 INTERNATIONAL FRAMEWORKS

UNITED NATIONS

As explored through the historical overview, the United Nations has a robust history concerning regulating outer space activity. On the topic of outer space, UN engagement has been housed in to two of its six main organs, the General Assembly and the Secretariat.[76] Under the UN Secretariat exists the United Nations Office for Outer Space Affairs (UNOOSA). UNOOSA is responsible for assisting nations in building their space sector capacity to accelerate sustainable development, working towards the sustainability of space activities, and fostering international solutions to the issues of space debris. UNOOSA also expands states capacity for understanding the fundamentals of international space law and drafting national space policy, maintains the Registry of Objects Launched into Outer Space, and services and supports COPUOS.[77]

COPUOS established first as an *ad hoc* committee in 1958 by UNGA resolution 1348 (XIII), was made a permanent committee to the UNGA the following year by UNGA resolution 1472 (XIV).[78] COPUOS was integral to the creation of the five legal treaties and five guiding principles concerning outer space activity under the auspices of the UN and continues to report to the UNGA Fourth Committee on

[76] United Nations Department of Global Communications. (2021, July). UN System Chart. Retrieved from United Nations: https://www.un.org/en/pdfs/un_system_chart.pdf
[77] UNOOSA. (2022, May 1). *Roles and Responsibilities*. Retrieved from United Nations Office for Outer Space Affairs: https://www.unoosa.org/oosa/en/aboutus/roles-responsibilities.html
[78] UNGA. (1961). *International Co-Operation in the Peaceful Uses of Outer Space*, U.N. Res 1721 (XVI).

the international cooperation in the peaceful uses of outer space. It is important to distinguish that for the issue of weaponization of outer space and arms control in outer space, the designated forum is the Conference on Disarmament.[79]

The UNGA's five treaties and principles on outer space contribute to the foundation of international outer space law. The 1962 Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space was an important step in laying the groundwork for 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 (hereinafter Outer Space Treaty or OST).[80] In addition, the Question of General and Complete Disarmament Resolution 1884, consequentially adopted on account of the U.S. and U.S.S.R's Partial Test Ban Treaty, also served as an important influence to the Outer Space Treaty, namely influencing Article IV, on the refrainment of placing nuclear weapons in orbit.[81]

The 1967 Outer Space Treaty serves as a primary contributor to international outer space law with 111 State parties and 23 additional signatories.[82] The treaty contains 17 articles and although the Outer Space Treaty does not solely focus on outer space security, the underlying framework of the treaty emphasizes outer space for *peaceful purposes* as expressed in the preamble. Although the inclusion of *peaceful purposes* was substantial, so in that it had not been an included phrase in the 1962 Declaration of Principles nor in the Partial Test Ban Treaty or Resolution 1884, the absence of a consensus understanding for *peaceful purposes* perpetuated an ambiguous interpretation of the treaty, allowing for the partial weaponization of outer space.

The signing of the Outer Space Treaty, 1967

Source: www.un.org

Article I outlines the legal concept of *province of all mankind* within outer space, stating that "the exploration and use of outer space, [...] shall be carried out for the benefit and in the interests of all countries, [...] and shall be the province of all mankind".[83] Article II outlines the principle of non-appropriation and in tandem, both can be interpreted as focusing on ensuring the exploration and use of space is to be enjoyed by and in the best interest of all states, irrespective of whether they are spacefaring or not.

[79] A further developed discussion on the workings of the Conference of Disarmament regarding Outer Space is present in Chapter 3's analysis.
[80] Principles 1 and 2 correspond to article I. Principle 3 corresponds to Article II, principle 4 to Article III, principle 5 to Article VI, principle 6 to Article IX, principle 7 to Article VIII, principle 8 to Article VII, and principle 9 to Article V.
[81] UNGA. (1963). *Question of general and complete disarmament*, Res 1884 (XVIII).
[82] UNGA. (1967). *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies* Res 2222 (XXI). The status of the treaty, as well as other international agreements relating to activities in outer space compiled is available online at: https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/status/index.html
[83] Ibid.

Article III is more substantive to the discussion of outer space security as it stipulates that:

> *States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the moon and other celestial bodies, in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international co-operation and understanding.*[84]

The importance of this article is in the applicability of *lex lata*[85] to outer space and the wide perspective made available therein to outer space governance. This would include article 2(4) of the UN Charter stating that, "all members shall refrain in their international relations from the threat or use of force against the territorial integrity or political independence of any state…"[86] As well as include international humanitarian law, article 51 of the UN Charter, the Law of Armed Conflict, Law of Neutrality, Principle of Proportionality and so forth. The difficulty of interpretating the corpus of this law specifically to the environment and context of outer space persists, however it is a promising pathway to strengthen and expand on outer space governance and law.

The Outer Space Treaty concerns itself specifically with weaponization of outer space in Article IV, wherein it states that state parties will undertake not to place any weapons of mass destruction into orbit, nor install them on a celestial body or "station such [WMD] weapons in outer space in any other manner".[87] It further elaborates that the moon and other celestial bodies shall be used exclusively for *peaceful purposes*, forbidding such things as establishing military installations, conducting military maneuvers, and testing of weapons. Article IV is prominent in its explicit language and prohibition of nuclear weapons and other weapons of mass destruction, and for its consideration specific to celestial bodies.

Due to this article, the OST enshrines the prohibition at least partially of weaponization in outer space. However, there is no further clarification regarding weapons placement in outer space at large beyond celestial bodies and in consideration of all weapon types. *Peaceful purposes* is again left undefined, and there is no elaboration on weapons launched from Earth to target space assets, nor space based hostile activity directed towards Earth targets. It is important to note that the subsequent 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (herein referred to as the Moon Agreement) which was created to

[84] Ibid.
[85] Lex lata meaning the law as it exists
[86] U.N. Charter art. 2, para. 4
[87] UNGA. (1967). *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies Res 2222* (XXI).

supplement article IV, did not have the same reception as the other four treaties of the UN. Some contentions against the Moon Treaty can be understood through the arguments of Stanley Rosenfield, who at the time the Moon Treaty was being considered, presented to the American Society of International Law's Annual Meeting his position on why the U.S. should not become a member. Points in his argument included topics such as the common heritage doctrine, an international regime on governing exploitation of natural resources on the moon, and overall moratorium on exploitation.[88] The common heritage of manking principle he argues was interpreted differently by nations, whereas the U.S. saw the phrase as having no meaning of an obligatory nature other nations interpreted it as being akin to common property and as Rosenfield argues, "under this interpretation the moon and all celestial bodies are commonly owned by all of mankind. They cannot be exploited except by agreement of the parties".[89] As for a moratorium on exploitation Rosenfield argues that this would disincentivize private enterprise and exploration of the moon in general if an actor is required to be granted permission for commercial exploit by an international regime. The concerns over limiting free enterprise and security interests were drivers against the Moon Treaty, making it the only treaty of the five UN outer space treaties that did not enjoy widespread ratification.[90]

The concerns over limiting free enterprise and security interests were drivers against the Moon Treaty, making it the only treaty of the five UN outer space treaties that did not enjoy widespread ratification

The Rescue Agreement, Registration Convention and Liability Convention were created to augment articles V-VIII, and received wide international support and ratification, the Moon Agreement has received ratification from only 18 States (sans support from space faring nations), in comparison with the 112 for the OST, 99 for the Rescue Agreement, 98 for the Liability Convention, and 72 for the Registration Convention.[91] This is significant for outer space security as the Moon Agreement expands the original parameters of article IV of the OST to include "...orbits around or other trajectories to or around it [the moon]" and "any threat or use of force or any other hostile act or threat of hostile act on the moon is prohibited. It is likewise prohibited to use the moon in order to commit any such act or to engage in any such threat in relation to the Earth, the moon, spacecraft, the personnel of spacecraft or man- made space objects".[92]

Article V of the OST concerns itself with the safety and cooperation of astronauts in outer space. Article V was further expanded on

[88] Rosenfield, S. B., & Smith, D. D. (1980). The Moon Treaty: The United States Should Not Become A Party. Proceedings of the Annual Meeting (American Society of International Law), 74, 162–170. http://www.jstor.org/stable/25658043
[89] Ibid. pg.163
[90] Current ratification of the Moon Treaty consists of only 18 nations, compared to the 112 of the Outer Space Treaty.
[91] Status of International Agreements relating to Activities in Outer Space. Retrieved from United Nations Office for Outer Space Affairs: https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/status/index.html
[92] UNGA. (1979). *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies*, Res 34/68.

in the 1968 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (Rescue Agreement), and further outlined the cooperative process for aiding in astronaut rescue and space object retrieval if found outside the jurisdiction of the launching state. [93] Articles VI and VII of the OST deal with liability and responsibility of space actors, declaring that states bear the international responsibility for activity from both national government capacity and non-governmental and private areas to other State parties in the event of damage. Articles VI and VII were expanded on in the adoption of the 1972 Convention on International Liability for Damage Caused by Space Objects (Liability Convention).[94] Article VI is important in so as it clarifies the relation between private actors and responsibility comparative to the domains of air and sea, which do not implicate a nation state with the responsibility for the actions of its non-governmental sector. However, article VI nor the Liability Convention, answer the question of to what threshold private space actors are to be regulated, held accountable for, or allowed to pursue weaponization in outer space.

Article VIII of the OST is significant in its use of the term registry, a concept to be later enshrined in the 1975 Convention on Registration of Objects Launched into Outer Space (Registration Convention).[95] However, it is not only limited to the language from article VIII that the Registration Convention was created, as article XI of the OST calls for States parties to, "...inform the Secretary-General of the United Nations as well as the public and the international scientific community, to the greatest extent feasible and practicable, of the nature, conduct, locations and results of such [outer space] activities".[96]

It is not only through these treaties and principles that the UN has addressed space security. Within the Tenth Special Session of the General Assembly devoted to disarmament (SSOD) in 1978, states concluded that in order to prevent an arms race in outer space measures should be taken in the proper international negotiations in accordance with the ethos of the OST.[97] This would initiate the formal work surrounding the concept Prevention of an Arms Race in Outer Space (PAROS), to be solidified in the Conference on Disarmament through UNGA resolutions 36/97 C[98] and 36/99[99]

[93] UNGA. (1967). *Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space*, Res 2345 (XXII).
[94] UNGA. (1971). *Convention on International Liability for Damage Caused by Space Objects*, Res 2777 (XXVI).
[95] UNGA. (1974). *Convention on Registration of Objects Launched into Outer Space*, Res 3235 (XXIX).
[96] UNGA. (1967). *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies* Res 2222 (XXI).
[97] General Assembly Resolution S-10/2, 10th Special Session of the United Nations General Assembly on Disarmament: Final Document, para. 80, United Nations document A/RES/S-10/2, para. 80 (Feb. 5 1980).
[98] General Assembly Resolution 36/97 C, 36th Session, on the Prevention of an arms race in outer space (Dec. 9 1981)
[99] General Assembly Resolution. 36/99, 36th Session, on the Conclusion of a treaty on

which called for the Conference on Disarmament to consider verifiable agreements of preventing an arms race in outer space and prohibition of ASATs and for the adoption of an international treaty to prevent the proliferation of arms into outer space.[100]

As witnessed the majority of the Outer Space Treaty does not explicitly address nor attempt to contain a complete arms proliferation in outer space. The Outer Space Treaty had the monumental task of being a forward-looking document considering the entirety of outer space activity. However, the OST serving in a more constitutional role has seen many of its articles interpreted and applied to efforts of preventing an arms race in outer space as to be explored further in the next chapter. In addition, corresponding UNGA resolutions strengthen the UNGA, specifically the Conference of Disarmament, as a mechanism for negotiations and solutions to issue of arms proliferation in outer space.

INTERNATIONAL AGREEMENTS

It is not only through the auspices of the United Nations that the issue of PAROS can be or has been addressed. As witnessed, the important UNGA resolution Question of General and Complete Disarmament was a direct result of the cooperative efforts between the Soviet Union, United States, and United Kingdom. The 1963 Partial Test Ban Treaty negotiated in the spirit of achieving general and complete disarmament in line with the objectives of the United Nations, prohibited States parties to conduct nuclear testing wherein radioactive debris would contaminate territory outside the State jurisdictional control. The treaty concerns itself specifically with governing outer space in article I (a) wherein it states, "[States parties undertake] not to carry out any nuclear weapon test explosion, or any other nuclear explosion, at any place under its jurisdiction or control: in the atmosphere; beyond its limits, including outer space…"[101] As witnessed this effort would be expanded on in the OST, in article IV in an explicit ban of nuclear weapons in outer space at large.

The 1972 Treaty Between the United States of America and The Union of Soviet Socialist Republics on The Limitation of Anti-Ballistic Missile Systems (ABM Treaty) was a bilateral framework which also explicitly placed restraint on the weaponization of outer space. The treaty as a whole was a mutual prohibition of deploying nationwide defenses to guard against strategic ballistic missiles, in an attempt to curtail the arms race at large. However, it was significant to outer space security as it in article V stated that, "Each Party undertakes not to develop, test, or deploy ABM systems or components which

the prohibition of the stationing of weapons of any kind in outer space (Dec. 9 1981).
[100] An expanded analysis of the work of the Conference of Disarmament, including the corresponding Group of Governmental Expert sessions is dedicated to Chapter 3.
[101] Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water, Aug 5 1963. Article I (a).

are sea-based, air-based, space-based, or mobile land-based."[102] Moreover, Article VI prohibits a state to give missiles the capability to counter strategic ballistic missiles or their elements in their flight trajectory. It can be argued that this would have had restraints on the development and scope of ASATs, as an ASAT with the capability of being used as an anti-ballistic missile would have been in violation of article VI of the treaty. By this interpretation the pulling out of the treaty by the U.S. may not only be considered counterproductive to arms control in general but stripped a legal legitimacy to criticize recent Russian ASAT testings. Furthermore, this treaty is significant because it highlights that pursuing disarmament and arms control at large have tangible affects to security across fields.

The ABM Treaty article XII para. 2 states that, "Each Party undertakes not to interfere with the national technical means of verification of the other Party", a provision that could have been argued to refrain the deployment and use of ASAT technologically for its interferent capacity in state verification mechanisms. This is because many national technical means of verification are in fact space-based monitoring techniques, dependent on satellites systems and starring infrared sensors. Despite, these provisions governing outer space activity in regard to weapons capabilities, the interpretations of the ABM treaty unfortunately do no apply today, due to the defunct nature of the treaty following the United States withdrawal in 2002. This widened again the scope and permissibility of weaponization of outer space.

Another bilateral agreement that can be interpreted with limited scope to outer space security is the Treaty Between the United States of America and the Russian Federation on Measures for the Further Reduction and Limitation of Strategic Offensive Arms (New START Treaty). The treaty entertains continued relevance thanks to its agreed extension in February of 2021. However, it is set to expire on February 4, 2026. The treaty rests on the basis of a series of Russia-US treaties which have been limiting and reducing intercontinental ballistic missiles (ICBM), sea launched ballistic missiles (SLBM), their warheads and heavy bombers since 1972. The 2010 New Start Treaty sets further limits on strategic offensive arms, and as its predecessors did, under article X may offer protection of satellites integral to national technical means of verification. Such protection can be seen in article X para. (b) wherein it is written that State parties undertake, "not to interfere with the national technical means of verification of the other Party operating in accordance with this Article".[103] Additionally it requires that ICBMs and SLBMs and their launch components be of non-deployed status when placed on space launch facilities.

[102] Treaty Between The United States of America And The Union of Soviet Socialist Republics on The Limitation of Anti-Ballistic Missile Systems, May 26, 1972. Article V.
[103] Treaty Between the United States of America and the Russian Federation on Measures for the Further Reduction and Limitation of Strategic Offensive Arms, April 8 2010. Article X para. (b).

Beyond bilateral agreements there exists certain multilateral agreements with concerns to outer space. Namely The 1976 Convention on The Prohibition of Military or Any Hostile Use of Environmental Modification Techniques (ENMOD), which in article I prohibits States parties to, "engage in military or any other hostile use of environmental modification techniques having widespread, long lasting or severe effects as the means of destruction, damage or injury to any other State Party", which further defines environmental modification techniques in article II as, "changing - through the deliberate manipulation of natural processes - the dynamics, composition or structure of the Earth, including its biota, lithosphere, hydrosphere and atmosphere, or of outer space".[104]

Further efforts have been made by multilateral forums in non-binding arrangements to attempt to regulate capabilities of existing technologies in concern to outer space and the export and exchange of such technologies as relating to outer space. The first example is the Missile Technology Control Regime (MTCR), an international guideline aimed at regulation and export of rocket and missile technology. Within its guidelines it outlays categories of technology with corresponding levels of restriction on exports and transfers.[105] In its Equipment, Software and Technology Annex it prescribes within Category I, "Complete rocket systems (including ballistic missiles, space launch vehicles, and sounding rockets) capable of delivering at least a 500 kg *payload* to a *range* of at least 300 km".[106]

Similarly, the Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies (Wassenaar Arrangement) is a non-binding framework encouraging member states to disclose information of their national export policies on the agreed upon conventional weapons and dual-use technology controls lists.[107] Outlined in its List of Dual-Use Goods and Technologies and Munitions List is space launch vehicles, spacecraft, spacebuses, and spacecraft payloads in category 9, and further includes in the Munition List, *Satellite* navigation system jamming equipment and specially designed components therefor; and *spacecraft* specially designed or modified for military use, and *spacecraft* components specially designed for military use".[108]

Finally, The Hague Code of Conduct against Ballistic Missile Proliferation (HCoC) is a non-legally binding guideline on the

The 1963 Partial Test Ban Treaty negotiated in the spirit of achieving general and complete disarmament in line with the objectives of the UN, prohibited States parties to conduct nuclear testing wherein radioactive debris would contaminate territory outside the State jurisdictional control

[104] The Convention on The Prohibition of Military or Any Hostile Use of Environmental Modification Techniques, October 5, 1977.Article I and article II. As it currently stands the treaty has 78 ratifications, including China, India, Russian Federation, United Kingdom, United States.
[105] MTCR. *GUIDELINES FOR SENSITIVE MISSILE-RELEVANT TRANSFERS*. Retrieved from Missile Technology Control Regime: https://mtcr.info/guidelines-for-sensitive-missile-relevant-transfers/ Para. 2. There are currently 35 member states, including India, the Russian Federation and the United States (China is not a member).
[106] MTCR. (2017, October 19). Equipment, Software and Technology Annex. Pg. 17.
[107] The Wassenaar group has 42 member states including India, Russian Federation, United States (China is not a member).
[108] Wassenaar Group. (2021, December). List of Dual-Use Goods and Technologies. Pgs. 158; 202.

regulation of WMD capable carrying ballistic missiles. Specific to outer space in article 2g the HCoC outlines recognizes and calls for space launch vehicles not to conceal ballistic missiles programmes, and in article 2h supports transparency building measures on space launch vehicle programmes in the pursuance of decreasing proliferation of ballistic missiles.[109] Experts such as Emmanuelle Maitre argue that the inclusion of this provision is points to clear similarities between space launch vehicles and ballistic missiles and shows that the international community has recognized the need to avoid the diversion of dual-use components and technologies.[110] This comparison again explores the possibility of what pursuing adjacent arms control measures could mean for outer space. Additionally, the HCoC places emphasis on the need for states to ratify the OST, Liability and Registration Convention, and increase transparency of space launch vehicle programmes, policies, and launch and capability information.

2.2 REGIONAL FRAMEWORKS

EUROPE

European Union. Recognizing outer space as a strategic asset integral to the independence, security, and prosperity of Europe, the Treaty on the Functioning of the European Union amended in 2007, in article 189, to draw a European space policy.[111] The 2007 Resolution on the European Space Policy in regard to security and defense recognized the civilian and defense applications of space technologies and that through a user-based approach defense and civilian program cooperation could be strengthened.[112] It also called for implementation of structured communication between Member States and the European Defense Agency, and reaffirmed that, "any military users of Galileo or GMES [Global Monitoring for Environment and Security][113] must be consistent with the principle that Galileo and GMES are civil systems under civil control".[114]

The 2022 Management Plan of the Directorate-General for Defense Industry and Space by the European Commission focuses its aims on a sustainable space policy, an EU space-based global secure

[109] Hague Code of Conduct. (2012, November). Text of the HCoC. Article 2g, 2h, 3a, 4aii.
[110] Maitre, E., 'The HCoC and Space,' HCoC Research Paper n°8, Foundation for Strategic Research. https://www.nonproliferation.eu/hcoc/the-hcoc-and-space/#:~:text=A%20component%20of%20international%20space,(CBMs)%20among%20subscribing%20states.
[111] Consolidated Version of the Treaty On The Functioning of The European Union, Oct. 26 2012. Article 189. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:12012E/TXT&from=EN
[112] ESA Communications. Resolution on the European Space Policy, ESA Director General's Proposal for the European Space Policy. The Netherlands. (June 2007). Section B point 8. https://www.esa.int/esapub/br/br269/br269.pdf
[113] The GMES programme is an initiative to use Earth Observation satellite data to enhance environmental and security-related information services and decision making.
[114] Ibid.

communication system, EU strategy for space traffic management, implementation of the European Defence Fund, a European Alliance on space launchers, and an Action Plan on synergies between civil, defense and space industries.[115] Particularly relevant to space security is the implementation of the European Defence Fund as it allocates 10%, approximately 800 million euros, to support development of space-based capabilities for defense applications.[116] In addition the European Union in March of 2022 approved the Strategic Compass, a plan of action strengthening the EU's security and defence policy by 2030. Included in its ambitions is the development of an EU Space Strategy for Security and Defense and a call to strengthen cooperation with strategic partners such as NATO.[117]

NATO. The NATO framework on outer space is also important to analyze, especially considering that in 2019 Allies at the Leaders' Meeting in London declared outer space to be the fifth operational domain.[118] NATO's space policy highlights outer space as, "essential to coherent Alliance deterrence and defence" and clarifies that while NATO is not seeking to become an autonomous space actor, "Allies will undertake to provide, on a voluntary basis and in accordance with national laws, regulations and policies, the space data, products, services or effects that could be required for the Alliance's operations, missions, and other activities".[119] The policy reiterates however that, "...use of outer space for peaceful purposes is in the common interest of all nations. NATO and Allies will continue to carry out all activities in outer space in accordance with international law...".[120]

What is left vague in NATO's space policy is whether the organization will apply article 5 of The North Atlantic Treaty. Article 5 invokes the right to exercise collective or individual defense, including armed force, in a case of armed attack against any state member. As Dr. Aurel Sari from the Lieber Institute from West Point Academy, points out there was no clarity given on behalf of NATO whether Article 5 would be applicable in the domain of outer space, whereas for the cyber domain it was confirmed in the Summit Communique that a cyber-attack could lead to the invocation of Article 5.[121] Ambiguous doctrine on the applicability of article 5

[115] Management Plan 2022 DG Defence Industry and Space. (January 2022). https://ec.europa.eu/info/system/files/defis_mp_2022_en.pdf
[116] Ibid. pg. 23.
[117] Council of the European Union. (2022, March 21). A *Strategic Compass for a stronger EU security and defence in the next decade*. Retrieved from https://www.consilium.europa.eu/en/press/press-releases/2022/03/21/a-strategic-compass-for-a-stronger-eu-security-and-defence-in-the-next-decade/
[118] NATO. (2019, November 20). *Foreign Ministers take decisions to adapt* NATO, *recognize space as an operational domain*. Retrieved from North Atlantic Treaty Organization: https://www.nato.int/cps/en/natohq/news_171028.htm
[119] NATO. (2022, January 17). NATO's *overarching Space Policy*. Retrieved from North Atlantic Treaty Organization: https://www.nato.int/cps/en/natohq/official_texts_190862.htm?utm_source=linkedin&utm_medium=nato&utm_campaign=20220117_space Para.5a and 5f
[120] Ibid. Para 5c
[121] Sari. (2020). NATO *In Outer Space. A Domain Too Far?* https://lieber.westpoint.edu/nato-outer-space/

may lead to misunderstandings and misinterpretations of behavior. However, clarification of Article 5 applicability by itself would not be enough, as Sari points out it would give rise to new questions such as whether anticipatory self-defense to protect critical space infrastructure would apply, whether non-kinetic interference would call for the response of armed attack, whether self-defense would apply if the interference came from a non-state actor, and so forth.[122] We see how the expanded military domain to outer space and ambiguous outer space policy opens the door to new escalatory pathways.

While space policy in Europe emphasizes the applicability and need for space technologies towards peace and sustainability, there exists a clear line to the continued escalation of space as an arena for conflict engagement and augmentation

While the consideration of outer space technology for peaceful uses in sustainability, crisis management, civil security, and so forth is a corner stone of space policy within the Europe, the applicability of outer space technology to defensive bodies and policy is expanding. Not only is the scope for outer space technology as applied to defensive capabilities growing, the export framework for information and instrument sharing is permissible as is evident in the NATO space policy principles. Ultimately, while space policy in Europe emphasizes the applicability and need for space technologies towards peace and sustainability, there exists a clear line to the continued escalation of space as an arena for conflict engagement and augmentation.

ASIA-PACIFIC

The Asia-Pacific Regional Space Agency Forum (APRSAF). APRSAF is the longest standing forum dedicated entirely to space activities in the region. Founded by an initiative of Japan in 1993 to coordinate and enhance Asia-Pacific space activity, the forum hosts annual rotating meetings every year coordinated by Japanese Aerospace Exploration Agency (JAXA) the Japanese Ministry of Education Culture, Sports, Science and Technology (MEXT), and the agencies of the corresponding host country of a given year.[123] With 52 states representation, 844 organizations, and 32 international organizations, this marks APRSAF as the largest forum in the region dedicated to space activities.[124]

Outlined in the Principles of APRSAF, the goal of the group is to, *promote and expand peaceful uses of space activities and their applications for socio-economic development in Asia and the Pacific.*[125] Although the general scope of the organization is increasing outer space capacity through facilitating research, education, and development, APRSAF also places emphasis on national policy

[122] Ibid.
[123] Aliberti, M. (2013). *Regionalisation of Space Activities in Asia?* European Space Policy Institute. Pg. 2
[124] Asia-Pacific Regional Space Agency Forum. (2019, November). *Participants*. Retrieved from APRSAF Asia-Pacific Regional Space Agency Forum: https://www.aprsaf.org/participants/
[125] APRSAF. (2012, February). *Principles of* APRSAF. Retrieved from https://www.aprsaf.org/about/pdf/Principles.pdf para.1

and law. The National Space Legislation Initiative from 2019 was created to, *enhance the Asia-Pacific countries* capacity to draft and implement their national space legislation or policies in accordance with international norms".[126] One of the publications to come from the group was a working paper to COPUOS Legal Subcommittee in 2021 on national legislation relevant to the peaceful exploration and use of outer space.[127] The aim of the paper was to support the long-term sustainability of outer space through transparency, mutual understanding of national legislation, and promoting the Guidelines for the Long-term Sustainability of Outer Space Activities. The study group also created a new working group for APRSAF on space policy and law.[128] Although APRSAF deals primarily with expanding space capacity for developing spacefaring nations they make the important connection of a nations' space legislation capacity in complying with international law contributing towards the goal of a peaceful and sustainable outer space.

The Asia-Pacific Space Cooperation Organization (APSCO). APSCO is headquartered in Beijing and was established in 2008 as a cooperative mechanism for countries to further enhance, develop, and facilitate exchange of space science, technologies, and applications.[129] In addition to supporting data sharing, disaster monitoring, space application, education, and interconnection of ground stations, APSCO has created International Symposiums and Space Law and Policy workshops for strengthening both national and regional outer space legislation. The workshops also enable the exchange of best practices and implementation strategies of educational and private sectors in shaping outer space governance for the peaceful uses of outer space.[130]

The Association of Southeast Asian Nations (ASEAN). ASEAN is an inter-governmental organization facilitating economic and security cooperation between its 10 member states. ASEAN houses a specific sub-committee dedicated to outer space, called the Sub-Committee on Space Technology and Applications which focuses on enhancing the technical applications of space technology in area of space-based communications, disaster risk reductions, climate change resilience, and environment and resource monitoring.[131] ASEAN

The Asia-Pacific regional outer space frameworks are significant to outer space security, as it strengthens the goals of PAROS through an expanding spacefaring political bloc that has shared political will for enshrining the principle of outer space for peaceful uses as an international protected norm

[126] APRSAF. (n.d.). *National Space Legislation Initiative*. Retrieved from Asia-Pacific Regional Space Agency Forum: https://www.aprsaf.org/initiatives/national_space_legislation/

[127] Report on the status of the national space legislation of countries of the Asia-Pacific Regional Space Agency Forum National Space Legislation Initiative. Retrieved from: https://www.unoosa.org/oosa/documents-and-resolutions/search.jspx?view=&match=A/AC.105/C.2/L.318

[128] APRSAF. *Space Policy and Law Working Group*. Retrieved from Asia-Pacific Regional Space Agency Forum: https://www.aprsaf.org/working_groups/spl/

[129] APSCO. About APSCO. Retrieved from Asia Pacific Space Cooperation Organization: http://www.apsco.int/html/comp1/content/WhatisAPSCO/2018-06-06/33-144-1.shtml

[130] European Space Agency. (2021, September). APSCO/ESA/CISL Space Law Workshop 2021 Theme: Regional Cooperation Schemes on Space Law and Policy. https://iislweb.space/wp-content/uploads/2021/06/Announcement-of-APSCO-ESA-CISL-SPACE-LAW-WORKSHOP-2021.pdf

[131] ASEAN. (n.d.). *Sub-Committee on Space Technology and Applications*. Retrieved from

Regional Forum has hosted three regional forum workshops on space security, which establish working groups to consider issues of space debris, discussing methods for progressing the PAROS, and sharing best practices and ideas for strengthening regional cooperation in space security.[132] Additionally, ASEAN plays an integral role in representing a number of nations with expanding space capabilities and policies that recognize and encompass the importance of outer space to national security to international bodies working towards PAROS, such as the Conference on Disarmament. ASEAN has regularly participated in the Conference on Disarmament and in formal capacity supported PAROS and efforts for both legally and non-legally binding efforts to achieve the goal of PAROS.[133]

The Asia-Pacific regional outer space frameworks are significant to outer space security, as it strengthens the goals of PAROS through an expanding spacefaring political bloc that has shared political will for enshrining the principle of outer space for peaceful uses as an international protected norm.

ADDITIONAL REGIONAL FRAMEWORKS

The Collective Security Treaty Organization (CSTO). CSTO is an intergovernmental regional organization with the goal of strengthening peace, international and regional security and stability of its member states. It unites several former Soviet Union Republics - Russia, Armenia, Belarus, Kazakhstan, Kyrgyzstan, and Tajikistan. Although the CSTO structure does not support a specific organ to outer space, nor does it mention outer space in its treaty or charter, the CSTO still represents its member states to the UN in official capacity on matters concerning outer space and outer space security. For example, in a statement to the United Nations CSTO states emphasized the importance for legally binding instruments on PAROS, specifically supporting the No First Placement of Weapons in Outer Space Initiative pledging commitment to this initiative.[134]

The Commonwealth of Independent States (CIS). CIS is an interstate organization aimed at promoting political, economic and social interactions among several former Soviet Union Republics. At

ASEAN Science and Technology Network: https://astnet.asean.org/sub-committee-on-space-technology-and-applications-scosa/

[132] Topics from the most recent ASEAN Regional Forum workshop on space security can be further explored through formal addresses by Vice Foreign Minister Li Baodong and Assistant Secretary, Bureau of Arms Control, Verification and Compliance Frank A. Rose.

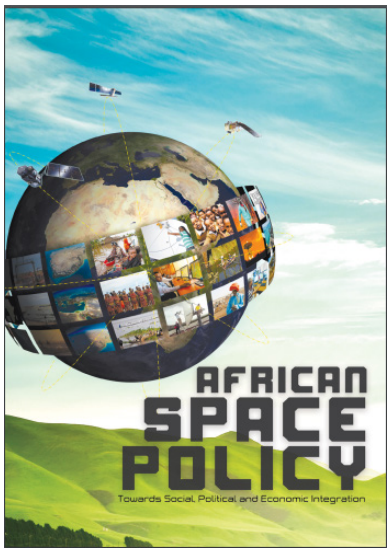
[133] Examples of such support can be seen expressed in formal statements to the 74th First Committee Thematic Debate on Outer Space (Disarmament Aspects) https://www.un.org/disarmament/wp-content/uploads/2019/11/statement-by-malaysia-os-oct-29-19.pdf or most recently the 76th First Committee Session https://reachingcriticalwill.org/images/documents/Disarmament-fora/1com/1com21/statements/12Oct_ASEAN.pdf

[134] *Statement by the Permanent Representatives of the Member States of the Collective Security Treaty Organization to the United Nations "On Support for the Multilateral Initiative on No First Deployment of Weapons in Outer Space"*. (2019, March 14). Retrieved from Ministry of Foreign Affairs of the Russian Federation: https://archive.mid.ru/integracionnye-struktury-prostranstva-sng/-/asset_publisher/rl7Fzr0mbE6x/content/id/3570650

present the CIS unites: Azerbaijan, Armenia, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Uzbekistan and Ukraine. Among its 84 bodies is an Interstate Council on Outer Space. Under its umbrella two interstate treaties were concluded: the 2018 Convention of the Commonwealth of Independent States on cooperation in the field of exploration and use of outer space for peaceful purposes and the 2018 Agreement on the implementation of joint activities of the member states of the Commonwealth of Independent States in the field of exploration and use of outer space for peaceful purposes.[135]

The African Union (AU). AU is an intergovernmental organization connecting the 55 countries on the African continent created to promote unity, economic development, and international cooperation. The African Union has a dedicated African Space Strategy with the aims to, "meet the objectives of the African Union (AU) Agenda 2063, make a significant contribution to the implementation of the Science, Technology and Innovation Strategy for Africa (STISA), take advantage of new opportunities offered by our geographic advantages, and become a global space player".[136] In regard to security and weaponization of outer space the African Group, the Permanent Observer Mission of the African Union to the United Nations, has in official capacity supported the goals of PAROS. In its support to the Group of Governmental Experts on Further Practical Measures for the Prevention of an Arms Race in Outer Space, the African Group stated that outer space must be exclusively for the purposes of peace without the admittance of any kind of weapon and stressed the importance of a legally binding treaty with multilateral agreements on verification of such a treaty.[137]

The Organization of Islamic Cooperation (OIC). OIC is an intergovernmental organization of 57 states with the aim of safeguarding the interest of the Muslim world and promoting international peace. Within its structure there is a permanent committee to science, technology, and higher education, COMSTECH, which established an Inter-Islamic Network on Space Sciences and Technology to facilitate among OIC members states the peaceful uses of outer space, exchange of space science and technology, coordinate consultancy between states and assist in training and development.[138] In addition to OIC, the League of Arab States to the UN represents 22 members with four observers



Cover of the African Space Policy

Source: www.africanews.space

[135] Convention of the Commonwealth of Independent States on cooperation in the field of exploration and use of outer space for peaceful purposes. (2018). https://cis-legislation.com/document.fwx?rgn=110819

[136] African Union. (2019). African Space Strategy for Social, Political and Economic Integration. African Union Commission.

[137] African Group. (2018, January 31). *Statement on Behalf of The African Group By at The Open-Ended Informal Consultative Meeting, Organized by The Chair Of The Group Of Governmental Experts On Further Practical Measures for The Prevention of An Arms Race In Outer Space.* Retrieved from https://www.un.org/disarmament/wp-content/uploads/2019/02/African-Group.pdf

[138] ISNET. (n.d.). *Objectives.* Retrieved from Inter-Islamic Network on Space Science and Technology: https://www.isnet.org.pk/pages/objectives.asp

and has stated support for PAROS and called for the adoption of a legally binding international instrument to ban arms in outer space.[139]

2.3 NATIONAL FRAMEWORKS

National policy and legislation are inherently important to the governance of outer space for the reason that the Outer Space Treaty and established international outer space governance regime as witnessed, does not sufficiently address pathways to the weaponization of outer space. Rather there is an inherent reliance and dependance placed on national actors to assume the responsibility of their space activity, including that of non-governmental capacity as seen in article VI of the OST and within the Liability Convention. Due to the insufficient nature of outer space governance in establishing concrete instruments for preventing an arms race in outer space, it is up to States to have unilateral political will to adopt national policy that align with the principle of outer space for peaceful purposes. It is therefore important to analyze the national structures of spacefaring states, to uncover how relying on unilateral voluntary restraint and adherence to the principle of outer space for peaceful purposes is insufficient. For the purposes of maintaining the scope of this work, the four national frameworks of the United States, the Russian Federation, the People's Republic of China, and the Republic of India will be analyzed. The national frameworks of these countries were chosen because of their advanced civilian and military outer space assets and records, the fact they exploit a permanent set of orbital satellites, and they have conducted kinetic ASAT tests against real orbital targets.

THE UNITED STATES

The United States outer space activity is organized in the following structure. NASA was established in 1958 as a civilian agency for the purposes of directing aeronautical and space activity, "except that activities peculiar to or primarily associated with the development of weapons systems, military operations, or the defense of the United States", which was to be under the responsibility of the Department of Defense.[140] In addition, 2019 saw the creation of a dedicated branch of the armed services to outer space activity. Namely under the United States Space Force Act, transfer of responsibility went from the previous Air Force Space Command to

[139] League of Arab States. (2019, October). *Remarks from Ambassador Maged Abdel Fattah Aziz, Permanent Observer of the League of Arab States to the UN First Committee session.* Retrieved from https://reachingcriticalwill.org/images/documents/Disarmament-fora/1com/1com19/statements/18Oct_Arab-League.pdf

[140] United States. (1958). *National Aeronautics and Space Act of 1958*. Sec 102(b).

the United States Space Force.[141] The duties of the Space Force are laid out as follows, "[to] protect the interests of the United States in space; deter aggression in, from, and to space; and conduct space operations"[142] The significance of this structure is that it inherently lays out outer space as an operational military domain with an established escalatory path to weaponization of outer space. Some scholars also point to its creation as an obstacle to future multilateral arms control efforts. For example, Robert Farley from the CATO Institute explains that U.S. military services historically are wary of arms control agreements for fear that they will affect the autonomy of the branch in its specialized domain. He argues, "if the Space Force manages to acquire the bureaucratic heft it needs to accomplish its core missions, it could act as an interest group within government to prevent the execution of strong multilateral arms control agreements".[143] This means that the U.S. Space Force not only implicates security of outer space by marking outer space as an explicit military zone, but it has the tangible future possibility of being a strong lobby against U.S. participation in multilateral arms control agreements for outer space.

The United States has an established a National Space Policy, that was initiated by the Carter administration in a review conducted with the National Security Council over the relation between the civilian and national security aspect of the national space program. Resulting from this review came the Presidential Directive establishing National Space Policy to guide the conduct of United States activities in and related to the space programs and outer space activity at large.[144] The directive states that the national space program will be conducted under the following principles, that it will commit to the principles of exploration of outer space for peaceful purposes and that peaceful purposes "allow for military and intelligence-related activities in pursuit of national security and other goals".[145] In addition to the principle guidelines, the directive stipulates that the United States will conduct activities in outer space which they deem necessary to national defense with an outline of policies to govern military space programs. Included in these policies are, "emergency utilization of civil systems" which established a program by the Secretary of Defense to identify, modify and integrate civil and commercial resources into military operations or deny such services and resources to an enemy during any declared national emergency.[146] This is particularly relevant to the issue of dual-use technology in outer space. The complexity of

[141] United States. (2020). *National Defense Authorization Act for Fiscal Year 2020*. Subtitle D—United States Space Force.
[142] Ibid. § 9081(d).
[143] Farley, R. (2020). *Space Force: Ahead of Its Time, or Dreadfully Premature?* https://www.cato.org/policy-analysis/space-force-ahead-its-time-or-dreadfully-premature
[144] United States. (1978). *Presidential Directive/NSC-37, National Space Policy*. https://www.jimmycarterlibrary.gov/assets/documents/directives/pd37.pdf
[145] Ibid. Para. 1(a)
[146] Ibid. Para. 2(b)

regulating dual-use capabilities at the international level is made more evident, when one understands that it is how enshrined in state policy for military operations to have access to civilian sector technology in the case of national security.

Additionally in concern to ASATs, the directive states that the U.S., "shall seek a verifiable ban on anti-satellite capabilities, excluding electronic warfare".[147] Directly after it follows that the Department of Defense, "shall vigorously pursue development of an anti-satellite capability, but will not carry to production those elements which are included in any treaty with the Soviets".[148] This is significant in showing that foundational U.S. national space policy actively supported the pursuance of offensive outer space military capability. However, it also shows that a window for a future legally binding restraint on production and use of agreed upon capabilities could exist, albeit a narrow window.

The United States will continue to use space for national security activities, including for the exercise of the inherent right of self-defense

How does this translate to the current national space policy of the U.S.? Current U.S. space policy adheres to the same principles of non-appropriation and adherence to the exploration of outer space for peaceful purposes. However, it remains within the national understanding of the United States that peaceful purposes include activities of national security as it claims that "Consistent with that principle [use of outer space for peaceful purposes], the United States will continue to use space for national security activities, including for the exercise of the inherent right of self-defense. Unfettered access and freedom to operate in space is a vital national interest".[149] Moreover, the policy outlines U.S. considerations and response to interference of outer space activity. Although the policy does not define which actions it constitutes as interference, the policy states that:

> *Purposeful interference with space systems, including supporting infrastructure, will be considered an infringement of a nation's rights. Consistent with the defense of those rights, the United States will seek to deter, counter, and defeat threats in the space domain that are hostile to the national interests of the United States and its allies. Any purposeful interference with or an attack upon the space systems of the United States or its allies that directly affects national rights will be met with a deliberate response at a time, place, manner, and domain of our choosing.*[150]

This is further elaborated in the cross-sector guidelines portion of the document, under which the goal of safeguarding space components and critical infrastructure is carried out through the promotion of developing strategies and capabilities to respond to any

[147] Ibid. Para. 2(d)
[148] Ibid. Para. 2(d)
[149] *National Space Policy of the United States.* (December, 2020). Pg. 3 Retrieved from https://history.nasa.gov/NationalSpacePolicy12-9-20.pdf
[150] Ibid. Pg. 9

purposeful interference. Once again the indistinctness of the term purposeful interference is of concern, and it is evident that national level policy from the U.S. does not reduce the vulnerability of the international space governance system by providing definitions and understanding of concepts such as harmful interference, but rather perpetuates the ambiguity for national security purposes leaving room for escalatory pathways of conflict in outer space.

The U.S. National Space Policy importantly addresses the role of non-governmental actors in outer space. The policy expresses that a commercial sector which leads in the global space market is foundational to national objectives. The policy also states that the U.S. government will purchase and utilize to the maximum extent possible commercial space capabilities and services and furthermore, that the U.S. government will develop space systems only when the optimal option for national interest and in the case that there is no other cost-effective commercial alternative.[151] From this policy, it is evident that the complexity of dual-use technology is not alleviated at the national level, rather made more complex as national U.S. policy promotes the further integration of civilian and commercial space sectors.

Vice President Kamala Harris delivers remarks at the administrations' first meeting of the National Space Council at the US Institute of Space in Washington, DC, December 1, 2021

Source: www.defenseone.com

Further concerning the security perspective, U.S. policy outlines that space technologies will be subject to International Traffic in Arms Regulations (ITAR), the Conventional Arms Transfer Policy, the Export Administration Regulations, and other applicable effective export policies and laws which is debated in COPUOS. Although this provides assurances that U.S. is mitigating security risks of space technology to unauthorized users and bad actors, it does not curtail the risk of national proliferation of arms in space. This concern is only exacerbated when analyzing the language of the National Security Space Guidelines section of the policy, under which it states that, "The United States seeks a secure, stable, and accessible space domain, which has become a warfighting domain as a result of competitors seeking to challenge United States and allied interests in space".[152] The explicit dedication of space as a *warfighting domain* in the policy is concerning as it delineates space in a manner inconsistent with a peaceful and collaborative domain, and could be considered escalatory language with aggressive intent by states, impeding progress in international fora. Although these guidelines are structured for defensive purposes, the assurance that force will not be used in outer space is dependent on the interpretation of what the U.S. considers a threat, challenge, or irresponsible behavior towards vital national interests. It is this ambiguity and dependency on national interpretations that the international efforts on preventing an arms race in outer space seeks to amend.

[151] Ibid. Pg. 20
[152] Ibid. Pg. 27

In addition to the national space policy, the recent self-imposed U.S. moratorium is extremely relevant and important to consider. On April 18, 2022, U.S. Vice President Harris announced the United States' commitment not to carry out direct-ascent ASAT missile testing to pursue U.S. goals of a secure and sustainable space environment.[153] It is crucial to note however, that this moratorium is not inclusive of all kinetic ASAT testing. As Ankit Panda and Benjamin Silverstein from the Carnegie Endowment for International Peace point out the tactfully worded moratorium does not preclude direct ascent ASAT testing against simulated orbital targets, as these test types are nondestructive.[154] It is also important to consider that the moratorium does not speak to co orbital ASATs. Furthermore, it is left unclear whether this initiative is meant to exist in a unilateral vacuum or be used as an invitation for international talks and negotiations. Although the moratorium is niche and specific in scope, it is still a significant national policy that unilaterally addresses a specific gap in international outer space security governance.

RUSSIAN FEDERATION

Rather than having separate civilian and military space agencies, Russian space activity is organized under the State Space Corporation of the Russian Federation or simply Roscosmos, which houses both civilian and military space actives and works in joint cooperation with the Ministry of Defense. The current Roscosmos is a result of the dissolution of the Russian Federal Space Agency and union with the United Rocket and Space Corporation in 2015 as part of the reorganization of the Russian space framework.[155] Outlined in the goals of the corporation it states that the corporation will carry out the production of rocket and space equipment for military, dual, scientific, and socio-economic purposes.[156] Within article six on the regulation of the corporations activities it ensures that its activities are governed by regulatory legal acts of the Russian Federation as well as international treaties to which Russia is party to.

Happening alongside the governmental restructure of the space program in 2015, a new branch of the Russian Armed Forces was formed. The Aerospace Forces was formed by combining both the previous Air Force and Aerospace Defense Forces.[157] Within this

[153] The White House. (2022, April 18). *FACT SHEET: Vice President Harris Advances National Security Norms in Space*. Retrieved from https://www.whitehouse.gov/briefing-room/statements-releases/2022/04/18/fact-sheet-vice-president-harris-advances-national-security-norms-in-space/

[154] Silverstein. (2022). *The U.S. Moratorium on Anti-Satellite Missile Tests Is a Welcome Shift in Space Policy* https://carnegieendowment.org/2022/04/20/u.s.-moratorium-on-anti-satellite-missile-tests-is-welcome-shift-in-space-policy-pub-86943

[155] Федеральный закон от 13.07.2015 г. № 215-ФЗ О Государственной корпорации по космической деятельности «Роскосмос». (2015, July 13). Retrieved from Разделы сайта Президента: http://www.kremlin.ru/acts/bank/39889

[156] Ibid. Art. 4 para. 3

[157] Новый вид Вооруженных Сил РФ – Воздушно-космические силы – приступил к несению боевого дежурства по воздушно-космической обороне. (2015, August 3). Retrieved from Министерство обороны Российской Федерации: https://function.mil.

command exists the Space Force branch and it is these authorities that lead Roscosmos' financial and technical military procurement, supply and production activities.

The Russian Federation also has an extensive history on its national outer space framework, namely the Law of the Russian Federation *On space activities* N 5663-1 from August 20, 1993. Russia's space governance is foundationally rooted in this law. Rather than having an outer space governance structure that varies on administration and its corresponding policy, this law remains a fundamental authority on Russia's outer space activity. The law has undergone several amendments, the most recent being in June 2021, on remote sensing data from state spacecraft for use in monitoring compliance,[158] however the bulk of the content has remained consistent since 1993.

Within the outset of the law in Article I, it explicitly states that outer space activities are to be regulated not only in accordance with the constitution of the Russian Federation but in accordance with the general principles and norms of international law and treaties of the Russian Federation.[159] This is significant because it creates an expedited process to the adherence of future developed international laws and treaties, since adhering to international law is a fundamental to Russian outer space governance. Outlined in its principles of space activity in article IV, it states that space activities should be carried out in accordance with the principle of ensuring international peace and security as well as mutually beneficial international cooperation in outer space.[160] This follows suit with the international principle of peaceful uses of outer space. In article II, on defining space activities, the law stipulates that space activities include the use of space technology and materials in the interest of Russian defense and security. Therefore, similarly to the U.S., the Russian interpretation of peaceful uses of outer space does not preclude military or security operations. This is further elaborated in article VII which expands on the responsibilities of the federal executive body of defense in implementing state policy of outer space activities in the field of defense and security of the Russian Federation. Within these stated responsibilities are:

> *...разрабатывает проекты космического раздела федеральной программы разработки, создания и производства вооружения и военной техники; осуществляет размещение*

Rather than having separate civilian and military space agencies, Russian space activity is organized under the State Space Corporation of the Russian Federation or simply Roscosmos, which houses both civilian and military space actives and works in joint cooperation with the Ministry of Defense

ru/news_page/country/more.htm?id=12047166@egNews

[158] О внесении изменений в отдельные законодательные акты Российской Федерации в связи с принятием Федерального закона «О государственном контроле (надзоре) и муниципальном контроле в Российской Федерации». (2021, June 2). Retrieved from Официальный интернет-портал правовой информации: http://pravo.gov.ru/proxy/ips/?docbody=&prevDoc=102025742&backlink=1&&nd=602242444 Art. 10

[159] Закон Российской Федерации О космической деятельности No 5663-1 [Law of the Russian Federation, About Space Activity, Decree No. 5663-1]. (1993, August 20). Retrieved from http://pravo.gov.ru/proxy/ips/?docbody=&nd=102025742 Article I

[160] Ibid. Article IV

государственного оборонного заказа на разработку, производство и поставки космического вооружения и военной техники; планирует и осуществляет использование (эксплуатацию) космической техники в интересах обороны и безопасности Российской Федерации [develops projects for the outer space section of the federal program for the development, creation and production of weapons and military equipment; carries out the placement of the state defense order for the development, production and supply of space weapons and military equipment; plans and implements the use (operation) of space technology in the interests of the defense and security of the Russian Federation].[161]

Rosatom pavilion at VDNH, Conference of Satellite Russia & CIS 2022

Source: www.sk.ru

These statements are substantial in that they expose the consideration of outer space as a military domain, with allowance for possible weaponization of outer space. The explicit reference to space weapons shows intent or consideration of such capabilities within the national space framework, and demonstrates that the national framework on its own is not enough to prohibit a proliferation of arms in outer space. Furthermore article VII, speaks to the development and research of dual-use space technology. Once again, the complexity of the dual use issue arises as national space regimes explicitly gear their policy towards pursuance and adoption of dual-use technologies.

Furthermore, when exploring the amendments to the law, we see an erosion of the definitive principles against escalatory behavior that existed in the original language of the law outlined in article IV, Principles of space activities. For example, in its initial adoption in 1993, the law stated that the Russian Federation would prohibit the testing of nuclear weapons and any other WMDs in space, use of space objects and other space technology as a means of influencing the natural environment for militaristic or hostile purposes, the use of the Moon and other celestial bodies for military purposes, the intentional creation of a direct threat to safety of space activities, including for security of space objects, and the harmful pollution of space, including deliberate elimination of space objects in space.[162] However, these provisions were removed in the first amendment to the law in 1996, limiting the principles of space activities to be carried out in compliance with the requirements established by law for the protection of state secrets, official and commercial secrets, as well as the results of intellectual activity and exclusive rights

[161] Ibid. Article 7, translation is my own.

[162] Закон Российской Федерации О космической деятельности No 5663-1 Первая Редакция Исходный Текст Закона (Без Изм. И Доп.) [Law of the Russian Federation On Space Activities No 5663-1 First Edition. Source Text Of The Law (Without Amendments And Additions). (1993, August 20). Retrieved from https://lawrussia.ru/texts/legal_185/doc18a291x553.htm Article IV para. 2

to them.[163]

Article IV in the amended version assures that activities prohibited by international treaties and law are not allowed, and so the removal of principles such as prohibition of nuclear testing and placement of WMDs are not implicated by the amendment due to their explicit prohibition in outer space in the OST. However, the removal of other principles such as deliberate elimination of space objects and influencing the environment for hostile purposes demonstrates state policy leaning towards broader language with wider variability for interpretation for national security purposes.

In addition to the national legal framework dedicated to space activity, the Russian Federation has declared a political initiative not to be the first to place weapons in outer space. The political directive is born from the No First Placement draft resolution[164] introduced by Russia to the UN Conference on Disarmament. This political initiative is significant because it is not only a unilateral effort, nor has it remained confined to the forum of the UN. In fact, the political initiative has gained multilateral support from BRICS[165] and CSTO and Russia has signed joint declarations with 30 countries such as China, Argentina, Pakistan, Syria, Sierra Leone, Turkmenistan, and others not to be the first to place weapons in outer space. Although the question arises on the lexicon of the initiative and what constitutes a weapon therefore, limiting the scope similarly to the U.S. initiative, we see another example of an essentially unilateral political initiative, attempting to address the disparities in the international outer space legal regime.

PEOPLE'S REPUBLIC OF CHINA

The China National Space Administration (CNSA) is the leading organ of the Chinese government on space related activity. CNSA states to be the governing organ over space activities for civilian use and international cooperation.[166] Within its governing framework there is no relation or partnership with defense and military bodies of the government mentioned. In regard to national space policy, the State Council Information Office of the People's Republic of China released its white paper, *China's Space Program: A 2021 Perspective*. In its stated mission for outer space usage, China aligns itself with

[163] Федеральный Закон О внесении изменений и дополнений в Закон Российской Федерации «О космической деятельности" [Federal Law On the introduction of amendments and additions to the Law of the Russian Federation "On space activities"]. (1996, November 13). Retrieved from http://pravo.gov.ru/proxy/ips/?docbody=&prevDoc=102025742&backlink=1&&nd=102044427

[164] The resolution later passed in the UNGA, and will be discussed further in chapter three. https://documents-dds-ny.un.org/doc/UNDOC/GEN/N14/662/89/PDF/N1466289.pdf?OpenElement

[165] XII *BRICS Summit Moscow Declaration*. (2020, November 17). Retrieved from Presedential Executive Office: http://en.kremlin.ru/supplement/5581 para. 19

[166] CNSA. (2018, May 24). *Organization and Function*. Retrieved from China National Space Administration: http://www.cnsa.gov.cn/english/n6465645/n6465650/c6768437/content.html

the principle of peaceful uses of outer space and expands on this by including an aim of achieving global consensus on the utilization of outer space for peaceful purposes. The use of outer space for peaceful purposes is further emphasized under its principles when it states that, "China has always advocated the use of outer space for peaceful purposes and opposes any attempt to turn outer space into a weapon or battlefield or launch an arms race in outer space".[167] Beyond the scope of the white paper, China also has political initiatives supporting the peaceful purposes principle. Similarly, to and in bilateral cooperation with Russia, China has declared its political position not to be the first to place weapons in outer space.[168] It is significant in that a nation uses a variety of methods both policy and political initiative to support its stated principle.

In addition to the principle of peaceful uses of outer space however, China similarly to the previous national frameworks includes space activities for national security under the umbrella of its peaceful usage interpretation. It is stated within the white paper's mission, that space activities will meet the demands of national security, and it is included within its vision that China will strengthen its space presence, "to defend national security".[169] Moreover, in the Information Office of the State Council's white paper on China's military strategy, outer space is recognized as having, "become [a] new commanding heights in strategic competition among all parties", and a catalyst for change within global national defense strategies and military transformations posing new threats and "severe challenges to China's military security".[170] Furthermore under the Strategic Guideline of Active Defense in the white paper, outer space is recognized as a new security domain. The Chinese military structure, in meeting the challenges outlined in its military strategy, underwent reform in 2015, and the Strategic Support Force and Rocket Force were created. Although the operational domains and responsibility of the Strategic Support Force remains opaque to the public, in his address during the inauguration ceremony, Xi Jinping emphasizes the Strategic Support Force as a new type of

In addition to the principle of peaceful uses of outer space however, China similarly to the previous national frameworks includes space activities for national security under the umbrella of its peaceful usage interpretation

[167] The State Council Information Office of the China. (2022, January 28). China's Space Program: A 2021 Perspective. Retrieved from China National Space Administration: http://www.cnsa.gov.cn/english/n6465645/n6465648/c6813088/content.html

[168] The political initiative has been expressed through many avenues including within auspices of UN, in multilateral and bilateral agreements spanning nearly a decade. For purposes of this source, a more recent joint political statement released during the Winter Olympics of 2022 is included to demonstrate ongoing relevance and adherence to the political initiative. Chinese activity on prospective solutions to PAROS within UN and international arena will be expanded in the following chapter. China Aerospace Studies Institute . (2022, February 4). Retrieved from Joint Statement of the Russian Federation and the People's Republic of China on the International Relations Entering a New Era and the Global Sustainable Development: https://www.airuniversity.af.edu/Portals/10/CASI/documents/Translations/2022-02-04%20China%20Russia%20joint%20statement%20International%20Relations%20Entering%20a%20New%20Era.pdf

[169] The State Council Information Office of the China. (2022, January 28). China's Space Program: A 2021 Perspective. Retrieved from China National Space Administration: http://www.cnsa.gov.cn/english/n6465645/n6465648/c6813088/content.html Para. 2

[170] The Information Office of the State Council. (2015, May 27). *The State Council of the People's Republic of China*. Retrieved from China's Military Strategy: http://english.www.gov.cn/archive/white_paper/2015/05/27/content_281475115610833.htm Art. I

combat force to maintain national security, an important growth point for the army's new combat capability, and promotion of military-civilian integration systems.[171]

Marc Julienne from the French Institute of International Relations makes the important distinction that China's outer space policy is based on three distinct pillars, national development, military empowerment, and great-power competition.[172] He argues China has pursued a two-track path of enhancing national security and military capability while espousing outer space for the peace of the whole of mankind. Julienne calls this *peaceful rise*, a dialogue tactic on behalf of China to try not to provoke tensions with other nations on its power rise under its pursuit of pillar three great-power competition.[173] In addition, China uses outer space achievements as benchmarks to measure its progress within great-power competition. It can be extracted that so long as these pillars remain central to Chinese national policy, the incentive for enhancing military capabilities in space will continue to exist and drive further expanse on military capabilities.

Rollout of the Long March 2F (Y14) on May 29, 2022, ahead of launch of Shenzhou-14 to the Chinese space station

Source: www. spacenews.com

It is evident that military and security operations are supported within the scope of Chinese outer space activity. However, in comparison to previous national frameworks, it is more difficult to gauge to what extent the military and security operations impact the national space regime. This is in part due to the less extensive governance regime that has been developed, which the white paper on space activities addresses and aims to strengthen for both national space activity and its space industry. But it is also in part to purposeful ambiguity, opaqueness and lack of transparency from the nation's military intentions in outer space. Both aspects of lack of transparency and limited developed space policy does not alleviate the vulnerabilities of the international space governance regime but rather exacerbates its concerns.

REPUBLIC OF INDIA

The Republic of India government has a Department of Space under which is housed the Indian Space Research Organization, the Indian National Space Promotion and Authorization Center and various autonomous bodies concerning outer space research and technology like the Indian Institute of Space Science and Technology. The Indian Space Research Organization (ISRO)

[171] 习近平向中国人民解放军陆军火箭军战略支援部队授予军旗并致训词 [Xi *Jinping awarded the military flag and delivered a speech to the strategic support force of the Chinese People's Liberation Army Rocket Force*]. (2016, January 2). Retrieved from Chinese Communist Party News Network: http://cpc.people.com.cn/n1/2016/0102/c64094-28003839.html
[172] Julienne. (2021). *China's Ambitions in Space: The Sky's the Limit*. Pp. 15 https://www.ifri.org/sites/default/files/atoms/files/julienne_china_ambitions_space_2021.pdf
[173] Ibid. Pp. 16

remains the main organ through which space activity is directed and carried out. The ISRO is stated as being a civilian entity with a vision to, "Harness space technology for national development, while pursuing space science research and planetary exploration".[174] Under its organization's stated objectives, missions, and structure it remains unclear to what extent the organization supports military activity and development.

The launch of LVM3-M2, OneWeb India-1 Mission's, October 23, 2022

Source: www.tech.hindustan-times.com

The Indian Defense Research and Development Organization, however, in its Citizens Charter outlines one of its mission objectives is to, "Design & develop state-of-the-art sensors, weapon systems, platforms & allied equipment in defense & Security domains of land, air, sea, space & cyber".[175] There is further implication of military space activity in the Defense Research and Development Organization in its organized technology clusters. For instance, within the Electronic and Communications Systems technology cluster it outlines its development in areas such as laser sources and sensors, directed energy weapon systems and communication systems which it states, "are deployed and are being used by Indian Armed forces and paramilitary services".[176] Additionally, the Missiles and Strategic Systems technology clusters vision states its purpose is to, "Empower the nation with state-of-the-art indigenous systems and technologies for missile based weapon systems deployable from underwater to outer space".[177] Additional outer space military structure remains ambiguous and unclear. Despite media reporting on the approval of a Defense Space Agency by the Cabinet Committee on Security, the Government of India and Ministry of Defense have yet to recognize in official capacity such operating agencies or specified forces nor release their corresponding structures and planned implementation. Therefore, it is best to recognize the ongoing effort of the Government of India in restructuring and developing military command and control for space activity.

Similar to India's outer space military structure, India's national political framework on outer space policy and law is under development. The ISRO has established policies for satellite communications and remote sensing, however, when it comes to overarching space conduct and activity there is no established

[174] Department of Space of the Government of India. (2022). *Vision and Mission Statements*. Retrieved from Indian Space Research Organisation: https://www.isro.gov.in/about-isro/vision-and-mission-statements

[175] Republic of India Ministry of Defense. (2022). *Citizen's Charter of the Department of Defence Research and Development, Government of India*. Retrieved from Defense Research and Development Organization: https://www.drdo.gov.in/citizen-charter

[176] Republic of India Ministry of Defense. (2022). *Electronics and Communication Systems About Us*. Retrieved from Defense Research and Development Organisation: https://www.drdo.gov.in/technology-cluster/about-us/electronics-and-communications

[177] Republic of India Minsitry of Defense. (2022). *Missiles and Strategic Systems About Us*. Retrieved from Defence Research and Development Organisation: https://www.drdo.gov.in/technology-cluster/about-us/missiles-and-strategic-systems

domestic governance, as the *Space Activities Bill* is still under consideration by the government.[178] In the absence of domestic law, the constitution of India in article 51 calls upon the state to respect international law and treaty obligations.[179] This demonstrates the importance of international law to India's transitionary domestic outer space framework.

Rajeswari Pillai Rajagopalan, expert on India's outer space infrastructure from the Observer Research Foundation, claims that geopolitics and the changing security environment are the main drivers of Indian Space Strategy. She argues China's rise and growing power has a direct impact on India's national security.[180] The consequences of this to outer space security are significant. Following on the conclusions of China's national space policy, if two of the rising space powers have geopolitical national security incentives, and one particularly fueled by a rising geopolitical rivalry, the future of outer space policy developments and activities will be directly affected by this context. We can, therefore, expect that in the absence of international arms control and preventative regulatory structures, the strategic geopolitical context will proliferate military capabilities and activities in outer space.

We can, therefore, expect that in the absence of international arms control and preventative regulatory structures, the strategic geopolitical context will proliferate military capabilities and activities in outer space

Though we have seen ways in which national legislation has attempted to strengthen the vulnerabilities in the international outer space legal regime, upon analysis of national space frameworks it becomes evident that national policy and legislation on its own cannot offer a solution to an arms race in outer space. In fact, relying on national legislation and frameworks alone would prove counterproductive to the aim of PAROS as we have seen the tendency of national space policy to cater to the needs of national security and craft policy with pathways to weaponization and aggression in outer space in the name of national defense and security.

As demonstrated, the strength of outer space domestic law and policy varies greatly nation to nation. The United States and the Russian Federation may have more robust, transparent, and developed frameworks dedicated solely to space activity given their historic advantage and significance in outer space exploration. However, this is not a reality for most nations, even those with considerable space presence and so looking to domestic outer space governance to solve outer space security concerns is insufficient. When combined with the reality that national frameworks have explicit pathways for the weaponization of outer space in name of national security and outer space policy and activity is informed by geopolitical rivalries and insecurity, it is clear the incentives

[178] *Space Activities Bill is under active consideration of the Government*. (2021, July 29). Retrieved from India Department of Space: https://pib.gov.in/PressReleasePage.aspx-?PRID=1740219
[179] Republic of India. (2021, November 26). *Constitution of India*. Retrieved from https://legislative.gov.in/sites/default/files/COI...pdf Art. 51
[180] Rajagopalan. (2020). *India's Space Strategy: Geopolitics Is the Driver*. https://www.ispi-online.it/en/pubblicazione/indias-space-strategy-geopolitics-driver-28607

for advancement of outer space activity are strong. Therefore, it is imperative that the international governance system be strengthened as it is the international regime which currently acts as a foundation for many national domestic frameworks, and if strengthened can have a direct influence on regional and domestic outer space activity.

CHAPTER 3. PROSPECTS AND THE PATHWAY FORWARD FOR SPACE GOVERNANCE

The international effort to prevent an arms race in outer space has a robust history dating back decades. The issue has been an original point of concern in the Conference on Disarmament since its inception, when in the UN General Assembly's Tenth Special Session on Disarmament it was stated that an arms race in outer space was a measure of disarmament that the programme of action should cover.[181] However, from early discussions on PAROS in the Conference of Disarmament it was evident that two camps were forming to tackle the issue. In 1981, two resolutions with different nuanced concerns to PAROS were passed. Resolution 36/97C, sponsored largely by the Western Europe and Others Group, called for negotiation of an effective and verifiable agreements towards PAROS and to prohibit anti-satellite systems.[182] Another resolution sponsored largely by Eastern European and other states, resolution 36/99, called for the conclusion of an appropriate treaty on the prohibition of any weapons of any kind in outer space.[183] Although there is multilateral recognition of the urgency of the issue and collaborative measures have been taken in establishing a continuous forum within the CD to work on such issues, progress has been largely stagnant across several decades.

The two camps have since developed into an overall two-based approach to tackling PAROS. One approach is rooted in hard law and pursing a legally binding mechanism, while the other is a behavior-based approach seeking to establish norms, rules, and principles on the behavior of outer space activities. This chapter aims to analyze prospective solutions to PAROS through the lens of the competing camps, and through such analysis expose the false dichotomy and politicization of the two-based approach. The chapter concludes with a necessary analysis of the role of the commercial sector and considerations for an all-encompassing approach, inclusive of hard law, soft law, norms, behavior-based approaches, and industry best practices.

[181] UNGA. (1978). *Resolutions and Decision adopted by the General Assembly during its Tenth Special Session*, A/S-10/4. Art. III para. 80.
[182] UNGA. (1981). *Prevention of arms race in outer space*, A/RES/36/97C.
[183] UNGA. (1981). *Conclusion of a treaty on the prohibition of the stationing of weapons of any kind in outer space*, A/RES/36/99.

3.1 ON THE PURSUIT OF LEGALLY-BINDING MECHANISMS

PPWT

The most prominent and substantive effort to fill the existing void in outer space security regime is the draft Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects (herein referred to as the PPWT). The origins of the treaty date back to 1981 when the Soviet Union introduced to the General Assembly its draft on prohibiting any type of weapons in outer space.[184] This was pursued in the years following when the Soviet Union submitted another draft treaty, "Treaty on the Prohibition of use of force in outer space and from outer space to Earth" in 1983.[185] Fast forward to 2002, Russia and China both presented to the Conference on Disarmament elements of a future international legal agreement to prevent the placement of weapons in outer space, the use of force or threats by force against space objects. We see the longstanding effort and work leading up to the PPWT which was jointly introduced to the CD by China and Russia in 2008.

As its name implies the PPWT would bind states not to place weapons in outer space in any manner, including Earth orbit and on celestial bodies. The treaty defines weapon as, "any device placed in outer space, based on any physical principle, which has been specially produced or converted to destroy, damage or disrupt the normal functioning of objects in outer space, on the Earth or in the Earth's atmosphere, or to eliminate a population or components of the biosphere which are important to human existence or inflict damage on them" and the treaty defines *placement* as, "orbit[ing] the Earth at least once, or follow[ing] a section of such an orbit before leaving this orbit, or permanently located somewhere in outer space".[186] Furthermore the treaty calls on state parties not to resort to the threat or use of force against outer space objects, defining *threat or use of force* as, "any hostile actions against outer space objects including, inter alia, actions aimed at destroying them, damaging them, temporarily or permanently disrupting their normal functioning or deliberately changing their orbit parameters, or the threat of such actions".[187] The treaty in its lexicon also includes a

[184] UNGA. (1981). *Conclusion of a treaty on the prohibition of the stationing of weapons of any kind in outer space*, A/RES/36/99.
[185] UNGA. (1983). Conclusion Of A Treaty On The Prohibition Of The Use Of Force In Outer Space And From Space Against The Earth, Res 38/194.
[186] Letter Dated 12 February 2008 from the Permanent Representative of The Russian Federation and the Permanent Representative of China to the Conference on Disarmament Addressed to the Secretary-General of the Conference Transmitting the Russian and Chinese Texts of the Draft "Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force Against Outer Space Objects (PPWT)" Introduced by The Russian Federation and China, Art. I (c)(d). https://digitallibrary.un.org/record/633470?ln=ru
[187] Ibid. Art. I (e)

robust definition for *outer space objects*.

The treaty notes in article IV that nothing included in the treaty is impediment to the peaceful purposes' principle, and importantly notes in article V that nothing in the treaty is to be interpreted as impeding a nation's right to self-defense. When addressing the topic of verification and compliance, article VI of the treaty proposes the implementation of voluntary confidence-building measures agreed to by state parties and suggests that measures to verify compliance may be the subject of further additional protocols.

It is unquestionable that such a treaty entering into force would immediately contribute to the goals of PAROS and prevent or at least postpone outer space becoming an arena of military confrontation. The treaty's definition of weapon notably includes space to space and space to Earth type weapons and it importantly includes a comprehensive and full encompassing definition of an outer space object with no room for ambiguity. The treaty is preventative in nature, and it is important to note that it is not only usage of a weapon in space but also the mere placement that would be in violation of the treaty, aligning significantly with disarmament goals by addressing the source of proliferation.

The restraint on the threat or use of force against outer space objects is equally significant and even more encompassing. This focal point provides a further comprehensive ban on aggressive action to outer space objects. What is important to note is that the definition for threat or use of force does not confine the origin of activity, meaning that outer space objects should be protected from aggression and harm regardless of where the threat originates, including Earth-based weapons capabilities. Additionally, the definition of threat or use of force is not limited to only destructive maneuvers but is wide in scope including temporary disruption of normal functions. This gives states liberty to interpret this to include emerging space threats such as non-kinetic ASAT capabilities.

The restraint on the threat or use of force against outer space objects is equally significant and even more encompassing

The inherent room for multilateral collaboration is also a key feature of the treaty. Article IX, specifically endorses the participation of intergovernmental organizations in the Treaty negotiation process, and Article X lays out the process for submitting and adopting amendments to the treaty from any state member. Such key points are important to laying the path for a collaborative and successful negotiation process.

Despite the significance of the PPWT, it was met with opposition and criticism from certain groups and states. One notable and staunch opposition of the time came from the U.S. whose national space policy at the time opposed, "the development of new legal regimes or other restrictions that seek to prohibit or limit U.S. access to or use of space. Proposed arms control agreements or restrictions must not impair the rights of the United States to conduct research, development, testing, and operations or other

activities in space for U.S. national interests".[188] The domestic policy translated into Ambassador Christina Rocca's statement to the Conference on Disarmament, stating, "we [U.S.] continue to believe that there is no arms race in space, and therefore no problem for arms control to solve".[189]

However, there was not only unilateral opposition to the PPWT. Other criticisms focused largely on the lack of explicit banning of testing and deploying kinetic ASAT systems. Criticisms have also expressed that it remains unclear under the treaty whether a destruction of a state's own satellite or spacecraft constitutes a hostile act, and if there so exists justified reasoning for an intentional act the treaty lacks provisions outlining such legitimate scenarios. The reoccurring criticisms due to lack of inclusivity of ASATs has stalled the progression of the treaty. Therefore, a recommendation moving forward would be to have a more nuanced debate in the Conference on Disarmament of space-space, space-Earth, and Earth-space weapons capabilities. The PPWT provides a valuable foundation for considering two of the three outer space security concerns, and states parties should not let stalemates in one area affect the entirety of outer space security. Historical arms control in the nuclear field has seen success in pursuing nuanced technical agreements limiting and reducing certain capabilities as a way to pursue the goal of disarmament at large, applying the same nuanced negotiations to outer space could prove fruitful. Enacted this could look like a GGE on space-space and space-Earth weapons prohibition and prevention, where the clear parameters and mandates allow states to work directly on these issues without the confrontation of ASATs, which should be handled in its own nuanced and dedicated forum.

Further criticism on the draft treaty question its efficacy due to the lack of verification mechanisms. Furthermore, some states voice concern that the self-defense article V, has the potential to be utilized as a loophole for evading the main responsibilities of the treaty in the guise of national interest.[190]

A revised draft was submitted by Russia and China in 2014.[191] The main substantive changes were made to Article VII on the process of

[188] U.S. National Space Policy, 2006. https://irp.fas.org/offdocs/nspd/space.pdf Para 2.
[189] U.S. Delegation to the Conference on Disarmament. (2007, February 13). *Statement to the Conference on Disarmament by Ambassador Christina Rocca U.S Permanent Representative.* Retrieved from https://www.reachingcriticalwill.org/images/documents/Disarmament-fora/cd/2007/statements/1session/Feb13USA.pdf
[190] Further exploration of concerns and questions of the draft treaty with corresponding answers from Russia and China can be read in the Letter from the Permanent Representative of China and the Permanent Representative of the Russian Federation to the Conference on Disarmament addressed to the Secretary-General of the conference Transmitting Answers to the Principal Questions and Comments on the Draft "Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force Against Outer Space Objects (Ppwt)" Introduced by The Russian Federation and China and issued as document CD/1839, Dated 29 February 2008. https://documents-dds-ny.un.org/doc/UNDOC/GEN/G09/631/75/PDF/G0963175.pdf?OpenElement
[191] Draft Treaty on the Prevention ofthe Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects https://www.reachingcriticalwill.org/images/documents/Disarmament-fora/cd/2014/documents/PPWT2014.pdf

dispute settlements and due regard and Article V on self-defense. The new draft treaty includes the concept of collective self-defense measures as opposed to the previous limited national self-defense. The new draft treaty also reads that if consultations do not lead to mutual settlement the state parties can seek assistance from the Executive Organization of the Treaty and provide relevant evidence to advance dispute settlements. The inclusion of providing evidence was a new introduced concept to the treaty, whereas previously it was left to a broader relevant argumentation.

Given that the change from the original was not immense similar criticisms of the draft treaty remained, while new concerns were risen. Once such argumentative point is that the definition of space object does not correspond to the definition within the Liability and Registration Convention, and that for a seamless transition of the PPWT into international law, it should adopt the same established definition. On the point of vagueness and unverifiability, some states rejected the notion of convening for additional protocol after the adoption of a treaty, citing concerns of entering a legally binding agreement before understanding the entire scope and reach of the treaty. Since the release of both the draft and revised draft treaty, progress on adoption has remained stagnant with a consistent political bloc led by U.S. efforts, rejecting progress and negotiation pursuit of the treaty.

NO FIRST PLACEMENT INITIATIVE

The *No First Placement of Weapons in Outer Space Initiative* is rooted from a UNGA resolution put forward by Brazil, China, and Russia in 2014. The resolution reaffirms the importance and the urgency for all states to participate towards PAROS, but most importantly introduces a political undertaking to not place weapons in outer space. This political commitment will be expanded on in the subsequent section of non-legally binding mechanisms. The resolution however is valuable to the pursuance of legally binding mechanisms as it, "Urges an early start of substantive work based on the updated draft treaty on the prevention of the placement of weapons in outer space and of the threat or use of force against outer space objects…".[192]

The resolution passed with 126 votes in support, 4 against, and 46 abstentions, showing the broad support the pursuit of a legally binding mechanism holds.[193] The U.S. once again was a prominent opponent of the initiative leading the vote against, while many of the same states in the political bloc against the PPWT abstained from voting. The concerns of those parties, such as members of the EU state

[192] UNGA. (2014). *No First Placement of Weapons in Outer Space*, Res 69/32. https://documents-dds-ny.un.org/doc/UNDOC/GEN/N14/662/89/PDF/N1466289.pdf?OpenElement

[193] UNGA. (2014). Official Records of 62nd plenary meeting. https://documents-dds-ny.un.org/doc/UNDOC/GEN/N14/658/86/PDF/N1465886.pdf?OpenElement

that the *No First Placement Initiative*, "does not adequately respond to the objective of strengthening trust and confidence between States to concretely strengthen space security".[194] Furthermore, they state that the initiative does not define what a weapon is in outer space nor address dual-use capabilities and such an arbitrary and ambiguous commitment could lead to misinterpretation and misunderstandings therefore increasing the conflict in outer space. The critique that the initiative does not define a weapon and further convolutes the global understanding of space security does not take into account that the political commitment in the resolution exists with the expectation to continue PPWT negotiations, a draft treaty which does offer a definition of a space weapon. Moreover, the initiative exists as a steppingstone towards progress on PAROS and such criticisms, as necessary as they are, would serve the goals of outer space security better if they were given in a participatory manner in the form of amendments in negotiations on the PPWT.

GGE ON SUBSTANTIAL ELEMENTS OF AN INTERNATIONAL LEGALLY BINDING INSTRUMENT ON PAROS

Initiated from a UNGA resolution 72/250 put forth by China and the Russian Federation in 2017, a Group of Governmental Experts (GGE) was called for to recommend substantial elements of an international legally binding instrument on the prevention of an arms race in outer space, including, inter alia, on the prevention of the placement of weapons in outer space. This was proposed on the urgency and need to commence negotiations on a legally binding instrument on PAROS. The group convened in January of 2019 and laid out four topics for consideration; the existing legal regime in outer space; elements of general obligations; elements related to monitoring, verification and transparency and confidence-building measures; and lastly elements related to international cooperation, institutional arrangements and final provisions.

Regrettably there was no final document adopted by consensus, however the chair provided his factual summary on the work of the group.[195] Within the report the concerns and wishes of states were expressed. States were concerned with further development of ASATs. Many states expressed the desire for a legally binding instrument, and even though support was voiced for transparency and confidence building measures (TCBMs), it was agreed upon by many that such measures alone or voluntary measures could not

[194] Delegation of the European Union to the UN. (2021, November 1). *EU Explanation of Vote: United Nations 1st Committee: No First Placement of Weapons in Outer Space*. Retrieved from https://www.eeas.europa.eu/delegations/un-new-york/eu-explanation-vote-united-nations-1st-committee-no-first-placement-0_en?s=63

[195] Ambassador Patriota, G. (2019). *Chair's Summary, Open-ended intersessional informal consultative meeting on the work of the Group of Governmental Experts on further practical measures for the prevention of an arms race in outer space.* https://www.un.org/disarmament/wp-content/uploads/2019/03/paros-gge-open-ended-informal-consultative-meeting-chair-summary-final.pdf

replace a legally binding instrument. There was wide affirmation of the applicability of existing international law to outer space, and specifically the application of the UN Charter as expressed in the OST. It was considered whether a legally binding instrument should include space to space, Earth to space, and space to Earth provisions, provisions addressing capabilities and or behaviors, prohibitions relating to the use of force, prohibitions on the development, testing, stockpiling and deployment of weapons designed for armed attacks against satellites or other outer space objects, and the importance of verification.

Despite the lack of consensus on a working document, the group was influential in its reinvigoration of pursuing a legally binding instrument. There was agreement by states that the PPWT was a good foundation. There were also important comparisons to other treaties as examples of flexible models of entering a treaty into force, while important points were brought up that the PPWT had placed requirements of Security Council participation and ratification when it should in fact require ratification by all major space faring nations. The GGE overall served as an expressive and constructive forum introducing and underpinning important topics to the future progress of a legally binding instrument.

The Soyuz TMA-15M spacecraft undocked from the Rassvet module on the International Space Station on June 11, 2015

Source: www.nasa.gov

3.2 ON THE PURSUIT OF A NON-BINDING APPROACH

NO FIRST PLACEMENT POLITICAL COMMITMENT

As discussed previously the *No First Placement of Weapons in Outer Space Initiative* was developed through a resolution pushed forward by Russia in 2014. The resolution importantly, "Encourages all States, especially space-faring nations, to consider the possibility of upholding as appropriate a political commitment not to be the first to place weapons in outer space".[196] This political commitment is a significant act often overlooked within the camp of voluntary measures. However, it deserves recognition as being an incremental step more akin to a behavior-based approach as there is no legally binding mechanism but a political promise on the actions of a nation not to place weapons in outer space. Moreover, compared to the similar U.S. moratorium on direct-ascent ASAT testing mentioned in Chapter 2 and further elaborated below, the *No First Placement initiative* has wider participation. 11 states originally announced

[196] UNGA. (2014). *No First Placement of Weapons in Outer Space*, Res 69/32. https://documents-dds-ny.un.org/doc/UNDOC/GEN/N14/662/89/PDF/N1466289.pdf?OpenElement

their pledge to the UN General Assembly in 2014 alongside the resolution, and the number of states who have through multilateral political statements has only increased the participation up to 30. A growing number of states also support the initiative as an important transparency and confidence building measures such as BRICS in their XII BRICS Summit Moscow Declaration.[197] It can be argued that by more countries pledging to such a political commitment, a common understanding of a space weapon, including the concerns of dual-use and non-kinetic ASATs, could be reached as increased participation brings expanded national perspective to the issue. Furthermore, if those states who criticize the *No First Placement Initiative* for definitional ambiguities participated in the commitment, they could abide by their national perspective on what constitutes a weapon in outer space further legitimizing the movement and building trust, cooperation, and shared understandings.

U.S. UNILATERAL VOLUNTARY MORATORIUM

The recent moratorium from the U.S. announced in April 2022, to self-restrain direct-ascent ASAT testing is a new addition to space security efforts. Within the official press release from the White House, it can be seen that the initiative was explicitly intended to act as an example of a behavior-based approach as it states, "...the United States seeks to establish this as a new international norm for responsible behavior in space".[198] The U.S. also called on other nations to take such voluntary measures. In the first session of the *Open-Ended Working Group* on reducing space threats through norms, principles, and responsible behavior, Canada made a unilateral statement joining the U.S. and imposing a self-moratorium on direct ascent ASAT testing.

The action has been welcomed by the international community with support across camps. However, criticisms arise as many states voice that the ban is entirely too limited in scope and is insufficient in addressing the wider concerns of ASAT capabilities. In line with this criticism is the opinion that the ban addresses the easiest low hanging fruit and can be used as a distraction for more substantial political commitment. Finally, some states express the hypocrisy of the U.S. labeling recent destructive ASAT testing as bad behavior while conveniently not including their national destructive ASAT testing amongst those they label as irresponsible. This selectiveness has some states worried over the political interference in the concept of responsible behavior and the possible conflation of responsible behavior with responsible states. Therefore, the ban

[197] BRICS. (2020). XII BRICS Summit Moscow Declaration. Para. 19 http://www.brics.utoronto.ca/docs/201117-moscow-declaration.html

[198] The White House. (2022, April 18). *FACT SHEET: Vice President Harris Advances National Security Norms in Space*. Retrieved from https://www.whitehouse.gov/briefing-room/statements-releases/2022/04/18/fact-sheet-vice-president-harris-advances-national-security-norms-in-space/

although an important and timely addition to advancing the goals of PAROS, runs the risk of being a tool for further division if not carefully addressed.

INTERNATIONAL CODE OF CONDUCT FOR OUTER SPACE ACTIVITIES

In reaction to the UN General Assembly Resolution's 61/75 from 2006 calling for concrete proposals for *Transparency and Confidence-Building Measures in Outer Space Activities*, the EU in 2008 initiated a consultation process on establishing an International Code of Conduct for Outer Space Activities (ICoC). In 2013 after the tabling a draft of ICoC the EU initiated an open-ended multilateral consultation process to bolster international support. The process consisted of three open-ended meetings over the span of 2013-2014. However, even before the first meeting there were criticism from many regions and states over the lack of transparency and inclusivity leading up to the consultations, especially given that the ICoC draft had received endorsements from nations prior to the first consultation.

In addition to the previous criticism, during the consultation process separating schools of thoughts and considerations for the code became evident. One of the most notable diverging thoughts was the inclusion of the right to self-defense. Twice in the draft, within paragraph 26, "the responsibility of states to refrain from the threat or use of force against the territorial integrity or political independence of any state, or in any manner inconsistent with the purposes of the Charter of the United Nations, and the inherent right of states to individual or collective self-defense as recognized in the Charter of the United Nations" and within paragraph 51 where it states that parties resolve to, "refrain from any action which brings about, directly or indirectly, damage, or destruction, of space objects unless such action is justified… by the Charter of the United Nations, including the inherent right of individual or collective self-defense".[199] However, states such as Brazil, Mexico, and Chile among others argued that reference to self-defense could still encourage an arms race in outer space.

Further criticism was given to the avenue of the discussion. It was pointed out by some states that creating an adjacent space outside the auspices of the UN was competing with other work of the UN and could serve to erode progress happening within the designated UN bodies towards a legally binding instrument. The EU had defended its decision, explaining that the ad hoc format was ideal to facilitate an even wider discussion and participation not limited state membership of specific UN forums.

The final meeting, even if held at the UN headquarters, could not

Some states express the hypocrisy of the U.S. labeling recent destructive ASAT testing as bad behavior while conveniently not including their national destructive ASAT testing amongst those they label as irresponsible

[199] European External Action Service, EU proposal for an international Space Code of Conduct, Draft (2014). https://www.eeas.europa.eu/node/14715_en

be considered a UN event because there was no UN mandate. This de facto changed the meeting to a consultation with no legal grounds for negotiating text on the draft. It was not only to procedural issues that hindered any sort of adoption as the issues raised above persisted and common ground was not achieved. There was not only leading opposition from China, Russia and concern from other regions. Internal U.S. domestic politics showed resilience to becoming party to a code that had the potential of limiting U.S. strategic abilities in outer space, even in a non-legally binding mechanism. One of the main concerns noted by congressional members to President Obama was that such a code would serve the foundation for a future arms control regime binding the U.S. without congressional approval and there was concern over the limitations it could pose to future military and intelligence programs.[200] In addition, Undersecretary of State for Arms Control and International Security Ellen Tauscher had stated U.S plans not to sign the code on the basis of it being too restrictive. Irrespective of the lack of substantive outcome the ICoC process was an important effort towards outer space security. Through its process it still managed to engage states in a collaborative forum and give them the opportunity to exchange views and thoughts on a possible code of conduct. The draft itself contained pertinent topics important to overall safety and security of space which gave inspiration to future pursuits in COPUOS.

GUIDELINES FOR SPACE DEBRIS MITIGATION AND THE LONG-TERM SUSTAINABILITY OF OUTER SPACE ACTIVITIES

Although the following initiatives fall traditionally within the field of space safety and sustainability, it is important to consider adjacent efforts whose process and outcome can influence the field of space security. The bodies of COPUOS and UNOOSA have shared success stories on working with the softer approach of guidelines, codes, and principles. This success is demonstrated in their adoption of the Guidelines for Space Debris Mitigation and the Long-term Sustainability of Outer Space Activities.

The Space Debris Mitigation Guidelines were accomplished over a long process that begin in the 90s in COPUOS, specifically in its Scientific and Technical Subcommittee. It was first introduced to the committee as a priority basis, matters associated with space debris under a new item of its agenda, in its 1994 thirty-first session.[201] Over the following years several multi-year work plans and reports were adopted. In its fortieth session in 2003 the Inter-Agency Space Debris Coordination Committee presented its draft on debris mitigation, the Subcommittee began its review of

[200] Arms Control Association, U.S. Backs Efforts to Draft Space Code, https://www.armscontrol.org/act/2012-03/us-backs-efforts-draft-space-code
[201] UNGA. (1994) Report of the Scientific and Technical Subcommittee on the Work of its Thirty-first Session, A/AC.105/571. Para. 63-74 https://www.unoosa.org/oosa/oosadoc/data/documents/1994/aac.105/aac.105571_0.html

the proposals and discussed means of endorsing their utilization. After subsequent workplans and negotiations with member states, in 2007 the Subcommittee adopted its guidelines and later in the year the UNGA endorsed the Space Debris Mitigation Guidelines in resolution 62/217 of December 22, 2007.

The report importantly defines space debris as, "all man-made objects, including fragments and elements thereof, in Earth orbit or re-entering the atmosphere, that are non-functional".[202] On discussing application, it is clearly stated that the guidelines are not legally binding but that states should take voluntary measures to ensure implantation of guidelines. There are seven concrete guidelines included: limiting the debris released during normal operations, minimizing the potential for break-ups during operational phases, limiting the probability of accidental collision in orbit, avoiding intentional destruction and other harmful activities, minimizing potential for post-mission break-ups resulting from stored energy, limiting the long-term presence of spacecraft and launch vehicle orbital stages in the low-Earth orbit region after the end of their mission, and limiting the long-term interference of spacecraft and launch vehicle orbital stages with the geosynchronous Earth orbit region after the end of their mission.[203]

On discussing application, it is clearly stated that the guidelines are not legally binding but that states should take voluntary measures to ensure implantation of guidelines

The guidelines provide pertinent applicability to space security. The guideline on avoiding intentional debris creation and harmful activities could act as a foundation steppingstone on which TCBMs in the CD could build upon. The guideline on limiting the probability of accidental collision in orbit reaffirm commitments of the Registration and Liability Conventions as well as Article IX of the OST when considering the obligation of due regard. Therefore, the strengthening and building on of these guidelines could service CD negotiations, as well as the ongoing considerations of due regard and consultation processes in the Open-Ended Working Group on Reducing space threats through norms, rules and principles of responsible behaviours.

It is not only the substance of the guidelines however that are useful to efforts in the CD. The application of technical expertise and direct contribution from the Inter-Agency Space Debris Coordination Committee, which consists of national space organizations, arguably led to a more comprehensive, robust, and long-lasting product. Such collaborative processes could be emulated, especially within the context of the new Open-Ended Working Group which supports a higher inclusivity model than the member limited operations of the CD. Upon endorsement of the guidelines, it was also agreed that approval of the voluntary guidelines would increase mutual understanding on acceptable activities in space, enhancing the stability in space-related matters

[202] UNOOSA. (2010). Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space. https://www.unoosa.org/pdf/publications/st_space_49E.pdf
[203] Ibid. Section 4.

and decreasing the likelihood of friction and conflict.

The Guidelines for the Long-Term Sustainability of Outer Space Activities (LTS) took root in 2010 when the Scientific and Technical Subcommittee began their consideration as an agenda item. After nearly the span of a decade in 2019 the LST Guidelines were adopted and overall provide 21 concrete guidelines within the areas of policy and regulatory frameworks for space activities; safety of space operations; capacity-building, international cooperation, awareness; and scientific and technical research and development.

The LST guidelines are consistent with the Declaration of Legal Principles Governing the Activities of States in the Exploration and the OST Treaty. It is clearly stated that the guidelines are voluntary and not legally binding under international law, and that states should take their own voluntary measures to ensure implementation. Many guidelines are significant to the advancing of trust and confidence needed to pursue security regulations. For example, guidance on national space policy and regulation implementation could directly lead to increased adoptions of national policies, which as seen in some cases can strengthen the international legal regime by filling existing gaps. Within this category also exists the guideline of enhancing the practice of registering space objects, through adoption of relevant and timely registration practices and policies. Such measures embolden the practice of information sharing, and an increase in transparency on vehicle and object launches decreases the chances of misinterpretation and misunderstandings.

On the topic of safety of space operations, the first guideline calls for, "states and international intergovernmental organizations to exchange, on a voluntary basis, and make readily available regularly updated contact information on their designated entities authorized to engage in exchanges of appropriate information on on-orbit spacecraft operations".[204] Such provisions could serve as foundational measures to further enhance efforts of establishing communication hotlines for avoiding misperceptions of satellite close encounters and proximity maneuvers. Also included in this section is the call for improving accuracy of orbital data. Although in this context orbital data is for the increased safety of spaceflight, increased data collection ultimately leads to more informed understanding of space behaviors and will be a necessity for verification measures in the future.

The success of both guidelines have shown how they may be exemplary to adjacent efforts in the CD on security issues. Not only is their substantive content which can serve as foundational steppingstones for further TCBMs, but more importantly the form and process of these initiatives demonstrate possible pathways to alleviate political deadlock on the issue of PAROS and more broadly

[204] UNGA. (2019). Report of the Committee on the Peaceful Uses of Outer Space, 74/20. Annex II, Para. B(1). https://www.unoosa.org/oosa/en/oosadoc/data/documents/2019/a/a7420_0.html

to space security. We see in both cases that the guidelines reaffirm obligations laid out within the OST, and by doing so these measures help to reinforce the existing legal regime. Also, although there may not be explicit language on weaponization of outer space, these measures are important to preventing escalatory and conflict provoking actions or misunderstandings.

OPEN-ENDED WORKING GROUP ON REDUCING SPACE THREATS THROUGH NORMS, RULES AND PRINCIPLES OF RESPONSIBLE BEHAVIOURS

The most recent initiative on progressing the work of PAROS has been the creation of the Open-Ended Working Group on Reducing Space Threats Through Norms, Rules and Principles of Responsible Behaviors (herein referred to simply as OEWG). In December of 2021 the UNGA adopted a resolution put forward by the United Kingdom deciding to convene the OEWG.[205] As part of the mandate the resolution calls for the group to consider the existing international legal and other normative frameworks concerning threats arising from State behaviours with respect to outer space. Calls for the group to consider current and future threats by states to space systems, and actions and activities that could be considered irresponsible, as well as to make recommendations on possible norms, rules and principles of responsible behaviours relating to such threats. The organizational session of the OEWG confirmed a multiyear working plan, consisting of four sessions from 2022-2023. The first of these sessions recently took place from May 9-13, 2022.

What is poignantly unique to this initiative is the language on behavior and measuring behavior through the lens of being responsible or irresponsible. It is the position of some states that traditional arms control approach on limiting capabilities is not efficient to the context of outer space due to the inherent dual-use and dual-purpose nature of majority of outer space objects. They argue therefore, that one has to focus on behaviour as a realistic and concrete way to strengthen space security and to prevent misconceptions and miscalculations. Behaviours may be interpreted as, "the actions, activities or omissions of States, which either prevent, manage, limit (in the case of responsible behaviours) or can create (in the case of irresponsible behaviours) threats – or potential threats – to space systems", as defined by the UK in their working paper to the first session.[206] Another rubric for defining *responsible behaviours* was presented by Australia, as

Also, although there may not be explicit language on weaponization of outer space, these measures are important to preventing escalatory and conflict provoking actions or misunderstandings

[205] UNGA. (2021). Reducing space threats through norms, rules and principles of responsible behaviours, Res 76/231. https://documents-dds-ny.un.org/doc/UNDOC/GEN/N21/417/21/PDF/N2141721.pdf?OpenElement

[206] Delegation of the United Kingdom to the OEWG, UK Working Paper for The Un Open Ended Working Group On Reducing Space Threats Through Norms, Rules And Principles Of Responsible Behaviours. Para. 27 https://documents.unoda.org/wp-content/uploads/2022/05/FINAL-space-threats-OEWG-UK-working-paper-FINAL.pdf

they characterized responsible as being, "actions or activities that are clearly communicated, avoid surprise, respect the safety and security of other actors and beneficiaries, contribute to stability or risk reduction and avoid provocation of tensions" and irresponsible as being, "any actions which do not meet the above expectations and/or could – deliberately or inadvertently – create debris, require emergency maneuvers to lower the risk of collision, or otherwise threaten or interfere with the normal operation of space objects in peacetime".[207] Other states such as China put forward that the country with the ablest space faring capability was the most responsible for carrying out exemplary behaviours, and introduced their working concept of responsible behavior within this context stating, "the superpower should be its commitment of not seeking hegemony and dominance in outer space. No country should assure the security of its own or of a small group of countries by undermining the security interests of other countries, nor cling to major power competition or military bloc confrontation."[208]

"No country should assure the security of its own or of a small group of countries by undermining the security interests of other countries, nor cling to major power competition or military bloc confrontation"

As witnessed, there is a body starting to develop on working definitions and understandings of what constitutes responsible behaviours in outer space occurring in and around the OEWG. However, there has been voiced criticisms of the unfolding behavior-based approach. The foremost criticism is the possibility to further entrench politicization of the process. Concerns have been expressed that the political bloc leading the initiative may convolute the labeling of actions to the labeling of states themselves. Therefore, it could so happen that *irresponsible* or *bad* behaviors could politically translate to *irresponsible* or *bad* states deepening international geopolitical tensions and conflicts.

Despite the lack of consensus on the efficacy of the behaviours-based approach there are additional positive features of the OEWG. The open-ended environment of the forum is a unique recent allowance, as PAROS has been negotiated previously in limited member CD subcommittees or limited member Groups of Governmental Experts. Some delegations believe the inclusivity of the forum can galvanize the discussion on PAROS once again. An inclusive approach that garners wider endorsement and participation from both developing space-faring and non-space faring nations, increases the ownership over the processes leading to a higher chance of success in future negotiations.

Moreover, the allowance of contribution from intergovernmental organizations and civil society have generally been viewed in a positive manner, understanding that these organizations bring with

[207] Delegation of Australia to the OEWG, Exchange of views – Australian Statement – as delivered on Tuesday 10 May 2022, https://documents.unoda.org/wp-content/uploads/2022/05/Day-2-Space-OEWG-Australian-statement-General-Exchange-of-Views-as-delivered.pdf

[208] Delegation of China to the OEWG, General Remarks by H.E. Amb. LI Song at the First Session of the Open-Ended Working Group on reducing space threats through norms, rules and principles of responsible behaviours https://documents.unoda.org/wp-content/uploads/2022/05/EN-Remarks-by-H.E.-Amb.-LI-Song-at-the-Space-OEWG.pdf

them sophisticating network mappings and cross sector dialogue expertise needed to advancing understandings on issues of space security. In the first session of the OEWG eight out of the twenty-five working papers submitted were from intergovernmental or NGOs, contributing nearly a third of the working paper content. In addition, the morning informal panels consisted of members from the academic community and civil society. Their presentations and contributions to the sessions inspired fruitful debates and discussions throughout the whole of the OEWG. Continuing in such a model allows the forum to hear new voices and perspectives to the issues of space security.

Additionally, some delegations have pointed out the agnosticism of outcome for the OEWG as being a positive feature. Although the resolution calls for a report to be adopted by consensus, some delegations have expressed the importance of function over form and the need for states to use this forum to express genuine concerns and issues. An example can be seen from the Philippines when in their working paper they stress that, "exchanging our views and clarifying our understandings of these principles already constitute a crucial confidence-building measure that help create the appropriate environment to advance our work in promoting a peaceful, stable, and safe outer space. We hope that delegations will engage constructively in this regard".[209]

The first session was fruitful, as member states had a productive exchange of views on topics relating to existing legal regimes and their applicability to outer space. Some topics such as creating processes for due regard and consultations, reaffirming the applicability of international law, and supporting ratifications of UN outer space treaties have shown promise for wide endorsement. The subsequent session in September, on considerations of current and future threats to space systems, will prove to be more challenging but necessary. If member states share their views on *irresponsible* behaviors and or capabilities implicated therein through concrete examples, the conversation will bring to the forefront kinetic, non-kinetic, directed energy, cyber, and other interfering systems. This harmful interference-based conversation, whether through the lens of behavior or capabilities, is crucial if we are to reach international definitions and common understandings on outer space weapons.

[209] Delegation of the Philippines to the OEWG, General Statement Delivered by H.E. Maria Teresa T. Almojuela, Ambassador and Deputy Permanent Representative of the Philippines to the United Nations and Other International Organizations in Geneva. https://documents.unoda.org/wp-content/uploads/2022/05/PHILIPPINES-National-Statement.pdf

3.3 POLITICIZATION AND THE FALSE DICHOTOMOY OF AN EITHER-OR APPROACH

One of the most prevalent challenges to progress on PAROS is the politicization of the process and the influence from geopolitical conflicts. Historically there has been a political bloc led by Russia and China on initiatives and propositions to PAROS in the CD. This leadership is demonstrated through their proposed draft treaty PPWT in 2008 (then revised in 2014), their proposed GGE on recommending substantial elements of an international legally binding instrument on PAROS in 2017, along with Russia's *No First Placement Initiative* in 2014 and proposed GGE on TCMBs in 2012. There has also been a rising political bloc led by members of the European Union and the United States as seen by the ICoC initiative, the resolution from the United Kingdom on creating the recent OEWG, and the U.S. moratorium on direct ascent kinetic ASAT testing. Unfortunately, these two factions are reminiscent of historical geopolitical rivalries. Each faction has shown preference of approach in its initiatives, therefore politicizing to some extent the approaches themselves.

This is most evidently seen through their voting records on resolutions in the UNGA. As seen in Figure 1, a culmination of a decade's worth of voting on resolutions pertaining to space security in the UNGA exposes the politicization of the process. What is immediately apparent is the United States pattern of voting, as seen in Figure 2. From the 30 resolutions, 6 of which are adopted without a vote, the U.S. had 6 abstaining positions, 16 votes against, and only 2 in favour. As the nation with most liability and responsibility over actors and objects in outer space such voting behavior is a substantial impediment to the progress of PAROS.

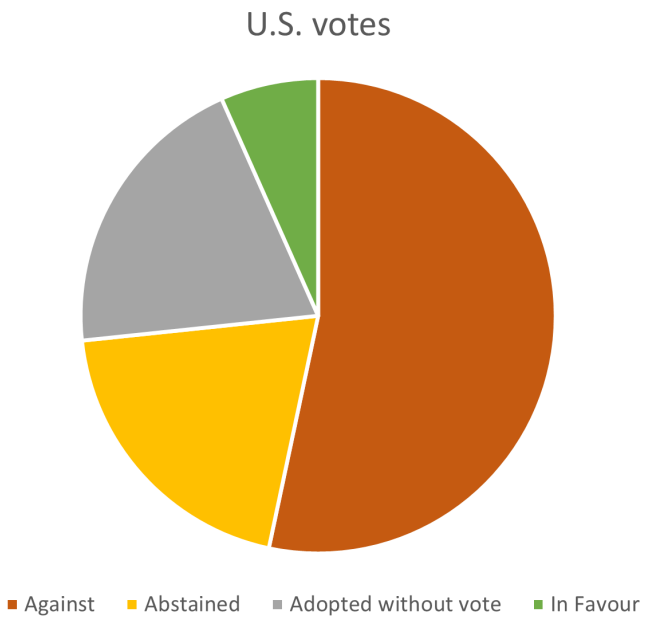
Figure 1. A decade of voting on UNGA Resolutions pertaining to space security

Resolution	China	Russia	United Kingdom	United States
Prevention of an arms race in outer space, A/RES/66/27, 2011	In Favour	In Favour	In Favour	Abstaining
Prevention of an arms race in outer space, A/RES/67/30, 2012	In Favour	In Favour	-	Abstaining
Transparency and confidence-building measures in outer space activities, A/RES/68/50, 2013	Adopted without vote	Adopted without vote	Adopted without vote	Adopted without vote
Prevention of an arms race in outer space, A/RES/68/29, 2013	In Favour	In Favour	In Favour	Abstaining
Transparency and confidence-building measures in outer space activities, A/RES/69/38, 2014	Adopted without vote	Adopted without vote	Adopted without vote	Adopted without vote
No first placement of weapons in outer space, A/RES/69/32, 2014	In Favour	In Favour	Abstaining	Against
Prevention of an arms race in outer space, A/RES/69/31, 2014	In Favour	In Favour	In Favour	Abstaining
Transparency and confidence-building measures in outer space activities, A/RES/71/42, 2016	Adopted without vote	Adopted without vote	Adopted without vote	Adopted without vote
No first placement of weapons in outer space, A/RES/71/32, 2016	In Favour	In Favour	Abstaining	Against
Prevention of an arms race into outer space, A/RES/71/31, 2016	In Favour	In Favour	In Favour	Abstaining
Further practical measures for the prevention of an arms race in outer space Statement of financial implications, A/RES/72/250, 2017	In Favour	In Favour	Against	Against
Transparency and confidence-building measures in outer space activities, A/RES/72/56, 2017	Adopted without vote	Adopted without vote	Adopted without vote	Adopted without vote
No first placement of weapons in outer space, A/RES/72/27, 2017	In Favour	In Favour	Abstaining	Against
Prevention of an arms race in outer space, A/RES/72/26, 2017	In Favour	In Favour	In Favour	Abstaining
Transparency and confidence-building measures in outer space activities, A/RES/73/72, 2018	In Favour	In Favour	In Favour	Against
No first placement of weapons in outer space, A/RES/73/31, 2018	In Favour	In Favour	Against	Against
Prevention of an arms race in outer space, A/RES/73/30, 2018	In Favour	In Favour	In Favour	Against

Transparency and confidence-building measures in outer space activities, A/RES/74/67, 2019	In Favour	In Favour	Abstaining	Against
Further practical measures for the prevention of an arms race in outer space, A/RES/74/34, 2019	In Favour	In Favour	Against	Against
No first placement of weapons in outer space, A/RES/74/33, 2019	In Favour	In Favour	Against	Against
Prevention of an arms race in outer space, A/RES/74/32, 2019	In Favour	In Favour	In Favour	Against
Transparency and confidence-building measures in outer space activities, A/RES/75/69, 2020	In Favour	In Favour	Abstaining	Against
No first placement of weapons in outer space, A/RES/75/37, 2020	In Favour	In Favour	Against	Against
Reducing space threats through norms, rules and principles of responsible behaviours, A/RES/75/36, 2020	Against	Against	In Favour	In Favour
Prevention of an arms race in outer space, A/RES/75/35, 2020	In Favour	In Favour	In Favour	Against
Reducing space threats through norms, rules and principles of responsible behaviours, A/RES/76/231, 2021	Against	Against	In Favour	In Favour
Further practical measures for the prevention of an arms race in outer space, A/RES/76/230, 2021	In Favour	In Favour	Against	Against
Transparency and confidence-building measures in outer space activities, A/RES/76/55, 2021	Adopted without vote	Adopted without vote	Adopted without vote	Adopted without vote
No first placement of weapons in outer space, A/RES/76/23, 2021	In Favour	In Favour	Against	Against
Prevention of an arms race in outer space, A/RES/76/22, 2021	Adopted without vote	Adopted without vote	Adopted without vote	Adopted without vote

Note. This data is from my own compilation of votes searched through the meeting voting records from 2011-2021. Voting is from the UNGA 66th-76th session and data from voting records of UNGA sessions can be viewed for more detail here: https://research.un.org/en/docs/ga/quick/regular/76 Explanations of the highlighted rows are included in the analysis.

Figure 2. U.S. voting behavior over a decade of UNGA resolution relating to space security



Note. This chart is a reflection of U.S. votes pulled from data from Figure 1.

Furthermore, we see the voting patterns against each faction's initiative fall in line with the self-interest of their political bloc. As denotated in blue, the first introduction of the *No First Placement Initiative* was voted against by the U.S. and abstained by the U.K. However, we see the U.K. position change from abstaining to against in 2018. Additionally, as denotated in green, the initiative of a GGE on recommendations on substantial elements of an international legally binding instrument on PAROS was voted against by the U.S. and U.K. The entrenching of political bias intensifies as we see in 2019 the U.K. position on TCBMs changes from in favour to abstaining and the U.S. changes their position from abstaining to against. Also in this time frame, we see U.S. position change on the PAROS resolution from abstaining to against. Finally in 2020, as denotated in yellow, we see the first against votes from Russia and China on the reducing space threats through norms, rules and principles of responsible behaviours initative.

This politicization of methodology undermines the efforts of the international community on achieving the goals of PAROS. This also influences the way member states interpret the efforts put forward by fellow states. For example, in the most recent EU explanation as to why it voted against the *No First Placement Initiative* it stated that, "Rather than introducing a NFP [No First Placement] pledge, the EU

and its Member States believe that voluntary measures constitute a pragmatic way forward at the moment, starting with norms, rules and principles of responsible behaviours, through an incremental and inclusive process".[210] We see that politicization prompts a hyper focus on the semantics of terms such as pledge versus voluntary measures. In this statement the EU is unintentionally opposing the very thing it subsequently proposes. Ultimately, pledges, political commitments and or statements serve the same functions; they are voluntary measures not bound to an international legal framework. This is not to undermine the important and valid criticism of the *No First Placement Initiative*, but to expose that the criticism was not provided in a negotiatory manner. Feedback would be most productive if given in a collaborate effort, for example if states were to agree that No First Placement of Weapons in Outer Space were worthy of wide endorsement and through a negotiation process worked to resolve its parameters and a common definition of weapons. In this manner behavior-based approach initiatives could be understood as complimentary to the initiative by pursuing a common understanding of space weapons and space weaponized behaviors, rather than being perceived as a competing initiative.

The obstacle of politicization has led some to believe in a false dichotomy of having to pursue either legally binding or voluntary measures approach

The obstacle of politicization has led some to believe in a false dichotomy of having to pursue either legally binding or voluntary measures approach. However, this is far from the natural reality of these methodologies which have historically consistently coexisted. A prime example has already been outlined in the *No First Placement Initiative*. Not only does it explicitly support and strengthen the efforts of a legally binding mechanism, but the initiative itself, "stresses that, while such an agreement [legally binding] is not yet concluded, other measures may contribute to ensuring that weapons are not placed in outer space".[211] However, we can see the coexistence of approaches even more so through the following case studies.

THE OUTER SPACE TREATY IN THE CONTEXT OF NON-LEGALLY BINDING ARRANGEMENTS

The Outer Space Treaty itself is a prime example of the importance of non-legally binding measures. It was afterall, through non-binding political memorandums of understanding that cooperative international space measures began. If one recalls from the historical overview, U.S. and Soviet space cooperation began through a 1962 Memorandum of Understanding in the area of satellite

[210] Delegation of the European Union to the United Nations in New York (2021). EU Explanation of Vote: United Nations 1st Committee: No First Placement of Weapons in Outer Space. https://www.eeas.europa.eu/delegations/un-new-york/eu-explanation-vote-united-nations-1st-committee-no-first-placement-0_en?s=63

[211] UNGA. (2014). No First Placement of Weapons in Outer Space, Res 69/32. https://documents-dds-ny.un.org/doc/UNDOC/GEN/N14/662/89/PDF/N1466289.pdf?OpenElement

meteorological data. The initiative was important as it increased trust and communication, enabling further measures to take place like negotiations on the Partial Test Ban Treaty.

Additionally, the U.S. and U.S.S.R. in a 1963 UNGA both gave unilateral political commitments not to station in outer space any objects carrying nuclear weapons or other kinds of WMDs. This prompted the UNGA Resolution 18/1884, welcoming the measures from the U.S. and U.S.S.R. and calling upon all states to do the same. These voluntary measures were enacted alongside the negotiations of the Partial Test Ban Treaty itself, which came into force in October of 1963. These measures can be seen as a significant influence on article IV of the Outer Space Treaty.

Additional non-legally binding mechanisms were being adopted by the UN namely, the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space. This declaration consisted of nine guiding principles outlining the expectations on the exploration and use of outer space. Although this declaration was not legally binding in nature, these principles are intrinsically tied to the foundation of the outer space treaty itself. Each one of the nine guiding principles have been cemented in the OST. Moreover, the process of negotiating principles fostered a crucial dialogue on the intent and future of outer space. The peaceful uses principle, common heritage principle, non-appropriation principle, and unique expectations for nations to bear responsibility for governmental and non-governmental activity in space were all negotiated under this non-legally binding mandate. We may currently take for granted these international expectations for outer space; however, it must be emphasized that if not for the good faith negotiations of these principles and common understanding of global values at the inception of outer space exploration, the environment of outer space could have been entirely different with appropriation and terrestrial conflicts extending directly into space. Furthermore, we see a direct pathway between the principles existing on the basis of voluntary implementation, and them being made into international law in the OST. In addition to their being enacted into international law, the principles have formed international norms and expectations for outer space activity and continue to serve a foundational role for legal initiatives, national policies, and global outer space governance. Ultimately, the coexistence of both approaches during the initial creation of outer space governance, served to strengthen the regime and increase its longevity, compliance, and global implementation.

GGE ON TRANSPARENCY AND CONFIDENCE-BUILDING MEASURES IN OUTER SPACE ACTIVITIES

Transparency and confidence building measures (TCBM) are

important to consider for their historical flexibility, existing sometimes as legally binding and sometimes not. TCBMs are also valuable to consider, because of their wider acknowledgement as being successful and effective tools for advancing initiatives for progress and security. The 2010 resolution 65/68 put forward by the Russian Federation requested a group of governmental experts to conduct a study on outer space transparency and confidence-building measures. The group convened in 2012 and successfully adopted by consensus a final report submitted to the General Assembly.[212] Within the report it was noted that existing treaties on outer space already contained some transparency and confidence-building measures of a mandatory nature, while also expressing those new non-legally binding measures for outer space activities should be complementary to the existing international legal framework. It was also noted that TCBMs should be complimentary to and not substitute verification measures. The work of the group is a case study to the success of pursuing both non-legally binding and legally binding measures simultaneously. As TCBMs can be both of mandatory and voluntary nature, the exercise and recommendations of the group were able to advance the goals of PAROS satisfying both camps and reaching a document by consensus.

The report outlined successful criteria of a TCBM as being clear, practical, proven, able to be confirmed in its application by other parties, and able to reduce the causes of mistrust, miscalculation, and misunderstandings.[213] In addition to criteria for successful TCBMs there were several concrete recommendations for outer space security TCBMs going forward. The recommendations were inclusive of both highlighting and promoting implantation of mandatory protocol within the outer space legal regime and encouraging voluntary measures and behaviors.

The first was a recommendation to enhance information exchange on national space policies. The recommendation was not exclusive to national space policy however, as it also called for making available information on national strategy and security policies, outer space research, space application programmes, and outer space military expenditure. The following TCBM recommendation was to exchange information on "orbital parameters of outer space objects and potential orbital conjunctions".[214] Expectations for this parameter included information on the orbital elements of space objects and possible conjunctions of both government and private spacecraft, provisions to provide registration information to the UN as soon as feasible, and a provision of ensuring public access to the UN registration. Finally, among recommendations on information exchange, it was proposed to include information exchanges on

[212] UNGA. (2013) Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities, 68/189. https://documents-dds-ny.un.org/doc/UNDOC/GEN/N13/408/35/PDF/N1340835.pdf?OpenElement
[213] Ibid. Para. 34
[214] Ibid. Art IV, Section B.

the forecasting of natural hazards in outer space and notifications prior to spacecraft launches. It is important to highlight that such TCBMs on registration information and hazard forecasting are included in the Registration convention and Rescue Agreement, and these recommendations serve to strengthen, specify and enhance common understanding on those legal obligations.

There were several recommendations on TCBMs related to risk reduction notifications. The first recommendation was enabling notifications on scheduled maneuvers that may result in risk to the flight safety of other space objects. This recommendation was followed by developing measures to notify states of predicted high-risk re-entry events in which the re-entering space object or residual material from the re-entering space object could cause damage or radioactive contamination. There were two other recommendations on the notifications in the case of emergency situations and of intentional orbital breakups. On the last point it was expressed that intentional destruction of any on-orbit spacecraft and launch vehicle orbital stages or other harmful activities that generate long-lived debris should be avoided, but in the event of a determined necessary break-up, states should inform other potentially affected states of such intents and plans and that such actions are to be caried out in conformity with the Space Debris Mitigation Guidelines.

60 Starlink satellites stacked together before deployment on 24 May 2019

Source: www.starlink.com

Further concrete TCBM recommendations were the implementation of voluntary familiarization visits to launch sites and facilities, expert visits and international observers to launch sites, flight control and command centers and other space infrastructure and facilities. Finally, it was also put forward that states should carry demonstrations of space related technology on voluntary basis in line with national export controls.

The group also spoke to the importance of pursuing international cooperation, increasing outreach measures, enhancing coordination, and clarifying, strengthening, and implementing routine consultation measures as provided for in article IX of the OST. Finally, in addition to the concrete recommendations the group concluded that, "States and international organizations, on a voluntary basis and without prejudice to the implementation of obligations deriving from existing legal commitments, consider and implement the transparency and confidence-building measures described in the present report".[215] The conclusion and key recommendations of the report are significant for their recognition of both approaches and paying equal respect to the ability of both to endue progress.

[215] Ibid. Article IX, para. 68.

THE INTERMEDIATE-RANGE NUCLEAR FORCES TREATY

It is not only within the field of outer space security that the synergy of both methodologies is important. One can look to the adjacent security sphere of nuclear arms control to see strong examples of collaborative methods. In this case the negotiations of the Intermediate-Range Nuclear Forces (INF) Treaty provide a useful example.

The negotiation of the INF treaty was a multi-year process which consisted of continuous bilateral dialogue between the U.S. and Soviet Union. There were adjacent voluntary actions from states, such as the unilateral declaration from the Federal Republic of Germany to dismantle its 72 Pershing IA missiles and not replace them with more modern weapons if the U.S. and the Soviet Union eliminated all of their INF missiles as foreseen in the emerging double global zero strategy. Such unilateral commitments were arguably important for building momentum to the treaty. However, the most prominent voluntary measure to take place was the joint political statement from Gorbachev and Reagan at their meeting in Geneva in 1985. The statement was in part purpose to call for an interim accord on intermediate-range nuclear forces, but it most famously conceived the principle, "that a nuclear war cannot be won and must never be fought".[216] Afterwards with additional dialogue the INF Treaty was signed in 1987.

This case is especially relevant because it shows the value in pursuing both approaches. The INF Treaty, as known is contemporarily defunct, given the U.S. 2019 withdrawal of the treaty siting Russian violation as its primary reason.[217] However, despite the collapse of the legally binding mechanism itself the principles agreed and exchanged upon in its inception have endured, namely, the Gorbachev-Reagan Principle. We see the significance of this principle in its continued use, for example in its recent reaffirmation in the joint P5 statement from earlier this year.[218]

Principles and the non-binding methodology at large have the ability to act as continuous foundational sources, forging pathways for future international cooperation. However, the value of both binding and non-binding methodologies cannot be understated. Furthermore, it has been shown how successful governance comes not from siloed attempts to negotiate only one approach, but most often is a combination and diverse set of strategies aimed at making

[216] Joint Soviet-United States Statement on the Summit Meeting in Geneva. (1985). https://www.reaganlibrary.gov/archives/speech/joint-soviet-united-states-statement-summit-meeting-geneva

[217] U.S. Department of State. (2019) U.S. Withdrawal from the INF Treaty on August 2, 2019. https://2017-2021.state.gov/u-s-withdrawal-from-the-inf-treaty-on-august-2-2019/index.html#:~:text=On%20February%202%2C%202019%2C%20the,continuing%20violation%20of%20the%20treaty.

[218] Joint Statement of the Leaders of the Five Nuclear-Weapon States on Preventing Nuclear War and Avoiding Arms Races (2022). https://www.whitehouse.gov/briefing-room/statements-releases/2022/01/03/p5-statement-on-preventing-nuclear-war-and-avoiding-arms-races/

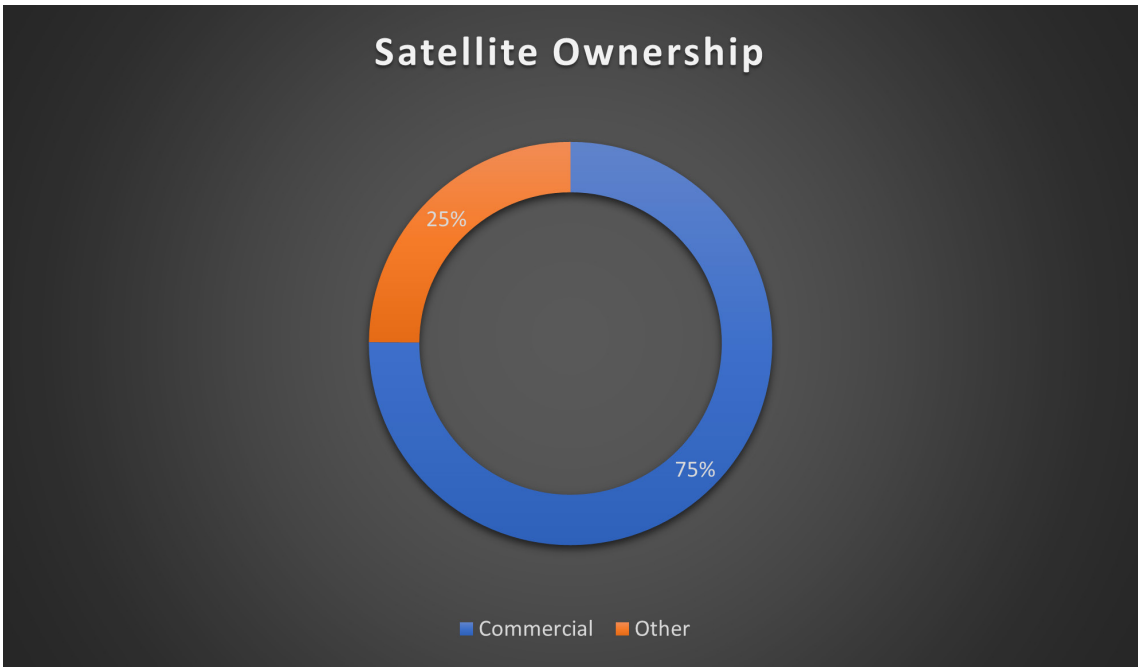
a comprehensive and long-lasting governance structure. If the feat of enhancing global space regulatory and legal frameworks is to be accomplished, it will be through actors ensuring the synergy of both approaches is pursued.

3.4 THE ROLE OF THE COMMERCIAL SECTOR AND A BOTTOM-UP APPROACH

On the topic of what diverse strategies and considerations for what makes a robust governance structure, in the context of outer space, constructing a governance regime without consideration of the commercial sector would prove inadequate and insufficient. Although the UN treaties and sets of guiding principles currently serve as the basis for the legal regime, one must consider the context under which they were established. During the time of the OST, there were two hegemonies in outer space. The State at the time was the proliferator of human activity in space, and more specifically only two states. The context of this historical hegemony has been severely challenged and up ended in the case of contemporary outer space actors.

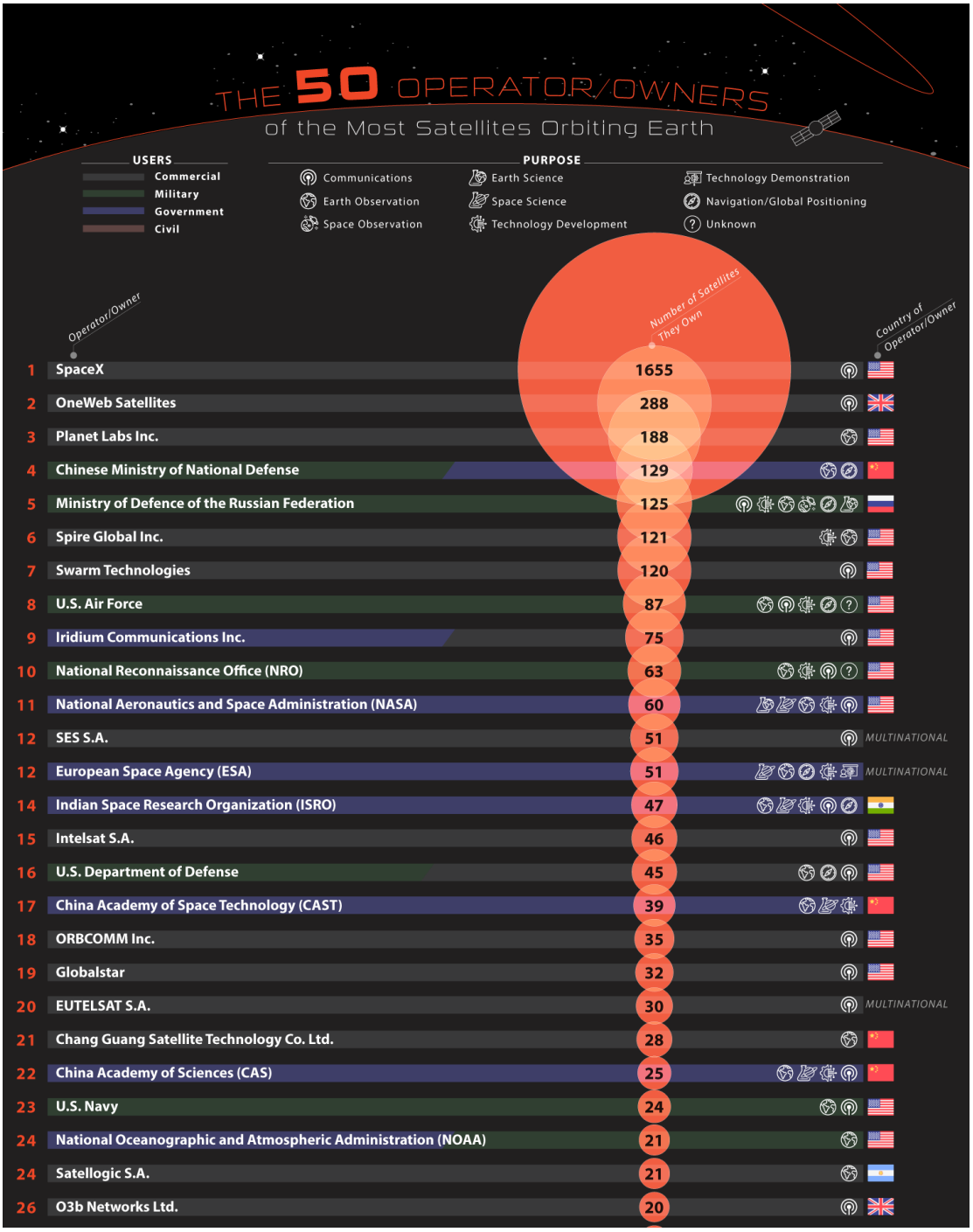
In the case of today, as seen in Figure 3, the largest stakeholder group of outer space satellites is in fact the commercial sector. More specifically it is SpaceX, a privately held U.S. corporation, which currently holds 36% of all satellites in orbit. From the data in Figure 3, we can see that the top three holders of space satellites are in fact commercial entities, followed by governmental military stakeholders. As seen in Figure 4, by taking an aggregate of the top 50 satellite owner affiliations, we see that 2,833 satellites are owned by purely commercial entities, not including entities which have both commercial and governmental aspects, compared to the 939 satellites owned by other entities including government, military, and civilian sectors. This means a resounding 75% of stakeholders among the top 50 outer space stakeholders belong in fact to the commercial sector. Despite the fact that within the existing legal regime, liability of these actors falls to the nation where the entity is domiciled and from where launch takes place, it does not erode from the increasing agency and influence of the commercial sector. Furthermore, because the governing of the commercial sector is delegated more to national policy, when the national policy gives greater agency to its commercial sector, as seen in the case of the U.S., the commercial sector de facto has increased international power.

Figure 3. Every Satellite Orbiting Earth and Who Owns Them



Note. This infographic is taken from a larger infographic on satellite ownership data, compiled by the Dewesoft, a data acquisition systems developer and manufacturer. For the purposes of brevity, this portion includes only half of the top fifty ownership entities. For the complete data infographic see: https://dewesoft.com/daq/every-satellite-orbiting-earth-and-who-owns-them.

Figure 4. Ownership by entity affiliation among the top 50 satellite operators



Note. The graph indicates satellite affiliation from the top 50 stakeholders according to DeweSoft's data compilation seen here: https://dewesoft.com/daq/every-satellite-orbiting-earth-and-who-owns-them. Commercial for the purposes of this chart does not include stakeholders who affiliation includes both commercial and governmental. More specifically the percentages represent a ratio of 2,833 satellites from the commercial sector to 939 from other sectors which comprise of military, government, and civilian.

In realization of this factor, it is ever more evident that the work taking place through the auspices of the UN, an intergovernmental framework, needs to give further credence to the initiatives of the commercial sector. A recommendation for this problem would be to consider implementing a bottom-up approach. Such an approach would include looking at how industry best practices and codes of conduct could contribute to an international governance structure. Considerations of established initiatives such as the Space Safety Coalition and The Consortium for Execution of Rendezvous and Servicing Operations could give foundational support to intergovernmental efforts on tackling issues of space security.

The Space Safety Coalition (SSC) consists of companies, organizations, and additional government and industry stakeholders who promote space safety through adoption and development of international standards, guidelines, and practices. The SSC also coordinates and updates a Best Practices for the Sustainability of Outer Space Operations that as one of its objectives serves to address governance gaps.[219] The document is described by the SSC as being, "a living set of best practices assembled and *owned* by the coalition of like-minded space organizations which have endorsed it".[220] Included in these best practices are measures such as increasing information exchange and ensuring constellation architecture minimizes risk of collisions and need for emergency maneuvers.

The Consortium for Execution of Rendezvous and Servicing Operations (CONFERS) is an industry-led initiative that aims to develop consensus-derived technical and operational standards for on-orbit servicing (OOS) and rendezvous proximity operations (RPO). Such standards are published in a non-binding format and are gathered from best practices in government and industry. As part of its stated mission CONFERS also seeks to, "guide international policies for servicing that contribute to a sustainable, safe, and diverse space economy".[221] CONFERS has recent publications such as, *Using Historical Practices to Develop Safety Standards for Cooperative On-Orbit Rendezvous and Proximity Operations*[222]and *CONFERS Recommended Design and Operational Practices.*[223]In addition to such resources, CONFERS also hosts a Lexicon Working Group who work to aggregate an ongoing lexicon of language used in the discussion of OOS and RPOs.

Ultimately, these initiatives serve as a nexus of international expertise and experience on the issues of outer space activity.

[219] Space Safety Coalition. (2019). Best Practices for the Sustainability of Outer Space Operations, https://spacesafety.org/best-practices/
[220] Space Safety Coalition. Best Practices for the Sustainability of Space Operations, https://spacesafety.org/.
[221] The Consortium for Execution of Rendezvous and Servicing Operations (CONFERS). Mission statement. https://www.satelliteconfers.org/about-us/
[222] See here for publication: https://www.isi.edu/sites/default/files/centers/serc/CONFERS_IAC_Paper_PUBLISH.PDF
[223] See here for publication: https://www.satelliteconfers.org/publications/

The inclusion of such initiatives into the dialogue surrounding outer space governance overall would ensure wider cross sector engagement. Both national and international endorsement of efforts by organizations such as SSC and CONFERS would serve to encourage future cooperation and collaborative conversation between sectors. The existence of these structures also has the potential to be used as a basis for communication channels and emergency hotlines for international space actors across sectors. Such hotlines and communication channels would enhance risk reduction measures and strengthen the ability to pursue future verification mechanisms.

In addition, there exists concrete and strong incentives within the commercial sector to protect their investments and survivability of their business model. Governmental delegations working on the issues within space security would do well to capitalize on these incentives and use them to increase participation and compliance. By capitalizing on existing incentives, member states could also seek endorsement from corporate entities on proposals concerning norms, behaviors, principles, and draft treaties. Such endorsements from private actors would bolster the legitimacy of any measure and increase the chance of its success, implementation, and compliance in the future. The commercial sector is too large not to be considered or included, and it is evident that by implementing a bottom-up approach and increasing cross sector dialogue, new perspectives, incentives, and momentum would advance the goals of space security.

It must also be emphasized that participation from NGOs, think tanks, and the academic sector have an important role to play. Not only do these institutions contribute original problem-solving methods but they come with extensive cross sector training and networks which facilitate this important dialogue between industry and public sector. Take for example the Space Industry Workshop by UNIDIR. The workshop was a dedicated forum to exchange ideas from industry representatives on topics such as what does the private sector consider a threat to its space systems and what steps does the private sector think governments should take to prevent an armed conflict in outer space.[224] The ability for NGOs to capitalize their role as bridge builders would increase the inclusive dialogue needed for solving these issues. Moreover, NGOs have specific regional trainings that allow for not only inclusive dialogue across sectors but among developing nations, ensuring the most diverse participation to the discussion on outer space security as possible.

Not only do these institutions contribute original problem-solving methods but they come with extensive cross sector training and networks which facilitate this important dialogue between industry and public sector

[224] Almudena Azcárate Ortega & James Revill. 2021. “Space Industry Workshop Report”, UNIDIR, Geneva. https://doi.org/10.37559/WMD/21/Space/01

CONCLUSION

The significance of outer space systems and resources to the infrastructures of modern-day life cannot be understated. These outer space systems and the quality of life they enable for us all are in jeopardy and would be rendered completely unusable if even one conflict took place in outer space. If outer space is weaponized the possibility of such a conflict grows exponentially. Yet, even with this fact, the outer space governance regime has remained stagnant and inadequate in preventing such a conflict.

There is an alarming increase of consideration of space as a conflict hosting domain amongst national and regional defense agencies. The current outer space governance enables this military capacity and development. It is undeniable that the dependency of military activities on outer space systems and the further integration of military and civilian capabilities complicates a balanced understanding of peaceful applications and uses for outer space. Furthermore, the rapid expansion of new capabilities and the rate at which emerging technologies outpace the efforts of the global community to regulate them, complicates the process even more. However, despite these challenges there exists no ambiguity on the need to ensure the protection and access to outer space.

The existing legal framework has acted as a corner stone on the expectations and guidelines for outer space activity. In the creation of this framework however, there was limited foresight in the 1960s to develop a nuanced instrument capable of addressing modern threats to outer space. It has become necessary to augment the existing legal framework through a variety of approaches and initiatives to ensure that the weaponization of outer space does not happen.

It must be stated that prospects for solving outer space security will be in the imminent future more challenging due to the current international crisis over Ukraine. The escalation in conflicts and tensions has a direct influence over the environment in negotiating fora. This has resulted in a stalemate across arms control and disarmament, and we should expect outer space to be no different. However, it is important to be forward looking and understand the recommendations and pathways to be implemented as soon as is feasible. Member states should also keep into consideration that stalling progress in areas of arms control because of specific conflicts and crises is a disservice to global peace, stability, and security at large.

The changing context and deliveries of threats may mean that the global community utilize a broadening definition of weapons and expand the way it thinks of arms control. State parties could borrow from adjacent fields in arms control and pursue smaller technical agreements to serve as the basis for future progress. An example would be to make clear the categories of space weapons

(space-space, space-Earth, Earth-space) in negotiating fora and organize efforts in a corresponding manner. The complexity and current existence of Earth-space capabilities should not hinder the necessary preventive measures for space-space and space-Earth weapons development and deployment.

Another manner to overcome impasses is to pursue an inclusive approach. Historically, outer space governance has always constituted an array of both non-binding and binding tactics. This precedent should be further employed to establish steppingstones on which legally substantive instruments can be achieved. However, it is important that these novel techniques for arms control do not inhibit progress itself but rather are used in complimentary fashions to the existing efforts such as the PPWT which serve as a strong baseline for future legally binding mechanisms. Additionally, states should avoid prescribing their political standing and dominance to specific methodologies. All parties concerned on the issues of space security have an equal part to ensure that politicization and historic hegemonies do not impede progress on a topic that is so integral to modern human existence.

Furthermore, the global community must consider it an absolute necessity to incorporate the participation of industry, civil society, academia, and the non-governmental sector at large. It is crucial to consider the new incentives of the commercial industry and how such incentives can be capitalized to encourage strong and immediate action. Only with the contribution of the largest stakeholders in outer space will the global community be able to implement a robust and long-lasting global outer space governance. By pursuing inclusive approaches in good faith by a diverse set of actors, the global community can ensure that outer space be unequivocally sanctioned a domain of peace for the advancement of humanity. ■

ABBREVIATIONS

APRSAF — Asia-Pacific Regional Space Agency Forum
APSCO — Asia-Pacific Space Cooperation Organization
ASAT — Anti-Satellite
ASEAN — The Association of Southeast Asian Nations
AU — African Union
CIS — The Commonwealth of Independent States
CONFERS — The Consortium for Execution of Rendezvous and Servicing Operations
COPUOS — Committee on the Peaceful Uses of Outer Space
CSTO — Collective Security Treaty Organization
DE — Directed Energy
ENMOD — Environmental Modification Techniques
IAF — International Astronautical Federation
ICBM — Intercontinental Ballistic Missile
IGY — International Geophysical Year
IISL — International Institutions of Space Law
ITAR — International Traffic in Arms Regulations
JAXA — Japanese Aerospace Exploration Agency
JBIS — Journal of the British Interplanetary Society
LaWS — Laser Weapon System
LST — Guidelines for Long-term Sustainability for Outer Space Activities
MEXT — Japanese Ministry of Education Culture, Sports, Science and Technology
NASA — National Aeronautics and Space Agency
NATO — North Atlantic Treaty Organization
OIC — The Organization of Islamic Cooperation
OOS — On-orbit Servicing
RPO — Rendezvous Proximity Operations
SLBM — Submarine Launched Ballistic Missile
SSC — Space Safety Coalition
TCBM — Transparency and Confidence Building Measure
UNGA — United Nations General Assembly
UNOOSA — United Nations Office for Outer Space Affairs

Security Index Occasional Paper Series
Global Edition

№7 (34), 2022

Sarah Erickson

Prospects for preventing an Arms Race
in Outer Space: Political and Legal Aspects

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Editorial work on this paper
was completed on December 19, 2022

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ARMS CONTROL AND SCENARIOS OF NUCLEAR DISARMAMENT

This occasional paper was made within the framework of the project *Arms Control and Scenarios of Nuclear Disarmament*, which is part of the *Nuclear Nonproliferation & Russia* Program. The project is aimed on monitoring of the situation around the Treaty on Measures for the Further Reduction and Limitation of Strategic Offensive Arms, START, capacity development and modernization of the US nuclear forces, the possibilities of the P5 dialogue on arms control issues and confidence-building measures in the nuclear field in case of the collapse of the arms control architecture.

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To visit Gennady Evstafiev's memory gallery, please, go to: https://pircenter.org/experts/194-gennady-evstafiev

The Gennady Evstafiev Award was established in 2021. The Award winners list:

- Sergey Semenov (2021);
- Leonid Tsukanov (2022).