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“Lasso the Moon? Is It Possible? What about Hack the Moon? Today’s International Framework for Activities on the Moon”

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Cover Page Footnote

Thank you to the Military Cyber Professional Association, Maryland Innovation and Security Institute, and Capitol Technology University for their support of cyber education and learning. Hammercon 2022 and Hack the Moon offer outstanding professional learning and networking opportunities for which military cyber professionals are grateful.

Lasso the Moon? Is It Possible? What about Hack the Moon? Today's International Framework for Activities on the Moon and Celestial Bodies

Diane M. Janosek, Armando Seay, and Jose P. Natera

Introduction

The global interest in the moon and space skyrocketed ever since April 8, 2016, as humanity watched with wonder as the SpaceX Falcon 9 booster launch ushered in the newest era of space activity.¹ Again the world watched when SpaceX traveled, almost seamlessly through space, then safely landed back on Earth. SpaceX, a private company, accomplished what was previously reserved for nation-state governments.² The dawn of the new era of space travel, space activities, and now exponential investment in space has been launched, and with it, comes some uncertainty in moon and space governance.

What can a country or private company do on the moon and in space? This era brings in new participants into the space frontier, and thus challenges. Advancements in technology have allowed for private companies to accomplish feats that were never thought possible. Private enterprise has begun venturing into the final frontier of outer space. This dive into the unknown ranges from private space travel, nanosatellites and internet of things, space mining, private satellites, adversarial cyber-attacks³, and even possibly colonization of the Moon.

Further two adversaries of the United States have demonstrated successful antisatellite weapons. Today, both Russia and China can and have each taken out a satellite from space in space... yes, space wars. In response, the United States established the United States Space Force and Space Command. National security now rests on space security.

Who Owns Outer Space?

Who owns outer space? No one nor any nation state. "There is no sovereignty in space."⁴ While there is sovereignty on earth, the same does not apply to space.

¹ Mike Brown, *SpaceX: Watch the Iconic Falcon 9 Landing That Started a New Era*, INVERSE, (April 20, 2021) <https://www.inverse.com/innovation/spacex-first-ship-landing>.

² Mike Brown, *SpaceX: Watch the Iconic Falcon 9 Landing That Started a New Era*, INVERSE, (April 20, 2021) <https://www.inverse.com/innovation/spacex-first-ship-landing>.

³ The Maryland Innovation and Security Institute sponsor cyber competitions and symposiums. They have hosted Hack the Building, Hack the Port, and next is Hack the moon. For more information, go to www.misi.tech

⁴ Gabrynowicz, Joanne Irene. "Some Legal Considerations Regarding the Future of Space Governance," 48 GA. J. INT'L & COMP. L. 739, 742 (2020).

“Sovereignty is not the legal organizing principle in space as it is on Earth and in airspace.”⁵ Outer space has raised so many novel arrangements and concerns.

Birth of the Space Age

In history, the Space Age was born with the Soviet Union’s successful launch of Sputnik I in 1957,⁶ no one could have predicted the vast array of satellites now in orbit today or the myriad of ways in which satellites and space exploration have affected and, in many ways, improved our terrestrial way of life.⁷ Within ten years of Sputnik I’s launch, the United Nations General Assembly agreed to the Outer Space Treaty, which is still in force today.⁸ The core focus of the treaty is the use of space for peaceful purposes.⁹

Fifty-four years later, this treaty remains the sole international governance document of the space domain, with, to date, 110 signatory countries.¹⁰ Some obvious questions arise when considering the Outer Space Treaty, such as how effective is this treaty in allocating the rights and obligations of nations and other entities that are using space now in ways that were beyond global imagination in 1967?¹¹ What is peaceful exploration?

Exactly half a century later, the world has changed, and so has space. A bipolar world has become multipolar, and an optimistic period of

⁵ Ibid. at 742, n. 15 referencing Outer Space Treaty at Art. I and II.

⁶ See *Sputnik I*, NASA (Oct. 14, 2011),

https://www.nasa.gov/multimedia/imagegallery/image_feature_924.html (stating: “On Oct. 4, 1957, Sputnik 1 successfully launched and entered Earth’s orbit. Thus, began the space age. The successful launch shocked the world, giving the former Soviet Union the distinction of putting the first human-made object into space. The word ‘Sputnik’ originally meant ‘fellow traveler,’ but has become synonymous with ‘satellite’ in modern Russian.”).

⁷ *World Space Week: Six Ways Satellites Improve Our Lives*, AUSTL. GOV’T DEP’T OF INDUS., SCI., ENERGY AND RES. (Oct. 2, 2020), <https://www.industry.gov.au/news/world-space-week-six-ways-satellites-improve-our-lives> (stating, “As they orbit above us in space, satellites are supporting more than 7 billion people down on Earth.”) [hereinafter “*World Space Week*”].

⁸ Chen, David Kuan-Wei, “New Ways and Means to Strengthen the Responsible and Peaceful Use of Outer Space.” *Ga. J. Int’l & Comp Law Review*, Vol 48, at 662-65 (2019)(describing the inaugural Outer Space Treaty as a binding multilateral agreement. The catalyst for international cooperation came thirteen years earlier, when Sputnik I was launched by the Soviet Union. Fears of space wars rallied the global community. The United Nations passed the 1967 global Outer Space Treaty).

⁹ “Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies.” 18 U.S.T. 2410, 610 U.N.T.S. 205, at 1 (entered into force Oct. 10, 1967) (acknowledging “the importance of international co-operation in the field of activities in the peaceful exploration and use of outer space”)(hereinafter Outer Space Treaty).

¹⁰ G.A. Res. 2222 (XXI), at 15 (1966) (“The treaty was signed in London. Moscow and Washington on 27 January 1967.”). Twenty-three other signatories have yet to complete ratification.

¹¹ See Jason Krause, *The Outer Space Treaty Turns 50. Can it Survive a New Space Race?*, A.B.A. J. (Apr. 1, 2017), https://www.abajournal.com/magazine/article/outer_space_treaty (noting that “unfortunately, there are a number of key treaty phases that remain opaque” and that there has been no judicial enforcement to resolve the Treaty’s ambiguous language).

multilateralism has given way to a decline in robust international cooperation. Meanwhile, developments in outer space have exploded in complexity, ambition, and commercial promise. The number of entrants and potential entrants has proliferated...One of the key new entrants is China [planning] a permanent Chinese lunar colony as early as 2030.¹²

The conversation has begun on what does peaceful exploration really mean. The world awaits.

Cyber Attacks in Space

Today, foreign competitors and adversaries can conduct electronic attacks to disrupt, deny, deceive, or degrade space services by attacking the segments in space, on the ground, or through the user or the links themselves.¹³

There are multiple types of threats to space assets:

- Jamming: method used to prevent users from receiving intended signals. Jamming can be accomplished by two primary methods, uplink jamming (directed toward the satellite) or downlink jamming (directed at the users on the ground).¹⁴
- Spoofing: method used to make data or signals appear to be legitimate when they are not. This could tragically hurt an operation when knowing the location of something or someone is the key to a successful mission.

Accordingly, these methods suggest spoofing and jamming have non-peaceful purposes.

Attacks on Satellites

Since attacking of satellites and denial of service are possible, there is a concern about the potential impacts to daily lives in light of the global dependence on space.¹⁵ All lives would be impacted, at least in part, by satellite attacks, as the U.S. dependence on satellites and their secure transmission of data to many critical

¹² Melissa Durkee, *The Future of Space Governance*, 48 GA. J. INT'L & COMP. L. 711, 711 (2019) (noting that in 2019, seventy-two nations had space agencies, and fourteen had orbital launch capabilities).

¹³ See Competing in Space, National Air and Space Intelligence Center. Jan 2019 at 19. (<https://www.nasic.af.mil>)

¹⁴ See "Above us Only Stars: Exposing GPS Spoofing in Russia and Syria," *Center for Advanced Defense*, November 2018, at 11. Accessed on November 19, 2020 at <https://www.c4reports.org/aboveusonlystars>

¹⁵ White House. (2020, December). National Space Policy of the United States of America. *The White House* at 1 (stating "Our way of life on Earth is greatly enhanced by space and the United States acknowledges the importance of space to the advancement of all humanity.") Retrieved from [National-Space-Policy.pdf \(whitehouse.gov\)](#)

infrastructure sector services is widespread.¹⁶ While no longer racing to get into space first, the United States is exploring all international and military options to protect and secure space satellites from harm.¹⁷ Military options are one avenue.

One such military option is to centralize defense space activities under common leadership and control, should a military response become necessary.¹⁸ Accordingly, the United States Space Command was formed in 2020 to “organize, train, and equip space forces in order to protect U.S. and allied interests in space and to provide space capabilities to the joint force,” to invest in national defense beyond borders and earth’s atmosphere.¹⁹ The U.S. has a particular reliance on the Defense Industrial Base.²⁰ As such, all eyes are looking at space security.

United Nations Engagement in Space

The General Assembly of the United Nations recognized at the 1499th Plenary Meeting on December 19, 1966, that a discussion was captured in the record that more definitions would be useful, if not essential in the future.²¹ The United Nations’ Resolution reads:

2222 (XXI) Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies:

The General Assembly . . .

¹⁶ Hollingham, Richard “What would happen if all satellites stopped working?” BBC.COM (June 9, 2013) accessible at [What would happen if all satellites stopped working? - BBC Future](#)

¹⁷ Pentagon. (2020, June). Defense Space Strategy Summary (unclassified version) at 1. *The Department of Defense (stating “Ensuring the availability of these capabilities is fundamental to establishing and maintaining military superiority across all domains and to advancing U.S. and global security and economic prosperity.”)*

¹⁸ *Ibid* at 1 (stating “The Department is taking innovative and bold actions to ensure space superiority and to secure the Nation’s vital interests in space now and in the future. Establishing the U.S. Space Force (USSF) as the newest branch of our Armed Forces and the U.S. Space Command (USSPACECOM) as a unified combatant command, as well as undertaking significant space acquisition reform across the DoD, has set a strategic path to expand spacepower for the Nation. It is a path that embraces space as a unique domain of national military power that, together with the other domains, underpins multi-domain joint and combined military operations to advance national security.”)

¹⁹ See United States Space Command website, accessed November 17, 2020, at <https://www.spacecom.mil/#/>

²⁰ U.S. Cyberspace Solarium Commission (2020, March) at 23. Solarium Commission Report (stating “Since America relies on critical infrastructure that is primarily owned and operated by the private sector, the government cannot defend the nation alone. The public and private sectors, along with key international partners, must collaborate to build national resilience and reshape the cyber ecosystem in a manner that increases its security, while imposing costs against malicious actors and preventing attacks of significant consequence.” Retrieved at [Cyberspace Solarium Commission - Report](#) Businesses supporting the Department of Defense are referred to as the Defense Industrial Base. See more at Solarium Commission Report at 119.

²¹ G.A. Res. 2222 (XXI), at 15 (1966).

Requests the Committee on the Peaceful Uses of Outer Space . . .

(b) To begin at the same time the study of questions relative to the definition of outer space and utilization of outer space and celestial bodies; including various implications of space communications;

(c) To report on the progress of its work to the General Assembly at its twenty-second session.²²

Accordingly, while the treaty's signatory nations and the General Assembly of the United Nations acknowledged their work had just begun and requested further resolution, fifty years later there have been no additional definitions on peaceful explorations.²³ But there is so much interest in space- why now? What has changed? Space exploration and increasing investment has changed the landscape. Space security is essential to global safety and prosperity, and as such the time may have come to modernize the treaty to reflect the world's innovation in space.

What about the moon? What is on the horizon for investments and activity in space?

The Moon Treaty

The last agreement that was implemented by COPUOS was the "Agreement Governing the Activities of States on the Moon and Other Celestial Bodies" (known as the "Moon Treaty").²⁴ The goal of this agreement was to build upon the Outer Space Treaty of 1967 and establish a redefinition of the rights regarding resources in space.²⁵ The United Nations formed the United Nations Conference on the Exploration and Peaceful Uses of Outer Space after the Outer Space Treaty was signed.²⁶ This conference sought to form a structure of international law that would dictate the world's use of resources on the moon.²⁷

The most unique and controversial aspect of the Moon Treaty lies in Article 11. This is the Moon Treaty's largest article which begins by stating "1. The moon and its natural resources are the common heritage of mankind, which finds its expression in the provisions of this Agreement, in particular in paragraph 5 of

²² Outer Space Treaty, *supra* note 7, at Preamble 4(b), (c).

²³ *Ibid.* at art. XV ("Any State Party to the Treaty may propose amendments to this Treaty. Amendments shall enter into force for each State Party to the Treaty accepting the amendments upon their acceptance by a majority of the State Parties to the Treaty and thereafter for each remaining State Party to the Treaty on the date of acceptance of it.").

²⁴ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

²⁵ James R. Wilson, Regulation of the Outer Space Environment Through International Accord: The 1979 Moon Treaty, 2 Fordham Envtl. L. Rep. 173 (1991).

²⁶ James R. Wilson, Regulation of the Outer Space Environment Through International Accord: The 1979 Moon Treaty, 2 Fordham Envtl. L. Rep. 173 (1991).

²⁷ James R. Wilson, Regulation of the Outer Space Environment Through International Accord: The 1979 Moon Treaty, 2 Fordham Envtl. L. Rep. 173 (1991).

this article.” This portion puts forth the principle of common heritage of mankind in which space and its resources should be sought for the benefit of all mankind rather than private individuals or countries.²⁸

Article 11 continues and states that “2. The moon is not subject to national appropriation by any claim of sovereignty, by means of use or occupation, or by any other means.”²⁹ This section builds further on the previous section and establishes that the moon is not able to be claimed by any state through any action. This means no country can assert dominance of the moon.

The most concerning of this treaty is established states that “3. Neither the surface nor the subsurface of the moon, nor any part thereof or natural resources in place, shall become property of any State, international intergovernmental or non-governmental organization, national organization or non-governmental entity or of any natural person.”³⁰ This section puts forward the principle that no lunar property or resources shall be owned by any governmental entity or private individual. This portion is one of the more problematic portions of this agreement as it essentially removes a private incentive to develop or acquiring materials on the moon.

Nation States’ Concerns with Investing in Lunar Activity

As expected, countries do not want, nor support, such a strict governance model, and as such, it is not surprising that most space faring nations have not adopted the Moon Treaty.³¹ This section of the treaty is one of the most concerning:

The placement of personnel, space vehicles, equipment, facilities, stations and installations on or below the surface of the moon, including structures connected with its surface or subsurface, shall not create a right of ownership over the surface or the subsurface of the moon or any areas thereof. The foregoing provisions are without prejudice to the international regime referred to in paragraph 5 of this article.³²

This builds on its previous principles of essentially stopping private lunar ownership. This is accomplished in stating how placement of private vehicles,

²⁸ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

²⁹ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

³⁰ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

³¹ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

³² Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

equipment, or structure does not create a right of ownership to the land for which it is placed.³³

Equitable Sharing of Lunar Research

No moon resources can be claimed by any state or private entity.³⁴ But almost equally concerning is Article 11 as it would accomplish that the moon's resources are to be shared between all agreeing nations.³⁵ Additionally, This essentially bars private companies from laying claim to any resources they obtained on the moon.³⁶

Article 11 then states that “4. States Parties have the right to exploration and use of the moon without discrimination of any kind, on the basis of equality and in accordance with international law and the terms of this Agreement.” While previous sections restricted to private acquisition of land and resources, this section establishes that parities are free to explore and use the moon without discrimination as long as they are in accordance with international law and the Moon Treaty.³⁷ The treaty continues and states:

5. States Parties to this Agreement hereby undertake to establish an international regime, including appropriate procedures, to govern the exploitation of the natural resources of the moon as such exploitation is about to become feasible. This provision shall be implemented in accordance with article 18 of this Agreement.³⁸

Accordingly, countries that signed up to the Moon Treaty equally share the right to explore the moon freely.³⁹ Moreover, the Moon Treaty proposes the creation of an “international regime” which would regulate and manage resources on the moon between all parties to the agreement.⁴⁰

³³ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

³⁴ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

³⁵ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

³⁶ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

³⁷ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

³⁸ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

³⁹ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

⁴⁰ James R. Wilson, Regulation of the Outer Space Environment Through International Accord: The 1979 Moon Treaty, 2 Fordham Env'tl. L. Rep. 173 (1991).

This treaty was controversial as it removed individual states' ability to lay claim to resources on the moon.⁴¹ Due to this, the treaty would remove the ability for private organization to capitalize and obtain resources on the moon.⁴² This barring is under global attention today as questions have arisen as to whether it is the best model.

Celestial Mining and UN Mandate to Inform

In 2022, celestial mining for minerals is now of interest and a major area of potential investment by nation states and industry alike. However, there is ambiguity in the Moon Treaty, and clarity is desired before dramatic investments are made as Article 11 states:

6. In order to facilitate the establishment of the international regime referred to in paragraph 5 of this article, States Parties shall 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 any natural resources they may discover on the moon.

This international regime is problematic area for space faring nations. What is intended by the “shall inform” mandate is concerning. There is an active global discussion on whether, and how, nation states are to report to the United Nations and the international scientific community of the natural resources discovered. As such, there is a hesitation now to engage in lunar research. Further, the mandate to inform is further blurred when the agreement details its purpose. It reads: “7. The main purposes of the international regime to be established shall include: (a) The orderly and safe development of the natural resources of the moon; (b) The rational management of those resources; (c) The expansion of opportunities in the use of those resources;”⁴³ This section discusses the function of the international regime and provides that any natural resources that are discovered must be reported to the international regime.⁴⁴

It adds that the regime will determine how to manage and use any resources found in space⁴⁵ and suggests equitable sharing. More questions are raised by the sheer inability to provide equitable sharing as it reads:

⁴¹ James R. Wilson, Regulation of the Outer Space Environment Through International Accord: The 1979 Moon Treaty, 2 Fordham Envtl. L. Rep. 173 (1991).

⁴² James R. Wilson, Regulation of the Outer Space Environment Through International Accord: The 1979 Moon Treaty, 2 Fordham Envtl. L. Rep. 173 (1991).

⁴³ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

⁴⁴ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

⁴⁵ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

(d) An equitable sharing by all States Parties in the benefits derived from those resources, whereby the interests and needs of the developing countries, as well as the efforts of those countries which have contributed either directly or indirectly to the exploration of the moon, shall be given special consideration.⁴⁶

This section states that any benefits gained from resources on the moon shall be shared equitably among all States that are parties to the treaty.⁴⁷ Special consideration shall be given to countries depending on the amount of effort in the benefits derived from space exploration.⁴⁸

Incentive (or Not)?

So, is there an incentive to invest and conduct lunar research and activities? Is there a private incentive to acquire resources for individual countries or a private organization? It is no surprise that that international implementation of this agreement has been lackluster.⁴⁹ In contrast to other supplemental agreements proposed by United Nations Committee, only 18 states have ratified the Moon Treaty.⁵⁰ Additionally, it would make suspect any signatory nation that engages in space launches as a potential violation of the Moon Treaty.⁵¹

One Legal Benefit to Moon Treaty

The Moon Treaty did take the first step to establish the recognition of legal rights to materials and resources obtained in space.⁵² However, the way it suggests the recognition of one's legal rights is problematic. It does not recognize individual property rights but instead directs it to an international body to dictate how materials and resources are used.⁵³ So while it affords recognition, it then defeats the recognition, by taking away from individual countries and private entities the incentive of owning the resources. Accordingly, there is a natural hesitancy to not

⁴⁶ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

⁴⁷ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

⁴⁸ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

⁴⁹ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

⁵⁰ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

⁵¹ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

⁵² James R. Wilson, Regulation of the Outer Space Environment Through International Accord: The 1979 Moon Treaty, 2 Fordham Env'tl. L. Rep. 173 (1991).

⁵³ James R. Wilson, Regulation of the Outer Space Environment Through International Accord: The 1979 Moon Treaty, 2 Fordham Env'tl. L. Rep. 173 (1991).

incur significant costs to obtain them.⁵⁴ Thus, it is no surprise that all space faring nations that have the ability to reach space have not adopted or supported the Moon Treaty.⁵⁵

One Environmental Benefit to Moon Treaty

The Moon Treaty seeks to protect the Moon through international agreement and cooperation. An unique part of the Moon treaty lies in Article 7, Section 1 which states that “[i]n exploring and using the moon, States Parties shall take measures to prevent the disruption of the existing balance of its environment, whether by introducing adverse changes in that environment, by its harmful contamination through the introduction of extra-environmental matter or otherwise.”⁵⁶ This continues and state that “[s]tates Parties shall also take measures to avoid harmfully affecting the environment of the earth through the introduction of extraterrestrial matter or otherwise.”⁵⁷ In summary, while this treaty took bold strides in forming environmental and property rights, universal support on the international scale has been lackluster.

Conclusion

Outer space is key to mankind and its future on Earth. National security rests on each countries’ sovereignty to not be challenged by space weapons and antisatellite missiles. Together there needs to be a global commitment to space security while respecting the desire and need to explore and defend in space, for both civilian and defense needs. The Moon Treaty is a start. International cooperation and discussion are needed to refine and define the boundaries for future space development and lunar research.⁵⁸

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⁵⁴ James R. Wilson, Regulation of the Outer Space Environment Through International Accord: The 1979 Moon Treaty, 2 Fordham Envtl. L. Rep. 173 (1991).

⁵⁵ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

⁵⁶ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

⁵⁷ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 U.N.T.S. 22, 18 I.L.M. 1434 (1979).

⁵⁸ David Kuan-Wei Chen, *New Ways and Means to Strengthen the Responsible and Peaceful Use of Outer Space*, 48 GA. J. INT’L & COMP L. 661, 664–65 (2019).