

PLANETARY PROTECTION: A NEW LAUNCH PAD FOR THE
REGULATION OF THE COMMERCIAL SPACE INDUSTRY

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INTRODUCTION

Here is a wild thought: if you were born in 1880 and lived to be at least eighty-nine years old, you would live until 1969. That means in your lifetime you would have gone from riding horses and carriages as a young child, to seeing the United States (U.S.) put a man on the moon. Consider how drastic that progress was for humankind. Now, fifty years later, in 2019, we are hearing about plans for space tourism and colonizing Mars.¹ So, we must ask: How much further will we go? How fast will it happen? How will our society possibly keep up with the expeditious growth of technology?

The twentieth century was the birth of the space age where the most powerful nations of Earth accomplished unimaginable feats of genius. Based on what we have seen so far, in the twenty-first century we will witness the birth of a new space age dominated by private actors and commercial ventures, rather than by governments and nations.

As exciting as this may seem, many risks come with the increased commercialization of space by private actors; our society may not be readily equipped to address those risks. Outer space has untapped

1. See Tariq Malik, *Elon Musk Unveils SpaceX's New Starship Plans for Private Trips to the Moon, Mars and Beyond*, SPACE, <https://www.space.com/elon-musk-unveils-spacex-starship-2019-update.html> (last visited Sept. 29, 2019).

potential that can be revolutionary to humankind or potentially destructive. The truth is that we will not know the potential of commercializing space until we fully understand space. This dilemma raises the question: If we do not understand outer space, how are we supposed to regulate it? This problem is magnified when we realize that we cannot even come to an agreement on current world problems; so, how are we supposed to agree on the unknown?

This comment discusses the current state of domestic and international space law and how we got to the status quo. It assesses where space law has succeeded and failed to illustrate how we can create a new and improved regulatory scheme building on lessons we have learned. It is imperative that we find a new regulatory structure. A recent surge in the use of space by private actors has presented new issues that must be addressed. Our current platform for regulation, both domestically and internationally, has failed to adequately address the growing concerns associated with the increased commercialization of space. Therefore, we need a new regulatory platform that can garner universal support and cooperation.

Part I discusses the evolution of space law, both domestically and internationally. It examines the political and economic forces that drive the current state of space law. The discussion focuses on the gradual commercialization of space, which strays from the original provisions of the Outer Space Treaty (OST), formerly known as the international Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies. Moreover, Part I also illustrates that there is a need for increased regulation of space commercialization because the OST lacks any binding international authority to enforce its provisions.

Part II focuses on specific factors that made the OST successful. Further, it analyzes other international treaties to determine how the presence or absence of such factors may have contributed to the success or failure of those treaties. Ultimately, this analysis aims to identify the key components for creating a successful agreement among the international community to effectively regulate an increasingly commercialized outer space.

Part III proceeds to offer a new platform to regulate space on a domestic and international level. The factors that were critical to the success of past treaties is used as the foundation for this new regulatory platform. Finally, I apply the platform to the current state of the space

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industry and international law to illustrate how this regulatory scheme would work in practice.

The world is not equipped to face the new challenges that will soon arise from the exponential increase in space activity. Therefore, it is time to reinvent the wheel (or the spaceship equivalent of the wheel).

I. THE ORIGIN AND EVOLUTION OF SPACE LAW AND THE PUSH TOWARD COMMERCIALIZATION

Throughout much of the twentieth century, the United States and the Soviet Union dominated outer space exploration. During the Cold War, tensions between the two superpowers grew. In response, in a 1967 agreement, the United Nations established a set of international guidelines for the use of space under the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, otherwise known as the Outer Space Treaty (OST).² The treaty serves as the foundation of international space law to promote the peaceful use of space and progress for all humankind.

The international community has widely accepted the OST. Subsequent agreements were established to elaborate on the OST's intentions and to reaffirm the major issues that arise with the use of space. However, as international interests changed over time, space law began to transition from international cooperation to domestic legislation within each spacefaring³ nation, using the OST as a guideline.

Conflicting, and often polarizing, national interests resulted in different interpretations of the OST and inconsistency in the regulation of space. This has become a greater problem now because of the rapid commercialization of space, which increased the number of actors engaged in space activity. This section discusses the evolution of space law toward a new era of space commercialization.

2. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410 [hereinafter Outer Space Treaty].

3. Spacefaring nations are nations that "hav[e] vehicles capable of traveling beyond the earth's atmosphere." *Spacefaring*, MERRIAM-WEBSTER'S DICTIONARY, <https://www.merriam-webster.com/dictionary/spacefaring> (last visited Apr. 11, 2019).

A. *Evolution of Space Law Toward Commercialization*

One of the most successful treaties to govern international space law is the OST, which went into effect on October 10, 1967.⁴ As of 2019, there are 109 parties to the treaty, and eighty-nine other countries have signed the treaty but have not fully ratified it.⁵

1. *The Birth of the Outer Space Treaty*

The OST was a response to the growing tensions and major concerns of the Cold War Era.⁶ The OST's narrow focus left the remainder of space law issues largely unregulated.⁷ The OST was born in a time when major issues surrounding the Cold War needed to be addressed on an international level.⁸ In the time leading up to the OST's formation, the world had experienced World War II's devastating impact. Following the war, two superpowers emerged with a drastic divergence in ideology: western capitalism in the United States and communism in the Soviet Union.⁹

4. Outer Space Treaty, *supra* note 2. See also Christopher D. Johnson, *The Outer Space Treaty at 50*, THE SPACE REVIEW (Jan. 23, 2017), <http://www.thespacereview.com/article/3155/1> (“As a successful undertaking in international diplomacy, and one that helped foster the global development of outer space as a realm of humankind’s activities, the importance of [the OST’s opening for signature] warrants reflection.”).

5. *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies: Status of the Treaty*, UNODA, http://disarmament.un.org/treaties/t/outer_space (last visited Oct. 17, 2019).

6. Jason Krause, *The Outer Space Treaty Turns 50. Can It Survive a New Space Race?*, ABA JOURNAL (Apr. 2017), http://www.abajournal.com/magazine/article/outer_space_treaty.

7. See *id.* (“[T]he [OST] was very much written to address military, scientific and political questions—not with commercial interests in mind. As a result, there is no framework for regulating or managing commercial actors in space. ‘The document mentions “nongovernmental agencies” only once,’ Gabrynowicz says. ‘And because of that oversight, there is no U.S. agency with jurisdiction of on-orbit activity. That’s a big gap in the law.’”).

8. Arguably, the potential of devastating nuclear war was an international issue that required international cooperation. See *id.*

9. Erin Blakemore, *What Was the Cold War?*, NAT’L GEOGRAPHIC (Mar. 22, 2019), <https://www.nationalgeographic.com/culture/topics/reference/cold-war/>.

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As tensions increased during the 1950s and 1960s, the two superpowers engaged in both a nuclear arms and space race.¹⁰ During this time, major concerns arose at the United Nations regarding the outer space rivalry between the United States and Soviet Union.¹¹ This rivalry created an urgent need to promote international cooperation and peace.¹² The Cuban Missile Crisis was a catalyst for addressing these concerns.¹³ The Cuban Missile Crisis was a nuclear standoff between the United States and the Soviet Union from October 16, 1962, to October 28, 1962.¹⁴ At that time, the two superpowers came the closest to escalating their ideological conflict into a full scale nuclear war than at any other time during the Cold War.¹⁵

Soon after the crisis, the United Nations General Assembly (Assembly) met on November 21, 1962, to discuss its concern of “avert[ing] the grave dangers to the human race of nuclear confrontation”¹⁶ A few weeks later, on December 14, 1962, the United Nations “urgently” requested the Committee on the Peaceful Uses of Outer Space “[to] work on the further elaboration of basic legal principles governing the activity of States in the exploration and use of outer space . . . and on other legal problems.”¹⁷ About a year later, on December 13, 1963, the Assembly submitted a Declaration of Legal Principles Governing the Activities of States in the Exploration and Use

10. *See id.*

11. *See generally* G.A. Res. 1348 (XIII), (Dec. 13, 1958); G.A. Res. 1472 (XIV), (Dec. 12, 1959); G.A. Res. 1721 (XVI), (Dec. 20, 1961); G.A. Res. 1802 (XVII), (Dec. 14, 1962); G.A. Res. 1962-63 (XVIII), (Dec. 13, 1963); G.A. Res. 2130 (XX), (Dec. 21, 1965).

12. *See generally* G.A. Res. 1348 (XIII), (Dec. 13, 1958); G.A. Res. 1472 (XIV), (Dec. 12, 1959); G.A. Res. 1721 (XVI), (Dec. 20, 1961); G.A. Res. 1802 (XVII), (Dec. 14, 1962); G.A. Res. 1962-63 (XVIII), (Dec. 13, 1963); G.A. Res. 2130 (XX), (Dec. 21, 1965).

13. The Cuban Missile Crisis catalyzed the need to address these concerns because it was the closest the superpowers came to actual nuclear conflict. Blakemore, *supra* note 9.

14. *See* Patrick J. Kiger, *Key Moments in the Cuban Missile Crisis*, HISTORY (June 17, 2019), <https://www.history.com/news/cuban-missile-crisis-timeline-jfk-khrushchev>.

15. Blakemore, *supra* note 9.

16. G.A. Res. 1767 (XVII), (Nov. 21, 1962).

17. G.A. Res. 1802(I)(3) (XVII), (Dec. 14, 1962).

of Outer Space,¹⁸ which laid out many of the principles that would later be included in the OST. The Assembly discussed its intent for the treaty to function as an agreement to promote progress and the peaceful use of outer space for the benefit of all humankind, regardless of a nation's economic or scientific development.¹⁹ Over time, change in the political and economic climate of the world led to differing interests among nations. These competing interests ultimately affected the way space law developed.

2. *Subsequent Treaties to the Outer Space Treaty*

The OST served its purpose of regulating space law by addressing the Cold War concerns, promoting the peaceful cooperation in the use of outer space, and preventing a potential nuclear war. Over time, subsequent treaties continued to focus on these concerns. In 1967, the Assembly established the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (Rescue Agreement).²⁰ The Rescue Agreement elaborates on Article V of the OST, which requires nations to assist each other in rescuing astronauts in distress and in recovering space objects to return them to their respective nations.²¹ Later in 1972, the United Nations established the Convention on International Liability for Damage Caused by Space Objects treaty (Liability Convention).²² The Liability Convention expanded Article VII of the OST regarding liability of states for damages caused by their own space objects.²³ In 1976, the Convention on Registration of Objects Launched into Outer Space (Registration Convention) went into effect, which requires states to register and provide information to the United Nations about the space

18. G.A. Res. 1962 (XVIII), (Dec. 13, 1963).

19. G.A. Res. 2222 (XXI), (Dec. 19, 1966).

20. G.A. Res. 2345 (XXII), (Dec. 19, 1967); Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, Apr. 22, 1968, 19 U.S.T. 7570 [hereinafter Rescue Agreement].

21. *See* Rescue Agreement; *see also* Outer Space Treaty, *supra* note 2, art. V.

22. Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389 [hereinafter Liability Convention].

23. *Id.* *See also* Outer Space Treaty, *supra* note 2, art. VII.

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objects that they have in orbit around the Earth or beyond.²⁴ All of these agreements promoted further collaboration between states by making space exploration activity more accessible and transparent.

However, the most recent international space treaty did not gain much acceptance as space law transitioned away from international regulation toward domestic law. This treaty was the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Moon Agreement), which consists of only eighteen State Parties.²⁵ Neither the United States nor any major spacefaring nation is a party to the agreement.²⁶ The Moon Agreement, effective July 11, 1984, grants jurisdictional control of all celestial bodies to international law, and it reaffirms the use of celestial bodies and their natural resources for the benefit of all mankind.²⁷ The Moon Agreement's failed attempt to promote the idea of non-appropriation of property in space illustrates that nations realized space's potential and deviated from international collaboration toward commercialization of space.

3. Current U.S. Space Law

The OST has always served as a guideline for nations to develop their own domestic law, especially as space law shifted from

24. Convention on Registration of Objects Launched into Outer Space, Nov. 12, 1974, 28 U.S.T. 695 [hereinafter Registration Convention].

25. Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 18, 1979, 18 U.S.T. 2410 [hereinafter Moon Treaty]; *see also Agreement Governing the Activities of States on the Moon and Other Celestial Bodies: Status of the Treaty*, UNODA, <http://disarmament.un.org/treaties/t/moon> (last visited Oct. 18, 2019).

26. *See Agreement Governing the Activities of States on the Moon and Other Celestial Bodies: Status of the Treaty*, UNODA, <http://disarmament.un.org/treaties/t/moon> (last visited Oct. 18, 2019); *see also* Shekhar Chandra, *India's "Vyomanauts" Seek to Join the Elite Club of Spacefaring Nations by 2022*, SCI. AMERICAN (Aug. 23, 2018), <https://www.scientificamerican.com/article/india-s-ldquo-vyomanauts-rdquo-seek-to-join-the-elite-club-of-spacefaring-nations-by-2022/> (stating that the United States, Russia, and China are the only countries to have successfully achieved spaceflight).

27. *See generally* Moon Treaty, *supra* note 25 (stating that the "exploration and use of the Moon shall be the province of all mankind and shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development").

international treaties to domestic legislation. As this transition occurred, the OST's lack of binding authority led to different interpretations of its vague language. As a result, international cooperation faded, and nations developed their own domestic space law to align with their own interests. This transition toward domestic space law eventually led to a focus on the commercialization of space as private actors became increasingly involved in the space industry.

The first sign of this push for commercialization of space was when most spacefaring nations refused to sign the Moon Agreement.²⁸ This refusal was based on the agreement's intended purpose to expand international authority in space.²⁹ The expansion of international authority would limit the ability of individual nations to pursue their respective interests in commercial space ventures.

It has been predicted that “[r]ather than amend[ing] the treaty, space-faring nations like the United States will likely pass legislation to authorize and supervise space activities.”³⁰ For example, instead of signing the Moon Agreement in 1984, the United States passed the Commercial Space Launch Act of 1984.³¹ Under this act, private entities were permitted to launch vehicles into space for the first time, expanding the space industry beyond the government's exclusive use,³² but this transition was a gradual process. Moreover, until the passing of the Asteroids Act in 2014, private space activity was limited to the use of satellites.³³ The Asteroids Act expanded private actors' freedom in space to “facilitate the commercial exploration and utilization of

28. See Krause, *supra* note 6; see also Rachel Mitchell, *Into the Final Frontier: The Expanse of Space Commercialization*, 83 MO. L. REV. 429, 436 (2018).

29. The agreement “calls for the establishment of an international regime to govern exploitation of the Moon's resources.” See Mitchell, *supra* note 28, at 435.

30. Krause, *supra* note 6.

31. Commercial Space Launch Act, Pub. L. No. 98-575, 98 Stat. 3055 (1984) (codified as 51 U.S.C. § 50901, *et seq.* (2010)).

32. *Id.*

33. See American Bar Ass'n, *Space Law Then, Now, and in the Future: A Conversation with Pamela Meredith and Laura Montgomery*, 30 AIR & SPACE LAWYER NO. 4 (2017), https://www.kmazuckert.com/publications/space/ABA_AirSpaceLawyer_v030n04_Meredith_Montgomery.pdf (stating that there has been a push to allow private actors to own commercial extractions from asteroids and the Moon) [hereinafter American Bar Ass'n].

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asteroid resources to meet national needs.”³⁴ This law allowed the government to collaborate with private entities to harness the commercial potential of space.³⁵ Finally, in 2015, the United States passed the Commercial Space Launch Competitiveness Act, also known as the SPACE Act.³⁶ This act allows private actors to obtain property rights over the resources they mine from asteroids.³⁷

As of today, the United States has the most developed space regulation framework in the world.³⁸ For this reason, countries such as the United Kingdom, France, and Japan have discussed integrating U.S. space law into their own legal systems.³⁹ Moreover, the SPACE Act, among other factors, has catalyzed the emergence of a new space industry as private entities develop the technology to explore and harness the potential of space.

B. Factors Contributing to Increased Commercialization

Throughout the twentieth century, space exploration and travel was largely a race between superpower nations. However, in recent years, companies such as SpaceX, Blue Origin, and Virgin Galactic have been racing to establish commercial space ventures for tourism, mining, and other endeavors.⁴⁰ Therefore, it is no surprise that when the SPACE Act was enacted in 2015, the space industry grew to \$323 billion.⁴¹ Besides the SPACE Act, there are several reasons space

34. Asteroids Act, H.R. 5063, 113th Cong. (2014). The Asteroids Act became part of the U.S. Commercial Space Launch Competitiveness Act. *See generally* Matthew Shaer, *The Asteroid Miner's Guide to the Galaxy*, FOREIGN POL'Y (Apr. 28, 2016), <https://foreignpolicy.com/2016/04/28/the-asteroid-miners-guide-to-the-galaxy-space-race-mining-asteroids-planetary-research-deep-space-industries/>.

35. *See* Asteroids Act, H.R. 5063, 113th Cong. (2014) (enacted) (stating that its purpose is to “facilitate the commercial exploration and utilization of asteroid resources . . . [by] discourag[ing] government barriers to the development of economically viable, safe, and stable industries . . .”).

36. U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114-90, 129 Stat. 704 (2015) (enacted).

37. *Id.*

38. American Bar Ass'n, *supra* note 33.

39. *Id.*

40. Krause, *supra* note 6.

41. W. P. Carey School, *The Business of Space*, MEDIUM (Oct. 6, 2017), <https://medium.com/w-p-carey-magazine/the-business-of-space-2389ed011d7c>.

commercialization has expanded rapidly from satellites in 1984, to mining operations today and tourism in the near future.

I. NASA's Reliance on Private Actors

Currently, the U.S. government is more involved with private space ventures by encouraging the private sector's involvement in space through funding and legislation.⁴² Private actors must be on the forefront of space exploration as government funding for the National Aeronautics and Space Administration (NASA) dwindles.⁴³ There is uncertainty about NASA's ability to continue its progress in space considering lack of funding. For example, in 2011, the Space Shuttle Program, the successor to NASA's Apollo missions that put a man on the moon, ended.⁴⁴ Further, NASA's financial difficulties are impeding its ability to afford the cost of ferrying astronauts to the International Space Station (ISS).⁴⁵

As a result, the U.S. government has taken steps to encourage and facilitate companies such as Boeing and SpaceX to develop technology that would make "space more accessible from an operational and cost perspective."⁴⁶ The government has thus prioritized the commercial space industry's growth by offering various private contracts.⁴⁷ For example, NASA contracted with SpaceX and Boeing to develop better

42. See *Prospects for Space Exploration: Economic and Strategic Assessment*, BUS. WIRE (Mar. 27, 2019, 1:24 PM), <https://www.businesswire.com/news/home/20190327005644/en/Prospects-Space-Exploration-Economic-Strategic-Assessment>—.

43. See American Bar Ass'n, *supra* note 33 (explaining that NASA's contracts with private companies such as SpaceX and Boeing are not being adequately funded).

44. *Space Shuttle Era*, NASA, https://www.nasa.gov/mission_pages/shuttle/flyout/index.html (last visited Oct. 18, 2019).

45. Part of the Space Shuttle program was to shuttle astronauts to space who could complete the ISS, but the program became too costly. See Michele Lerner, *Why Did NASA End the Space Shuttle Program?*, FORBES (Feb. 2, 2017), <https://www.forbes.com/sites/quora/2017/02/02/why-did-nasa-end-the-space-shuttle-program/#434f2616799f>.

46. One example of this technology is reusable rockets. American Bar Ass'n, *supra* note 33.

47. By involving private entities, the government can lower its costs. This means it has an incentive to prioritize private contracts over conducting the activities itself. See Lerner, *supra* note 45.

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technology to facilitate the transportation of U.S. astronauts to the ISS.⁴⁸ This collaboration created “a high degree of collegiality and interchange between government and the private sector”⁴⁹

Although funding shortfalls have caused difficulties for U.S. space exploration, NASA’s attempt to encourage private sector participation in space ventures will allow the United States to continue pursuing its interests in outer space.

2. *Collapse of the Soviet Union*

The end of the Cold War allowed more collaboration in the international space community. “The breakup of the Soviet Union and the creation of new East-West ventures . . . contributed greatly to . . . space law practice.”⁵⁰ Together with the emergence of the private sector, this new collaborative environment made space travel more feasible and affordable.⁵¹

For example, after the Soviet Union collapsed, the United States began working with private Russian companies with access to launch technology because it was less expensive to launch from Russia.⁵² However, now that the private space industry has rapidly grown, driving costs down in the United States, some experts believe it is better to spend the money on private U.S. companies.⁵³ Shifting these investments would likely increase the presence of U.S. companies in outer space and help the United States maintain its own interests.

3. *Economic Potential*

Worldwide, the potential for private actors and more countries to participate in space ventures because of various factors has increased;

48. American Bar Ass’n, *supra* note 33.

49. *Id.*

50. *Id.*

51. This feasibility and affordability can also be attributed to an overall increase in global space budgets due to an increased involvement of private actors with government entities. *See* BUS. WIRE, *supra* note 42.

52. American Bar Ass’n, *supra* note 33.

53. *See id.* (stating that although U.S. companies should be in charge of servicing the ISS, there is still no adequate funding from the government; therefore, the United States still relies on Russian companies).

one of those factors is a decrease in the cost of building and launching satellites.⁵⁴ According to a March 2019 report by Prospects for Space Exploration, “[g]lobal government investment in space exploration totaled \$14.6 billion in 2017, a 6% increase compared to 2016.”⁵⁵ The rapid increase in funding and investing in space commercialization will likely see this projection grow exponentially in the near future.

To put this increase into perspective, in the last decade alone, there were nineteen space exploration missions conducted by six global powers, including the United States, European Union, Russia, Japan, China, and India.⁵⁶ Now, with the inclusion of private actors in space ventures, either through independent ventures or government contracts, this number is expected to increase to eighty missions over the next decade.⁵⁷ Of this estimate, only sixty-three percent will be government missions, while the remainder of the missions will be conducted by private companies.⁵⁸ Two private companies, Deep Space Industries and Planetary Resources, are developing plans to mine asteroids using robots,⁵⁹ which could be an extremely lucrative venture. It is estimated that an asteroid the size of a football field can potentially contain up to \$50 billion worth of platinum.⁶⁰

C. Problems with Space Law: Regulation of Commercialization

A rapid increase in commercialization has generated concerns over the current state of space law and its ability to regulate such an expanding industry. International law is vague regarding commercial space regulation because the OST was a product of Cold War mentality,

54. *Id.*

55. PROSPECTS FOR SPACE EXPL., PROSPECTS FOR SPACE EXPLORATION REPORT 2019 (2019), https://www.researchandmarkets.com/research/8xmjbj/global_market?w=5 (on file with author). “Prospects for Space Exploration is an economic and strategic assessment of the space exploration sector, including an analysis and benchmark of government and commercial space exploration programs worldwide.” *See also* BUS. WIRE, *supra* note 42.

56. BUS. WIRE, *supra* note 42.

57. *Id.*

58. About thirty of the eighty expected missions will be commercial. *See id.*

59. American Bar Ass’n, *supra* note 33.

60. Mitchell, *supra* note 28, at 441.

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which does not take into consideration contemporaneous issues.⁶¹ “[T]he treaty was very much written to address military, scientific and political questions — not with commercial interests in mind.”⁶²

For example, the OST does not clearly address the process that will apply when there is a dispute between two parties in space:

It’s not clear which international court would be called on to settle a dispute in space. In order to fully address these and other concerns, the U.N. would need to amend existing treaties or draft new ones. That would likely be the only way to create binding legal opinions in space law, but in the current political climate, there is little political will or interest in new treaties.⁶³

Still, it is more problematic that the OST only applies to states that are parties to the treaty, not commercial actors.⁶⁴ As a result, there is no international “framework for regulating or managing commercial actors in space[,]” and such actors are largely regulated through domestic law.⁶⁵ However, domestic law has expanded commercialization beyond the scope of the OST and has created conflicting interpretations of the OST’s guidelines because they are too vague and unenforceable; the result is less cooperation among the international community to regulate the commercial space industry.

D. Regulation Under Article VI

Article VI of the Outer Space Treaty serves as the “foundation on which any laws or regulations regarding commercial space activity are

61. The major concern during the Cold War era was preventing mass destruction through nuclear disarmament. Therefore, there are large gaps in space law regarding certain activities such as commercialization. *See Krause, supra* note 6.

62. *Id.*

63. *Id.*

64. “States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the Moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities.” *See Outer Space Treaty, supra* note 2, art. VI.

65. *See Krause, supra* note 6 (arguing that countries like the United States will likely pass laws and regulations to address space activity due to gaps in the OST, such as addressing commercial actors).

erected.”⁶⁶ The United States can use Article VI as a tool for regulating private actors in space because the article states in pertinent part that activities of government and private civilians must be authorized and supervised by their respective governments if they are to undertake any venture in space.⁶⁷

However, Article VI is vague as to private actors’ involvement in space because the regulation of commercialization was not the original intent behind the OST.⁶⁸ The treaty was drafted during the emergence of the space industry, so certain issues surrounding the regulation of private space actors were neglected and later regulated by domestic law.⁶⁹ Perhaps the greatest problem is that domestic space law must conform with the OST, which means disagreement over the vague interpretation of the OST has slowed the progress toward effective regulation.

For example, some people argue for a narrow interpretation that Article VI is not enforceable in United States because the provision is not self-executing, meaning Congress should only regulate when space activity poses a dangerous threat to humankind.⁷⁰ Conversely, some argue for a broader interpretation that Congress should regulate all private space activity because the government is responsible for the activities of its private entities under Article VI.⁷¹ Depending on the interpretation taken, Article VI can have drastically different results,

66. *Id.*

67. “This does not mean a State like the United States is compelled to authorize a private space activity but rather permits a State to allow non-government entities to perform space activities.” See Michael J. Listner, *A Reality Check on Article VI and Private Space Activities*, SPACE NEWS (June 6, 2017), <https://spacenews.com/a-reality-check-on-article-vi-and-private-space-activities/>; see also Outer Space Treaty, *supra* note 2, art. VI.

68. Krause, *supra* note 6 (discussing that the original intent of the OST was to address scientific, military, and political questions).

69. For example, because the OST did not address commercial actors, the United States passed the SPACE Act, which allowed the commercial exploration and exploitation of space resources. See *id.*

70. The U.S. Supreme Court has stated that a non-self-executing treaty cannot be enforced in the United States. American Bar Ass’n, *supra* note 33.

71. One of the previous Federal Aviation Administrations (FAA) had proposed that everything in space should be regulated. See *id.*; see also Outer Space Treaty, *supra* note 2, art. VI.

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illustrating “considerable regulatory uncertainty.”⁷² To add to the uncertainty, many of the new proposed private space activities do not necessarily fit into the traditional regulatory scope of existing U.S. agencies, such as the Federal Aviation Administration (FAA) or Federal Communications Commission (FCC); thus, there is much overlap in what agency regulates what activity.⁷³

The attempt to use Article VI to regulate private commercial actors in space has failed. “The big issue going forward is whether and how to regulate . . . new space activities.”⁷⁴ Even if the United States can successfully establish its own domestic law, without a strong international framework for regulation, the United States will still face international and domestic scrutiny for regulation of its commercial actors under the provisions of the OST.⁷⁵

Since the OST’s ratification in 1967, international interests have transitioned from focusing on Cold War concerns regarding nuclear prevention to prioritizing commercial interests in space. This new focus has rested largely on a broad interpretation of Article VI of the OST, which was not created with the intent of regulating private actors. Article VI regulation has also proved ineffective because of the vast disagreement regarding its interpretation and application. Therefore, it is both necessary and urgent to develop a new platform.

II. A NEED FOR REGULATION

As explained in part I, Article VI of the Outer Space Treaty has failed to effectively address whether the private actions and regulations

72. See American Bar Ass’n, *supra* note 33 (discussing that there is a split between the approaches taken by the U.S. House of Representatives and the U.S. Senate).

73. Although there has been some overlap, some think that this has not impeded progress in space law and can benefit it by bringing in different expertise. *But see* American Bar Ass’n, *supra* note 33.

74. *Id.*

75. The main reason for such critique could be that international cooperation in space law is necessary, as exemplified through numerous U.N. resolutions, but by taking its own measures, the United States is seen as unwilling to cooperate internationally. See Yun Zhao, *Space Commercialization and the Development of Space Law*, OXFORD RESEARCH ENCYCLOPEDIA (July 2018), <https://oxfordre.com/planetaryscience/view/10.1093/acrefore/9780190647926.001.0001/acrefore-9780190647926-e-42>.

by the United States conforms with the general principles of the OST. Part II expands on how Article VI has failed to regulate commercialization of space by discussing the need to adopt a universally appealing platform to promote international cooperation.

A. Root of Success in Space Law

To understand why international cooperation in space law has faded, it is important to consider the failures and successes of past international space treaties. Although the OST has no real authority to regulate space law, it has been the most successful space treaty considering the number of nations that have accepted and ratified it. The OST has served as the foundation for three subsequent treaties that expanded its principles. At least three identifiable factors contributed to the OST's success. These factors include (1) the treaty's intent to promote the greater good of mankind, (2) its focus on a universally accepted concern, and (3) its relatively loose restrictions.

1. First Factor: The OST's Intent to Promote the Greater Good for All of Mankind

The first factor that has made the OST successful is the intent with which it was created. On December 19, 1966, the United Nations' 21st General Assembly laid out the OST's provisions.⁷⁶ On January 27, 1967, the United States, the United Kingdom, and the Soviet Union signed the treaty.⁷⁷ The General Assembly discussed its intent for the treaty to function as an agreement to promote progress and the peaceful use of outer space for the benefit of humankind, regardless of a nation's economic or scientific development.⁷⁸

When it was ratified, the OST reflected the international community's desire to reaffirm "the importance of international cooperation in the field of activities in the peaceful exploration and use of outer space, including the Moon and other celestial bodies, and the

76. G.A. Res. 2222 (XXI), (Dec. 19, 1966).

77. *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies*, UNOOSA, <http://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introouterspacetreaty.html> (last visited Oct. 23, 2019).

78. G.A. Res. 2222 (XXI), (Dec. 19, 1966).

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importance of developing the rule of law in this new area of human endeavor”⁷⁹

Because space exploration is intriguing and relatively new, the United Nations has continuously recognized the potential advantages that space has for mankind.⁸⁰ As such, the OST’s language emphasizes the United Nations’ desire for space to be used in a peaceful way. In essence, the treaty promotes international cooperation to reap the potential benefits of space for “all mankind.”⁸¹

2. *Second Factor: The OST’s Provisions Addressed a Universally Accepted Concern*

The second factor that made OST a success was that it was created as a response to Cold War Era concerns as reflected by its provisions and purpose.⁸² At the time, the world had just seen the Nazis rapidly rise to power during the 1930’s.⁸³ Around the same time, the Japanese Imperial Army overthrew the colonial powers in Asia and began to build its own empire.⁸⁴ In the process, both of these new superpowers committed acts that led to World War II.⁸⁵ Eventually, the majority of the world became involved in this conflict, where misuse of power and technology resulted in the development of a new technology: nuclear

79. *Id.*

80. For example, social and economic advantages can arise from the advancement of meteorology and communications technologies in outer space. G.A. Res. 1802 (XVII), (Dec. 14, 1962).

81. “The exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind.” *See* Outer Space Treaty, *supra* note 2, art. I.

82. *See generally* Krause, *supra* note 6 (discussing that the OST was a reflection of Cold Era concerns and as such the treaty focused on the specific issues of military and science, leaving large gaps in the treaty).

83. *See* Wilfrid F. Knapp et al., *Adolf Hitler: Dictator of Germany*, ENCYCLOPEDIA BRITANNICA, <https://www.britannica.com/biography/Adolf-Hitler> (last updated May 3, 2019).

84. *See* Marius B. Jansen et al., *Japan*, ENCYCLOPEDIA BRITANNICA, <https://www.britannica.com/place/Japan/History> (last updated Oct. 24, 2019).

85. *See id.*; *see also* Knapp, *supra* note 83.

energy.⁸⁶ At that time, nuclear energy had an unknown potential for power and destruction, which is similar to the unknown potential of the exploration and commercialization of space in today's world.

The Cold War era created the fear of a sovereign nation, once again, becoming too powerful.⁸⁷ Leading up to 1967 when the treaty was drafted, there were two superpower nations, the United States and Soviet Union, which threatened the existence of humankind with the possibility of starting a nuclear war.⁸⁸ These two nations were the first to harness the ability to utilize the power of space.⁸⁹

Provisions in the OST addressed the concern of a nation gaining too much power. Specifically, the OST prevents sovereign nations from claiming territory in space and requires that the fruits of space exploration be used for the benefit of everyone on Earth.⁹⁰ For example, Article II states that a nation cannot claim a celestial body as their own sovereign territory through occupation or any other means.⁹¹ Further, Article IV stresses the use of celestial bodies for peaceful purposes only.⁹² Notably, Article IV prohibits weapons of mass destruction in space, specifically nuclear weapons.⁹³ This prohibition includes placing weapons on celestial bodies, stationing weapons anywhere, or putting weapons into orbit.⁹⁴

Additionally, the OST addressed Cold War concerns by promoting human collaboration in space. The first Article in the treaty expressly provides that activity in space and on celestial bodies should be done

86. See Robert S. Norris et al., *Nuclear Weapon*, ENCYCLOPEDIA BRITANNICA, <https://www.britannica.com/technology/nuclear-weapon> (last updated June 7, 2019).

87. The United States and Russia viewed each other with suspicion because each was trying to prevent the other from dominating the world. See Blakemore, *supra* note 9.

88. During this period, both countries poured trillions of dollars into developing their nuclear weapons to defend themselves from each other. See *id.*

89. "After the 1950s the US and USSR were deep into a Space Race, adding another arena to the Cold War competition to be the most militarily prepared." See *id.*

90. See Outer Space Treaty, *supra* note 2, art. I-II.

91. *Id.* art. II.

92. As a result of this peaceful purpose, the "establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military [maneuvers] on celestial bodies shall be forbidden." *Id.* art. IV.

93. *Id.*

94. *Id.*

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“for the benefit and in the interests of all countries . . . [and] without discrimination of any kind.”⁹⁵ Article III stresses the importance of all nations maintaining international peace and promoting cooperation.⁹⁶ Article V establishes that astronauts should be the ambassadors of all mankind, which entails offering assistance to anyone in distress, regardless of national origin.⁹⁷ This provision aimed to prevent the use of space for a single nation’s benefit and instead, provide benefits for the greater good, such as scientific progress.

The OST’s major provisions were a direct response to the fears that formed in the tense atmosphere of the Cold War. With newfound nuclear arsenals, the potential for destruction was high; thus, the international community accepted the OST as a means to alleviate those fears.⁹⁸

3. *The OST is Not Overly Restrictive*

The last factor attributable to the OST’s success is that it is not overly restrictive; it allows the nations to maintain much of their sovereignty. For instance, the OST includes a process that allows the nations to withdraw from the treaty.⁹⁹ The OST does not bind any nation to any sort of obligation or burden unless it decides to engage in space activity.¹⁰⁰ Moreover, no international court has the express authority to resolve a dispute under the OST, which means the parties must negotiate to reach a resolution.¹⁰¹

95. *Id.* art. I.

96. *Id.* art. III.

97. It must be noted that the article specifically states that assistance shall be rendered to all astronauts of State Parties and does not mention non-State Parties. *Id.* art. V.

98. *See* Mitchell, *supra* note 28, at 432.

99. “Any State Party to the Treaty may give notice of its withdrawal from the Treaty one year after its entry into force by written notification to the Depositary Governments. Such withdrawal shall take effect one year from the date of receipt of this notification.” Outer Space Treaty, *supra* note 2, art. XVI.

100. The treaty lays out a few prohibitions on space activity, thus, it can be argued that as long as a State Party is not engaged in these activities, it does not have an affirmative duty under the treaty. Moreover, no express language in the treaty hints at an enforcement mechanism to impose legal liability on a State Party. *See id.*

101. The OST does not expressly provide for an enforcement mechanism, but if the parties cannot come to an agreement, then they can go to the International Court

In addition, the OST does not limit the use of space to certain activities, but instead promotes the free use of space, as long as the activity conforms with the OST's interests.¹⁰² In other words, while the OST's provisions are not enforceable on all nations,¹⁰³ the provisions provide each nation with a guideline for enacting their own domestic space laws in accordance with the treaty.

The OST's lack of binding authority prevented an international entity from gaining too much power over the regulation of space law. The discussion in the 21st General Assembly resolution that led to the adoption of the OST, conveys the need to further develop ways of building the foundation of international space law.¹⁰⁴ The OST's vague language and loose regulatory scheme left international space law open—perhaps intentionally—to interpretation and domestic construction.¹⁰⁵ Over time, this significantly affected the evolution of space law.

Implementing these three factors allowed the United Nations to address major Cold War concerns, and it established a collaborative approach for utilizing the space exploration to promote the greater good. Additionally, the liberal framing allowed nations to remain unbound by an international authority. Overall, it instilled a universal mentality that promoted the exploration of space for a common purpose and in a joint effort to avoid catastrophe at a potentially unprecedented level in outer space.

of Justice. However, that requires that the court accept the case and that the disputing parties accept jurisdiction, which poses great difficulties for reaching a resolution. Daniel Wilson, *Legal Uncertainty May Keep Space Exploration Grounded*, LAW 360 (Sept. 7, 2016, 3:48 PM), <https://www.law360.com/articles/835962/legal-uncertainty-may-keep-space-exploration-grounded>.

102. See Outer Space Treaty, *supra* note 2, art. I.

103. As is the case with most treaties, the OST is only enforceable against State Parties, which the treaty makes clear by referring to State Parties often. See *id.* art. I-XVII.

104. The General Assembly requested that the Committee on the Peaceful Uses of Outer Space work on the elaboration of a liability agreement for damages caused by launched objects in outer space, study the implications of space communications, and report progress in the following session. See G.A. Res. 2222 (XXI), (Dec. 19, 1966).

105. See generally Krause, *supra* note 6 (discussing the large gaps in the OST and how countries are passing laws to address unregulated activities such as commercial activity).

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B. OST Factors Applied to Other Treaties

As discussed above, the following factors helped the OST gain universal acceptance: (1) its intent to promote the greater good of mankind, (2) its focus on a universally accepted concern, and (3) its relatively loose restrictions. The relative impact of these factors can be measured by analyzing how they have been applied in subsequent treaties that have shaped space law.

1. Post-OST Space Treaties That Succeeded

The OST continues to be the most widely ratified treaty among nations, with a total of 109 parties; however, some subsequent treaties have also been able to find relative success within the United Nations, such as the Registration Convention with sixty-nine parties,¹⁰⁶ the Liability Convention with ninety-six parties,¹⁰⁷ and the Rescue Agreement with ninety-eight parties.¹⁰⁸ Each of these subsequent treaties reiterated the same three factors found in the OST, which played a significant role in their success. Each treaty's provisions contributed to the successful international regulation of space by elaborating on the OST's original provisions.

2. Post-OST Space Treaties That Failed

In 1984, the Moon Agreement marked a significant departure from the international space community's collaborative approach to the regulation of space because it did not completely embody the factors that had made other treaties successful. The Moon Agreement *does* satisfy the first factor by promoting the use of space and celestial bodies

106. *Status of Treaties: Convention on Registration of Objects Launched into Outer Space*, U.N. TREATY COLLECTION, https://treaties.un.org/Pages/ViewDetailsIII.aspx?src=TREATY&mtdsg_no=XXIV-1&chapter=24&Temp=mtdsg3&clang=_en (last visited Oct. 29, 2019).

107. UNOOSA, STATUS OF INTERNATIONAL AGREEMENTS RELATING TO ACTIVITIES IN OUTER SPACE AS AT 1 JANUARY 2019 5-10 (Apr. 1, 2019), http://www.unoosa.org/documents/pdf/spacelaw/treatystatus/AC105_C2_2019_CRP03E.pdf.

108. *Id.*

for the greater good of mankind.¹⁰⁹ However, the Moon Agreement does not successfully incorporate the second and third factors.

The Moon Agreement did not satisfy the second factor, focus on a universally accepted concern, because international interests had drastically changed by 1984. Nuclear disarmament had led to the end of the nuclear arms race, thereby diminishing the imminent fear of destruction.¹¹⁰ The United States was in a new era of “Reaganomics” and free-market activity.¹¹¹ The Moon Agreement conflicted with Western countries’ interests because commercial interests were “lukewarm to treaty language that reserve[d] lunar resources for ‘the common interest of all mankind.’”¹¹² Furthermore, the Moon Agreement was drafted at a time when domestic legislation began to regulate space activity, as seen by the passing of the U.S. Commercial Space Launch Act of 1984, which allowed private companies to launch objects into space.¹¹³ Without the presence of a universally appealing concern, such as the prevention of nuclear holocaust, the Moon Agreement was undermined by polarizing interests, which hindered its ability to gain universal acceptance.

The Moon Agreement did not satisfy the third factor, relatively loose restrictions, because the Moon Agreement over-regulated space activity by giving binding authority to an international entity.¹¹⁴ This would limit a sovereign nation’s ability to act in its best interest when conducting space activity. Therefore, major spacefaring nations have

109. This first factor was met because the primary purpose of the Moon Agreement’s provisions is to mandate that the Moon is strictly used for peaceful purposes to benefit mankind. *See* Outer Space Treaty, *supra* note 2, art. I, IV; *see also* Mitchell, *supra* note 28, at 433.

110. *See generally* Norris, *supra* note 86 (discussing the historical development of nuclear arms from their birth to the disarmament that occurred as a result of the end of the Cold War).

111. *See generally* Kimberly Amadeo, *What Is Reaganomics? Did It Work?*, THE BALANCE (Feb. 17, 2019), <https://www.thebalance.com/reaganomics-did-it-work-would-it-today-3305569> (discussing the economic policy of Reaganomics and its main tenets).

112. *See* Krause, *supra* note 6.

113. Commercial Space Launch Act, Pub. L. No. 98-575, 98 Stat. 3055 (1984).

114. Throughout the treaty, it is stated that State Parties must give notice to the Secretary-General of the United Nations before embarking on certain activities. *See* Moon Treaty, *supra* note 25; *see also* Krause, *supra* note 6 (discussing how the OST did not address the issue of how a dispute would be resolved).

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declined to establish international space law and have instead focused their efforts on domestic space law.¹¹⁵ Essentially, the Moon Agreement strayed from the three factors that made the OST and other treaties successful, thus failing to encourage international collaboration and shifting the responsibilities of space regulation to national entities.

3. *Antarctic Treaty*

One treaty that has been compared to the OST is the Antarctic Treaty, which is often considered a blueprint to the OST.¹¹⁶ The Antarctic Treaty is an international treaty that governs how the signatory nations are to use the continent of Antarctica.¹¹⁷ Like the OST, the Antarctic Treaty has gained wide acceptance among the international community, with fifty-three parties to the treaty.¹¹⁸ The treaty has been considered a success, perhaps because it contains the same factors present in the OST.

First, the Antarctic Treaty promotes a peaceful agreement between nations to allow unrestricted access to Antarctica for purposes of conducting scientific research.¹¹⁹ In retrospect, “the Antarctic Treaty is seen as one of the most successful international treaties because the international cooperation it fostered has led to significant scientific and environmental discoveries, such as the depletion of the atmospheric ozone layer.”¹²⁰ Thus, like the OST, which promotes the use of outer space for the good of mankind, the Antarctic Treaty promotes the use of Antarctica for discoveries that can benefit all.

115. The most notable space treaties were enacted in the 1960s and 1970s. *See* American Bar Ass’n, *supra* note 33.

116. Mitchell, *supra* note 28, at 436.

117. *See generally* Antarctic Treaty, June 23, 1961, 12 U.S.T. 794 [hereinafter Antarctic Treaty].

118. This argument is based on the fact that major spacefaring nations like the United States and Russia are State Parties to the treaty. U.S. DEP’T OF STATE, THE ANTARCTIC TREATY (Apr. 22, 2019), <https://www.state.gov/wp-content/uploads/2019/05/141-Antarctic-Treaty.pdf>.

119. The main restrictions on access are in regard to purely military activities. *See* Antarctic Treaty, *supra* note 117, art I.

120. Mitchell, *supra* note 28, at 437.

Second, the Antarctic Treaty was drafted in the late 1950s, a few short years before the OST's provisions were conceived.¹²¹ The Antarctic Treaty reflected many of the OST's same concerns, such as the Cold War concerns regarding peaceful military purposes, scientific research, and cooperation among nations.¹²²

Lastly, the Antarctic Treaty was successful because like the OST, it was not overly restrictive, as it allowed sovereign nations to utilize Antarctica for scientific research and progress. In fact, it was less restrictive than the OST because it also allowed for territorial claims, unlike the OST, which included a non-appropriation clause.¹²³

4. *The OST Factors and Article VI*

As discussed, Article VI of the OST has long served as the basis for domestic and international commercial regulation of outer space. However, Article VI has failed to provide guidance needed to regulate the exponential advancement of the commercialization of space. In recent years, the application of Article VI to commercial actors has undermined the effectiveness of the three factors.

First, Article VI does not promote the general welfare of mankind because it focuses on governments' right to control commercial space activities,¹²⁴ which is generally seen as self-serving. This conflicts with the OST's original purpose of serving the greater good of mankind. The shift toward commercial benefits, which by their nature serve the interests of a few, may arouse suspicions about the true intentions behind Article VI regulations.

Second, space regulation no longer focuses on Cold War concerns. Contemporary concerns center on how to regulate the rapid increase of

121. However, the treaty did not enter into force until June 23, 1961. *See Antarctic Treaty*, U.S. DEP'T OF STATE, <https://2009-2017.state.gov/t/avc/trty/193967.htm> (last visited Oct. 30, 2019).

122. *See Mitchell, supra* note 28, at 436-37 (discussing that besides promoting the peaceful use of Antarctica, there are prohibitions on nuclear testing and waste disposal).

123. *See Antarctic Treaty, supra* note 117, art. IV; *see also Outer Space Treaty, supra* note 2, art. II.

124. The OST does not mention private actors. Instead, responsibility and liability for space activity by "non-governmental entities" fall on the relevant State Party. *See generally Outer Space Treaty, supra* note 2, art. VI.

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space commercialization.¹²⁵ Commerce in space is inherently competitive and appears to be tailored toward private financial gain.¹²⁶ As competition increases, so do differences in how to interpret Article VI and its applicability to private actors.

Lastly, there is vast disagreement on how much regulation to allow through Article VI. In particular, one question remains unanswered: Who should have the international authority to enforce provisions or settle disputes? Some advocate for a strict interpretation of Article VI that supports creating a binding authority able to directly control commercial space actors.¹²⁷ Others have argued for a looser interpretation that supports promoting free market activity.¹²⁸ As a result of these conflicting interpretations, the restrictive nature of Article VI remains unclear. International cooperation in space law was achieved under the original intent of the OST. When it was created, the OST's goal was to address concerns stemming from the Cold War. The shift toward regulating private actors by using Article VI as a basis has proved to be ineffective and has weakened the factors that have made past treaties successful.

The three OST factors seem to be essential in treaties that have succeeded. The most successful international agreements have been based on accomplishing feats for the greater good of mankind. A strong platform that does not contain the same flaws as Article VI is both urgent and necessary to address the lack of international regulation in the face of a new space era.

III. PLANETARY PROTECTION: A NEW PLATFORM

A different platform, rather than Article VI, can create more uniformity in the international realm of space law by reinforcing the

125. Specifically, the concern is about regulating resource extraction and new activities in space. *See* American Bar Ass'n, *supra* note 33.

126. "A decision was made [by Congress] to put priority on nurturing the commercial space flight industry and a program was put into place to help commercial companies that wanted to get into human space flight by giving them a customer-ferrying ISS crews." *See* Lerner, *supra* note 45.

127. The previous U.S. FAA administration followed a strict interpretation in seeking to regulate everything in space. *See* American Bar Ass'n, *supra* note 33.

128. *See id.* (arguing that not everything needs to be regulated in space just because it is a new and unregulated field).

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OST factors. Regulation of commercial space activity through Article VI has resulted in different interpretations on how Article VI should be applied. It will be more effective to create a different, more universally appealing platform than to attempt to reconcile the different interpretations of Article VI. The goal will be to reestablish the OST's factors and promote collaboration among the international community in order to extend the OST to regulate commercial space activity. Planetary protection is one platform that may accomplish this goal.

A. *Planetary Protection: Background*

Planetary protection is an emerging issue that needs to be addressed in the commercial space industry. Increased activity in space raises concern about the planetary protection of Earth and other celestial bodies. It should be noted that “planetary protection has . . . gained a higher profile” because the space industry is expecting exponential growth within the next decade.¹²⁹

1. *Planetary Protection Issues*

Several planetary protection issues arise from the emergence of the commercial space industry. One issue is planetary contamination, which is the contamination of celestial bodies, asteroids, and space by humans.¹³⁰ Another concern is that space actors may bring contamination back *into* Earth, such as microbes, chemicals, and radiation—all of which can be detrimental to Earth's safety.¹³¹ Other

129. As companies become serious about sending humans to Mars and beyond, the issue has gained much attention, specifically in terms of safety and survival. Marc Kaufman, *Planetary Protection Is a “Wicked” Problem*, NASA (May 17, 2017), <https://astrobiology.nasa.gov/news/planetary-protection-is-a-wicked-problem/>.

130. “If someone proposes to mine an asteroid or the Moon, we should regulate that activity, for example, to prevent contamination of these celestial bodies (which is an obligation under the treaty) and also back-contamination on Earth (if anything is brought back to Earth). We need to ensure that the activity is safe and that it complies with the treaty.” See American Bar Ass’n, *supra* note 33; see also Kaufman, *supra* note 129.

131. See generally *New Report Addresses Limiting Interplanetary Contamination During Human Missions*, NASA (Nov. 2, 2016), <https://www.nasa.gov/feature/new-report-addresses-limiting-interplanetary-contamination-during-human-missions> (stating that “[i]t’s critical to establish the

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issues include harming the environment of celestial bodies and space debris by littering Earth's orbit.¹³²

2. Current Regulations for Planetary Protection

Current planetary protection regulations are insufficient to prevent planetary contamination because they do not have any binding international authority. Under the OST and the Liability Convention, indemnification laws hold states accountable for any damages caused by their actors.¹³³ However, this merely establishes liability and it does not provide any preventative measures. Additionally, the OST only holds states liable for the damages caused by their own private actors, which does not encourage international cooperation in protecting the celestial environment.

In 2002, the Committee on Space Research (COSPAR) created international guidelines for planetary protection.¹³⁴ COSPAR is an international agency that promotes scientific research of space on an international level.¹³⁵ It serves as an objective and scientific forum for the exchange of information regarding space research.¹³⁶ It has been acknowledged as an agency that helps establish cooperation between

quantitative requirements now, that engineers need to follow while designing human-rated systems for travel beyond Earth orbit”).

132. “States Parties to the Treaty shall pursue studies of outer space, including the Moon and other celestial bodies, and conduct exploration of them so as to avoid their harmful contamination and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter, and where necessary, shall adopt appropriate measures for this purpose.” *See* Outer Space Treaty, *supra* note 2, art. IX; *see also* G. KMINEK, C. CONLEY, V. HIPKIN, H. YANO & COSPAR, COSPAR’S PLANETARY PROTECTION POLICY 13 (2017), https://cosparhq.cnes.fr/sites/default/files/pppolicydecember_2017.pdf [hereinafter COSPAR POLICY].

133. Outer Space Treaty, *supra* note 2, art. VII; Liability Convention, *supra* note 22, art. V.

134. “NASA proposed a consolidation of various COSPAR decisions on Planetary Protection into a single policy document (first time since 1964), which was accomplished in 2002.” CATHARINE A. CONLEY, WHAT IS PLANETARY PROTECTION? 14 (Mar. 7, 2017), https://sites.nationalacademies.org/cs/groups/ssbsite/documents/webpage/ssb_178093.pdf.

135. *About*, COSPAR, <https://cosparhq.cnes.fr/about> (last visited Oct. 30, 2019).

136. *Id.*

the East and West in space.¹³⁷ COSPAR created a Planetary Protection Policy that lays out non-binding guidelines for planetary protection.¹³⁸ The policy itself states that it is intended only to be a guideline for nations to follow.¹³⁹

NASA, the European Space Agency, and the Japanese Aerospace Exploration Agency have established their own system of planetary protection policies to meet the international guidelines for planetary protection under the OST.¹⁴⁰ However, some countries have not adopted similar policies to regulate their commercial use. With increased technological and financial feasibility for private actors to get into space, there is a concern that some private actors might not follow the COSPAR guidelines for planetary protection, unless their respective governments directly regulate their activities. With no binding international standard for planetary protection, Earth (and celestial bodies in space) may be vulnerable to those nations that do not follow binding regulatory guidelines.

3. *Need for Regulation*

The lack of binding regulation for commercial space actors and their activities can detrimentally affect the success of a planetary protection platform.¹⁴¹ Experts have highlighted the urgency of developing a better and more strategic plan for planetary protection,

137. *Id.*

138. “COSPAR maintains and promulgates this planetary protection policy for the reference of spacefaring nations, both as an international standard on procedures to avoid organic-constituent and biological contamination in space exploration, and to provide accepted guidelines in this area to guide compliance with the wording of this UN Space Treaty and other relevant international agreements.” *See* COSPAR POLICY, *supra* note 132, at 13.

139. In pertinent part, the introduction to the policy states that this is meant “to provide advice on these issues [of extraterrestrial contamination].” *See id.* at 12.

140. *Planetary Protection*, NASA, <https://sma.nasa.gov/sma-disciplines/planetary-protection> (last visited Oct. 30, 2019).

141. *See* Leonard David, *NASA’s Planetary Protection Policies Need to Be Updated, Report Finds*, SPACE (July 3, 2018), <https://www.space.com/41060-nasa-planetary-protection-policies-questioned.html> (arguing that in the absence of a regulatory agency in the United States, NASA needs to update its planetary protection policies in order to address private actor exploration of space).

indicating that “private-sector space exploration activities are another reason why planetary protection policies need re-examination.”¹⁴²

B. How Planetary Protection Will Function

An international agreement should be established to develop a Planetary Protection Agency (PPA), deriving its power from Article IX¹⁴³ of the OST, to address the lack of regulation for both planetary protection and commercialization. The PPA would ignore political considerations, like COSPAR, and would have the ability to regulate dangerous space activities. Further, the PPA would impose provisions to ensure planetary protection from the space activities of commercial and state actors and to avoid harmful contamination in space and on Earth. Scientists educated in planetary protection would be in charge of running the PPA. The scope of the PPA’s regulation would encompass all space activity by all actors in space without distinguishing between state or private actors. Thus, this regulation will protect space from dangerous policies that are influenced by differing economic or political ideologies.

1. Article IX as a Basis for Regulation

A close analogy of how PPA regulation would work is how the U.S. Congress uses its Commerce Power to regulate private commercial action in the United States. One of the powers given to Congress by the U.S. Constitution is the power to “regulate commerce with foreign nations, and among the several states, and with the Indian tribes.”¹⁴⁴ This power is frequently cited as the basis for Congress enacting legislation.¹⁴⁵ One way Congress may regulate private commercial

142. *Id.*

143. Article IX provides that states “shall pursue studies of outer space, including the Moon and other celestial bodies, . . . to avoid their harmful contamination and . . . adverse changes in the environment of the Earth.” *See* Outer Space Treaty, *supra* note 2, art. IX.

144. U.S. Const. art. I, § 8, cl. 3.

145. The “Commerce Clause has become the constitutional basis for a significant portion of the laws passed by Congress over the last 50 years, and it currently represents one of the broadest bases for the exercise of congressional powers.” KENNETH R. THOMAS, CONG. RESEARCH SERV., RL32844, THE POWER TO REGULATE COMMERCE: LIMITS ON CONGRESSIONAL POWER 1 (2014).

activity is if that activity has a substantial effect on interstate commerce.¹⁴⁶ Similarly, the PPA should be able to regulate the activity of sovereign nations and private citizens involved in space activity if that activity presents a substantial risk of harm to planetary protection.

So, how would the PPA justify this authority? It would begin at the domestic level. Initially, the OST only applied to state actors' activities, but Articles VI and VII of the OST were expanded in the 1972 Liability Convention to require that each nation take responsibility for any harm caused by its private actors while exploring space.¹⁴⁷ Regardless of a narrow or broad interpretation of Article VI, there is agreement that if a space activity is dangerous, then it should be regulated to prevent harm.¹⁴⁸

The PPA should impose liability on states for the harmful actions of their private citizens that cause any damage to Earth or other celestial bodies. This provision would add to Article IX of the OST, which ensures that states "shall pursue studies of outer space, including the Moon and other celestial bodies, . . . to avoid their harmful contamination and . . . adverse changes in the environment of the Earth."¹⁴⁹ Because governments have an interest in not being held liable for the harm caused by their private citizens, there should be some balance of power to allow sovereign states to regulate private activity in space. By controlling their citizens' activities in space, governments would likely regulate space commercialization in a way that reduces the risk of states being held liable.

Another concern to consider when framing a new regulatory scheme would be how and what power is delegated to a binding international entity. Under Article IX, if a nation believes it may be conducting dangerous activities in space that might harm the planet, the nation must "undertake appropriate international consultations before proceeding with any such activity or experiment."¹⁵⁰ This same procedure could be helpful in promoting nations to take responsibility

146. *United States v. Darby*, 312 U.S. 100, 119 (1941).

147. *Compare* Liability Convention, *supra* note 22, art. II, with Outer Space Treaty, *supra* note 2, art. VI-VII.

148. *See* American Bar Ass'n, *supra* note 33 (discussing how rockets can be dangerous because of their high explosive yield and as such should be regulated).

149. Outer Space Treaty, *supra* note 2, art. IX.

150. *Id.*

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in regulating their own commercial actors. It would allow the PPA to serve as the appropriate international consultation before nations could proceed with activities in space.¹⁵¹ Thus, the PPA's essential function would be to preside over space activity to ensure state and private actors are in conformity with its regulations.

2. *Scope of Regulation*

Space regulation is a dangerous enterprise. Space contains untapped potential, and any entity with an ability to regulate it can raise serious risks. However, not regulating the potential can be just as dangerous. With the possibility that there may be abuse of regulatory power, how can we ensure the effective implementation of regulations?

As discussed, commerce power is very broad and gives the U.S. Congress the ability to regulate a wide range of private conduct. Thus, to be effective, the PPA's regulatory power should be tailored to specific issues that affect planetary protection. For example, when an entity plans to transport a massive amount of an unstable chemical element through the ozone layer, such as uranium, the PPA should have the authority to regulate such activity *only* to the extent that would prevent planetary protection from being at risk. This means that the PPA's regulatory power must be narrowly tailored to bring the activity in conformity with the PPA's planetary protection regulations. Thus, if the entity's activity conforms with safety standard regulations, the PPA's regulatory power stops, giving the actors the permission to proceed. Under the above-mentioned scenario, the PPA would *not* be able to regulate the shipment of uranium for political or economic reasons, such as preventing a nuclear arms buildup or stabilizing the global market, as long as the shipment conforms with PPA's safety standard regulations.

Therefore, on one hand, the PPA should address sovereign nations' interest in conducting space activity with relative freedom. On the other hand, the PPA's main interest in ensuring planetary protection must not be jeopardized. These interests must be balanced by the PPA when regulating a certain type of activity. Essentially, regulations must not be so burdensome as to deter innovation and exploration.

151. Essentially, the PPA would approve or disapprove an activity based on some kind of study or research. *See id.*

3. *Burden of Proof*

Another issue involves determining who should carry the burden of proof. Does the PPA have to show that there is a need for an immediate planetary protection? Or does the challenger of the regulation have to show that there is no compelling need for planetary protection or that the regulation is unreasonably burdensome?

The PPA should be given self-executing power to regulate space activities because it is in everyone's best interest to protect the earth from the potentially devastating and irreparable harm. The environmental harm could potentially be irreversible, so immediate protection is necessary. However, there should be procedural safeguards in place to prevent the PPA from gaining too much power. For instance, once a regulation is challenged, the challenger, in order to satisfy its initial burden, should only be required to present a *prima facie* case that the law is unreasonably burdensome or discriminatory. To prevent the PPA from gaining too much power, and to promote the free use of space, the challenger's burden should be low. Once the challenger meets the *prima facie* burden, the burden should shift back to the PPA to prove the law's validity. The PPA's justification for regulation must be based on an environmental rationale because unlike speculative, ideological, and complex economic and political platforms,¹⁵² environmental arguments can be proven with concrete and scientific evidence. This will also prevent the PPA from becoming a political or economic branch of spacefaring nations.

C. Why Planetary Protection Will Provide a More Effective Platform for Regulation

The OST's factors, which once fostered cooperation in international space law, may be strengthened by extending the OST's regulation of space activity through Article IX to encompass both private and state actors.

152. See Bruce R. Scott, *The Political Economy of Capitalism* 4, 16 (Harvard Bus. Sch., Working Paper No. 07-037, 2006), <https://www.hbs.edu/faculty/Publication%20Files/07-037.pdf>.

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1. Intent to Promote the Greater Good for All of Mankind

Much like the original intent of the OST, Article IX can help extend regulation to commercial actors by having the same intention of promoting the interests of the greater good. Thus, the regulating entity, the PPA, must ensure that it does not follow any self-serving commercial or political interest because planetary protection is better achieved if it only considers the interests of the greater good.

Therefore, the entity's regulations will be enacted for the greater good of mankind because they will protect the planet from an immediate threat, and they will continue the beneficial exploration and use of space. Much like the Cold War concerns over nuclear destruction, planetary protection is an issue that may threaten our very existence.

2. Planetary Protection Is a Universally Accepted Concern

Article IX provides an environmental platform¹⁵³ to reestablish international cooperation through a universally accepted concern. Addressing Cold War concerns fostered the OST's original success, but cooperation faded as international interests transitioned from a focus on international peace to a desire for commercial success in space.¹⁵⁴ An environmental platform of planetary protection may be the universally appealing concern that the international community needs to reestablish cooperation.

The millennial¹⁵⁵ and younger generations are more inclined to respond to regulation through an environmental platform such as planetary protection rather than through Article VI. Article VI has not been effective in regulating commercial space activity; it has instead generated controversy about its proper interpretation.¹⁵⁶ Millennials

153. See Outer Space Treaty, *supra* note 2, art. IX.

154. See generally Krause, *supra* note 6 (discussing that a large reason for this transition was the lack of a binding authority and the OST's silence on commercial actors).

155. A millennial is "a person born in the 1980s or 1990s." *Millennial*, MERRIAM-WEBSTER DICTIONARY, <https://www.merriam-webster.com/dictionary/millennial> (last visited Oct. 30, 2019).

156. See generally American Bar Ass'n, *supra* note 33 (addressing that there are potential problems with both the under and over regulation of space activity).

may be more open to regulating state and private actors if it is narrowly tailored to an environmental platform, as seen by their attitude toward issues like climate change.

A . . . study, released in March by Pew, found that 65 percent of all U.S. millennials say both that there is solid evidence of global warming and attribute this primarily to human activity—the only generation for which this viewpoint has a clear majority. And an MIT study found that millennials self-identify as climate conscious, with most believing they care more about protecting the environment than older generations.¹⁵⁷

Millennials concern regarding environmental issues is similar to the apocalyptic mentality people had during the Cold War Era over nuclear destruction. The Millennial generation is important because it may very well be the first generation to build the new era of the commercial space industry. Reports indicate that there will be a substantial growth in the commercial space industry within the next decade.¹⁵⁸ Since this new era is in the near future, regulation is urgent.

Environmental concerns were compelling enough to help the Antarctic Treaty find success in the twentieth century by addressing concerns over “the depletion of the atmospheric ozone layer.”¹⁵⁹ Arguably, these environmental concerns are even more compelling and accepted in 2019 among Millennials who will likely take over the new era of the commercial space industry.

3. New Regulations Would Not Be Overly Restrictive

Much like the OST, this proposal is also not overly restrictive for an agency that regulates all space activity, including state and private actors. OST’s Article IX power is an extremely narrow regulatory scheme designed to address a very specific type of issue. The PPA’s environmental platform only has one interest: the preservation of life

157. Madeleine Cuff, *Eco-operation: Why Your Climate Strategy Is Central to Wooing Millennials*, GREENBIZ (May 29, 2018), <https://www.greenbiz.com/article/eco-operation-why-your-climate-strategy-central-wooing-millennials>.

158. See BUS. WIRE, *supra* note 42.

159. Mitchell, *supra* note 28, at 437.

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on Earth and other celestial bodies. Unlike a purely environmental justification, commercialization is inherently prone to political and economic bias; thus, any economic and political justification has been met with scrutiny.¹⁶⁰ This single planetary protection justification contains less bias and leaves no room for disagreement—Who doesn't want to save the planet?

Like the successful Antarctic Treaty, experts and scientists will run the PPA. Science based decisions will allow these experts to prove their justifications through scientific evidence rather than through ideological debate over interpretation, as is the case with Article VI. For this reason, the PPA would have the ultimate burden to prove its regulation is in conformity with the OST. If there is scientific evidence to justify a regulation, the PPA should be able to easily present the supporting evidence. Therefore, this planetary protection platform is tailored to be less restrictive because the PPA has to meet the ultimate burden of showing that its execution of power is justified through scientific evidence. This will prevent the PPA from wielding excessive regulatory authority.

CONCLUSION

The rapid increase of space commercialization makes the risk of harm to planetary protection more realistic; therefore, it must be addressed. I hope that drawing attention to this risk will rally the next generation into action, especially given that the Millennial generation will be the main player in the new space age and will have expressed its appeal for environmental platforms.

Much like the OST, the success of this new platform will depend on addressing the concerns of our era. The world witnessed how the OST aligned with many Cold War concerns. That alignment helped explain the OST's nearly universal acceptance as the foundation of space law. Now, the environmental justification for creating the Planetary Protection Agency may lead to similar success. Admittedly,

160. Describing investors in the space industry as “very successful business people, who are not doing it as a science experiment but because they see a commercial return.” See Jane Bird, *Commercialisation of Space Is New Final Frontier*, FIN. TIMES (Dec. 9, 2014), <https://www.ft.com/content/fcc72e0c-7564-11e4-a1a9-00144feabdc0>; see also Scott, *supra* note 152, at 4, 16.

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it is an optimistic proposal, but one founded on the lessons we have learned from the successes and failures we have witnessed.

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