

Extraterrestrial Property Rights: Utilizing the Resources of the Final Frontier

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I. INTRODUCTION

On September 12, 1962, President Kennedy, speaking at Rice University, declared, “The exploration of space will go ahead, whether we join in it or not, and it is one of the great adventures of all time, and no nation which expects to be the leader of other nations can expect to stay behind in the race for space.”¹ This speech was an attempt by President Kennedy to garner public support for the Apollo program by explaining why putting a man on the Moon by the end of the decade was imperative.² During the Cold War, the Moon was the object of rivalry and competition between the United States and the Soviet Union.³ In fact, after World War II, only the United States and the Soviet Union had the resources and political motivation to become the first space-faring nations of the world.⁴ Much has changed in the intervening decades as more countries are developing space programs and private corporations are investing in space technology.

One important change is a shift in the purpose behind space exploration from being primarily concerned with national competitiveness to being primarily concerned with scientific progress and international cooperation.⁵ For example, space exploration has transformed life on Earth by introducing technologies on which people depend on for telecommunications, navigation, and business transactions.⁶ In addition, satellites currently allow scientists and researchers to locate natural resources and to monitor the environmental impact of global warming.⁷ It is even thought that the answer to the world’s energy crisis can be found in space, with the United States, China, Russia, and India

1. President John F. Kennedy, Address at Rice University on the Nation’s Space Effort (Sept. 12, 1962).

2. Mike Wall, *JFK’s ‘Moon Speech’ Still Resonates 50 Years Later*, SPACE.COM. (Sept. 12, 2012, 6:00 AM), <http://www.space.com/17547-jfk-moon-speech-50years-anniversary.html>.

3. FABIO TRONCHETTI, *THE EXPLOITATION OF NATURAL RESOURCES OF THE MOON AND OTHER CELESTIAL BODIES: A PROPOSAL FOR A LEGAL REGIME I* (2009).

4. OUTER SPACE IN SOCIETY, POLITICS AND LAW 159 (Christian Brunner & Alexander Soucek eds., 2011).

5. See MATTHEW J. KLEIMAN, *THE LITTLE BOOK OF SPACE LAW IX* (2013).

6. *Id.* “The temporary loss of a single communications satellite in 1998, for example, affected over 45 million users, ranging from medical workers whose pagers stopped working to gas station owners who lost pay-at-the-pump functions.” *Id.*

7. *Id.*

planning on mining Helium-3 on the Moon.⁸ At the same time, international cooperation in space endeavors has increased, as evidenced by the International Space Station, the European Space Agency, and other joint ventures between national space programs.⁹

Another significant change is the introduction of non-state actors in space exploration. Private corporations are assuming the roles traditionally held by government agencies and are expanding their spaceflight capabilities and opening new markets in space.¹⁰ In May 2012, Space Exploration Technologies Corporation, or SpaceX, became the first private company to have its spacecraft dock with the International Space Station.¹¹ In addition, corporations are planning on mining valuable minerals from near-Earth asteroids, which will have a vast impact on the world's economy.¹²

A further change, unfortunately, has been the decline of the United States from being the global leader in math and science to being ranked near the bottom among developed nations.¹³ As a result, 2.5 million science, technology, engineering, and math (STEM) jobs are not being filled in the United States for a lack of qualified workers.¹⁴ Grant Imahara,¹⁵ a University of Southern California engineering graduate, believes the best way to change this steady decline is to instill in children a passion and desire to learn about STEM subjects.¹⁶ Mr. Imahara stated during a STEM Diversity Symposium on Capitol Hill that the best way to develop this passion in children is with rock stars—reminding everyone that astronauts had rock

8. Richard B. Bilder, *A Legal Regime for the Mining of Helium-3 on the Moon: U.S. Policy Options*, 33 *FORDHAM INT'L L.J.* 243, 243–46 (2010). Helium-3 is an isotope of Helium that is rarely found on Earth, but is believed to be common in the lunar soil. Helium-3 is an ideal fuel for thermonuclear fusion reactors and could serve as a limitless source of clean energy. *Id.*

9. GÉRARDINE MEISHAN GOH, *DISPUTE SETTLEMENT IN INTERNATIONAL SPACE LAW* 20 (2007).

10. KLEIMAN, *supra* note 5, at X.

11. Kenneth Chang, *First Private Craft Docks with Space Station*, *THE NEW YORK TIMES*, May 26, 2012, at A12.

12. KLEIMAN, *supra* note 5, at X.

13. Katherine Beard, *Behind America's Decline in Math, Science and Technology*, *U.S. NEWS & WORLD REP.*, Nov. 13, 2013, <http://www.usnews.com/news/articles/2013/11/13/behind-americas-decline-in-math-science-and-technology>.

14. *Id.*

15. Grant Imahara contributes to inspiring everyone to learn more about STEM subjects through his work on *Myth Busters* on the Discovery Channel. *See id.*

16. *Id.*

star status during the 1960s.¹⁷ Dr. Neal deGrasse Tyson¹⁸ similarly expressed that space exploration has the power to inspire children to pursue careers in STEM fields.¹⁹ Dr. Tyson asserts that if the United States does not begin once again to thus inspire children, then “the country might as well just recede back into the cave because that’s where we’re headed.”²⁰

In sum, space exploration offers three important opportunities for the United States. First, space exploration promotes scientific progress and international cooperation. Second, space exploration will drive the world economy by creating new jobs and introducing exploited space resources into the markets. Third, space exploration will reverse the decline of the United States in math and science by inspiring children to be interested in STEM fields.²¹ More than fifty years later, President Kennedy’s words

17. *Id.*

18. *See About Neil deGrasse Tyson*, HAYDEN PLANETARIUM, <http://www.haydenplanetarium.org/tyson/profile/about-neil-degrasse-tyson> (last visited Feb. 28, 2016). Dr. Neal deGrasse Tyson is often referred to as the “rock star” of astrophysics. Dr. Tyson earned his B.A. in Physics from Harvard University and his Ph.D. in Astrophysics from Columbia University. In addition to writing professional publications, Dr. Tyson has written ten books (including *Death by Black Hole and Other Cosmic Quandaries*, which was a New York Times best seller) and has hosted five seasons of PBS’s *NOVA ScienceNOW*. Dr. Tyson has been awarded nineteen honorary doctorates and NASA’s Distinguished Public Service Medal. Currently, Dr. Tyson is the director of the Hayden Planetarium in New York City. In 2000, People Magazine named Dr. Tyson the “Sexiest Astrophysicist Alive.” In addition, Dr. Tyson appeared in a cameo role in *Zoolander 2*.

19. Chris Heller, *Neil deGrasse Tyson: How Space Exploration Can Make America Great Again*, THE ATLANTIC (Mar. 5, 2012), <http://www.theatlantic.com/technology/archive/2012/03/neil-degrasse-tyson-how-space-exploration-can-make-america-great-again/253989/>. Neil deGrasse Tyson stated,

My favorite quote, I think it was Antoine Saint-Exupery who said, “If you want to teach someone to sail, you don’t train them how to build a boat. You compel them to long for the open seas.” That longing drives our urge to innovate, and space exploration has the power to do that, especially when it’s a moving frontier because all traditional sciences are there. And so you’ll get the best students, they’ll have a place to land, and you’ll change the attitude that our culture has to the role of science, engineering, technology, and math on our future.

Id. While Dr. Tyson inaccurately quoted Antoine Saint-Exupery in this interview, he gave the correct quote in his written testimony to the U.S. Senate: “If you want to build a ship, don’t drum up people to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea.” *Past Present and Future of NASA: Hearing Before the S. Comm. On Com., Sci., and Transp.*, 112th Cong. (2012) (written testimony of Neil deGrasse Tyson).

For his compelling argument in favor of the importance of space exploration, watch his speech titled “We Stopped Dreaming,” available at <https://www.youtube.com/watch?v=CblZU8cQWXc>.

20. Chris Heller, *Neil deGrasse Tyson: How Space Exploration Can Make America Great Again*, THE ATLANTIC, Mar. 5, 2012, <http://www.theatlantic.com/technology/archive/2012/03/neil-degrasse-tyson-how-space-exploration-can-make-america-great-again/253989/>.

21. In this respect, national competitiveness still plays a minor, but substantial role.

still ring true: “[N]o nation which expects to be the leader of other nations can expect to stay behind in the race for space.”

A. Comment Overview

The proposition that space exploration will promote scientific progress and international cooperation, drive the global economy, and increase the United State’s global position in math and science, hinges on the exploitation of space resources. Since private corporations have an expanded role in space exploration, it is necessary that these corporations be able to generate a return on investment. Currently, private corporations are engaged in space exploration and are developing technologies to exploit resources located in near-Earth asteroids. This presents a novel legal issue: what is the legal regime for property rights in space? Put another way, will these corporations have a legal property right in the resources extracted from asteroids? The United States has addressed this issue directly by enacting the U.S. Commercial Space Launch Competitiveness Act. This Act grants property rights to U.S. citizens who are engaged in the commercial recovery of asteroid resources.

Professor John G. Sprankling²² said, “At this point, the law governing property rights in outer space is both unclear and incomplete.”²³ Alternatively, Professor Dr. Fabio Tronchetti²⁴ stated that “[t]he major space law treaties, indeed, do not contain any specific rule dealing with the use of extraterrestrial resources, and thus there is no clear cut regime dealing with it which has received the general acceptance of States.”²⁵ With these quotes as a starting point, this comment aims to provide an investigation of property rights in outer space. Through an analysis of current international obligations in

22. Professor John G. Sprankling, an internationally recognized authority on property law, is a distinguished professor of law at the University of the Pacific, McGeorge School of Law. JOHN G. SPRANKLING, http://www.mcgeorge.edu/John_G_Sprankling.htm (last visited Feb. 28, 2016).

23. JOHN G. SPRANKLING, *THE INTERNATIONAL LAW OF PROPERTY* 175 (2014).

24. Dr. Fabio Tronchetti is an Associate Professor of Law at the School of Law of the Harbin Institute of Technology, People’s Republic of China, where he also serves as Director of the International Law Department. Since 2014, Dr. Tronchetti is an Adjunct Professor of Comparative National Space Law at the School of Law of the University of Mississippi. He holds a Ph.D. in International Space Law and an Advanced LL.M in International Relations. He is Member of the International Institute of Space Law, the European Centre for Space Law, and the Asian Society of International Law. FABIO TRONCHETTI, <http://law.olemiss.edu/faculty-directory/fabio-tronchetti/> (last visited Feb. 28, 2016).

25. TRONCHETTI, *supra* note 3, at 3–4.

space and new legislation in both the United States and Luxembourg, the legal regime for property rights in space is not as uncertain as it was when Professor Sprankling and Professor Dr. Tronchetti wrote their books from which the above quotes were excerpted. In fact, the U.S. Commercial Space Launch Competitiveness Act is fully consistent with international law.

Part I B will provide an overview of national and international space programs that have a stake in the exploitation of space resources. Part I C will introduce private asteroid mining corporations. Part I D will consider new legislation in both the United States and Luxembourg that concerns property rights in space.

Part II will examine current international treaty obligations and international customary law with respect to property rights in space. Part III will analyze the history of international property law with respect to exploration and discovery. Part IV will discuss current analogous situations on Earth regarding property rights in areas that are not subject to national sovereignty. Part V will synthesize the information from Parts II–IV and offer a recommendation for future international agreements based on the U.S. Commercial Space Launch Competitiveness Act.

B. Current National and International Space Programs

Currently, at least 17 national space programs are in existence, and approximately 52 nations now have interests in space.²⁶ For example, on December 14, 2013, China became the third nation, after the United States and the Soviet Union, to land a space vehicle on the Moon.²⁷ On September 24, 2014, India successfully placed a satellite in orbit around Mars.²⁸ In addition, in July 2014, the United Arab Emirates announced the creation of its own space agency with the purpose of sending an unmanned mission to Mars in 2021 to coincide with the 50th anniversary of its independence from the United Kingdom.²⁹ Also, the European Space Agency and Russia's Space Agency are working on a joint project named Luna 27, the purpose of which is to assess the feasibility of a permanent habitable base on the Moon.³⁰ Although unconfirmed, Iran's space program in January 2013

26. *Global Space Programs*, SPACEFOUNDATION.ORG, <http://www.spacefoundation.org/programs/public-policy-and-government-affairs/introduction-space/global-space-programs>.

27. Paul Rincon, *China Lands Jade Rabbit Robot Rover on Moon*, BBC NEWS (Dec. 14, 2013), <http://www.bbc.com/news/science-environment-25356603>.

28. Jonathan Amos, *Why India's Mars Mission Is So Cheap – And Thrilling*, BBC NEWS (Sept. 24, 2014), <http://www.bbc.com/news/science-environment-29341850>.

29. Ishaan Tharoor, *U.A.E. Plans Arab World's First Mission to Mars*, THE WASHINGTON POST (July 16, 2014), <https://www.washingtonpost.com/news/worldviews/wp/2014/07/16/u-a-e-plans-arab-worlds-first-mission-to-mars/>.

30. Pallab Ghosh, *Europe and Russia Mission to Assess Moon Settlement*, BBC NEWS (Oct. 16, 2015), <http://www.bbc.com/news/science-environment-34504067>.

claimed to have sent two monkeys into space, as they prepare for manned space flight.³¹

Significantly, the European Space Agency on November 12, 2014, landed a probe on a comet showing that landing on small, very distant objects is possible.³² In June 2010, the Japan Aerospace Exploration Agency's asteroid explorer Hayabusa returned to Earth from an asteroid with a sample of asteroid material.³³ Currently, the Japan Aerospace Exploration Agency has an asteroid explorer named Hayabusa-2 en route to an asteroid to explore below the surface and then return to Earth with another asteroid sample.³⁴ The United States' NASA is also planning for manned missions to Mars and to an asteroid.³⁵

NASA along with 13 other national space agencies comprise the International Space Exploration Coordination Group (ISECG) with the stated goal of advancing long-range human space exploration by "strengthening both individual exploration programs as well as the collective effort."³⁶ This voluntary international group allows individual space agencies to exchange information regarding interests, objectives, and plans in space exploration.³⁷ In a publication titled, *Benefits Stemming from Space Exploration*, ISECG noted that publicly-funded space exploration has lowered the risks and costs of accessing and working in space.³⁸ The ISECG continued to point out that as a result private investment is increasing in space-based endeavors

31. *Iran Sends Second Monkey into Space*, USA TODAY (Dec. 14, 2013, 3:23 PM), <http://www.usatoday.com/story/news/world/2013/12/14/iran-sends-second-monkey-into-space/4024207/>.

32. *Touchdown! Rosetta's Philae Probe Lands on Comet*, EUROPEAN SPACE AGENCY (Nov. 12, 2014), http://www.esa.int/Our_Activities/Space_Science/Rosetta/Touchdown!_Rosetta_s_Philae_probe_lands_on_comet.

33. *Asteroid Explorer "Hayabusa"*, JAPAN AEROSPACE EXPLORATION AGENCY (Dec. 28, 2011), <http://global.jaxa.jp/activity/pr/brochure/files/sat14.pdf>.

34. *Asteroid Explorer "Hayabusa-2"*, JAPAN AEROSPACE EXPLORATION AGENCY, <http://global.jaxa.jp/activity/pr/brochure/files/sat33.pdf>.

35. *What's Next for NASA*, NASA.GOV (July 12, 2016), http://www.nasa.gov/about/whats_next.html.

36. *International Space Exploration Coordination Group*, NASA.GOV, <http://www.nasa.gov/exploration/about/isecg/#.WCjVt-ErJAa>. ISECG's membership consists of the national space agencies of Italy, France, China, Canada, Australia, Germany, India, Japan, the Republic of Korea, the United States, Ukraine, Russia, the United Kingdom, and the European Space Agency. *Id.*

37. *Id.*

38. *Benefits Stemming from Space Exploration*, ISECG 10, 11 (Sept. 2013), <https://www.nasa.gov/sites/default/files/files/Benefits-Stemming-from-Space-Exploration-2013-TAGGED.pdf>.

such as mining technologies to eventually harvest precious metals present in asteroids.³⁹ As an example, ISECG highlights the hundreds of millions of dollars of venture capital that has been invested in the development of space travel with relevance to potential future industries such as resource mining.⁴⁰ The 14 space agencies that make up ISECG are aware of the great potential for private enterprise in space. There are currently at least two private corporations that plan on mining asteroids in space: Deep Space Industries and Planetary Resources.

C. Current Private Asteroid Mining Corporations

Deep Space Industries (DSI) is an international asteroid mining company, with offices in Silicon Valley, California and Luxembourg City, EU.⁴¹ DSI has a four-stage approach to using asteroid resources.⁴² Currently, DSI is on the first step, which is “prospecting”—using advanced, tiny spacecraft to directly interact with Near Earth Asteroids.⁴³ The second step is to harvest resources by means of harvester spacecraft that will utilize water extracted from the target asteroid as propellant for the return trip.⁴⁴ The next step is processing, using a process known as “benefaction” which is a separation process that will discard the low-value material before the harvester transports the most valuable resources to a processing depot in Earth orbit.⁴⁵ The final stage is manufacturing.⁴⁶ Once the materials are in Earth orbit, they can be processed into valuable products such as fuel, water, oxygen, and building supplies such as raw materials for 3D printers.⁴⁷

DSI has already made significant progress. According to DSI, it is generating revenue from commercial contracts as well as government and

39. *Id.* at 11.

40. *Id.*

41. DEEP SPACE INDUSTRIES, <http://deepspaceindustries.com> (last visited Feb. 28, 2016).

42. *Space Resources*, DEEP SPACE INDUSTRIES, <http://deepspaceindustries.com/mining/> (last visited Nov. 12, 2016).

43. *Prospecting*, DEEP SPACE INDUSTRIES, <http://deepspaceindustries.com/mining/> (last visited Nov. 12, 2016).

44. *Harvesting*, DEEP SPACE INDUSTRIES, <http://deepspaceindustries.com/mining/> (last visited Nov. 12, 2016).

45. *See Processing*, DEEP SPACE INDUSTRIES, <http://deepspaceindustries.com/mining/> (last visited Nov. 12, 2016).

46. *Manufacturing*, DEEP SPACE INDUSTRIES, <http://deepspaceindustries.com/mining/> (last visited Nov. 12, 2016).

47. *Processing*, *supra* note 45; *New Asteroid Mining Company Aims to Manufacture Products in Space*, DEEP SPACE INDUSTRIES, <https://deepspaceindustries.com/new-asteroid-mining-company-aims-to-manufacture-products-in-space/> (last visited Nov. 12, 2016).

university research projects.⁴⁸ One income stream is from selling “CubeSat-compatible platform of agile nanosats”—in other words, DSI currently sells small satellites for space research.⁴⁹ In addition, NASA has selected DSI to conduct studies related to NASA’s Asteroid Redirect Mission focusing on public-private partnerships in space.⁵⁰ DSI’s study, the *Industry Funded Participation in the Asteroid Initiative*, will analyze the economic fundamentals of a commercial asteroid initiative.⁵¹

DSI is headed by David Gump, a leading expert in space industry with experience dealing with NASA contracts.⁵² DSI’s business model relies on partnerships, licensing and sub-contracting, and enticing brands that are already sponsoring space adventures, such as Red Bull and Google, to invest.⁵³

Planetary Resources, on the other hand, is backed by some very wealthy and influential entrepreneurs such as Google founders Larry Page and Eric Schmidt; Texan billionaire Ross Perot, Jr.; Silicon Valley venture capitalist Ram Shriram; and Hollywood director James Cameron.⁵⁴ Planetary Resources is a Redmond, Washington-based corporation with the stated goal to “do the impossible now.”⁵⁵

48. *Business*, DEEP SPACE INDUSTRIES, <http://deepspaceindustries.com/business/> (last visited Feb. 28, 2016); Emily Calandrelli, *Deep Space Industries partners with Luxembourg to test asteroid mining technologies*, TECHCRUNCH, <http://deepspaceindustries.com/deep-space-industries-partners-with-luxembourg-to-test-asteroid-mining-technologies/> (last visited Nov. 12, 2016); *NASA selects two SBIR proposals from Deep Space Industries*, Deep Space Industries, <https://deepspaceindustries.com/nasa-selects-two-sbir-proposals-from-deep-space-industries/> (last visited Nov. 12, 2016).

49. *Deep Space Industries is Bringing High Quality ISISpace Flight Hardware to the American Market*, Deep Space Industries, <http://deepspaceindustries.com/dsi-isis-partnership/> (last visited Nov. 12, 2016).

50. *NASA Selects Studies for the Asteroid Redirect Mission*, NASA.GOV (June 19, 2014), <http://www.nasa.gov/content/nasa-selects-studies-for-the-asteroid-redirect-mission/#.ViMC17TZloV>. The Asteroid Redirect Mission is a key part of NASA’s “stepping stone path to send humans to Mars.” *Id.* The mission aims to use a robot spacecraft to lift a multi-ton boulder from the surface of an asteroid in order to change the asteroid’s trajectory. *Id.* The spacecraft will then place the boulder in an orbit around the moon so that astronauts will be able to land on the bolder and explore its surface. *Id.*

51. *Id.*

52. Kharunya Paramaguru, *Deep Space Industries: The Company that Wants to Mine Space*, TIME MAG. (Jan. 23, 2013), <http://newsfeed.time.com/2013/01/23/deep-space-industries-the-company-that-wants-to-mine-space/>.

53. *Id.*

54. *Id.*

55. *Company Intro*, PLANETARY RESOURCES, <http://www.planetaryresources.com/company/#company-intro> (last visited Feb. 28, 2016).

Planetary Resources plans to achieve its goal by breaking the technical process of asteroid mining down into a series of more manageable, viable, and profitable steps.⁵⁶ Currently, Planetary Resources is implementing the first step, which is to develop and test technologies in Earth Orbit.⁵⁷ On July 16, 2015, Planetary Resources announced that its Arkyd 3 Reflight (A3R) spacecraft deployed successfully from the International Space Station and has begun a 90-day mission.⁵⁸ The A3R is testing technologies that will become the main components of the Arkyd-6 (A6), which is scheduled to launch in Spring 2016.⁵⁹ The A6 will be used to measure resources on water-rich asteroids in order to determine if a particular asteroid is worth pursuing in the second step of the plan.⁶⁰ The second step is to harvest water from asteroids in order to produce rocket fuel in space.⁶¹ Once it is determined that an asteroid has a substantial amount of water, Planetary Resources will harvest the water possibly using a three phase process of enclosing the asteroid, utilizing solar energy to melt the ice on the asteroid, and then releasing the asteroid.⁶²

According to Planetary Resources, there is a large market for rocket fuel in space and producing the rocket fuel in space will “open the interplanetary equivalent of exploration era trade routes.”⁶³ Most importantly, this fuel will enable the final step: mining asteroids. According to Planetary Resources, asteroid mines will harvest platinum group metals in higher concentrations than any mine on Earth.⁶⁴ For example, in mid-July 2015, an asteroid that is suspected of containing 90 million tons of platinum in its core passed by the Earth 30 times closer to Earth than the nearest planet of the solar system.⁶⁵ Like DSI, Planetary Resources was selected by NASA to conduct a study related to NASA’s Asteroid Redirect Mission focusing on a

56. *See Asteroid Prospecting & Claim*, PLANETARY RESOURCES, <http://www.planetaryresources.com/asteroids/#roadmap-asteroid-prospecting-and-claim> (last visited Feb. 28, 2016).

57. *Id.*

58. *Planetary Resources’ First Spacecraft Deployed*, PLANETARY RESOURCES (July 16, 2015), <http://www.planetaryresources.com/2015/07/planetary-resources-first-spacecraft-deployed/>.

59. *Id.*

60. *Id.*

61. *Harvesting Water from Asteroids*, PLANETARY RESOURCES, <http://www.planetaryresources.com/asteroids/#harvesting-water> (last visited Feb. 28, 2016).

62. *Id.*

63. *Id.*

64. *Mining and Delivery*, PLANETARY RESOURCES, <http://www.planetaryresources.com/asteroids/#mining-delivery> (last visited Feb. 28, 2016).

65. *‘Platinum’ Asteroid Potentially Worth \$5.4 Trillion To Pass Earth on Sunday*, RT.COM (July 18, 2015), <https://www.rt.com/news/310170-platinum-asteroid-2011-uw-158/>.

government-private partnership towards “exploration and exploitation of space resources.”⁶⁶

Perhaps these plans seem like something out of a science fiction novel. However, the venture capitalists investing in corporations like DSI and Planetary Resources believe that exploiting resources in space is inevitable. It appears as though President Barack Obama and the United States Congress also believe that the ability to mine asteroids is just around the bend.

D. Current Legislation

House Bill 1508 (Space Resource Exploration and Utilization Act of 2015) was a proposed addition to subtitle V of title 51 of the United States Code.⁶⁷ The Act would authorize the President, acting through Federal agencies, to

(1) facilitate the commercial exploitation and utilization of space resources to meet national needs, (2) discourage government barriers to the development of economically viable, safe, and stable industries for the exploration and utilization of space resources in manners consistent with the existing international obligations of the United States; and (3) promote the right of United States commercial entities to explore outer space and utilize space resources, in accordance with the existing international obligations of the United States, free from harmful interference, and to transfer or sell such resources.⁶⁸

Additionally, the proposed Act defined property rights in space by stating: “Any asteroid resources obtained in outer space are the property of the entity that obtained such resources, which shall be entitled to all property rights thereto, consistent with applicable provisions of Federal law and existing international obligations.”⁶⁹ Moreover, the proposed Act set up a legal framework for civil actions resulting from harmful interference in space activities and established exclusive jurisdiction in the district courts of the United States.⁷⁰

66. *NASA Selects Studies for the Asteroid Redirect Mission*, NASA.GOV (June 19, 2014), <http://www.nasa.gov/content/nasa-selects-studies-for-the-asteroid-redirect-mission/#.ViMEMLTZloX>.

67. H.R. 1508, 114th Cong. § 2 (2015). Title 51 deals with national and commercial space programs with subtitle V dealing specifically with programs targeting commercial opportunities.

68. *Id.*

69. *Id.*

70. *Id.*

On June 15, 2015, the House Committee on Science, Space, and Technology recommended to the House of Representatives that the Space Resource Exploration and Utilization Act of 2015, as amended, should be passed.⁷¹ According to the Report, the purpose of H.R. 1508 was to “establish a legal framework to govern property rights of resources obtained from asteroids enabling this new industry and providing clarity for future entrepreneurs.”⁷² The Report specified that private entities in the United States are developing and investing in the technical capability to explore and utilize space resources.⁷³ In addition, the Report emphasized the importance of establishing a legal framework governing property rights in space due to stakeholder concern that legal and regulatory uncertainties are hindering their continued investment and eventual activities in space.⁷⁴ Significantly, the Report declared that House Bill 1508 “puts into practice the Outer Space Treaty rights and obligations through the establishment of a domestic legal framework to govern property rights of resources obtained from asteroids and to avoid causing harmful interference in outer space.”⁷⁵

House Bill 1508 passed through the Committee consideration stage by a narrow vote of 18–15.⁷⁶ In the minority view section of the Report, Representative Eddie Bernice Johnson, ranking member of the House Committee on Science, Space, and Technology, identified several potential problems with this bill.⁷⁷ Primarily, the minority based their resistance to the bill on the opinion of University of Mississippi professor and space law expert, Professor Joanne Gabrynowicz.⁷⁸ In a letter to Representative Eddie Bernice Johnson, Professor Gabrynowicz indicated that the bill appears to be in conflict with the 1967 Outer Space Treaty.⁷⁹ Professor Gabrynowicz opined that including the phrase “in accordance with the existing international obligations of the United States” in a section of the bill “does not make that inconsistency go away.”⁸⁰ In addition, the minority

71. H.R. REP. NO. 114–153, at 1 (2015).

72. *Id.* at 3.

73. *Id.*

74. *Id.*

75. *Id.*

76. *Space Resource Exploration and Utilization Act of 2015*, H.R. 1508, 114th Cong. (2015), <https://www.congress.gov/bill/114th-congress/house-bill/1508/all-actions> (last visited Oct. 9, 2015).

77. H.R. Rep. No. 114–153, at 20 (2015).

78. *Id.* Professor Gabrynowicz teaches space law the University of Mississippi School of Law and is the Editor-in-Chief of the *Journal of Space Law*. In addition, Professor Gabrynowicz is an official observer for the International Institute of Space Law to the UNCOPUOS Legal Subcommittee. JOANNE IRENE GABRYNOWICZ, <http://www.spacelaw.olemiss.edu/about/faculty-staff/gabrynowicz.html> (last visited Feb. 28, 2016).

79. H.R. Rep. No. 114–153, *supra* note 77, at 15.

80. *Id.*

view recognized three other deficiencies in the bill. First, it does not mandate a licensing regime by any agency of the U.S. government, which Professor Gabrynowicz declares unprecedented in United States Space Law.⁸¹ Second, the language of the bill needs to be clarified especially with respect to the phrase “obtained in.”⁸² Professor Gabrynowicz presented a hypothetical situation where a corporation is first to land a probe on an asteroid and collect a sample, but the probe never returns to Earth.⁸³ In one possible interpretation of this bill, it is possible for that corporation to obtain property rights in such a manner.⁸⁴ Finally, the minority view stated that it was unaware of any agency of the U.S. government that supported this bill in its current form.⁸⁵

On the other hand, the minority view did articulate what makes the bill important—it starts a discussion about property rights in space, international treaty obligations, and appropriate licensing and regulation of space activities.⁸⁶ The minority concluded that this legislation is simply premature.⁸⁷ The minority got it half right. The bill does start a critical conversation that Congress needs to have about property rights in space, international treaty obligations, and appropriate licensing and regulation of space activity. The minority is incorrect in asserting that this bill is premature. Instead, the legislature is timely addressing these issues because space technology is advancing rapidly and private industry can benefit from an established legal regime for property rights in space. Creating a licensing regime, as the minority insists, is premature. At this early stage in asteroid mining technology, licensing and regulation would impede the industry before it even got off the ground.

House Bill 1508 was incorporated into The Spurring Private Aerospace Competitiveness and Entrepreneurship Act of 2015 (SPACE Act of 2015) without change. The SPACE Act of 2015 was passed by the House of Representatives by a vote of 284–133.⁸⁸ On November 10, 2015, the Senate passed the SPACE Act of 2015, as part of the U.S. Commercial Space Launch Competitiveness Act with unanimous consent.⁸⁹ On November 19,

81. *Id.* at 20–21.

82. *Id.* at 21.

83. *Id.*

84. *Id.*

85. *Id.*

86. *Id.*

87. *Id.*

88. H.R. 2262, 114th Cong. (2015).

89. *Id.*

2015, it was presented to President Obama for signature and it was signed into law on November 25, 2015.⁹⁰

On February 2, 2016, slightly more than two months after President Obama signed the U.S. Commercial Space Launch Competitiveness Act, the government of Luxembourg announced a new initiative named *Spaceresources.lu*.⁹¹ A key part of this initiative is the development of a legal and regulatory framework that grants corporations property rights to resources extracted from asteroids.⁹² Luxembourg is the first European nation to announce its intention to establish a formal framework for property rights in space.⁹³ In addition, the government of Luxembourg stated that it is “eager to engage with other countries on this matter within a multilateral framework.”⁹⁴ At this point, the United States already has legislation in place and is in a position to work closely with the government of Luxembourg to ensure that corporations will be guaranteed property rights in space and that regulations will not be implemented that would prevent the development of this new industry. Furthermore, this will create a chain reaction in which other nations that have a stake in space resources, or wish to develop a stake in space resources, will enact similar legislation.

II. CURRENT INTERNATIONAL OBLIGATIONS

A. Introduction

Domestic laws, such as the U.S. Commercial Space Launch Competitiveness Act and the anticipated legal regime in Luxembourg, are constrained by international obligations. These international obligations are the focus of Part II.

In 1957, in response to the Soviet Union launch of *Sputik*, the United Nations created the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS).⁹⁵ Five treaties have come out of UNCOPUOS

90. *Id.* Apparently in response to Professor Gabrynowicz’s critique that including the phrase “in accordance with the existing international obligations of the United States” in a section of the bill “does not make that inconsistency go away,” the Senate amended the bill. The bill now reads: “It is the sense of Congress that by the enactment of this Act, the United States does not thereby assert sovereignty or sovereign or exclusive rights or jurisdiction over, or the ownership of, any celestial body.” *Id.*

91. *Luxembourg to Launch Framework to Support the Future Use of Space Resources*, GOVERNMENT.LU (Feb. 2, 2016, 8:37 AM), <http://www.gouvernement.lu/5653386>. It is also worth noting that, as previously mentioned, Deep Space Industries has a headquarter in Luxembourg City.

92. *Id.*

93. *Id.*

94. *Id.*

95. NATHAN C. GOLDMAN, *AMERICAN SPACE LAW: INTERNATIONAL AND DOMESTIC* 23 (1996).

—four of which have been ratified by the majority of space-faring nations.⁹⁶ Of these five treaties, the most important source of space law is the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (the “Outer Space Treaty”).⁹⁷ As of January 1, 2015, it has been ratified by 103 nations, including all space-faring nations.⁹⁸ The Outer Space Treaty is referred to as the “Magna Carta of Space.”⁹⁹ On the contrary, the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (the “Moon Treaty”) is essentially a failure because, as of January 1, 2015, only 16 nations have ratified the treaty and no space-faring nation is a party to it.¹⁰⁰

In order to assess the rights and obligations of any nation signatory to an international treaty, the Vienna Convention on Law of Treaties provides the rules of interpretation.¹⁰¹ When interpreting a treaty, the Convention dictates that the parties will first rely on its words.¹⁰² In addition, when interpreting a treaty, the Convention allows the parties to consider the terms in light of the “object and purpose” of the treaty.¹⁰³ In the event that the plain meaning of the words of a treaty is ambiguous, the Convention provides that supplementary means of interpretation, including consulting the preparatory work of the treaty, the *travaux préparatoires*, can be

96. *Id.* The four treaties ratified by the majority of space-faring nations are the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (the “Outer Space Treaty”); the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space; the Convention on International Liability for Damage Caused by Space Objects; and the Convention on Registration of Objects Launched into Outer Space. *See* DORINA ANDONI, *THE ULTIMATE SPACE LAW COLLECTION: VOL.1, THE TREATIES AND DECLARATIONS* (2013).

97. SPRANKLING, *supra* note 23, at 176.

98. Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Fifty-Fourth Session, U.N. DOC. A/AC.105/C.2/2015/CRP.8* (2015).

99. SPRANKLING, *supra* note 23, at 176.

100. Comm. on the Peaceful Uses of Outer Space, *supra* note 98.

101. GOLDMAN, *supra* note 95, at 69.

102. Vienna Convention on Law of Treaties art. 31.1, Jan. 27, 1980, 1155 U.N.T.S. 331. “A treaty will be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in light of its object and purpose.” The United States has never ratified this convention, but recognizes it as a source on international customary law; GOLDMAN, *supra* note 95, at 69.

103. *Id.*

considered to establish the terms of a treaty.¹⁰⁴ Finally, the Convention provides that subsequent agreements between parties and subsequent practices by states that establish an agreement between the parties can also be considered to establish the terms of a treaty.¹⁰⁵

Out of the five UNCOPUOUS treaties, the Outer Space Treaty and the Moon Treaty are the only treaties that touch on property rights in space.¹⁰⁶ Since the Outer Space Treaty was ratified by all space-faring nations, while the Moon treaty was ratified by none, the juxtaposition of the two treaties illustrates the extent to which space-faring nations were willing to cede their property rights in space. By examining their text, purpose, and history, the current international treaty obligations of the United States can be ascertained. Following this examination will be a discussion of customary international law and its role in challenging or changing existing international treaty obligations.

B. *The Outer Space Treaty*

1. *The Text of the Outer Space Treaty*

Ten years after the launch of *Sputnik*, the Outer Space Treaty was opened for signature on January 27, 1967.¹⁰⁷ The first two articles define the legal status of outer space and influence the commercial uses of outer space and its resources.¹⁰⁸ The treaty declares in its opening that the “States Parties to this Treaty . . . [i]nspired by the great prospects opening up before mankind as a result of man’s entry into outer space . . . [h]ave agreed to the following:”

104. *Id.* art. 32. “Recourse may be had to supplementary means of interpretation, including the preparatory work of the treaty and the circumstances of its conclusion.” *Id.*

105. *Id.* art. 31.3. “There shall be taken into account, together with the context: (a) Any subsequent agreement between the parties regarding the interpretation of the treaty or the application of its provisions; (b) Any subsequent practice in the application of the treaty which establishes the agreement of the parties regarding its interpretation.” *Id.* The subsequent agreements and practices by parties to a UNCOPUOS treaty are recent developments, so it remains unclear how large a role subsequent agreements and practices will play in the interpretation of these treaties. GOLDMAN, *supra* note 95, at 69. When subsequent agreements or practices by a state fall within the national interpretations brought up by that state during the drafting committee process, that national interpretation should be given weight when considering the interpretation of the treaty. *Id.*

106. TRONCHETTI, *supra* note 3, at 4.

107. 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, 61 U.N.T.S. 205 [hereinafter *Outer Space Treaty*].

108. TRONCHETTI, *supra* note 3, at 20.

Article I

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.

Outer space, including the moon and other celestial bodies, shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies.

There shall be freedom of scientific investigation in outer space, including the moon and other celestial bodies, and States shall facilitate and encourage international co-operation in such investigation.

Article II

Outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.

Article VI

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, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. The activities of non-governmental entities in outer space, including the moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty. . . .¹⁰⁹

The Outer Space Treaty contains aspirational language that does little to resolve the rights and obligations of its signatory parties. In fact, it highlights the dichotomy between nations that are capable of spaceflight and those that are not. For example, the Treaty states that the exploration and use of space must be for the “benefit and in the interests of all countries.”¹¹⁰ Similarly, the Treaty declares that space is the “province of all mankind” and that there “shall be free access to all areas of celestial bodies.”¹¹¹ If applied literally, the Outer Space Treaty would create a free-rider problem: nations incapable of spaceflight would reap the benefits of

109. *Outer Space Treaty*, *supra* note 107, arts. I, II, VI.

110. *Id.* art. I.

111. *Id.*

space exploration without contributing to the cost of development.¹¹² In order to fix the rights and obligations of the parties to the treaty, it is necessary to view the terms in light of the “object and purpose” of the treaty.¹¹³

2. *The Purpose of the Outer Space Treaty*

The launch of *Sputnik* led to a widespread fear of bombardment satellites, which both the Soviet Union and the United States researched for both defensive and offensive purposes.¹¹⁴ The Outer Space Treaty is a product of the Cold War era when the United States and the Soviet Union were rivals and fundamentally distrustful of the other.¹¹⁵ Because of the situation in the world at the time, the Outer Space Treaty was primarily intended to prevent either one from conducting military activities in space or obtaining national sovereignty over space.¹¹⁶

Article II captures the dual purposes of the Outer Space Treaty and unequivocally states the principle of non-appropriation: “Outer Space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.”¹¹⁷ At the time, the only actors in space were state entities, so the Outer Space Treaty only regulates governmental activities.¹¹⁸ Article VI does mention, however, non-governmental entities in space that are carrying out national activities.¹¹⁹ In such a situation, states party to the Treaty must authorize, supervise, and bear international responsibility for the activities of its non-governmental entities in space.¹²⁰

Other than these oblique references, the Outer Space Treaty does not address property rights of private actors, except for their rights in objects launched into space.¹²¹ The resolutions and reports issued by the United Nations and used in drafting the Outer Space Treaty illustrate that the Treaty was intended to prohibit the militarization of space by the United States and the Soviet Union, not to prohibit the private exploitation of resources

112. See Benjamin David Landry, *A Tragedy of the Anticommons: The Economic Inefficiencies of Space Law*, 38 BROOKLYN J. INT’L L. 523, 547–48 (2013).

113. Vienna Convention on Law of Treaties, *supra* note 102.

114. ENCYCLOPEDIA OF UNITED STATES NAT’L SECURITY 670 (Richard J. Samuels ed., 2006).

115. SPRANKLING, *supra* note 23, at 176.

116. *Id.*

117. *Id.*

118. *Id.*

119. *Id.*

120. *Id.*

121. *Id.*

in space, which was neither technologically feasible at the time nor specifically contemplated in the drafting of the Treaty.

This analysis, however, overlooks key language in Article I: “The exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and in the interest of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind.”¹²² There are two main interpretations of this article.¹²³ First, scholars, especially those in developing countries, argue that the language of Article I is the overriding principle of the treaty and overrules all other clauses.¹²⁴ On the other hand, the United States and other space-faring nations argue that Article I, with its lack of clearly-defined duties, renders it merely a principle rather than an enforceable rule.¹²⁵

On March 7, 1967, before the United States ratified the Outer Space Treaty, the language of Article I was discussed in a hearing before the Committee on Foreign Relations of the U.S. Senate.¹²⁶ During the hearing, an exchange between Ambassador Arthur J. Goldberg, the U.S. representative in the Legal Subcommittee of UNCOPUOS; Senator J. W. Fulbright, the Chairman of the Hearing; and Senator Hickenlooper highlights the United States’ understanding of Article I prior to the ratification of the Treaty:

Mr. GOLDBERG. . . . Article I of the treaty defines a principle that states that 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, and then there are a few words which were added by our colleagues from Brazil, “irrespective of their degree of economic or scientific development,” and shall be the province of all mankind.

The CHAIRMAN. Whether you can afford it or not?

Mr. GOLDBERG. Whether you can afford it or not. This is to be a broad attempt to do it for the benefit of all countries in the world.

The CHAIRMAN. Senator Hickenlooper.

122. See *Outer Space Treaty*, *supra* note 107.

123. See GOLDMAN, *supra* note 95, at 70.

124. *Id.*

125. *Id.*

126. *Treaty on Outer Space: Hearing Before the Comm. on Foreign Relations of the U.S. Senate*, 90th Cong. 1 (1967) [hereinafter *Outer Space Hearing*].

Senator HICKENLOOPER. Is this in the nature of securing for the noncontributing countries all the benefits of those who put up the money and the expense for this?

Mr. GOLDBERG. No. This is a goal—

Senator HICKENLOOPER. I mean giving them a complete fee simple title to all results that come out?

Mr. GOLDBERG. No. This is not a free ride.¹²⁷

Mr. Goldberg continued by contrasting Article I with articles that are self-executing, concluding that Article I states the general concept that the exploration and use of space shall be carried out generally for the benefit of all mankind.¹²⁸ In addition, Mr. Goldberg explained the concept that space shall be free for exploration and use by all states without discrimination of any kind by stating, “Here, too, it is intended as a statement of goal and purpose so as to not subject space to exclusive appropriation by any particular power.”¹²⁹

This broad reading of Article I was questioned by Senator Gore, who asked Mr. Goldberg: “Then do I correctly understand you to say that Article I is only a general statement which may or may not have a meaning in practical application?”¹³⁰ Mr. Goldberg replied:

I would say this: It surely has a meaning in broad perspective, not intended to not mean that as a general principle outer space shall be carried out, exploration should be carried out, for the benefit and in the interests of all countries. It is not intended, however, that practical arrangements should not be developed, that rules should not be laid down, by a specific treaty, that sharing should not be considered in terms of benefit and burden and, indeed, the resolution which was adopted contemplates that there should be a study of how the whole problem of communications satellites should be considered at the United Nations and should be developed into treaty form.¹³¹

This echoes an exchange during the debate in the Legal Subcommittee of UNCOPUOS between Mr. Delean of France and Mr. Morozov of the Soviet Union, discussed below. Mr. Delean asked about property rights in extracted minerals from celestial bodies, and was told by Mr. Morozov that “future developments would give rise to new problems requiring subsequent solution.”¹³² Similarly, in the Senate Hearings, Mr. Goldberg responded to Senator Gore that “there would have to be developed the rules that would govern the use of outer space in communications and other

127. *Id.* at 9–10.

128. *Id.* at 10.

129. *Id.*

130. *Id.* at 12.

131. *Id.* at 12–13.

132. *See infra* note 154, at 8, 10.

uses, and that this should be the subject of a further exploration.”¹³³ The drafters of the Treaty did not properly define the term “use,” and, in fact, it appears as if the contemplated uses of space were limited to the technology in use at the time.

3. *The History of the Outer Space Treaty*

In the event that the plain meaning of the words of a treaty are ambiguous, the Vienna Convention on Law of Treaties provides that supplementary means of interpretation, including consulting the preparatory work of the treaty, the *travaux préparatoires*, can be considered to establish the terms of a treaty.¹³⁴ The initial impetus for the Outer Space Treaty was Resolution 1148 of November 14, 1957, in which the U.N. General Assembly sought to reduce the “danger of war and improv[e] the prospects of a durable peace through achieving international agreement on reduction, limitation, and open inspection of armaments and armed forces.”¹³⁵ In addition, the Resolution called for a joint study of an inspection process that would ensure that the launching of objects through outer space would be solely for peaceful and scientific purposes.¹³⁶ In 1958, both the United States and the Soviet Union submitted requests for the peaceful uses of outer space to be discussed at the 13th Session of the General Assembly.¹³⁷ As a result, two topics were set forth at the 13th Session as Agenda Item 60—Question of the peaceful use of outer space: “(a) The banning of the use of cosmic space for military purposes . . . and international co-operation in the study of cosmic space; (b) Programme for international co-operation in the field of outer space.”¹³⁸ During the debate on Agenda Item 60, Mr. Vega Gomez, speaking for the delegation from El Salvador, indicated that any international treaty should “lay down the general principle that outer space and the various celestial bodies could not be appropriated by any nation but, like the

133. *Outer Space Hearing*, *supra* note 126, at 13.

134. Vienna Convention on Law of Treaties, *supra* note 102, art. 32. “Recourse may be had to supplementary means of interpretation, including the preparatory work of the treaty and the circumstances of its conclusion.” *Id.*

135. G.A. Res. 1148 (XII), at 3 (Nov. 14, 1957).

136. *Id.* at 4.

137. For the Soviet Union request, *see* U.N. GAOR, 13th Sess., 983rd mtg. at 199, U.N. Doc. A/3818 (Nov. 13, 1958). For the United States request, *see* U.N. GAOR, 13th Sess., 983rd mtg. at 199, U.N. Doc. A/3902 (Nov. 13, 1958).

138. U.N. GAOR, 13th Sess., 992nd mtg. at 231, U.N. Doc. A/C.1/SR.992 (Nov. 20, 1958).

atmosphere and the high seas, were the common property of all.”¹³⁹ In addition, Mr. Matsudaira, speaking for the delegation from Japan, stressed that the common objective of an international treaty is that space should be used for peaceful purposes only.¹⁴⁰ Mr. Matsudaira continued:

Just as the discovery of new continents in the 16th century had produced a fundamental change in the then existing world order, and particularly in its legal concepts, so the opening of the space age through the new advances in technology would have a dynamic impact, for it introduced a new dimension in the world order and in law as it had hitherto been known.¹⁴¹

Also during the 13th Session of the General Assembly, the body discussed two draft resolutions: (1) A/C.1/L.219 and Rev. 1, submitted by the Soviet Union; and (2) A/C.1/L.220 and Rev. 1, submitted jointly by 20 member states.¹⁴² The Soviet Union withdrew its draft resolution, and A/C.1/L.219 and Rev. 1 was adopted by a vote of 54 to 9, with 19 abstentions.¹⁴³ This draft resolution called for a committee to report on the nature of legal questions in the exploration of outer space.¹⁴⁴

At the 14th Session of the General Assembly in 1959, the Assembly adopted Resolution 1472 (XIV), which created a Committee on the Peaceful Uses of Outer Space (the “Outer Space Committee”) made up of 24 members, including the United States and the Soviet Union.¹⁴⁵ This Resolution stated that the exploration and use of space should be only for the betterment of mankind, but also recognized the great importance of international cooperation in the exploration and exploitation of space for peaceful purposes.¹⁴⁶

In the Report of the Outer Space Committee A/5181, the Outer Space Committee set up two subcommittees: one to consider legal questions and the other to consider scientific questions.¹⁴⁷ The legal subcommittee had five draft treaty proposals submitted—two by the Soviet Union, two by the United States, and one by the United Arab Republic.¹⁴⁸ These five draft treaty proposals cover a variety of topics: rendering help to the crews of spaceships that have had an accident; the return of foreign spaceships, satellites, and capsules; and the international liability of states or international organizations responsible for the launching of space vehicles, among other

139. *Id.* at 231–32.

140. *Id.* at 232.

141. *Id.*

142. *Id.* at 231.

143. *Id.*

144. *Id.*

145. G.A. Res. 1472 (XIV), at 5 (Dec. 12, 1959).

146. *Id.*

147. Comm. on the Peaceful Uses of Outer Space, on Its Seventeenth Session, U.N. Doc. A/5181 (1962).

148. *Id.*

topics.¹⁴⁹ The only reference to property rights over outer space or celestial bodies was in the first proposal by the Soviet Union. This draft proposal stated:

2. Outer space and celestial bodies are free for exploration and use by all States; no State may claim sovereignty over outer space or celestial bodies.
3. All States have equal rights to explore and use outer space.
4. The activities of States pertaining to the conquest of outer space shall be carried out in accordance with the principles of the United Nations Charter and with other generally recognized principles of international law. . .¹⁵⁰

During this session, the Outer Space Committee discussed the five proposed treaty drafts, but it was apparent that no agreement would be reached, so the Committee unanimously decided to submit the proposals and records of discussion to the General Assembly.¹⁵¹

During the 18th Session of the General Assembly, the Assembly unanimously adopted Resolution 1962 (XVIII), titled “Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space.”¹⁵² Once again, the Resolution contained the familiar language:

2. Outer space and celestial bodies are free for exploration and use by all states . . .
3. Outer space and celestial bodies are not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.

At this point, both the United States and the Soviet Union requested that the General Assembly begin drafting an international treaty that would govern the exploration and use of outer space.¹⁵³ During the debates on the Outer Space Treaty, Mr. Delean, speaking for the French delegation, observed that it was important to clarify the scope of the treaty.¹⁵⁴ According to Mr. Delean, the draft of the treaty failed to define the word

149. *Id.*

150. *Id.*

151. *Id.*

152. *Id.*

153. For the Soviet Union request, *see* U.N. GAOR, 21st Sess., U.N. Doc. A/6341 (May 31, 1966). For the United States request, *see* U.N. GAOR, 21st Sess., U.N. Doc. A/6392 (Sept. 19, 1966).

154. Comm. on the Peaceful Uses of Outer Space, Legal Subcomm. on its Fifth Session, U.N. DOC. A/AC.105/C.2/SR.63 (Oct. 20, 1966).

“use” as it was used in “exploration and use of outer space.”¹⁵⁵ Mr. Delean continued:

Did the latter term imply use for exploration purposes, such as the launching of satellites, or did it mean use in the sense of exploitation, which would involve for more complex issues? Space, of course, was already being used for meteorological research and telecommunications, but in the case of celestial bodies it was hard at present to conceive of utilizing the moon, say, for the extraction of minerals.¹⁵⁶

Mr. Morozov, speaking on behalf of the Soviet delegation, replied to Mr. Delean’s point by stating:

Needless to say, a treaty could deal only with the problems arising at the current stage of human evolution, and future developments would give rise to new problems requiring subsequent solution. But it would be unwise to look too far ahead and to attempt to prescribe rules for situations on which it was impossible to form adequate judgment at the present stage.¹⁵⁷

Finally, during the 21st Session of the General Assembly, the Assembly adopted Resolution 2222, which is the Outer Space Treaty.¹⁵⁸

The *travaux préparatoires* indicate that the parties negotiating the Outer Space Treaty did not intend the Treaty to govern property rights in outer space. Instead, the parties anticipated a future agreement to control a legal regime of property rights in outer space. The question of property rights in space, which was introduced by Mr. Delean, Senator Hickenlooper, and Senator Gore, would be answered later in the Moon Treaty.

C. *The Moon Treaty*

1. *The Text of the Moon Treaty*

The Outer Space Treaty was a product of its time and captured the U.S.-Soviet competition that defined the 1960s.¹⁵⁹ However, during the 1970s, an increasing number of nations started to develop space programs because they realized the benefits of space exploration.¹⁶⁰ Because the Outer Space Treaty used broad, ambiguous language when discussing property rights in space, the General Assembly pressured UNCOPUOS to draft a treaty that clearly and narrowly defined property rights in space.¹⁶¹ This came to fruition on December 5, 1979, when the General Assembly adopted the Agreement Governing the Activities of States on the Moon and Other

155. *Id.*

156. *Id.*

157. *Id.*

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

159. See GOLDMAN, *supra* note 95, at 89.

160. *Id.*

161. *Id.*

Celestial Bodies (the “Moon Treaty”).¹⁶² The following Articles of the Moon Treaty are those that relate to property rights in outer space:

Article 1

1. The provisions of this Agreement relating to the moon shall also apply to other celestial bodies within the solar system, other than the earth, except in so far as specific legal norms enter into force with respect to any of these celestial bodies.

Article 4

1. 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 . . .

Article 11

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 this article.
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.
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 . . .

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.

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;
 - (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

162. G.A. Res. 34/68 (Dec. 5, 1979).

directly or indirectly to the exploration of the moon, shall be given special consideration.¹⁶³

As previously mentioned, the Vienna Convention on Law of Treaties provides that when interpreting a treaty, the parties will first rely on its words.¹⁶⁴ Article 4 of the Moon Treaty echoes Article I of the Outer Space Treaty by parroting the “province of all mankind” language and reiterating that the exploration and use of outer space shall be “for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development.”¹⁶⁵ Thus far, the Moon Treaty has not introduced any clarifying language to make unambiguous the status of property rights under the Outer Space Treaty.

In Article 11, however, the Moon Treaty utilizes a new expression to describe states’ property interests in space resources: “The moon and its natural resources are the common heritage of mankind.”¹⁶⁶ In addition, Article 11 makes clear that the moon and other celestial bodies are not available for national appropriation by sovereign claims through “use or occupation, or by any other means.”¹⁶⁷ Furthermore, the resources located on celestial bodies cannot become the property of any state, governmental entity or organization, non-governmental entity or organization, or any natural person.¹⁶⁸ Instead, the Moon Treaty necessitates the formation of an international regime that will govern the exploitation of the natural resources of the moon as such exploitation is about to become feasible.¹⁶⁹ Moreover, the Moon Treaty dictates that this international regime will provide for the equitable sharing among states party to the agreement of the benefits derived from the resources exploited in space, whether or not the states contributed to the expense of obtaining the resources.¹⁷⁰

163. Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 18, 1979, 18 U.S.T. 2410, 1363 U.N.T.S. 22 [hereinafter *The Moon Treaty*].

164. Vienna Convention on Law of Treaties, *supra* note 102, art. 31.1. “A treaty will be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in light of its object and purpose.” *Id.* The United States has never ratified this convention, but recognizes it as a source on international customary law. GOLDMAN, *supra* note 95, at 69.

165. *The Moon Treaty*, *supra* note 163, art. 4.

166. *Id.* art. 11.

167. *Id.*

168. *Id.*

169. *Id.*

170. *Id.*

2. *The Purpose of the Moon Treaty*

The Vienna Convention on Law of Treaties allows for consideration of its purpose when interpreting a treaty.¹⁷¹ The Outer Space Treaty was written after the Soviet Union launched *Sputnik*. After the United States successfully landed on the moon, UNCOPUOS realized that advancements in technology would require a new treaty to deal with these new capabilities.¹⁷² Members of UNCOPUOS correctly assumed that rocks from the Moon would be returned to Earth, and that resources on the Moon might be exploited.¹⁷³ Since the Outer Space Treaty was painted with a broad brush, the Moon Treaty was intended to clarify provisions in the Outer Space Treaty relating to property rights in space.¹⁷⁴

As was evident from the UNCOPUOS discussions, there was a sharp division between nations that had space programs and those that did not, as well as a distinct division between American and Soviet ideologies.¹⁷⁵ It has been widely noted that the Moon Treaty was negotiated in an “atmosphere where socialists and capitalists endeavoured to mould an inchoate term, the common heritage of mankind, in accordance to their own ideologies.”¹⁷⁶ As a result, the ambiguous language of the “common heritage of mankind” and the “equitable sharing” of space resources by all nations party to the Moon Treaty prevented the Treaty from being widely ratified.¹⁷⁷ The Moon Treaty, which was adopted by the General Assembly in 1979, did not enter into force until 1984 when Australia became the fifth country to ratify the agreement.¹⁷⁸ As of January 1, 2015, there are only sixteen countries that have ratified the Moon Treaty.¹⁷⁹ Due to the low

171. Vienna Convention on Law of Treaties, *supra* note 102, art. 31.1. “A treaty will be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in light of its object and purpose.” *Id.*

172. DORINA ANDONI, *THE ULTIMATE SPACE LAW COLLECTION: THE TREATIES AND DECLARATIONS* 56 (vol. 1 2013).

173. *Id.*

174. *See The Moon Treaty*, *supra* note 163, 18 U.S.T. at 2410, 1363 U.N.T.S. at 21.

175. TRONCHETTI, *supra* note 3, at 48.

176. KEMAL BASLAR, *THE CONCEPT OF THE COMMON HERITAGE OF MANKIND IN INTERNATIONAL LAW*, 161–62 (1998).

177. ANDONI, *supra* note 172, at 56–57.

178. *Id.*

179. U.N. DOC. A/AC.105/C.2/2015/CRP.8*, *supra* note 98. The countries that have ratified the Moon Treaty are: Austria, Australia, Belgium, Chile, Kazakhstan, Kuwait, Lebanon, Mexico, Morocco, Netherlands, Pakistan, Peru, Philippines, Saudi Arabia, Turkey, and Uruguay. *Id.*

number of ratifications, particularly since it was not ratified by any major space-faring nation, the Moon Treaty is largely viewed as a failure.¹⁸⁰

As previously mentioned, the final version of the treaty addresses the exploitation of space resources “in place.” Both the Soviet Union and the United States interpreted this provision in Article 11 to mean that if the resources are removed from their location, they then become property of the removing party.¹⁸¹ However, Article 11 also dictates that these resources will be shared equitably between all nations party to the treaty, whether they materially contributed to obtaining the resources or not.¹⁸²

In 1975, The L-5 Society was formed during a conference on space manufacturing at Princeton.¹⁸³ The L-5 Society believed that the provision for the equitable sharing of space resources would amount to a “moratorium on private enterprise” in space exploitation and would result in a free-rider issue where developing nations would benefit without providing assistance in exploiting space resources.¹⁸⁴ In order to dissuade Congress from ratifying the Moon Treaty, the L-5 Society hired an influential lobbyist, Leigh Ratiner.¹⁸⁵

Mr. Ratiner testified during the Moon Treaty Hearings before the Subcommittee on Science on July 31, 1980. Mr. Ratiner pointed out that the Moon Treaty called for the future development of an international regime that would govern the exploitation of space resources, and asked “what company will put \$1 billion or \$2 billion into a mining venture on the Moon, or to harness the resources of an asteroid” if it does not know what the future international regime will be?¹⁸⁶ When asked by Senator Adelai Stevenson how the United States should define “common heritage,” Mr. Ratiner responded:

We should define “common heritage” as a resource to which all nations have free access in common and that those who are capable of using the resources and bringing them to world market, and who can demonstrate their capability, be allowed to

180. ANDONI, *supra* note 172, at 57.

181. TRONCHETTI, *supra* note 3, at 55.

182. *Id.* at 53–54.

183. *Next: McDonalds' Spaceburgers?*, HUMAN RIGHTS, A.B.A. SEC. OF INDIVIDUAL RTS. & RESP., vol. 8, no. 4, at 3 (Winter 1980). The L-5 Society's board of directors included Sen. Barry Goldwater, of Arizona, as well as scientists, authors and engineers. *Id.*

184. *Id.*

185. *Id.*

186. The Moon Treaty: Hearings Before the Subcomm. on Sci., Tech., and Space of the S. Comm. on Commerce, Sci., and Transp., 96th Cong. 93 (1980) (statement of Mr. Leigh Ratiner counsel to L-5 Society). Mr. Ratiner continued,

It would be impudent at best, and probably subject the corporation to a stockholder suit for wasting corporate assets. The administration is not filled with corporate lawyers, and therefore it perhaps does not have the same sensitivity that those of us on the outside have to the kinds of decisions that corporate executives must make.

Id.

do so—essentially on a first-come, first-serve basis, subject to reasonable rules and regulations to protect safety, the environment and the exclusivity of claims to particular bodies.¹⁸⁷

While the extent to which the L-5 Society influenced the Senate’s decision not to ratify the Moon Treaty is unknown, the Senate refused to ratify the Treaty and it has never again been debated in the Senate.¹⁸⁸ In hindsight, it appears as if Mr. Ratiner’s argument was correct: scholars, largely from developing nations, have attempted to read the Moon Treaty’s common heritage of mankind principal “backwards” into the Outer Space Treaty “relying on a retroactive expansion of the terms, ‘province’ and ‘benefit of mankind.’”¹⁸⁹

3. *The History of the Moon Treaty*

As previously stated, in the event that the plain meaning of the words of a treaty are ambiguous, the Vienna Convention on Law of Treaties provides that supplementary means of interpretation, including consulting the preparatory work of the treaty, the *travaux préparatoires*, can be considered to establish the terms of a treaty.¹⁹⁰ On July 4, 1969, the members of UNCOPUOS agreed that the Legal Subcommittee would examine questions relating to the legal rules that should govern mankind’s activities on the moon and other celestial bodies, including the legal regime governing substances coming from the moon and from other celestial bodies.¹⁹¹ The Soviet Union proposed a first draft in preparation of an international treaty concerning the moon at the twenty-sixth session of the First Committee on November 5, 1971.¹⁹² This first draft included a bright-line rule regarding

187. *Id.* at 116. When asked how serious of an issue this is, Mr. Ratiner responded, Mr. Chairman, I don’t know words to express to you how serious I think this issue is. We’re talking right now about setting in place, in my opinion, a regime directly contrary to the national interest of the United States with respect to what may be all of the resources of the 21st century needed by men on Earth.

Id.

188. TRONCHETTI, *supra* note 3, at 94.

189. *Id.*

190. Vienna Convention on Law of Treaties, *supra* note 102, art. 32. “Recourse may be had to supplementary means of interpretation, including the preparatory work of the treaty and the circumstances of its conclusion.” *Id.*

191. Comm. on the Peaceful Uses of Outer Space, Legal Subcomm. on Its Eighth Session, U.N. Doc. A/AC.105/58 (1969).

192. First Comm., Agenda Item 92, U.N. Doc. A/C.1/L.568 (Nov. 5, 1971).

property rights in space: absolute prohibition.¹⁹³ Between 1971 and 1979, the members of UNCOPUOS debated the Soviet-proposed draft, among many others.¹⁹⁴ The verbatim records of the UNCOPUOS debates show that the members could not agree on the specific provisions and processes that would govern property rights in outer space.¹⁹⁵

The positions taken by different countries during the UNCOPUOS meetings are the same positions that remain unresolved today.¹⁹⁶ Mr. Chakravarty, representative from India, stated that his delegation believed that it is an “accepted norm of international law that outer space” is not “subject to national appropriation,” and that resources found in space are the “common heritage of mankind.”¹⁹⁷ On the other hand, Mr. Bruce, representing Canada, asserted that, in the future, an international regime could be established to govern the exploitation of our common heritage.¹⁹⁸ The representative from Argentina, Mr. Cocca, stated his delegation’s position as the need to develop two legal regimes: one legal regime that governs the utilization of resources in their place of origin and another legal regime that governs resources that are taken to the earth for use there.¹⁹⁹

During the continued discussions, the member nations could not come to a clear consensus regarding property rights in space.²⁰⁰ As a result, the finished Moon Treaty contains the absolute prohibition from the Soviet draft, in modified form, in Article 11, paragraph 3.²⁰¹ It states that “natural resources *in place*” will not be property of “any state, international intergovernmental or non-governmental entity or of any natural person.”²⁰² In addition, the final version in Article 11, paragraph 5 anticipates a future international regime to govern the exploitation of resources in space.²⁰³

193. *Id.* Article VIII, paragraph 2 provides:

Portions of the surface or subsoil of the Moon may not be the object of concession, exchange, transfer, sale or purchase, lease, hire, gift or any other arrangements or transactions with or without compensation between States, international intergovernmental and non-governmental organizations or national organizations having the status of juridical persons or not, or of arrangements or transactions between natural persons.

Id.

194. James R. Wilson, *Regulation of the Outer Space Environment Through International Accord: The 1979 Moon Treaty*, 2 *FORDHAM ENVTL. L. REV.* 173, 176 (2011).

195. *Id.* at 176–77.

196. *Id.* at 177.

197. U.N. COPUOS, 113th mtg., at 18, U.N. Doc. A/AC.105/PV.113 (Sept. 7, 1972).

198. *Id.* at 31.

199. *Id.* at 46.

200. *See* Wilson, *supra* note 194, at 175.

201. *The Moon Treaty*, *supra* note 163.

202. *Id.*

203. *Id.*

The preceding discussion of the history and purpose of the Outer Space Treaty and the Moon Treaty, respectively, illustrate the extent to which space-faring nations were willing to concede their property rights in outer space. The space-faring nations, by ratifying the Outer Space Treaty, showed they were willing to forego national appropriation of the Moon and other celestial bodies; however, by rejecting the Moon Treaty, the space-faring nations showed they were unwilling to give up property rights in space resources.

D. Customary International Law of Outer Space

Treaties are one way states can show they are willing to be legally bound internationally.²⁰⁴ Alternatively, states can create legal rights and obligations by consistent practice in a certain area accompanied by an *opinio juris*.²⁰⁵ In other words, states' consistent practice in a certain area establishes custom only if the states subjectively believe that they are conforming to what amounts to a legal obligation.²⁰⁶

What is unique in the international law of space is the role that treaties played from the outset of this branch of international law.²⁰⁷ According to Professor Vereshchetin and Professor Danilenko, there are at least three factors that contributed to favoring treaties over customs.²⁰⁸ First, at the beginning of the space age, very few states participated in space exploration, so it was easy to form a consensus.²⁰⁹ However, now that more states are participating in space activities, it is becoming more difficult to reach a consensus.²¹⁰ Second, due to amount of international cooperation in space activities, it was "obvious" that only international treaties would work in regulating nations' activities in space.²¹¹ Third, treaties have a favored role

204. NANCY KONTOU, *THE TERMINATION AND REVISION OF TREATIES IN THE LIGHT OF NEW CUSTOMARY INTERNATIONAL LAW* 1 (1994).

205. *Id.*

206. *Id.* at 5.

207. Vladlen S. Vereshchetin & Gennady M. Danilenko, *Custom as a Source of International Law of Outer Space*, *J. OF SPACE L.* 22 (1985). Judge V.S. Vereshchetin is Professor of International Law at the Institute of State and Law of the Russian Academy of Sciences. From 1995–2006, Judge V.S. Vereshchetin served as a member of the International Court of Justice. http://legal.un.org/avl/pdf/ls/Vereshchetin_bio.pdf. Gennady M. Danilenko was a professor of International Law at Wayne State University Law School.

208. Vereshchetin & Danilenko, *supra* note 207, at 22.

209. *Id.*

210. *Id.* at 22–23.

211. *Id.* at 23.

in space law because historically the legal regulation of spaceflight tends to overtake the actual abilities of nations to explore and exploit resources in space.²¹²

Professor Vereshchetin and Professor Danilenko point out that treaties can be used as “an instrument of anticipatory legal regulation of future types of activities or future situations which do not exist at the moment of the conclusion of the treaty.”²¹³ Furthermore, they assert that custom cannot be a source of anticipatory legal regulation because custom is backward-looking toward past practices of states.²¹⁴

Do Vereshchetin and Danilenko accurately describe the three factors in favoring treaties over customs, and do they give custom short shrift? The first factor, fewer countries engaged in space activities resulted in an easier to achieve consensus, overlooks the fact that countries were primarily concerned with preventing nuclear weapons in space—a topic easy to agree upon. Whereas, as time passed, the issues to which countries needed to agree upon became more based on ideologies—what will be the international regime for property rights in space. The second factor, the obviousness of the utility of treaties in governing international space law, did not anticipate either the decrease in cost of space exploration that would lead to non-governmental actors or the value of resources that are located in space. The third factor, the tendency of the development of regulation of space activities to move faster than the development of the abilities of nations to explore and exploit space, seems only to retroactively describe what happened. This third factor overlooks the extent to which subsequent state practice can affect customary international law.

Scholars have observed that treaties that have been concluded in perpetuity are likely to become obsolete with the development of supervening customary law.²¹⁵ For example, capitulatory treaties concluded between the sixteenth and nineteenth centuries were later challenged and terminated in the twentieth century when state jurisdiction laws developed.²¹⁶ Also, the Treaty on the Panama Canal, which was concluded in perpetuity at the start of the twentieth century, was terminated after the Second World War when state perceptions of the duty of non-intervention in another State’s affairs changed.²¹⁷

212. *Id.*

213. *Id.*

214. *Id.* (“Custom, in contrast to treaty, cannot serve as a source of anticipatory creation of legal rights and obligations because it is based on the practice of States.”).

215. KONTOU, *supra* note 204, at 11.

216. *Id.* Capitulation treaties required that the laws of their home state would govern merchants working abroad. *Id.* at 1.

217. *Id.* at 11.

The 1969 Vienna Convention on the Law of Treaties is widely viewed as an authoritative guide to treaty law and covers a wide range of topics including treaty amendment, modification, termination, and suspension.²¹⁸ Article 31 sets forth the general rule for interpretation:

3. There shall be taken into account, together with the context:
 - (a) Any subsequent agreement between the parties regarding the interpretation of the treaty or the application of its provisions;
 - (b) Any subsequent practice in the application of the treaty which establishes the agreement of the parties regarding its interpretation.²¹⁹

It is worth noting that subsequent conduct of parties can be either a subsequent agreement or a subsequent practice.²²⁰ Whether the subsequent conduct is announced through an agreement or through practice, scholars have elucidated the following as commonalities between subsequent practice that has modified or terminated existing treaties.²²¹ First, the subsequent conduct must illustrate the state's subjective recognition or assertion of a point of law.²²² Second, the forms of expression in which the parties can announce their subsequent conduct include: written form, joint conduct, parallel or coordinated conduct, and silence or omission.²²³ Third, the subsequent conduct has to be attributable to a state actor, whether a high-ranking government official or a government authority.²²⁴ Finally, the subsequent conduct does not have to be common among all parties—one party or one group of parties can perform the subsequent conduct.²²⁵

This echoes the statement made by Mr. Morozov, the Soviet representative to UNCOPUOS, during the debate on the Outer Space Treaty: “Future developments would give rise to new problems requiring subsequent solution.” The U.S. Commercial Space Launch Competitiveness Act does just that. It is an assertion of a point of law: the United States can recognize

218. *Id.* at 13.

219. Vienna Convention on the Law of Treaties, *supra* note 102.

220. GEORG NOLTE, TREATIES AND SUBSEQUENT PRACTICE 190 (2013).

221. *Id.*

222. *Id.* This first requirement responds to the idea of *opinio juris* that is necessary for creation of international obligations and rights based on consistent practice in a certain area. *Id.*

223. *Id.* at 191–92.

224. *Id.* at 197–98.

225. *Id.* at 199.

a corporation's property rights in space. In order to further strengthen the claim of customary practice, the subsequent conduct is more compelling if it is a new peremptory norm of general international law.²²⁶ Since the subsequent conduct only needs to be performed by one party or one group of parties, in the case of property rights in space, the new custom should be set by space-faring states.

Professor Fabio Tronchetti, in his book *The Exploitation of Natural Resources of the Moon and Other Celestial Bodies* has proposed a legal regime that will be open for acceptance and ratification of states.²²⁷ Tronchetti asserts that the required instrument should preferably be a treaty.²²⁸ Also, Tronchetti's plan necessitates the formation of an international organization, which he calls an International Space Authority (ISA).²²⁹ The ISA offers a way around the prohibition of national appropriation, because it is this international organization that has the power to organize and direct these activities. This plan requires a treaty, ratification of the treaty, and the establishment of an International Space Authority to oversee the exploitation of outer space resources. Tronchetti's plan seems to create more questions than answers.²³⁰ In addition, this plan continues the historically favored status of treaty over custom.

Similar to the scholarly literature on space resource exploitation, the literature on climate change has focused on the need for universal consensus in developing an international treaty.²³¹ This approach culminated with 195 countries adopting the first-ever universal, legally binding global climate agreement at the Paris Climate Conference in December 2015.²³² This

226. KONTOU, *supra* note 204, at 31.

227. TRONCHETTI, *supra* note 3, at 242.

228. *Id.*

229. *Id.* at 244.

230. *Id.* at 246–85. The proposed International Space Authority would be composed of an Assembly and a Council. The Assembly would have the power “1. To elect the members of the council; 2. To elect the members of the Technical and Legal Committee; 3. To recommend to the Council the adoption of measures . . . and 5. To assess the contributions of states to the budget of the Authority and submit to the Council the annual budget of the Authority.” The Assembly would be composed of representatives from member states and members from UNCOPUOS. The plan also enumerates eight primary functions of the Council. Furthermore, the plan sets forth whom the Council should consist of, whom should compose the Technical and Legal Committee, how the Authority will be financed, how the licensing procedure should operate, what the legal aspects of the exploration phase are, what the application procedure is—starting with the submission of an exploitative working plan, etc. *Id.*

231. James W. Coleman, *Unilateral Climate Regulation*, 38 HARV. ENVTL. L. REV. 87, 88 (2014).

232. Coral Davenport, *Nations Approve Landmark Climate Deal*, N.Y. TIMES, Dec. 13, 2015, at A1.

agreement is due to enter into force in 2020.²³³ Because of the focus on developing a universally accepted international treaty, the Paris Agreement is the result of 23 years of international attempts under the UN to reach a consensus.²³⁴

Notably, five nations (China, the United States, India, Russia, and Japan) produce 60% of the global CO₂ emissions from fossil fuel combustion and industrial processes.²³⁵ The remaining 190 nations contribute the remaining 30%. The focus on universal consensus needlessly creates a process that is costly and inefficient. Like the Outer Space Treaty, the Paris Agreement is full of aspirational language and idealistic goals.²³⁶ In addition, the agreement lacks a legally binding mechanism that will require governments to adhere to the emission limits set in the agreement.²³⁷

In the absence of an international treaty, countries around the world have developed domestic policy instruments to control greenhouse emissions.²³⁸ The coordination of domestic policy instruments between nations through unilateral or bilateral climate regulation represents an opportunity to establish customary international law. Despite this opportunity, unilateral climate regulation has been neglected because of the focus on an international treaty.²³⁹ For example, instead of negotiations between 195 nations, the focus could have been on unilateral domestic policy instruments in the five nations responsible for the bulk of greenhouse gas emissions. These proposed unilateral domestic regulations “should interact with other nations’ regulations in a way that increases those nations’ incentive to regulate.”²⁴⁰ This interaction can be accomplished through simple regulatory cooperation, matching commitments, or formally linked

233. *Id.*

234. Fiona Harvey, *Paris Climate Change Agreement: The World’s Greatest Diplomatic Success*, THE GUARDIAN (Dec. 14, 2015, 2:51 AM), <http://www.theguardian.com/environment/2015/dec/13/paris-climate-deal-cop-diplomacy-developing-united-nations>. By the time the Agreement enters into force, a total of 28 years will have been spent developing international consensus.

235. *Global Greenhouse Gas Emissions Data*, EPA, (Aug. 9, 2016), <https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data>.

236. Nick Fillmore, *Weak Paris Agreement Unlikely to Achieve Climate Justice*, HUFFINGTON POST, (Dec. 18, 2015, 2:37 PM), http://www.huffingtonpost.ca/nick-fillmore/paris-agreement-weak_b_8829848.html.

237. *Id.*

238. Coleman, *supra* note 231, at 91.

239. *Id.* at 94.

240. *Id.* at 96.

domestic regulations.²⁴¹ The same is true of unilateral regulation of the exploitation of space resources.

III. BRIEF OVERVIEW OF PROPERTY LAW AS IT RELATES TO EXPLORATION AND DISCOVERY

There is universal agreement that a sovereign state has the inherent right to act according to its wishes unless the act is in violation of international law.²⁴² Therefore, absent international law to the contrary, a sovereign state has the ability to authorize its citizens to exploit resources in space.²⁴³ The purpose of Part III is to provide an overview of international and domestic property law as it relates to exploration and discovery to demonstrate that the U.S. Commercial Space Launch Competitiveness Act does not violate international law.

After the passage of the U.S. Commercial Space Launch Competitiveness Act, commentators argued that it violates the Outer Space Treaty because it allows the United States government to grant property rights to corporations when the government does not have the power to grant those rights.²⁴⁴ This argument is effectively summarized by Michael Listner, founder of the consulting firm Space Law and Policy Solutions: “It would be like you asking me for a piece of pie, and me saying, go over to my neighbor’s house and take a piece of their pie, and then come back and thank me for it.”²⁴⁵ This argument relies on a centuries’-old concept of acquisition—the doctrine of discovery.

In the popular first-year property case, *Johnson v. M’Intosh*, Chief Justice John Marshall used the doctrine of discovery as a justification for finding invalid a purchase and conveyance of land “by the chiefs of certain Indian tribes” while validating a subsequent grant from the United States government.²⁴⁶ Chief Justice Marshall traced the United States’ ability to grant title to land back to the European sovereign powers, particularly England and Spain.²⁴⁷ In short, only a sovereign government has “complete ultimate title” to the land it grants.²⁴⁸ On the other hand, the indigenous people had only a right of occupancy, which the discovering sovereign government

241. *Id.*

242. SPRANKLING, *supra* note 23, at 184.

243. *Id.*

244. Keith Cowing, *Is Space Mining Legal?*, POPULAR SCI. (Sept. 24, 2015, 8:44 PM), <http://nasawatch.com/archives/2015/09/can-congress-au.html>.

245. Sarah Fecht, *Senate Votes to Legalize Space Mining, Pieces of Asteroids*, POPULAR SCI. (Nov. 11, 2015, 8:44 PM), <http://www.popsoci.com/congress-votes-to-legalize-asteroid-mining>.

246. *Johnson v. M’Intosh*, 21 U.S. 543, 571–72 (1823).

247. *Id.* at 603.

248. *Id.* at 603.

could terminate either through conquest or purchase.²⁴⁹ Under the doctrine of discovery, property on celestial bodies can only be granted by a sovereign government who has complete ultimate title to the celestial body.

If the analysis begins and ends with an ancient view of property that is often taught on the first day of a property law class, then it is readily apparent that the United States is unable to recognize property rights in outer space. However, as anyone who has even cursorily studied property law knows, it is not that simple.²⁵⁰

Today, *Johnson v. M'Intosh* is viewed as imperialistic and has been called an "archaic, medievally-derived legal discourse."²⁵¹ The reason this case is viewed so unfavorably is due to its treatment of Native Americans that was "ultimately genocidal in both its practice and intent."²⁵² Only five years after signing on to the unanimous opinion in *Johnson v. M'Intosh*, Justice Joseph Story argued that the case violated both "natural law and moral right."²⁵³ If we believe that the doctrine of discovery is valid, then sovereignty and property are inherently intertwined, and "thus international property law cannot exist."²⁵⁴ Alternatively, if we take Justice Story's view of the doctrine of discovery as violative of natural law and moral right, then there should be a concept of property law that is inherent in human nature.²⁵⁵ Looking at property in this light, some modern legal theorists

249. GREGORY S. ALEXANDER & HANOCH DAGAN, *PROPERTIES OF PROPERTY* 392 (2012).

250. See John E. Cribbet, *Concepts in Transition: The Search for a New Definition of Property*, 1986 U. Ill. L. Rev. 1, 1 (1986). "What is property? . . . The question is unanswerable because the meaning of the chameleon-like word property constantly changes in time and space." *Id.*

251. Eric Kades, *The Dark Side of Efficiency: Johnson v. M'Intosh and the Expropriation of American Indian Lands*, 148 U. PA. L. REV. 1065, 1070 (2000). Chief Justice Marshall acknowledged this view in the opinion:

However extravagant the pretension of converting the discovery of an inhabited country into conquest may appear; if the principle has been asserted in the first instance, and afterwards sustained; if a country has been acquired and held under it; if the property of the great mass of the community originates in it, it becomes the law of the land, and cannot be questioned.

Id.

252. *Id.*

253. *Id.*

254. SPRANKLING, *supra* note 23, at 3.

255. *Id.*

propose that property law is “grown and developed from the bottom up, independently of any sovereign or legislative determination.”²⁵⁶

This bottom-up theory of property traces its roots back to Roman law.²⁵⁷ The Institutes of Justinian specified that property rights arose from either natural law or state action.²⁵⁸ The idea that property rights arise from natural law is evident in another old chestnut case, *Pierson v. Post*.²⁵⁹ Judge Tompkins, speaking for the Supreme Court of New York, based the opinion, in part, on the Institutes of Justinian and concluded that Post did not have ownership of the fox because property in *ferae naturae* is acquired by occupancy.²⁶⁰ However, with the fall of the Roman Empire, the idea of a universal property law based on natural law was set aside in favor of property rights governed by individual nations.²⁶¹

The 1648 Peace of Westphalia created the modern nation-state system and cemented the enduring legal positivist idea that “property rights exist only if and to the extent they are created by a state.”²⁶² Notwithstanding the Peace of Westphalia, the idea of universal property rights based on natural law continued to be popular among European Scholars.²⁶³ Grotius, in the early seventeenth century wrote that there is a “universal right [that] served the purpose of private ownership.”²⁶⁴ Likewise, Samuel Pufendorf wrote that “there was a tacit convention that each man could appropriate for his own use . . . what he wanted.”²⁶⁵

John Locke was the foremost Enlightenment scholar to apply a bottom-up, natural law approach to property rights.²⁶⁶ Locke’s labor theory builds on the doctrine of first occupancy:

Whatsoever, then, he removes out of the state that Nature hath provided and left it in, he hath mixed his labour with it, and joined to it something that is his own, and thereby makes it his property.²⁶⁷

256. Jeremy Waldron, ‘*To Bestow Stability upon Possession*’, in *PHILOSOPHICAL FOUNDATIONS OF PROPERTY LAW* 1, 1 (James Penner & Henry E. Smith eds., 2013).

257. SPRANKLING, *supra* note 23, at 4.

258. *Id.* “[F]or by natural law we obtain ownership of certain things . . .” Institutes of Justinian 2.1.11, quoted in *id.*

259. *Pierson v. Post*, 3 Cai. R. 175, 176 (1805).

260. “[P]ursuit alone vests no property or right in the huntsman; and that even pursuit, accompanied with wounding, is equally ineffectual for that purpose, unless the animal be actually taken.” *Id.* at 177.

261. SPRANKLING, *supra* note 23, at 5.

262. *Id.*

263. *Id.* at 6.

264. *Id.*

265. *Id.*

266. *Id.*

267. JOHN LOCKE, *TWO TREATISES OF GOVERNMENT*, Book II, ch. V, § 27 (1690).

This labor theory concept of property rights was relied upon in *Haslem v. Lockwood*, in which the court found that abandoned property belonged to the first occupant, Mr. Haslem, who “had changed its original condition and greatly enhanced its value by his labor.”²⁶⁸ The court did not solely rely on the fact that Mr. Haslem was the first to occupy the abandoned property; rather it was the “sweat of his brow” that gave him ownership in the property.²⁶⁹

Locke’s natural law approach to property rights has as its foundation the idea that “every man has a property in his own person.”²⁷⁰ This approach was challenged in *Moore v. Regents of University of California*, in which the California Supreme Court held that “the use of excised human cells in medical research does not amount to a conversion.”²⁷¹ The court based their conclusion on the fact that in order to amount to a conversion, the patient, Mr. Moore, would have had to retain “an ownership interest” in his excised cells.²⁷² The court looked to “specialized statutes” that deal with the disposal of human biological material to attempt to explain how Mr. Moore did not have an ownership interest in a part of his body, rather than the “general law of personal property.”²⁷³

268. *Haslem v. Lockwood*, 37 Conn. 500, 506–07 (1871). Mr. Haslem raked into piles the horse manure that gathered in a public street and planned to take it the next day to his land to use as fertilizer. Before he did so, Mr. Lockwood came and took the manure to his own land to use as fertilizer. The court held that the manure belonged to Mr. Haslem largely based on the labor theory of property. *Id.*

269. *See id.*

270. LOCKE, *supra* note 267.

271. *Moore v. Regents of University of California*, 51 Cal. 3d 120, 143 (1990). The Supreme Court of California stated, “We granted review in this case to determine whether plaintiff has stated a cause of action against his physician and other defendants for using his cells in potentially lucrative medical research without his permission.” *Id.* at 124–25.

272. *Id.* at 136–37.

273. *Id.* at 137.

Neither the Court of Appeal’s opinion, the parties’ briefs, nor our research discloses a case holding that a person retains a sufficient interest in excised cells to support a cause of action for conversion. We do not find this surprising, since the laws governing such things as human tissues, transplantable organs, blood, fetuses, pituitary glands, corneal tissue, and dead bodies deal with human biological materials as objects *sui generis*, regulating their disposition to achieve policy goals rather than abandoning them to the general law of personal property. It is these specialized statutes, not the law of conversion, to which courts ordinarily should and do look for guidance on the disposition of human biological materials.

Id.

Justice Mosk, in his dissent, looked to the concept of property and came to the opposite conclusion—Mr. Moore has a cause of action for conversion.²⁷⁴ According to Justice Mosk’s determination, Mr. Moore had a property interest in his excised cells because property is a “bundle of rights . . . principally the rights to possess the property, to use the property, to exclude others from the property, and to dispose of the property by sale or gift.”²⁷⁵ Importantly, the dissent recognized that the bundle of rights is subject to reconfiguration depending on the form of property.²⁷⁶

The concept of the “bundle of rights” traces back to the early twentieth century with Wesley Hohfeld’s theory of jural relations.²⁷⁷ In Hohfeld’s view, what people loosely refer to as “rights” can be broken down into distinct jural relationships between people.²⁷⁸ These jural relationships are broken down into correlatives and opposites.²⁷⁹ These include: rights correlate to duties, privileges to no-rights, powers to liabilities, and immunities to disabilities.²⁸⁰ For example, ownership not only includes the right to exclude others, but also includes privileges such as the right to use.²⁸¹ These rights and privileges correspond to a “no-right” that arises for everyone else.²⁸² However, a firefighter will have a privilege to enter the property in order

274. *Id.* at 160.

275. *Id.* at 165.

276. *Id.*

Being broad, the concept of property is also abstract: rather than referring directly to a material object such as a parcel of land or the tractor that cultivates it, the concept of property is often said to refer to a “bundle of rights” that may be exercised with respect to that object—principally the rights to possess the property, to use the property, to exclude others from the property, and to dispose of the property by sale or by gift. “Ownership is not a single concrete entity but a bundle of rights and privileges as well as of obligations.” But the same bundle of rights does not attach to all forms of property. For a variety of policy reasons, the law limits or even forbids the exercise of certain rights over certain forms of property. For example, both law and contract may limit the right of an owner of real property to use his parcel as he sees fit. Owners of various forms of personal property may likewise be subject to restrictions on the time, place, and manner of their use. Limitations on the disposition of real property, while less common, may also be imposed. Finally, some types of personal property may be sold but not given away, while others may be given away but not sold, and still others may neither be given away nor sold.

Id.

277. Henry E. Smith, *Property Is not Just a Bundle of Rights*, 8(3) *ECON. J. WATCH* 279, 279 (2011).

278. *Id.*

279. Henry E. Smith, *Emergent Property*, in *PHILOSOPHICAL FOUNDATIONS OF PROPERTY LAW* 320, 325 (James Penner & Henry E. Smith eds., 2013).

280. *Id.*

281. Denise R. Johnson, *Reflections on the Bundle of Rights*, 32 *VT. L. REV.* 247, 251 (2007).

282. *Id.*

to fight a fire, or an easement holder will have the right to cross the property.²⁸³ These privileges and rights will correspond to a “no-right” in the owner to interfere with the firefighter or easement holder.²⁸⁴

In 1961, A.M. Honoré published the influential essay, *Ownership*, which listed eleven “incidents” that are sticks in the bundle of rights.²⁸⁵ These incidents, or rights that are incidental to property, are: the rights to possess, use, manage, derive income from, dispose, immunity from expropriation, give it away upon death of owner, keep it for an indeterminate length of time, refrain from using it in ways that are harmful to others, have it taken away for payment of debt, to rely on rules that govern the reversion of lapsed ownership rights.²⁸⁶ These eleven incidents comprise the bundle of rights, but some of the incidents are more important than others.²⁸⁷ Today, four sticks in the bundle of rights are believed to be the most important: the right to possess, the right to use, the right to exclude, and the right to transfer.²⁸⁸

Any discussion of property law can benefit from a discussion of Professor Garrett Hardin’s influential essay “The Tragedy of the Commons.”²⁸⁹ Hardin performed a thought experiment in which he described a common field upon which people allow their animals to graze.²⁹⁰ A desire to grow an individual’s wealth will result in a corresponding desire to increase the size of one’s flock. Each animal added to the total number of animals allowed to graze on the common field, increases the damage done to the field. Hardin concludes:

Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit—in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own interest in a society that believes in the freedom of the commons.²⁹¹

283. *See id.*

284. *See id.*

285. A.M. Honoré, *Ownership*, in OXFORD ESSAYS IN JURISPRUDENCE, FIRST SERIES 107, 113–26 (A.G. Guest ed., 1961).

286. *Id.*

287. Johnson, *supra* note 281, at 254.

288. JESSE DUKEMINIER ET AL., PROPERTY 99–102 (WOLTERS KLUWERS 8th ed. 2006).

289. Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243 (1968). Professor Garrett Hardin was professor emeritus of biology and environmental studies at the University of California, Santa Barbara.

290. *See id.*

291. *Id.* at 1244.

Professor Michael Heller took this idea of the tragedy of the commons and developed the idea of the tragedy of the anticommons.²⁹² Anticommon property is property owned by no one.²⁹³ Unlike common property, which is prone to overuse, anticommon property is prone to underuse.²⁹⁴ Heller states, “Governments must take care to avoid creating anticommons property accidentally when they define new property rights.”²⁹⁵

IV. CURRENT ANALOGOUS SITUATIONS ON EARTH

While property rights in space are a novel concept, there are current analogous situations on earth regarding property rights in areas that are either not subject to national sovereignty or the national sovereignty is in question. Each of these analogous situations provides a glimpse into the effects of granting property rights in space.

A. African Land Grabs

A land grab is the capturing of power to control land and its associated resources.²⁹⁶ Although land grabs in Africa have been an issue for centuries, the number of land grabs has skyrocketed, in large part spurred on by the 2008 financial crisis.²⁹⁷ According to the World Bank Group, between 2008 and 2009, 75% of all agricultural land targeted for purchase by foreign investors took place in Sub-Saharan Africa.²⁹⁸ For example, South Sudan currently tops the Fund For Peace’s Fragile States Index²⁹⁹ and land grabs are common.³⁰⁰ Foreign investors in South Sudan conduct business under ambiguous prevailing laws and weak government institutions, and as a

292. Michael Heller, *The Tragedy of the Anticommons: Property in the Transition from Marx to Markets*, 111 HARV. L. REV. 621 (1998). Professor Heller is a professor of real estate law at Columbia Law School.

293. *Id.* at 668.

294. *Id.* at 687.

295. *Id.* at 688.

296. THE GLOBAL LAND GRAB, <https://www.tni.org/en/publication/the-global-land-grab#whatislandgrabbing> (last visited Feb. 28, 2016).

297. Smita Narula, *The Global Land Rush: Markets, Rights, and the Politics of Food*, 49 STAN. J. INT’L L. 101, 106 (2013).

298. *Id.* at 105–06.

299. *Fragile States Index*, THE FUND FOR PEACE, <http://fsi.fundforpeace.org> (last visited Feb. 28, 2016).

300. See Jay Johnson, *More Cases of Land Grabs in South Sudan*, <http://farmlandgrab.org/post/view/21849-more-cases-of-land-grabs-in-south-sudan> (last visited Feb. 28, 2016).

result, are able to capture the power to control land and the associated resources.³⁰¹

This example demonstrates the result of having no legal regime in place for property rights. The U.S. Commercial Space Launch Competitiveness Act provides such a legal regime in space by providing an assurance to corporations that the U.S. government will protect their legal property rights in asteroid resources. This guarantee on the part of the United States government will prevent extraterrestrial land grabs and over-utilization of resources on asteroids.

B. East and South China Seas

In the East and South China Seas, there are a number of islands and island groups the ownership of which are variously claimed by China, Japan, Taiwan, the Philippines, Brunei, Malaysia, and Vietnam.³⁰² This is the reverse of the African Land Grab situation, in that instead of effectively having no sovereign claim to land, here there are multiple sovereign claims to land. Tension continue to rise in this area, as China has “reclaimed” 3,000 acres of land through dredging and has turned sandbars into islands with airfields, ports, and lighthouses.³⁰³ While some commentators initially dismissed this conflict as “saber rattling,”³⁰⁴ the conflict has continued to escalate. On October 27, 2015, China warned and tracked the U.S.S. Lassen as it neared five of China’s artificial islands.³⁰⁵ Chinese Foreign Minister Wang Yi stated, “We advise the United States to think twice before action, not to conduct any rash action, and not to create trouble out of nothing.”³⁰⁶

The conflict in the East and South China Seas demonstrates a situation where multiple sovereign states claim the same area. The U.S. Commercial

301. Scott P. Stedjan, *Land is not the New Oil: What the Nigerian Oil Experience Can Teach South Sudan About Balancing the Risks and Benefits of Large Scale Land Acquisition*, 3 PENN. ST. J.L. & INT’L AFF. 168, 179–80 (2015).

302. Yann-huei Song, *Conflicting Outer Continental Shelf Claims in the East and South China Seas: Proposals for Cooperation and Peaceful Resolution*, 35 U. HAW. L. REV. 485, 492 (2013).

303. See Katie Hunt, *Showdown in the South China Sea: How Did We Get Here?*, CNN, Oct. 28, 2015, <http://www.cnn.com/2015/10/28/asia/china-south-china-sea-disputes-explainer/>.

304. Song, *supra* note 302, at 486.

305. Jim Sciutto & Barbara Starr, *U.S. Warship Sails Close to Chinese Artificial Island in South China Sea*, CNN, Oct. 27, 2015, <http://edition.cnn.com/2015/10/26/politics/south-china-sea-islands-u-s-destroyer/index.html>.

306. *Id.*

Space Launch Competitiveness Act prevents this situation through defining property rights in space and encouraging other spacefaring nations to enact similar legislation before we are capable of exploiting asteroid resources. The Act is a proactive measure to prevent conflicts and under-utilization of resources in space.

C. *The High Seas and Deep Seabed Mining*

Perhaps the most analogous situation to outer space on Earth is the High Seas. From time immemorial, nations have made sovereign claims over the high seas.³⁰⁷ In 1609, Hugo Grotius wrote *Mare Liberum*, which claimed that the high seas must be left open for trade and exploration.³⁰⁸ Throughout the nineteenth and early twentieth centuries, the ocean was used by all nations and protected by the British Navy.³⁰⁹ However, after World War II, advances in technology led to the discovery of valuable resources on the seabed.³¹⁰ This led to increased interest in property rights to the resources located on the seabed, so the laissez-faire approach to the high seas was abandoned.³¹¹

President Truman issued a proclamation in 1945 stating that all natural resources located in the seabed and subsoil of the United States' continental shelf was the property of the United States.³¹² Many other countries followed suit.³¹³ This led to the First United Nations Convention on the Law of the Sea (UNCLOS) in 1956.

As technology continued to progress, discovery of vast amounts of resources in the deep seabed was discovered in areas that were not on nations' continental shelves.³¹⁴ The United Nations General Assembly declared that the deep seabed should be used for peaceful purposes and is the "Common Heritage of Mankind."³¹⁵

The third United Nations Convention on the Law of the Sea was held from 1973 to 1982, and it was intended to create an agreement to regulate

307. Scott J. Shackelford, *The Tragedy of the Common Heritage of Mankind*, 28 STAN. ENVTL. L. J. 109, 122 (2009). The Romans claimed the Mediterranean Sea as "mare nostrum," or "our sea," and the English claimed the North Sea and the English Channel as its exclusive "Britannic Ocean." *Id.*

308. *Id.* at 123. "Whatever cannot be seized or enclosed is not capable of being a subject of property . . . meaning that the vagrant waters of the ocean are necessarily free." *Id.*

309. *Id.*

310. *Id.*

311. *Id.*

312. *Id.* at 123–24.

313. *Id.* at 124.

314. *Id.* at 126.

315. *Id.*

the use and exploitation of the resources in the deep seabed.³¹⁶ The United States did not sign or ratify UNCLOS, instead, along with Japan, West Germany, the United Kingdom, and other developed nations, pursued national legislation and other schemes to explore and exploit the deep seabed.³¹⁷

Under the Deep Seabed Hard Mineral Resources Act (DSHMRA),³¹⁸ the United States authorizes U.S. citizens to explore and exploit the deep seabed.³¹⁹ The DSHMRA also asserts that the United States does not claim sovereign rights to the seabed and recognizes the rights of other nations to engage in the same activities.³²⁰ Most importantly, DSHMRA contemplated bilateral and multilateral agreements to govern the relationship between the United States and other nations capable of exploiting the deep seabed.³²¹ At present, the United States has agreements with almost every nation capable of exploiting the deep seabed: Belgium, China, France, Germany, Japan, Russia, and the United Kingdom.³²²

The High Seas and Deep Seabed Mining provide the strongest indication of what is possible with the U.S. Commercial Space Launch Competitiveness Act. Shortly after the United States passed this Act, Luxembourg announced its intention to create similar legislation.³²³ As more nations begin to develop their own legal regimes for property rights in space, the United States will be able to enter into agreements with them for mutual-recognition of property rights in space.

D. The Antarctic Treaty System

Antarctica was subject to several territorial claims stretching as far back as the 1840s.³²⁴ By 1950, eight countries launched expeditions to Antarctica and staked claims on the continent, and in 1959, these eight claims were

316. *Id.*

317. *Id.* at 127.

318. Deep Seabed Hard Mineral Resources Act, 30 U.S.C.S. §§ 1401–1403 (2012).

319. Steven Groves, *The U.S. Can Mine the Deep Seabed Without Joining the U.N. Convention on the Law of the Sea*, HERITAGE FOUND. BACKGROUNDER, Dec. 4, 2012, at 1, 4.

320. *Id.*

321. *Id.* at 5.

322. *Id.* at 6.

323. *Luxembourg to Launch Framework to Support the Future Use of Space Resources*, GOUVERNEMENT.LU (Feb. 2, 2016, 8:37 AM), <http://www.gouvernement.lu/5653386>.

324. Benjamin D. Hatch, Comment, *Dividing the Pie in the Sky: The Need for a New Lunar Resources Regime*, 24 EMORY INT'L L. REV. 229, 259 (2010).

cemented in place with the Antarctic Treaty.³²⁵ Since 1959, these eight countries signed several supplementary agreements, which, along with the treaty, comprise the Antarctic Treaty System.³²⁶ This System has largely been seen as a success because it has prevented conflicts over sovereignty, militarization, and land grabs on that continent.³²⁷

There are two key reasons why the Antarctic Treaty System works so well. First, the eight states that had claims in 1959 did not have to abandon their claims to the continent; instead, they simply could not modify their existing claims.³²⁸ Second, and more importantly, the eight countries are completely barred from exploiting resources until 2048.³²⁹ Even after 2048, it is unlikely that conflict will arise from extracting resources because Antarctica does not have many natural resources.³³⁰

The Antarctic Treaty System serves as an example of a legal regime for property rights when there is no natural resource of any value present. A system such as this would work well if space were devoid of valuable resources. The U.S. Commercial Space Launch Competitiveness Act provides a better framework for property rights in space, since space is teeming with precious resources.

E. The Arctic Council

Unlike Antarctica, the Arctic does not have a treaty system.³³¹ Rather, the eight Arctic nations rely on international cooperation, such as the 1991 Arctic Environmental Protection Strategy (AEPS).³³² As a result of the AEPS, the Arctic Council was formed in 1996 to deal with issues relating to the environment.³³³ The Arctic Council does not have binding legal authority on the Arctic nations; rather it holds meetings every two years with decisions made by consensus.³³⁴ Also, unlike Antarctica, the Arctic is rich in resources.³³⁵

325. *Id.* at 259–60.

326. *Id.*

327. *Id.*

328. *Id.*

329. *Id.*

330. *Id.* at 260–61.

331. Joan M. Malik, *United States Environmental Law Applied in the Arctic Ocean: Frustrating the Balance of the Law of the Sea, National Sovereignty, and International Collaboration Efforts*, 60 NAVAL L. REV. 41, 43 (2010).

332. *Id.* at 44. The eight Arctic nations are: Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, and the United States. *Id.* at 41 n.3.

333. *Id.*

334. *Id.*

335. *Frozen Conflict*, THE ECONOMIST, Dec. 20, 2014, at 89. Global warming is making the Arctic more accessible for exploitation of its mineral resources. The Arctic is believed to contain an eighth of the world's untapped oil and a quarter of its gas. *Id.*

In 2007, a Russian expedition in a submarine planted a titanium Russian flag on the seabed 2.5 miles beneath the North Pole.³³⁶ While Canada compared this act to a fifteenth century land grab, Russia maintains that it was important for it to demonstrate its potential in the Arctic.³³⁷ On December 15, 2014, Denmark claimed national sovereignty over the North Pole.³³⁸ As global warming continues, and further access is gained to the seabed under the North Pole, it is likely that all of the Arctic nations will have an interest in claiming the North Pole as its own.

The Arctic Council acts as a warning: international cooperation works well until valuable resources are discovered. The U.S. Commercial Space Launch Competitiveness Act forestalls this eventuality and aims to have in place a legal regime for property rights in space before conflicts arise.

The U.S. Commercial Space Launch Competitiveness Act provides a practicable framework for property rights in space. It prevents both over-utilization and under-utilization of asteroid resources while anticipating international mutual-recognition of property rights in space. As a result, the Act will minimize conflicts over resources in space.

V. CONCLUSION AND RECOMMENDATION

Space exploration offers three important opportunities for the United States. First, space exploration promotes scientific progress and international cooperation. Second, space exploration will drive the world economy by creating new jobs and introducing exploited space resources into the markets. Third, space exploration will reverse the decline of the United States in math and science by inspiring children to be interested in STEM fields. All three opportunities hinge on the exploitation of space resources. Today, corporations play an expanded role in space exploration; therefore, it is imperative that these corporations be able to generate a return on investment. This presents a legal question: Will these corporations have a legal right to the resources extracted from space?

In response to this question, the U.S. government enacted the U.S. Commercial Space Launch Competitiveness Act, which grants property rights to U.S. citizens who are engaged in the commercial recovery of asteroid resources. An analysis of international treaty obligations and

336. *Id.*

337. Tom Parfitt, *Russia Plants Flag on North Pole Seabed*, THE GUARDIAN (Aug. 2, 2007, 1:01 PM), <http://www.theguardian.com/world/2007/aug/02/russia.arctic>.

338. *Frozen Conflict*, *supra* note 335.

international customary law, together with a review of international property law indicates that the Act is fully consistent with international law.

When President Kennedy delivered his speech at Rice University on September 12, 1962, there were only two countries involved in the space race. Today, the number of countries active in space exploration is increasing, as is the number of private corporations in space. In the United States, after the retirement of the Space Shuttle, private corporations are beginning to assume the role of government agencies and are preparing to make outer space open to the general public.³³⁹ However, as Planetary Resources and other space exploration corporations have made clear, it is too risky for private investors to invest large sums of money when property rights in space are not recognized and guaranteed. In order to grant property rights to asteroid resources in space, the United States government must look to both international and national law and customs governing human activities in space.³⁴⁰

The history of the Outer Space Treaty shows that it was intended to prevent the militarization of space and to prevent a country from obtaining national sovereignty over space. Furthermore, the language in Article I dealing with space exploration being carried out for the benefit and in the interest of all mankind, is largely aspirational as it contains no specific duties for signatories to the Treaty. This conclusion is reinforced by both the debate in the UNCOPUOS Legal Subcommittee and the hearing before the Committee on Foreign Relations of the U.S. Senate.

The history of the Moon Treaty offers an even more compelling glimpse into the intentions of the United States with respect to property rights in space. The Moon Treaty expressly states that resources located on celestial bodies cannot become the property of any state, governmental entity or organization, non-governmental entity or organization, or any natural person. Moreover, the Moon Treaty calls for the formation of an international regime to govern the exploitation of space resources and provides for the equitable sharing among states party to the agreement. As of January 1, 2015, only sixteen countries have ratified the Moon Treaty, none of which are space-faring nations. The space-faring nations, by ratifying the Outer Space Treaty, demonstrated a willingness to forego national appropriation of outer space; however, by rejecting the Moon Treaty, the space-faring nations made clear that they were unwilling to give up property rights in outer space resources.

Even if the United States were to concede that the Outer Space Treaty did preclude the government recognizing property rights in space, there is

339. ANDONI, *supra* note 172, at 3.

340. *Id.*

a strong argument that the Outer Space Treaty is obsolete because of subsequent developments in customary law. In order to further strengthen this argument, the subsequent conduct would be more compelling if it is a new peremptory norm of general international law. In other words, the United States' position would benefit from other nations enacting similar legislation.

The main argument levied against the U.S. Commercial Space Launch Competitiveness Act is that the United States government is unable to grant property rights in outer space because property rights can only be granted by a sovereign, and the United States cannot claim sovereignty in space because that violates the Outer Space Treaty. This argument relies on a centuries'-old concept of acquisition—the doctrine of discovery.

The doctrine of discovery is a “top-down” approach to the acquisition of property: sovereignty and property are inherently intertwined. The top-down view of property traces its roots to the 1648 Peace of Westphalia; however, there is a strong tradition in Western scholarship and law that property law is grown and developed from the bottom up. For example, in Roman law, the Institutes of Justinian advanced the idea of ownership through occupancy. In addition, John Locke in England promoted the labor theory that allows ownership to be earned by the “sweat of your brow.” Most importantly, property today is largely viewed as a bundle of rights that include the rights to possess, use, exclude, and transfer. This bundle of rights is subject to reconfiguration depending on the form of property. Property rights in space are novel and therefore require a new configuration in the bundle of rights associated with that property.

Moreover, the grant of property rights in space will prevent both the Tragedy of the Commons and the Tragedy of the Anticommons. In the first case, if property rights are not granted in space, it is foreseeable that conflicts will arise because multiple corporations could land on the same asteroid. Hypothetically, if a particularly resource-rich asteroid that would be easy to land on and mine is discovered, both an American corporation and a Chinese corporation could land on it and this would result in issues both in space and on Earth. In the second case, if property rights are not granted in space, it is as likely foreseeable that corporations will not invest in space and the resources of space will go underexploited.

Currently there are analogous situations on Earth that the recognition of property rights in space will either avoid or emulate. In the case of African land grabs, there is virtually no government oversight and therefore resources are being overexploited. On the other hand, in the East and South China

Seas, there are several governments claiming a number of islands and island groups leading to under-utilization of resources. Space offers an opportunity for a blank slate, provided the rights and obligations of nations are clear from the beginning.

The deep seabed is perhaps the most closely analogous situation on Earth. Like outer space, the deep seabed is considered the “Common Heritage of Mankind.” The UNCLOS was intended to create an agreement to regulate the use and exploitation of the resources in the deep seabed. The United States, along with Japan, West Germany, and the United Kingdom, did not sign the convention, and instead created national legislation and other schemes to explore and exploit the deep seabed. The United States legislature enacted the DSHMRA that authorizes U.S. citizens to explore and exploit deep seabed resources. This Act further asserts that the United States is not exerting sovereignty over the deep seabed and recognizes the rights of other nations to engage in the same activities. Most importantly, the United States currently has bilateral and multilateral agreements with almost every nation capable of exploiting the deep seabed.

Finally, the Antarctic Treaty System is largely viewed as a success because it has prevented conflicts over sovereignty, militarization, and land grabs on that continent. However, unlike space, Antarctica is not rich in resources. A more analogous situation to space would be the resource-rich Arctic. With global warming granting further access to the seabed under the North Pole, it appears that each Arctic nation will have an interest in naming the North Pole as its own.

President Kennedy said, “[N]o nation which expects to be the leader of other nations can expect to stay behind in the race for space.”³⁴¹ It seems that both Congress and President Barack Obama have the same vision for the future of American space exploration as President Kennedy had half a century ago. Thomas Kalil, Deputy Director for Policy for the White House Office of Science and Technology Policy, stated in a Google Hangout with the Commercial Space Flight Federation, “[The] President was delighted to sign the bill and it was consistent with his overall policy of promoting commercial activities in space.”³⁴²

The U.S. Commercial Space Launch Competitiveness Act does not violate any of the United States’ international obligations. The United States is able to recognize a corporation’s property rights in space without simultaneously claiming sovereignty over the property. The bundle of rights is configured differently in this situation, with the government holding the

341. Kennedy, *supra* note 1.

342. CSF Google+ Space Resources Hangout, GOOGLE PLUS (Dec. 1, 2015, 10:00 AM), <https://plus.google.com/events/c541n57cc8jvs7m8ub334huv8so>.

stick that grants the right to transfer, while the corporation holds the sticks that grant the right to possess, use, and exclude.

With the passing of this Act, the United States is again poised to be a leader in outer space exploration. It is essential that the United States actively works with Luxembourg to reach an agreement that allows for the mutual recognition of property rights in space. In addition, the United States government must earnestly promote and encourage other spacefaring nations into enacting similar legislation. In this manner, the United States and other spacefaring nations will create customary international law consistent with their interpretation of the Outer Space Treaty.

Specifically, the United States should pursue the strategy used in the deep seabed—the United States should actively create bilateral and multilateral agreements with all nations that are capable of space exploration. The U.S. Commercial Space Launch Competitiveness Act should be amended to include the international objectives of the Act. For example, the Act should include the following provisions:

1. The Secretary of State is encouraged to negotiate successfully a comprehensive Outer Space Resources Treaty, which, among other things, provides assured and nondiscriminatory access to the resources of outer space for all nations and gives legal definition to the principle that the resources of outer space are the common heritage of mankind.
2. Until such a Treaty is concluded, the Secretary of State is encouraged to promote any international actions necessary to adequately protect outer space from adverse impacts which may result from any exploration for and commercial recovery of outer space resources carried out by persons not subject to this chapter.³⁴³

Amending the Act in this manner will create the requisite legal regime for property rights in space that will enable the United States to attain the three important goals space exploration and exploitation offers: promotion of scientific progress and international cooperation, expansion of the world economic markets, and a reversal of the decline of the United States in STEM fields.

343. *Compare* Deep Seabed Hard Mineral Resources Act, 30 U.S.C. § 1402 (2012).

