

COMMENT

LIMITS ON THE GIANT LEAP FOR MANKIND: LEGAL AMBIGUITIES OF EXTRATERRESTRIAL RESOURCE EXTRACTION

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INTRODUCTION	1480
II. BACKGROUND	1485
A. PROPERTY THEORIES	1485
B. SOURCES OF SPACE LAW CONCERNING PROPERTY RIGHTS.....	1486
1. The Outer Space Treaty	1488
2. The Moon Treaty	1489
C. MODELS FOR OUTER SPACE: THE HIGH SEAS & ANTARCTICA..	1490
1. 1958 Geneva Convention on the High Seas	1492
2. United Nations Convention on the Law of the Sea.	1492
3. Antarctica.....	1495
D. A METHOD FOR INTERPRETING TREATIES	1496
III. ANALYSIS	1497
A. WHILE THE MOON TREATY'S COMMON HERITAGE OF MANKIND PRINCIPLE PREVENTS THE EXPLOITATION OF RESOURCES WITHOUT THE CONSENT OF AN INTERNATIONAL BODY, THE TREATY IS NON-BINDING ON THE SPACEFARING	

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1480	<i>AM. U. INT'L L. REV.</i>	[26:5
	NATIONS.....	1497
	1. Moon Treaty Interpretation.....	1498
	2. Customary International Law	1500
	B. THE OST IS THE APPROPRIATE TREATY FOR AN ANALYSIS OF EXTRATERRESTRIAL PROPERTY RIGHTS, THOUGH AMBIGUITIES IN THE TREATY PREVENT A CLEAR ANSWER AS TO WHETHER PRIVATE ACTORS MAY EXTRACT MINERAL RESOURCES.	1502
	C. AS OST'S PROPERTY PROVISIONS REMAIN AMBIGUOUS WITH RESPECT TO MINERAL EXTRACTION, FURTHER CONTEXTUAL INFORMATION MAY BE USED TO CLARIFY THIS ISSUE.....	1506
	1. Preparatory Work.....	1507
	2. Circumstances of OST's Conclusion	1510
	3. Subsequent State Interpretations.....	1511
	4. Making Use of Other Spheres of Human Activity....	1514
	a. Maritime Law	1514
	b. Antarctic Treaty.....	1516
	5. Failure to Overcome the Presumption of Freedom of Use	1517
	IV. RECOMMENDATIONS.....	1517
	A. THE U.N. GENERAL ASSEMBLY SHOULD PASS A RESOLUTION CALLING FOR THE COPUOS LEGAL SUB-COMMITTEE TO STUDY LEGAL PROBLEMS ASSOCIATED WITH THE FUTURE OF SPACE EXPLORATION AND USE.	1518
	1. COPUOS Legal Sub-Committee	1518
	a. Different Regions, Separate Treaties.....	1518
	b. Incremental Exploration	1519
	V. CONCLUSION.....	1520

INTRODUCTION

In October 1957, the people of the world gazed at the heavens in hopes of witnessing mankind's first step into outer space: the Soviet satellite, Sputnik 1.¹ Since then, humans have walked the moon, and continued to launch satellites to explore our solar

1. See *The Nation: Red Moon Over the U.S.*, TIME, Oct. 14, 1957, <http://www.time.com/time/magazine/article/0,9171,862748-1,00.html> (describing the Smithsonian's efforts to use its network of amateur star-gazers to track Sputnik 1's flight path over the United States).

system.² For the most part, national governments have borne the responsibility for these exploratory missions because of their enormous cost.³ Nevertheless, over the years, private enterprises have shown their ability to make use of outer space, as these companies maintain networks of communication and remote sensing satellites.⁴ Soon, tourism will join these ventures as customers already are lining up to experience zero-gravity.⁵ The efforts of private actors to develop outer space, however, are complicated by legal ambiguities.⁶

2. See, e.g., *The Pioneer Missions*, NASA (Mar. 26, 2007), <http://www.nasa.gov/centers/ames/missions/archive/pioneer.html> (detailing the history of a series of U.S. space probes, including Pioneer 10, the first manmade object to cross the Asteroid Belt).

3. See, e.g., James J. Trimble, *The International Law of Outer Space and its Effect on Commercial Space Activity*, 11. PEPP. L. REV. 521, 522 n.4 (1984) (contrasting the earlier trend of private “land-based exploration” with space travel, which requires advanced technology and significantly more resources than private enterprises can generally afford). This was particularly true in the early years of the space program. Compare 1974 NASA Authorization, Part 2: Hearing on H.R. 4567 and H.R. 7528 Before the Subcomm. on Manned Space Flight of the H. Comm. on Science and Astronautics, 93rd Cong. 1271 (1973) (estimating the Apollo Program’s total cost at \$25.4 billion), with *Fortune 500: 1969 Full List*, FORTUNE, http://money.cnn.com/magazines/fortune/fortune500_archive/full/1969/ (last visited May 12, 2011) (listing the 1969 revenues and profits for major private companies, including U.S. Steel’s total profits of \$253.7 million, which demonstrates that private enterprises lacked the necessary resources to spend on the U.S. space program).

4. See generally Kelly M. Zullo, Note, *The Need to Clarify the Status of Property Rights in International Space Law*, 90 GEO. L.J. 2413, 2436 (2002) (describing the significant benefits of the modern commercial satellite industry including “valuable communications, remote sensing, and navigational services” as well as employment opportunities).

5. See Nikhil D. Cooper, Note, *Circumventing Non-Appropriation: Law and Development of United States Space Commerce*, 36 HASTINGS CONST. L.Q. 457, 457 (2009) (describing the first “space-tourist,” Dennis Tito’s, six-day trip to the International Space Station in 2001 as the event that marks the beginning of the commercialization of outer space). To date, most space tourists have traveled as paying customers aboard national space vehicles, however, private companies are in the process of developing their own vehicles for space travel. See, e.g., Brian Deagon, *Tourists Close to Conquering Final Frontier*, INVESTOR’S BUS. DAILY (June 18, 2010, 4:13 PM), <http://www.investors.com/NewsAndAnalysis/Article.aspx?id=537806> (noting that Blue Origin, Armadillo Aerospace, and Virgin Galactic are among the companies developing vehicles for space tourism, and describing one company’s plan to send the first space tourists on a trip around the moon at a cost of \$100 million per passenger).

6. See Zullo, *supra* note 4, at 2432-33, 38-39 (noting that legal and policy

Given the significant costs involved,⁷ space mining is one such goal that will not come to fruition without a clear statement of what is permitted under international law.⁸ There is great potential for utilizing extraterrestrial resources, as minerals on celestial bodies—the moon, asteroids, and other planets—could represent an astronomical sum of money.⁹ The moon alone is believed to contain enough Helium-3 to supply the world's energy needs through fusion reactors.¹⁰ Moreover, *in situ*

ambiguities around private appropriation in space hinders commercial enterprise since investors generally avoid risk unless there is a “reasonable chance to recover all costs”); see also *Future Lunar, Martian Colony Property Rights May Have Legal Hitch*, 8 INSIDE FAA, Apr. 27, 2003 (explaining that the private sector's profit motives are often incompatible with the government's need to regulate space technology to ensure national defense and promote “humanitarian space projects”).

7. See, e.g., FUTRON CORP., SPACE TRANSPORTATION COSTS: TRENDS IN PRICE PER POUND TO ORBIT 1990-2000 (2002), available at http://www.futron.com/upload/wysiwyg/Resources/Whitepapers/Space_Transportation_Costs_Trends_0902.pdf (noting that the cost of transportation is the biggest obstacle to the exploitation of resources in space, despite significant drops in the “price per pound to orbit” in the 1990s).

8. See Ezra J. Reinstein, *Owning Outer Space*, 20 NW. J. INT'L L. & BUS. 59, 62-68 (1999) (describing how ambiguous language in the current law governing property rights in outer space undermines efforts to explore and exploit extraterrestrial resources, and arguing that “a new law of space real property must enliven and support” the rights to permanent possession, unlimited use, exclusion, and transfer to incentivize “efficient development of space”).

9. See Mark Sonter, *Asteroid Mining: Key to the Space Economy*, SPACE.COM (Feb. 9, 2006, 6:51 AM), http://www.space.com/adastra_/060209_adastra_mining.html (estimating that some celestial objects could be worth \$500,000 per ton and will be an attractive source of materials once the transportation costs are reduced). But see *The Great Asteroid Mining Con*, RONALD BRAK'S BLOGSPOT (Feb. 6, 2006, 6:42 AM), <http://ronaldbrak.blogspot.com/2006/02/great-asteroid-mining-con.html> (casting doubt on the claims of space mining optimists by citing extraction technology, transportation costs, and the unpredictable effects of asteroid minerals on world markets as barriers to a viable space mining industry).

10. See *Russian Space Co. Says Hopes to Start Extracting Helium on Moon*, RIA NOVOSTI (May 18, 2006, 4:37 PM), <http://en.rian.ru/russia/20060518/48306511.html> (reporting that one company hoped to begin extracting Helium-3 from the moon within the next ten years in an effort to supplement dwindling oil and gas resources). See generally FABIO TRONCHETTI, *THE EXPLOITATION OF NATURAL RESOURCES OF THE MOON AND OTHER CELESTIAL BODIES: A PROPOSAL FOR A LEGAL REGIME* 6 (F.G. von der Dunk ed., 2009) (elaborating on the potential for Helium-3, which is “scarcely present

resource utilization could provide the raw materials for a manned outpost's fuel, construction materials, and life support systems.¹¹ Thus, the fate of space exploration and enterprise may depend on whether astronauts can make use of the celestial environment, rather than rely on terrestrial resources. International law, however, does not clearly allow for good legal title to any materials that a company harvests from outer space.¹² Without a change in the current legal regime, future generations will have access only to the finite resources on Earth, complicating humanity's inevitable exploration of the stars.¹³

This Comment argues that international law does not effectively address the issue of property rights to extraterrestrial resources. While many claim the Moon Treaty's use of the common heritage of mankind principle prohibits the exploitation of extraterrestrial resources, that document's limited acceptance by spacefaring nations renders it practically useless. Accordingly, this Comment focuses instead on an earlier treaty, the Outer Space Treaty ("OST"), to analyze the status of resource property rights for private actors. It conducts this analysis by using the methodology established in the Vienna Convention on the Law of Treaties ("Vienna Convention"); by looking first to define the OST through an objective reading of its text and next through the use

on Earth but abundant on the Moon," to generate nuclear power without producing toxic waste).

11. See Jon Excell, *Mining the Moon*, THE ENGINEER (Apr. 24, 2009), <http://www.theengineer.co.uk/in-depth/mining-themoon/310927>. article (hypothesizing that lunar resources such as water, hydrogen, oxygen, aluminum, and titanium, could be invaluable catalysts for exploring the rest of the solar system, while recognizing the uncertainty around the existence and usefulness of such resources on the Moon).

12. See Cooper, *supra* note 5, at 461-62 (arguing that the Outer Space Treaty's protection of property rights in terrestrial objects launched into space is inconsistent with its lack of protection for property rights in extraterrestrial bodies).

13. Cf. Zullo, *supra* note 4, at 2439 (describing how commercial involvement allowed the Human Genome Project to accomplish its goal two years earlier than expected, lending credibility to the benefit of a profit motive in science). *But see*, THOMAS GANGALE, THE DEVELOPMENT OF OUTER SPACE: SOVEREIGNTY AND PROPERTY RIGHTS IN INTERNATIONAL SPACE LAW 202-06 (2009) (questioning whether free enterprise is the panacea for space development by highlighting the myriad technological challenges to cost-efficient travel in the "extreme environment" of outer space).

of supplementary means of interpretation, this Comment finds that the drafters of the OST were not concerned with resource property rights. This Comment therefore recommends that new discussions should be held to address this legal lacuna in a way that allows celestial bodies, as distinct from outer space, to be subject to prospecting missions.

To establish context for whether private companies are prohibited from developing outer space, Part II of this Comment explains several property theories, the development of maritime and Antarctic treaties that relate to property rights in those areas, and the relevant sources of space law.¹⁴ Part III employs the methodology of the Vienna Convention to reject the Moon Treaty's relevance given its limited impact on spacefaring nations.¹⁵ Then, Part III conducts a good faith interpretation of the OST's property provisions, taking into account contextual information that clarifies the drafters' intent.¹⁶ Part IV recommends that the U.N. Committee on the Peaceful Uses of Outer Space ("COPUOS") should solicit opinions from states and interested parties with a view to establishing theoretical answers to problems related to extraterrestrial resources.¹⁷ In doing so, COPUOS should firstly distinguish outer space from celestial bodies and secondly allow states and private actors to send prospecting missions to celestial bodies to research the feasibility of mining without granting exclusive property rights.¹⁸

14. See discussion, *infra* Part II (distinguishing the *res communis* theory from the common heritage of mankind principle, providing two examples of modern maritime law, and describing the differences between the two applicable space treaties).

15. See discussion, *infra* Part III.A (employing the Vienna Convention to refute the Moon Treaty on the basis that it cannot apply to third parties).

16. See discussion, *infra* Part III.B-C (relying on the Vienna Convention to guide an investigation into OST's definition, first through an objective reading of the text, and second, through the use of supplementary means of interpretation).

17. See discussion, *infra* Part IV (recommending COPUOS as the appropriate body to research possibilities for future space law, as states will recognize that it can do so without conferring additional legal responsibilities).

18. See discussion, *infra* Part IV (detailing two distinct issues that might be taken into consideration as ways of allowing for appropriate treaty making and informed discussion).

Such an incremental approach to extraterrestrial property rights strikes the appropriate balance between the need for increased exploration by private actors with governmental concerns regarding the exploitation and appropriation of resources in outer space.

II. BACKGROUND

A. PROPERTY THEORIES

Whether private actors may extract mineral resources from celestial bodies is largely determined by how property interests in those areas are defined.¹⁹ Traditionally, debates over new land, or rather land not already subject to sovereign control, focus on two concepts derived from Roman law: *res nullius* and *res communis omnium*.²⁰ The concept of *res nullius* applies to an area that does not belong to anyone at present but may be appropriated by any natural or juridical person.²¹ In contrast, *res communis omnium* applies to areas that are accessible to all, but which no person or State may own.²² Much controversy over space law revolves around a third concept that expands upon *res communis omnium*—the common heritage of mankind principle—and whether it applies in this case.²³

The common heritage of mankind is a twentieth-century

19. Cf. J.E. PENNER, *THE IDEA OF PROPERTY IN LAW* 2-3 (1997) (acknowledging the abstract nature of “property”).

20. See TRONCHETTI, *supra* note 10, at 10 (noting that scholars applied these concepts to outer space in the early years of space exploration).

21. See *id.* at 10-11 (supporting the argument that individual nations can claim sovereignty over celestial bodies through “effective occupation” in the same way that many European countries claimed parts of the New World and Africa).

22. See *id.* at 11-12 (claiming that outer space is “open for exploration, use, and exploitation by all States” on an equal basis).

23. See, e.g., Lynn M. Fountain, Note, *Creating Momentum in Space: Ending the Paralysis Produced by the “Common Heritage of Mankind” Doctrine*, 35 CONN. L. REV. 1753, 1753 n.3 (2003) (arguing that the Common Heritage doctrine should not apply to outer space because it represents a classic “tragedy of the commons” problem and fails to efficiently allocate resources). See also discussion *infra* Parts III.A-C (arguing that the Common Heritage doctrine does not apply to spacefaring nations and that, in reality, space is only a *res communis*).

creation.²⁴ Its proponents sought to articulate a new legal concept that would allow humanity to explore new frontiers, without risking the dangers that plagued centuries of land-based conquest.²⁵ The doctrine is comprised of several elements and generally provides that: (1) the designated areas shall not be appropriated, (2) the use of the area and its resources will be managed by an international authority, (3) benefits from the area will be actively and equitably shared, (4) the area will be peacefully used, and (5) the area's resources will be protected and preserved for the benefit of all mankind.²⁶ This goes beyond the principle of a *res communis* in that even the ownership of movable resources in a common heritage area is forbidden without international consent.²⁷

B. SOURCES OF SPACE LAW CONCERNING PROPERTY RIGHTS

Shortly after the Soviets launched Sputnik 1, diplomatic machinations created the U.N.'s focus group for outer space: the COPUOS.²⁸ This body's work contributed to several early

24. See Fountain, *supra* note 23, at 1758 n. 39, 1761-65 (noting that the Common Heritage doctrine developed during early discussions on the Law of the Sea, and was later integrated into space law instruments such as the OST and the Moon Treaty).

25. See generally Ryan Hugh O'Donnell, Comment, *Staking a Claim in the Twenty-First Century: Real Property Rights on Extraterrestrial Bodies*, 32 U. DAYTON L. REV. 461, 468-69 (2007) (describing the tumultuous Age of Discovery when Europe colonized North America, namely the conflict that arose over land and resources, which led to repetitious warfare).

26. Fountain, *supra* note 23, at 1759. This doctrine originated from discussions on the high seas, where a Maltese U.N. delegate, Arvid Pardo, proposed to apply the concept to the deep seabed. See Jefferson H. Weaver, *Illusion or Reality? State Sovereignty in Outer Space*, 10 B.U. INT'L L.J. 203, 220 (1992) (stating that Ambassador Pardo of Malta suggested that the ocean floor under the high seas be under global ownership and he proposed that this principle be incorporated into a binding U.N. document); see also Jeremy L. Zell, Note, *Putting a Mine on the Moon: Creating an International Authority to Regulate Mining Rights in Outer Space*, 15 MINN. J. INT'L L. 489, 495-96 (2006) (noting the origins of the common heritage principle as a method to ensure the equal sharing of benefits from new spheres of human activity, and can be a lens through which to view the Moon Agreement).

27. See discussion *infra* Part III.C.4.

28. See CARL Q. CHRISTOL, *THE MODERN INTERNATIONAL LAW OF OUTER SPACE* 14-15 (1982) (noting that five of the Committee's original eighteen members - Czechoslovakia, Poland, the Soviet Union, India, and the United Arab Republic

resolutions that, if not legally binding, at least allowed international opinion to coalesce before moving on to treaty drafting.²⁹ Five treaties were then drafted and entered into force in a relatively brief time period, between 1967 and 1979.³⁰

Each treaty was concluded against a Cold War backdrop, and the first was adopted during the race to the Moon.³¹ Indeed, the era's perceived dangers weighed heavily on the drafters' minds.³² This Comment focuses on two of these documents: the OST and the Moon Treaty.

- boycotted the Committee's first meetings until the United States and the Soviet Union agreed to add four additional States from the Soviet bloc to the Committee's membership).

29. *See id.* at 14 (enumerating the legal problems that the Committee agreed were important at the advent of the space age, including the question of exploration and use of extraterrestrial resources, and referencing peaceful use and free access for all states as touchstone principles); Vladimír Kopal, *Evolution of the Doctrine of Space Law*, in *SPACE LAW: DEVELOPMENT AND SCOPE* 17, 23 (Nandasiri Jasentuliyana ed., 1992) (explaining the early history of space law scholars and their relative agreement on major issues by the 1960s).

30. *See generally* Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 5, 1979, 1363 U.N.T.S. 3 [hereinafter Moon Treaty]; Convention on Registration of Objects Launched into Outer Space, *opened for signature* Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15; Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187; Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, *opened for signature* Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119; 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, 610 U.N.T.S. 205 [hereinafter OST].

31. *See* Cooper, *supra* note 5, at 459 (describing the 1960s "Space Race" climate in which the OST was adopted and emphasizing how the first nation to reach the moon would be the apparent winner of that Cold War theater, a race which climaxed with Apollo 11, the U.S. launch that landed the first man on the Moon).

32. *See, e.g.,* Jonathan C. Thomas, *Spatialis Liberum*, 7 FLA. COASTAL L. REV. 579, 589-90 (2006) (stating that the United States and the Soviet Union decided to avoid the risk of losing that contest by signing onto OST, so neither could conclusively claim space superiority).

1. *The Outer Space Treaty*

The General Assembly adopted the OST on December 19, 1966,³³ which laid the foundation upon which all other international space law is built.³⁴ It addresses a number of issues, ranging from weaponization to national liability for space launch problems.³⁵ Despite its breadth, or perhaps because of it, the treaty language varies in specificity.³⁶ This ambiguity reflects the urgency with which the treaty was created; there was great pressure to establish international space law before either the United States or the Soviet Union reached the moon.³⁷

Consequently, the two provisions necessary for an analysis of property rights in outer space are particularly vague: Articles 1 and 2.³⁸ Article 1 addresses the general freedom of use, declaring that outer space and celestial bodies “shall be the province of all mankind.”³⁹ It also provides for the liberties of exploration, access, and scientific investigation.⁴⁰ Essentially, Article 1

33. G.A. Res. 2222 (XXI), U.N. Doc. A/RES/2222(XXI) (Dec. 19, 1966).

34. See TRONCHETTI, *supra* note 10, at 18-19 (describing the OST as the “*Magna Charta* of space law”).

35. See OST, *supra* note 30, arts. 4, 6, 7 (providing that states shall neither place nor test weapons of mass destruction in outer space, and holding states liable for damage by both private and public national space activities); see also Stephen Gorove, *Sources and Principles of Space Law*, in SPACE LAW: DEVELOPMENT AND SCOPE, *supra* note 29, at 45, 46-47 (explaining that the OST’s broad freedoms, such as freedom of exploration and universal access, are limited by specific provisions like the requirements to act in the interest of all countries, to promote cooperation, and to avoid environmental contamination or national appropriation).

36. *Cf. Weaver, supra* note 26, at 218 (speculating that the OST’s drafters intentionally left certain terms ambiguous to allow for changing technologies).

37. See U.N. GAOR, Comm. on the Peaceful Uses of Outer Space [COPUOS], Legal Subcomm., 5th sess., 57th mtg. at 4, U.N. Doc. A/AC.105/C.2/SR.57 (Jul. 12, 1966) [hereinafter COPUOS, 5th Sess., 57th Mtg.] (statement by Mr. Waldheim, Comm. Chairman) (recognizing the importance of devising a treaty prior to the imminent manned mission to the moon to avoid an arms race or territory grab and help secure peace in space).

38. See OST, *supra* note 30, arts. 1-2; see also discussion *infra* Parts III.B-C (demonstrating the impact of Articles 1 & 2 on a state’s right to use outer space and the controversial impact this has on private actors).

39. See *id.* art. 1 (establishing that all countries are to enjoy the benefits of space exploration, “irrespective of their degree of economic or scientific development”).

40. See *id.* (guaranteeing equality to all states in their liberty to pursue

establishes a presumptive freedom of use, while the succeeding provisions qualify that freedom in a manner which advances the treaty's peaceful purpose.⁴¹ Article 2 limits the freedom of use outlined in Article 1 by declaring that outer space, including the Moon and other celestial bodies, is not subject to national appropriation.⁴²

An additional provision, Article 6, is necessary for an investigation of the OST's treatment of property rights.⁴³ By declaring that a state is liable for its citizens' actions in space, it serves as a juridical link and prevents the OST from being rendered toothless by actors who do not fit neatly into the category of sovereign state.⁴⁴ Thus, the OST applies to both private and state space activities.

2. *The Moon Treaty*

The Moon Treaty's place in space law is less certain.⁴⁵ It was adopted on December 5, 1979 and just barely entered into force.⁴⁶ The treaty has failed to receive much support, so it is not considered a binding element of international space law.⁴⁷ Article

such activities).

41. See, e.g., *id.* art. 4 (prohibiting states from establishing military bases in outer space and conducting military exercises on celestial bodies).

42. See *id.* art 2 (declaring that nations may not appropriate outer space or celestial bodies by "claim of sovereignty," "use or occupation," or "any other means").

43. See *id.* art. 6 (establishing that states are responsible for all national space activities and that non-governmental organizations must receive authorization by the state for any activities performed in outer space).

44. See O'Donnell, *supra* note 25, at 477-78 (observing that the OST's restrictions on states must necessarily apply to private actors because, otherwise, states could indirectly assert sovereignty over outer space vis-à-vis the claims of the private actors for which they are responsible pursuant to Article 6).

45. See Fountain, *supra* note 23, at 1764 (arguing that few nations accepted the Moon Treaty due to its explicit acceptance of the Common Heritage doctrine, and the resultant negative impact on the commercial development of outer space).

46. G.A. Res. 34/68, U.N. Doc. A/RES/34/68 (Dec. 5, 1979); see also CHRISTOL, *supra* note 28, at 311-12, 315-17 (recognizing that even though some major space powers, such as the United States, took the lead in drafting the Moon Treaty, they have been reluctant to become parties to the document for fear of its impact on their domestic economic interests).

47. See discussion *infra* Part III.B (arguing that the Moon Treaty has little

11 is likely a main reason for the treaty's limited acceptance.⁴⁸ Although similar to Article 2 of the OST, Article 11 is distinctive in that it further regulates lunar activities.⁴⁹ The additional restrictions in Article 11 highlight the drafters' intent to limit conflict over lunar resources.⁵⁰ To prevent all of the benefits of lunar exploration from going to a small group of developed states, Article 11 also calls for the establishment of an international organization to manage natural resources and redistribute benefits among nations.⁵¹

C. MODELS FOR OUTER SPACE: THE HIGH SEAS & ANTARCTICA

If space is the final frontier, then an analysis of its legal regime could draw from lessons derived from the penultimate frontier: the high seas.⁵² Earth's oceans and seas were once the domain of

impact because it has not been ratified by many states, including the spacefaring nations).

48. See Moon Treaty, *supra* note 30, art. 11 (providing the treaty's rules governing resource use and exploitation).

49. Compare OST, *supra* note 30, art. 2 (establishing that the moon "is not subject to national appropriation") with Moon Treaty, *supra* note 30, art. 11 (providing that "[t]he moon and its natural resources are the common heritage of mankind" and "[n]either the surface nor the subsurface of the moon . . . shall become property of any State"). "The additional restrictions in Article 11 highlight the drafters' intent to limit conflict over lunar resources."

50. See Moon Treaty, *supra* note 30, arts. 2, 11 (articulating the Treaty's purpose to promote peace by prohibiting ownership of the Moon). See generally discussion *infra* Part III.C (explaining the common heritage of mankind principle's origins and general provisions).

51. See Moon Treaty, *supra* note 30, art. 11(5)-(7) (calling for resource exploitation only under the guidance and control of the international community to ensure the "orderly and safe" development of natural resources, yet failing to provide guidelines as to how such an "international régime" should be established).

52. See, e.g., Thomas, *supra* note 32, at 601-02 (noting that the physical similarities between the high seas and outer space make the analogy apt, and further observing that both inspire similar thoughts of "exploration, possibility, expansion, technological evolution, colonization, scientific experimentation, fascination with the unknown, and increased freedom of movement"). *But see*, e.g., U.N. GAOR, COPUOS, Legal Subcomm., 5th Sess., 71st mtg. at 20, U.N. Doc. A/AC.105/C.2/SR.71 (addendum 1) (Aug. 4, 1966) [hereinafter COPUOS, 5th Sess., 71st mtg.] (statement by Mr. Tello Macias of Mexico) (arguing that analogies drawn between the high seas and outer space were of limited benefit due to differences in the areas, such as the inherent problem of defining the borders of outer space).

conquering armadas and privateers, when good legal title required as little as arbitrary lines drawn on a map.⁵³ By the 17th-century, arguments emerged for recognition of a “free sea,” where states equally shared access and none was allowed to obstruct the use of that privilege.⁵⁴ Hundreds of years and many naval conflicts later, the idea of a free sea is generally a reality.⁵⁵

Two modern maritime treaties are relevant to a discussion of extraterrestrial property rights: the 1958 Geneva Convention on the High Seas and the United Nations Convention on the Law of the Sea (“UNCLOS”).⁵⁶

Similarly, the international community has formulated a treaty system to govern another barren region that was not traditionally subject to sovereign control: Antarctica. Thus, the Antarctic Treaty is also relevant to this analysis.⁵⁷

53. See, e.g., O'Donnell, *supra* note 25, at 468-69 (discussing the 1494 Treaty of Tordesillas, which settled a dispute between Spain and Portugal over land in South America by identifying the longitude 47 27 W as the dividing line).

54. See HUGO GROTIUS, *THE FREE SEA* 49-51 (David Armitage ed., Richard Hakluyt trans., Liberty Fund, Inc. 2004) (1609) (recognizing the right to free navigation of the high seas as inherent in the established right to freedom of trade). Grotius' work, *Mare Liberum*, generally represents the original argument for freedom of the seas. See *id.* at xi-xii (providing the historical context for the original publication of *Mare Liberum*, which was the resolution of conflict between the Dutch and the Spanish after the Dutch revolt in the late sixteenth century).

55. See discussion *infra* Parts II.C.1-2 (describing the modern maritime treaties' interpretations of the law of the sea). Cf. H.A. SMITH, *THE LAW AND CUSTOM OF THE SEA* 64-72 (tracing the history of modern sea law from the 17th-century to the early postwar era, and noting that the right of all nations to navigate the high seas may conflict with a nation's right to interfere with an enemy's maritime trade during wartime).

56. Convention on the High Seas, Apr. 29, 1958, 13 U.S.T. 2312, 450 U.N.T.S. 82; United Nations Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 397 [hereinafter UNCLOS]. See also Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982 pmbl., July 28, 1994, 1836 U.N.T.S. 41 [hereinafter Implementation Agreement] (modifying UNCLOS to attract more international support).

57. The Antarctic Treaty, Dec. 1, 1959, 12 U.S.T. 794, 402 U.N.T.S. 71 [hereinafter Antarctic Treaty]; see also Fountain, *supra* note 23, at 1769-70 (describing the many similarities between outer space and Antarctica, including the fact that both areas contain valuable natural resources which are difficult to exploit, and citing the Antarctic Treaty System as highly

1. 1958 Geneva Convention on the High Seas

This treaty was the first post-World War II declaration of states' rights on the high seas.⁵⁸ It articulated rules governing the waters beyond those defined as territorial seas and contiguous zones.⁵⁹ Four liberties emerged from this document: navigation, fishing, laying submarine cables and pipelines, and overflight.⁶⁰ This list was neither exhaustive nor a grant of absolute freedom as other treaties qualified the freedoms to ensure reasonable use of the seas.⁶¹ Yet, the high seas convention remained an expansive document, granting land-locked states the right to sail the oceans by requiring their coastal neighbors to grant free passage over land and through territorial waters.⁶²

2. United Nations Convention on the Law of the Sea

The Third Conference on the Law of the Sea set out to resolve ambiguities in the 1958 Geneva Conventions on the Law of the Sea.⁶³ The result was a comprehensive agreement that replaced

influential in development of space law).

58. See generally Tullio Treves, *1958 Geneva Conventions on the Law of the Sea*, U.N. AUDIOVISUAL LIBRARY OF INT'L LAW, <http://untreaty.un.org/cod/avl/ha/gclos/gclos.html> (last visited May 12, 2011) (providing a narrative history of the work of the first U.N. Convention on the Law of the Sea, and concluding that the 1958 Convention essentially codified the state of customary law as it existed at the time).

59. See Convention on the High Seas, *supra* note 56, art. 2 (providing for free access to the high seas pursuant to certain conditions as they are "open to all nations"); see also Convention on the Territorial Sea and Contiguous Zones arts. 1, 7, Apr. 29, 1958, 15 U.S.T. 1606, 516 U.N.T.S. 205 (recognizing that a state's territory extends to its "internal waters" and defining the high seas as those waters approximately twenty-four miles from the coast).

60. Convention on the High Seas, *supra* note 56, art. 2.

61. See *id.* (conditioning these freedoms on compliance with "rules of international law" and requiring states parties to respect the rights and interests of other states when exercising these freedoms on the high seas); see also Convention on Fishing and Conservation of Living Resources of the High Seas art. 1, Apr. 29, 1958, 17 U.S.T. 138, 559 U.N.T.S. 285 (regulating the use of resources in the common area of the high seas, subject to treaty obligations, by calling on states to work together so their use does not prevent other states from enjoying the same fisheries).

62. See Convention on the High Seas, *supra* note 56, art. 3 (granting "free transit" by "reciprocity" through a sea-coast state).

63. See generally Tullio Treves, *United Nations Convention on the Law of the Sea*, U.N. AUDIOVISUAL LIBRARY OF INT'L LAW, <http://untreaty.un.org/cod/>

the first Conference's 1958 treaties, which, among other things, created a regime for territorial waters.⁶⁴ This system starts with a full grant of sovereignty at the coast and is followed by a series of zones that incrementally diminish such rights, until reaching the high seas where sovereignty is forbidden.⁶⁵

In addition to the four freedoms recognized in the 1958 Convention, UNCLOS articulates the additional freedoms to construct artificial islands and to conduct scientific research.⁶⁶ UNCLOS qualifies the freedom to fish, however, as it incorporates several provisions that require states to respect other states' rights and conserve the living resources of the high seas.⁶⁷

UNCLOS takes a different approach with respect to mineral resources.⁶⁸ Part XI governs the use of seabed minerals,⁶⁹ and declares that this area is the common heritage of mankind.⁷⁰ It further defines this provision by declaring that no state or person may appropriate the seabed's natural resources.⁷¹

avl/ha/uncls/uncls.html (last visited May 12, 2011) (detailing the events that led to the third UNCLOS, including the new geopolitical climate that fomented the development of the common heritage of mankind principle, one of the items on the Conference's agenda of issues to address).

64. *See id.* (describing UNCLOS's separate treatment of different maritime zones, and noting the changed definition of territorial sea: "maximum breadth . . . is fixed at 12 miles and that of the continuous zone at 24 miles").

65. *See UNCLOS, supra* note 56, arts. 3, 33, 47, 57, 76, 86 (defining the various maritime zones, including the territorial sea and contiguous zones near the coast, the exclusive economic zone within 200 nautical miles from the baseline of the territorial sea, the continental shelf, and finally the high seas).

66. *See id.* art. 87.

67. *See id.* arts. 116-120 (prohibiting states from acting in ways that prevent other states from enjoying the freedoms of the sea, for instance, by overfishing, and announcing that interested states shall promulgate regulations, beyond UNCLOS, for how particular fisheries may be used to restore fish populations and conserve living resources).

68. *See id.* art. 133 (defining "resources" as "solid, liquid, [and] gaseous mineral resources" which are found "at or beneath the seabed" of the high seas, separating them from the living resources governed under Part 7).

69. *See id.* art. 134 (distinguishing seabed mineral regulations from those applicable to the high seas in Part VI).

70. *Id.* arts. 136-37; *see id.* art. 140 (supplementing Article 136 by stating that all activities shall "be carried out for the benefit of mankind as a whole").

71. *See id.* art. 137 (extending UNCLOS regulations to public and private entities, including individuals).

Instead, UNCLOS calls for the establishment of an International Seabed Authority to regulate the exploitation of these resources.⁷² This body would promote the transfer of technology and scientific research among the State Parties.⁷³

Many states chose not to ratify the treaty, fearful that UNCLOS would be harmful to their economic interests.⁷⁴ Eventually, there was a push to renegotiate the treaty so as to achieve broader consensus.⁷⁵ The resulting treaty attracted “near-universal” support for UNCLOS.⁷⁶ This new treaty modified UNCLOS so that provisions for limited seabed production and mandatory technology transfers would not be applied to the new signatories.⁷⁷

72. See *id.* arts. 156-58 (calling for a body that would process applications for seabed mining and distribute the benefits of such ventures and laying out the organs of such a body).

73. See *id.* arts. 143-44 (providing guidelines as to what goals the Authority should try to accomplish, such as participating in international programs, fostering technological advancement, and encouraging a transfer of scientific knowledge to developing States). Interestingly, the United States was both a leading party in the negotiations for Part XI and one of its most vehement critics. U.S. negotiators were a moving force behind its development, but by the time UNCLOS was open for ratification, there had been a political sea change in U.S. politics that prevented (and continues to prevent) the federal government from unwaveringly supporting the Part's provisions. See generally Louise de La Fayette, Book Review, 86 AM. J. INT'L L. 212 (1992) (reviewing Markus G. Schmidt, *Common Heritage or Common Burden? The United States Position on the Development of a Regime for Deep Sea-Bed Mining in the Law of the Sea Convention* (1989)).

74. See, e.g., John Adolph, Comment, *The Recent Boom in Private Space Development and the Necessity of an International Framework Embracing Private Property Rights to Encourage Investment*, 40 INT'L LAW. 961, 972-73 (2006) (explaining that industrialized states' reluctance to ratify the treaty stemmed from UNCLOS's adoption of the common heritage principle, which essentially ensured access and control “regardless of [a nation's] technological capabilities or contributions to undersea exploration”).

75. See *id.* at 973 (noting that the United Nations attempted to mitigate the chilling effect of the common heritage doctrine on commercial mining nearly twelve years after UNCLOS was adopted).

76. See 2 E.D. BROWN, *SEA-BED ENERGY AND MINERALS: THE INTERNATIONAL LEGAL REGIME: SEA-BED MINING* 11-13 (2001) (acknowledging that several states parties to UNCLOS failed to adopt the Implementation Agreement, but noting the role of the Implementation Agreement in increasing acceptance of UNCLOS).

77. See Implementation Agreement, *supra* note 56, Annex sec. 5, 6; see also Adolph, *supra* note 74, at 973 (noting that these changes tempered UNCLOS's

3. Antarctica

The Antarctic Treaty of 1959 entered into force on June 23, 1961, establishing the first document of what grew into the Antarctic Treaty System.⁷⁸ This Treaty has slightly different roots than that for the oceans, as not all states sought to explore the former area.⁷⁹ States explored the region for more than a century before they realized its economic and scientific potential.⁸⁰ By then, several nations had made claims of sovereignty over parts of the continent, while others declined to do so.⁸¹ Interested parties established a treaty to avoid conflict in the area, which would grow into the Antarctic Treaty System (“ATS”).⁸² This system essentially froze sovereign claims as they appeared in 1959, while prohibiting new assertions of national control.⁸³ Combined with its other provisions, the ATS was a clear predecessor of the OST but with a significant difference: the polar region is subject to lingering sovereign claims.⁸⁴ Attempts

original common heritage mandates).

78. See Antarctic Treaty, *supra* note 57, pmb., art. 4, (ensuring that the continent is reserved for peaceful use and preventing new sovereign claims without renouncing existing sovereign claims).

79. See TRONCHETTI, *supra* note 10, at 134 (recognizing that states which did not explore the Antarctic region nevertheless affirmed their right to have input on the continent’s future).

80. See *id.* at 133 (noting that international interest in Antarctica did not begin until the late 1940’s, sparking a surge of important legal decisions).

81. See *id.* (observing that the United Kingdom, Australia, Argentina, Chile, Norway, New Zealand, and France all asserted sovereignty over the parts of the continent they had explored in preceding decades, while other states, including the United States and the Soviet Union, wished to make claims in the future, and still others, such as Italy and Germany, did not believe the area could be subject to national jurisdiction).

82. See *id.* at 136-39 (describing the Antarctic Treaty as both “innovative” in its mandate on states to promote international cooperation and scientific research on the continent and preservationist with respect to the existing state of sovereignty claims in Antarctica).

83. The Antarctic Treaty, *supra* note 57, art. 4; see also TRONCHETTI, *supra* note 10, at 137-38 (noting that, although this provision was extremely contentious, it facilitated scientific activity in Antarctica).

84. TRONCHETTI, *supra* note 10, at 139. See Howard J. Taubenfeld, *The Antarctic and Outer Space: An Analogy in Retrospect*, in THE ANTARCTIC LEGAL REGIME 269, 269 (Christopher C. Joyner & Sudhir K. Chopra eds., 1988) (explaining that as early as 1958, scholars recognized that space law could draw on the Antarctic model, as another territory “placed under an internationalized or ‘trust’ arrangement”).

were recently made to regulate the region's mineral resources, providing the catalyst for some nations to declare it the common heritage of mankind.⁸⁵

D. A METHOD FOR INTERPRETING TREATIES

The Vienna Convention codifies rules applicable to treaties.⁸⁶ While it addresses a number of issues related to written international agreements, a particularly important function of this instrument is to provide a method for interpreting such agreements.⁸⁷

Pursuant to Article 31, an analysis requires both a good faith interpretation of the treaty's text and consideration of its context.⁸⁸ Relevant contextual information includes any treaties that are made in connection with the primary document, subsequent agreements and practices, and relevant rules of international law.⁸⁹ According to Article 32, further analysis may be required if a term remains "ambiguous or obscure" or if the apparent definition is "absurd or unreasonable."⁹⁰ Only at that point may the preparatory works and circumstances surrounding the treaty's conclusion be taken into account.⁹¹

The Vienna Convention also acknowledges that customary

85. See TRONCHETTI, *supra* note 10, at 141-48 (noting that the Organization of African Unity, and many other developing countries, argued the common heritage doctrine applies to Antarctica in an effort to thwart attempts by industrialized nations to develop the continent in phases).

86. Vienna Convention on the Law of Treaties arts. 1, 2, May 23, 1969, 1155 U.N.T.S. 331 [hereinafter Vienna Convention] (establishing the Convention's scope and defining "treaty" as "an international agreement concluded between States in written form and governed by international law"). Note that the Vienna Convention only applies to agreements "concluded between States," and not international organizations, although this language does not necessarily exclude agreements concluded with the help of such bodies. *Id.*

87. See *id.*, *supra* note 86, arts. 31-33 (outlining the general rule of interpretation and specifying when primary and secondary sources, such as preparatory documents, may be used to supplement or enhance understanding of a treaty's terms).

88. See *id.* art. 31(1) (providing that the treaty's "object and purpose" control interpretation of the treaty's terms).

89. *Id.* art. 31(2)-(3).

90. *Id.* art. 32.

91. *Id.*

international law gives rise to legal obligations notwithstanding the success or failure of a treaty.⁹² Thus, if there is consistent state practice based on a sense of legal obligation, all states may be bound to obey that norm.⁹³ Customary law is therefore relevant to the legality of space mining because if the treaties are ambiguous, it nonetheless may be used to restrict state activities.

III. ANALYSIS

The right of governments and private organizations to extract minerals in space is unclear because of ambiguities in the OST and insufficient state practice.⁹⁴ Although more specific, the Moon Treaty lacked enough support to bind non-signatory states.⁹⁵ Maritime applications of the common heritage principle, though persuasive, do not provide an answer given the differences between the oceans and outer space.⁹⁶

A. WHILE THE MOON TREATY'S COMMON HERITAGE OF MANKIND PRINCIPLE PREVENTS THE EXPLOITATION OF RESOURCES WITHOUT THE CONSENT OF AN INTERNATIONAL BODY, THE TREATY IS NON-BINDING ON THE SPACEFARING NATIONS.

The Moon Treaty's prohibition on space mining is beyond doubt, as it employs the common heritage of mankind principle.⁹⁷ However, this principle is ultimately of little importance because

92. See *id.* arts. 34, 38 (stating that a treaty's terms may bind a non-party, despite the general rule that states may only be bound by consent, if the rule constitutes a recognized "customary rule of international law").

93. See, e.g., Statute of the International Court of Justice art. 38, June 26, 1945, 59 Stat. 1055, 33 U.N.T.S. 993 (1945) (declaring that the Court shall look to "international custom" as a source of applicable law when resolving disputes).

94. Cf. O'Donnell, *supra* note 25, at 462 (noting that space entrepreneurs are dissuaded by the "unanswered questions" of current space law and recommending the establishment of a regulatory framework that private industry can use to attain property rights in space).

95. See discussion, *infra* Part III.A (showing that in spite of the fact that the Moon Treaty entered into force, it cannot bind the actions of third-parties, including all the spacefaring nations).

96. See discussion *infra* Part III.C (demonstrating that maritime law is persuasive but an imperfect analogy for outer space).

97. See Moon Treaty, *supra* note 30, art. 11(1)-(3) (emphasizing that the Moon is immune to sovereignty claims and that the lunar surface as well as subsurface materials are not subject to appropriation).

the treaty is not binding on the current spacefaring nations.⁹⁸

1. *Moon Treaty Interpretation*

A good faith interpretation of the Moon Treaty pursuant to the Vienna Convention methodology confirms that it incorporates this restrictive property theory.⁹⁹ Cognizant of the benefits derived from using the Moon's natural resources, the Moon Treaty drafters sought to peacefully encourage such development on an equal basis.¹⁰⁰ Reflecting this commitment, Article 11 declares that the Moon and its resources are the common heritage of mankind.¹⁰¹

Looking at the term in context, subsequent clauses within Article 11 give substance to the common heritage provision and establish the theory's five general elements.¹⁰² First, sections 2

98. See *Treaty Signatures*, UN OFFICE FOR OUTER SPACE AFFAIRS, <http://www.unoosa.org/oosatdb/showTreatySignatures.do> (last visited May 12, 2010) (listing Australia, Austria, Belgium, Chile, Kazakhstan, Lebanon, Mexico, Morocco, the Netherlands, Pakistan, Peru, the Philippines, and Uruguay as the only parties to the Moon Treaty); see also CHRISTOL, *supra* note 28, at 311, 315 (discussing the United States' reluctance to ratify the Treaty, despite its role in the drafting phases, out of its concern about foreclosing the possibility of securing lunar resources in the future).

99. See Vienna Convention, *supra* note 86, art. 31 (specifying that "good faith interpretation" requires looking at the "ordinary meaning" of the terms in relation to the treaty's text, preamble, annex, related agreements, or international law, and in light of the treaty's "object and purpose"); see also MARK E. VILLIGER, COMMENTARY ON THE 1969 VIENNA CONVENTION ON THE LAW OF TREATIES 426-27 (Martinus Nijhoff Publishers 2009) (explaining that Article 31 of the Vienna Convention calls for the ordinary meaning of treaty terms to be established in their context, meaning all sentences, paragraphs, and articles of the treaty).

100. See Moon Treaty, *supra* note 30, pmb. (recognizing the Moon's potential to spark "international conflict" in the absence of consensus around the use of its resources).

101. See *id.* art. 11 (prohibiting ownership of the Moon's surface and subsurface minerals and calling for an "international régime" to ensure their "safe development," "rational management," and equitable use).

102. See *id.* (providing additional regulations as to what constitutes impermissible behavior on the Moon, such as national appropriation and discriminatory exploration); see also Fountain, *supra* note 23, at 1759 (enumerating the five elements that are generally recognized to comprise the common heritage of mankind principle, including eliminating national appropriation, sharing management of the region, equal sharing of the exploitation of resources, peaceful use of the area, and preservation for the

and 3 of Article 11 declare that the area is not subject to national appropriation by any means.¹⁰³ Second, section 5 calls for the establishment of an international body to manage the use of the area's natural resources.¹⁰⁴ Third, section 7 states that benefits derived from lunar exploitation shall be equitably shared among nations, including those which did not undertake exploratory programs.¹⁰⁵ Fourth, peaceful use is guaranteed through section 4, which notes that State Parties have the right to use the Moon in accordance with international law and the other terms of the treaty.¹⁰⁶ Finally, section 7's call for the rational management of resources provides for the doctrine's final element, to protect and to preserve them so as to benefit all mankind.¹⁰⁷ The treaty's treatment of property rights on the Moon is therefore quite clear after reading Article 11's inclusion of the common heritage principle along with the rest of the treaty.¹⁰⁸ Accordingly, this interpretation obviates the need to use additional sources for clarification purposes.¹⁰⁹

Despite this result, the Moon Treaty has little practical impact on current space law.¹¹⁰ Though it entered into force, the treaty does not bind the spacefaring nations because it cannot regulate the behavior of non-parties without their consent.¹¹¹ Since the

future).

103. Moon Treaty, *supra* note 30, art. 11(2)-(3).

104. *Id.* art. 11(5).

105. *See id.* art. 11(7) (declaring that benefits of lunar exploration shall be shared without providing clear criteria as to how that should be accomplished).

106. *Id.* art. 11(4). *See id.* arts. 2-3 (emphasizing that the Moon shall be used for peaceful purposes and with the goal of maintaining international peace).

107. *Id.* art. 11(7).

108. *See VILLIGER, supra* note 99, at 427 (recognizing that treaty interpretation must arise from the totality of the text, rather than isolated sections).

109. *See Vienna Convention, supra* note 86, art. 32 (providing that "supplementary means of interpretation" need only be consulted to "confirm the meaning resulting from the application of Article 31" or to determine the meaning when an Article 31 analysis "leaves the meaning ambiguous or obscure" or "leads to a result which is manifestly absurd or unreasonable").

110. *See Fountain, supra* note 23, at 1764 (noting that many scholars "consider [the Moon Treaty] already obsolete" as a result of its limited acceptance by the international community, and especially spacefaring nations).

111. *See Vienna Convention, supra* note 86, art. 34. *See generally* GANGALE,

Moon Treaty only binds a few ratifying states that do not explore space, it is largely irrelevant to the question at hand.

2. Customary International Law

Of course, treaties are not the only method by which a state may be bound; spacefaring nations not party to the Moon Treaty may be bound by its provisions if the provisions have become customary international law.¹¹² Since establishing that such norms exist can lead to even more confusion than results from treaty interpretation, it is unlikely that the Moon Treaty's terms will bind third parties through custom.¹¹³ But a successful analysis of space mining's legality demands thoroughness, so an examination of custom is nevertheless required.

There is insufficient state practice to claim that the common heritage doctrine as embodied in the Moon Treaty has become legal custom, such that non-parties to the Moon Treaty would be prohibited from space mining. While states have collected geological samples,¹¹⁴ the OST's grant of scientific investigation

supra note 13, at 67-88 (detailing the domestic political events in several countries that led to the Moon Treaty's limited acceptance, for example, the belief of certain U.S. congressmen that ratification of the Moon Treaty would impede negotiations on seabed mining in the Law of the Sea Conference).

112. See Vienna Convention, *supra* note 86, art. 38 ("Nothing . . . precludes a rule set forth in a treaty from becoming binding upon a third State as a customary rule of international law, recognized as such."); see also MAARTEN BOS, A METHODOLOGY OF INTERNATIONAL LAW 62 (1984) (explaining that formation of legal custom requires both the presence of state practice and *opinio juris*).

113. Compare Jean-Marie Henckaerts, *Study on Customary International Humanitarian Law: A Contribution to the Understanding and Respect for the Rule of Law in Armed Conflict*, 87 INT'L REV. RED CROSS 175, 179-80 (2005) (assessing state practice through "[b]oth physical and verbal acts" and stating that state practice must be "virtually uniform" to establish a rule of customary international law), with Letter from John Bellinger, Legal Adviser, U.S. State Dep't & William Haynes, Gen. Counsel, U.S. Defense Dep't, to Jakob Kellenberger, President, Int'l Comm. of the Red Cross (Nov. 3, 2006), 46 I.L.M. 514 (relying on the physical acts of states for the generation of customary international law and warning that undue weight may be given to opinions by non-governmental organizations as to sufficiency of state practice).

114. See generally *Apollo Moon Rocks*, SMITHSONIAN NAT'L AIR & SPACE MUSEUM, http://www.nasm.si.edu/exhibitions/cchoice/moon_rocks/moonrocks1.htm (last visited May 12, 2011) (providing descriptions of lunar rocks, such as basalt, collected by U.S. astronauts during the Apollo 15's landing on the

2011] *EXTRATERRESTRIAL RESOURCE EXTRACTION* 1501

permits such activity.¹¹⁵ As for space mining, neither states nor their private actors have attempted to harvest celestial resources, so there is no demonstrated practice by commission. Since technological hurdles prevent such an attempt at the present time, there is also no example of state practice by omission.¹¹⁶

Official statements also may be a demonstration of state practice—even in the absence of physical practice.¹¹⁷ This argument presents the best evidence for the emergence of legal custom, as there have been several instances in which private citizens have tried to claim ownership of a celestial body.¹¹⁸ National governments have rebuked such claims, which at first glance may seem like evidence of state practice.¹¹⁹

Moon).

115. See OST, *supra* note 30, art. 1 (guaranteeing the right to use the moon for scientific investigation).

116. See *The Challenge of Space Mining*, SPACE DAILY (Sept. 14, 1999), <http://www.spacedaily.com/news/asteroid-99i.html> (identifying numerous technological barriers to space mining, including, the absence of a system for processing rocks into valuable raw materials and a method of utilizing local raw materials to propel mined materials back to Earth).

117. See Henckaerts, *supra* note 113, at 179 (noting that verbal acts may include, *inter alia*, “military manuals, national legislation, national case-law, instructions to armed and security forces, military communiqués during war, diplomatic protests, opinions of official legal advisers, comments by governments on draft treaties, executive decisions and regulations, pleadings before international tribunals, statements in international fora, and government positions on resolutions adopted by international organizations”).

118. See, e.g., *Nemitz v. United States*, No. CV-N030599-HDM (RAM), 2004 WL 3167042 (D. Nev. Apr. 26, 2004) (involving a plaintiff who asserted ownership of 433 Eros and requested parking fees from NASA when the agency landed a spacecraft on the asteroid); *Court Rejects Lunar Embassy’s Right of Moon Land Selling*, CHINA.ORG.CN, March 17, 2007, <http://www.china.org.cn/english/China/203329.htm> (describing the attempt by a Chinese company to sell parcels of the Moon to individuals).

119. See *Nemitz*, 2004 WL 3167042, at *2 (dismissing a citizen’s claim of ownership of an asteroid because neither the United States’ failure to ratify the Moon Treaty, nor its acceptance of the OST granted private actors the right to appropriate celestial bodies); see also *Court rejects Lunar Embassy’s Right of Moon Land Selling*, *supra* note 118 (reporting the ruling by the Beijing First Intermediate People’s Court that a Chinese company could not sell plots of the Moon because neither individuals nor state actors could claim such ownership).

These situations do not provide evidence that contributes to an emerging legal custom, however, because of a fundamental difference from prospective space mining ventures. Space mining would mostly involve the extraction of resources,¹²⁰ whereas these cases revolve around whether a citizen may claim ownership of an entire celestial body or plot of land.¹²¹ Thus, it seems there is little evidence of state practice that would give rise to a new custom based on the Moon Treaty's principles.¹²² Since the Moon Treaty does not apply to the spacefaring nations, even as a matter of legal custom, proponents of a strict non-appropriation policy for outer space must find support in a widely accepted treaty: the OST.

B. THE OST IS THE APPROPRIATE TREATY FOR AN ANALYSIS OF
EXTRATERRESTRIAL PROPERTY RIGHTS, THOUGH AMBIGUITIES IN THE
TREATY PREVENT A CLEAR ANSWER AS TO WHETHER PRIVATE ACTORS
MAY EXTRACT MINERAL RESOURCES.

While some writers continue to argue the Moon Treaty's relevancy,¹²³ the OST is the proper treaty to consult.¹²⁴ Like the Moon Treaty analysis, the OST should first be subjected to a good faith interpretation, and in light of the treaty's purpose.¹²⁵ Once

120. See generally M.J. Sontner, *The Technical and Economic Feasibility of Mining the Near-Earth Asteroids* (paper presented at 45th IAF Congress, 1998), available at http://www.spacefuture.com/archive/the_technical_and_economic_feasibility_of_mining_the_near_earth_asteroids.shtml (detailing the process for removing resources from Earth-approaching asteroids and comets, and listing the wide array of resources available in space, including water, ammonia, carbon dioxide, methane, nickel-iron alloy, silicate minerals, hydrated minerals and bituminous material).

121. See, e.g., *Nemitz*, 2004 WL 3167042 at *1 (describing the plaintiff's claim of ownership of an asteroid).

122. Accordingly, there is no reason to address the *opinio juris* element of custom formation, since custom cannot be formed if there is no state practice. BOS, *supra* note 112, at 62.

123. See, e.g., Zach Meyer, *Private Commercialization of Space in an International Regime: A Proposal for a Space District*, 30 NW. J. INT'L L. & BUS. 241, 249-50 (arguing that the Moon Treaty is relevant because its principles are reflected in the OST, and because certain states that have ratified the Moon Treaty may soon develop spacefaring capabilities, for example India).

124. See discussion, *supra* Part III.A.1.

125. See Vienna Convention, *supra* note 86, art. 31 (providing that an objective analysis that looks at the treaty's text, along with its purpose, should be the first step in interpreting the treaty).

again, using the Vienna Convention methodology, this analysis must take into account the totality of the OST's provisions, including its preamble and Articles 1, 2, and 6.¹²⁶

The OST's preamble speaks to the drafters' intentions.¹²⁷ It recognizes the great potential of exploring outer space, as well as the problems that could result from such exploration, expressing hope for scientific cooperation and noting earlier efforts to prevent the weaponization of outer space.¹²⁸ Notably absent from this introduction is the sort of property-based equitable sharing language employed in the Moon Treaty.¹²⁹ The OST's expressed object and purpose to establish a general set of peaceful principles, rather than a detailed property rights system, color the analysis of its operative provisions.¹³⁰

Article 1 is the first substantive clause that relates to property claims and establishes the OST's fundamental presumption that outer space is "free for exploration and use."¹³¹ Several other provisions in the Article are less clear, for example, the declaration that outer space is the province of all mankind and that its exploration shall benefit all nations.¹³² This provision has

126. *See id.* (stating that the entirety of the treaty's text, including its preamble and annexes, should be used for interpretation).

127. *See OST, supra* note 30, pmbl. (enumerating general principles and benefits underlying space exploration and recognizing prior international resolutions); *see also* VILLIGER, *supra* note 99, at 428 (claiming that a preamble is a traditional source of explanation for a treaty's object and purpose).

128. *See OST, supra* note 30, pmbl. (citing the goal of enhancing mutual understanding and friendly relations between states and the prohibition of placing nuclear or weapons of mass destruction in space or on celestial bodies).

129. *Compare id.* (calling for the benefits derived from space exploration to be shared by all states), *with* Moon Treaty, *supra* note 30, pmbl. (recognizing the benefits derived from lunar resources, and calling upon states to explore and use these resources "on the basis of equality").

130. *See generally* Zell, *supra* note 26, at 489-90 (recognizing that the Cold War fears of nuclear war caused the drafters of the OST to focus on preventing military operations in space).

131. OST, *supra* note 30, art. 1 (granting access to outer space to "all States without discrimination," thereby preventing any single state from excluding other actors). *See* CHRISTOL, *supra* note 28, at 38-39 (explaining that the final version of Article 1 established an important right for all states to access, use, and explore space and its resources).

132. OST, *supra* note 30, art. 1.

been interpreted in several ways,¹³³ but the generally accepted argument is that it confirms the freedom of use because every state has an equal right to pursue space activities.¹³⁴ Thus, the province of all mankind language is an affirmation of general principles of access, rather than a prohibition of certain activities.¹³⁵ Without more information to give meaning to this article, its definition remains speculative.

The next relevant provision is found in Article 2, with its prohibition on national appropriation.¹³⁶ The term “appropriation” is admittedly more susceptible to an ordinary definition than the phrases analyzed in Article 1.¹³⁷ In light of the treaty’s purpose, drafters likely intended Article 2 to prevent territorial claims by states in outer space or the moon, since such actions would frustrate Article 1’s goal of equal access.¹³⁸ If a state claimed control over a section of outer space for its exclusive use, that claim would infringe on other states’ right to equal access.¹³⁹

Read together with Article 1, the prohibition on national appropriation establishes that outer space is a *res communis*, not

133. See, e.g., Thomas, *supra* note 32, at 585 (noting that developed states interpret this language as establishing a right to participate, while developing states view the same provision as establishing a right to equal distribution of resources regardless of participation or contribution).

134. See CHRISTOL, *supra* note 28, at 39-42 (arguing that Article 1’s main contribution was the concept of freedom of use, which necessarily implies the right to exploit the benefits of space).

135. *But see* Thomas, *supra* note 32, at 585 (noting that the equal benefits language may yet bar space exploration, since few investors will expend funds if the results of their activities are shared by all).

136. See OST, *supra* note 30, art. 2 (prohibiting appropriation “by claim of sovereignty, by means of use or occupation, or by any other means”).

137. See BLACK’S LAW DICTIONARY 117-18 (9th ed. 2009) (defining “appropriation” as “[t]he exercise of control over property” or “a taking of possession”).

138. See Vienna Convention, *supra* note 86, art. 31(1) (requiring any analysis of treaty text to take into account the treaty’s purpose); *see also* Thomas, *supra* note 32, at 586 (arguing that when read together, Articles 1 and 2 deny the right to claim territory because of the impact such action would have on the right of access).

139. *Cf.* PENNER, *supra* note 19, at 70-71 (explaining that the right to use does not necessarily equal the right to exclude, though they often go together in theory).

subject to the common heritage doctrine, which means that states are free to use the area so long as their activities do not deprive other states of the same right.¹⁴⁰ The OST fails to incorporate all of the common heritage elements: while it provides for non-appropriation, peaceful usage, and some form of benefits sharing, it does not require the establishment of an international body to manage natural resources, nor does it guarantee their preservation for future generations.¹⁴¹ Accordingly, unlike the Moon Treaty which incorporates all of the common heritage elements, outer space and celestial bodies are not off-limits to development under the OST.¹⁴² Thus, the text of the OST establishes outer space as a *res communis*, though further analysis may reveal that drafters did not intend for that to forever be the case.¹⁴³

Finally, Article 6 expands the OST's scope in a manner that renders pointless any argument that claims Article 2 applies only to government activities.¹⁴⁴ It provides that states are responsible for ensuring compliance with the treaty's principles with respect to both government activities and private actors.¹⁴⁵ Thus, Article 6 is important as it applies the rest of the treaty to all space activities, preventing the treaty from being rendered toothless.¹⁴⁶ Although the text of Article 6 is sufficient to establish

140. See CHRISTOL, *supra* note 28, at 44-48 (noting that U.S. officials drew on *res communis* concepts that had previously been applied to the high seas to help conceptualize legal rules that would apply to outer space).

141. Compare OST, *supra* note 30, arts. 1, 2, 4 (establishing that nations must not weaponize outer space or claim control over outer space, and that benefits derived from exploration should be enjoyed by all), with Fountain, *supra* note 23, at 1759 (providing a list of the five elements of the common heritage of mankind principle).

142. Compare OST, *supra* note 30, art. 1, with Moon Treaty, *supra* note 30, art. 11 (demonstrating the emergence of calls for an international body to manage the Moon's mineral resources, resulting in the Moon Treaty).

143. See VILLIGER, *supra* note 99, at 447 (noting that Article 32 of the Vienna Convention allows for supplementary means of interpretation even where the definition of a treaty term may be apparent).

144. See OST, *supra* note 30, art. 6 (noting that the OST applies to both government and non-governmental entities).

145. See *id.* (declaring that non-governmental entities still require "authorization and continuing supervision" from the State Party for any activities conducted in space or on a celestial body).

146. See CHRISTOL, *supra* note 28, at 48-49 (noting that Article 6 focuses on

its meaning without requiring contextual information for clarification,¹⁴⁷ which principles of Article 6 apply to private activities remain unclear without a distinct definition of the other articles.

After this good faith interpretation of the OST, it would be disingenuous to suggest that its text provides a clear statement on whether private actors may extract mineral resources from celestial bodies. The only safe conclusion is that the OST's authority is not limited to states. Presumably, a state will act to ensure private actors are in compliance with the OST's principles to avoid violating the treaty, lest it provoke other states to ignore the treaty. Therefore, further investigation is required to determine whether a private actor may enjoy the right to harvest extraterrestrial resources.

Nonetheless, the OST has received widespread support, especially among the spacefaring nations.¹⁴⁸ Moreover, the OST is the first and most important source of space law.¹⁴⁹ Any investigation with respect to rules for mineral resources therefore should be based on the OST, rather than its less-accepted descendent.

C. AS OST'S PROPERTY PROVISIONS REMAIN AMBIGUOUS WITH RESPECT TO MINERAL EXTRACTION, FURTHER CONTEXTUAL INFORMATION MAY BE USED TO CLARIFY THIS ISSUE.

While the OST's text provides the primary source for interpretation, Article 32 of the Vienna Convention provides that other information may be used to supplement the textual analysis.¹⁵⁰ These supplementary means include, but are not

operational aspects of space law, while Articles 1 and 2 establish substantive principles).

147. Vienna Convention, *supra* note 86, art. 32 (explaining the instances in which "recourse *may* be had to supplementary means of interpretation") (emphasis added).

148. See *OOSA - Treaty Database*, U.N. OFFICE FOR OUTER SPACE AFFAIRS, <http://www.oosa.unvienna.org/oosatdb/showTreatySignatures.do> (last visited May 12, 2011) (indicating that nearly one-hundred states are parties to the OST).

149. See TRONCHETTI, *supra* note 10, at 19 (acknowledging that subsequent treaties largely built on OST's work).

150. Vienna Convention, *supra* note 86, art. 32.

limited to, the preparatory work of the treaty and the circumstances of its conclusion.¹⁵¹ This secondary analysis may either confirm or clarify a textual interpretation.¹⁵²

1. Preparatory Work

Article 1's definition was subject to controversy, if not in substance then in its rhetorical style.¹⁵³ All drafters agreed that exploration of outer space should be peaceful in nature.¹⁵⁴ Differences arose when discussions turned to how the benefits derived from space exploration should be shared among nations.¹⁵⁵ Many delegations felt that such benefit sharing ought to be limited to information or the results of scientific investigations.¹⁵⁶ Going further, some developing states argued that the practical benefits of space should be shared, even with those nations that did not participate in the exploratory process.¹⁵⁷ Essentially, it was a question of whether all states should be treated as equals in fact or simply be given the opportunity to have equal access.¹⁵⁸ Ultimately, the drafters

151. *Id.*

152. *Id.*; see also VILLIGER, *supra* note 99, at 446-47 (explaining the several reasons why a person may need to resort to Article 32).

153. *Cf.* CHRISTOL, *supra* note 28, at 42 (accepting that Article 1 was generally stated because the purpose of the Treaty was to establish general principles rather than definitive regulations).

154. See, e.g., U.N. GAOR, COPUOS, Legal Subcomm., 5th Sess., 71st mtg. at 4, U.N. Doc. A/AC.105/C.2/SR.65 (July 22, 1966) [hereinafter COPUOS, 5th Sess., 65th mtg.] (statement of Mr. Ruda of Argentina) (arguing that an obligation to explore space peacefully was self-evident based on the text of Article 4 and the treaty's overall objectives).

155. Compare *id.* (statement of Mr. Partli of Hungary) (noting that whether information is shared should be left up to those nations that sacrificed the most for exploration), with COPUOS, Legal Subcomm., Interim Report by the Chairman, annex 2 at 6, U.N. Doc. A/AC.105/C.2/L.16 (Sept. 6, 1966) [hereinafter United Arab Republic: Proposal] (prepared by United Arab Republic) (calling for all nations to enjoy the practical benefits of outer space).

156. See COPUOS, 5th Sess., 65th mtg., *supra* note 154, at 4 (statement of Mr. Partli of Hungary) (arguing that states which actually invested in space exploration should have discretion to disclose the results obtained as a result of their efforts).

157. See United Arab Republic: Proposal, *supra* note 155, at 6 (proposing that any benefits obtained from the exploration or use of outer space should be shared by all nations).

158. Similar problems arose and were resolved in the context of the law of

decided on the less intrusive principle, setting the tone for the rest of the treaty by establishing that the freedom to use space is a positive right that can only be defeated by a corresponding restriction found later in the treaty.¹⁵⁹

While current work focuses on whether Article 2 provided such a clear restriction on the right to use space, discussions among the OST drafters on that provision were notably lacking in frequency and length.¹⁶⁰ The language in Article 2 was based on an earlier U.N. resolution that sought “to avoid the extension of present national rivalries” into outer space.¹⁶¹ Article 2 added substance to this goal, which the resolution lacked.¹⁶² Many delegates praised its inclusion in the OST, and some even alluded to the Article’s dual purposes of prohibiting sovereign claims as well as private law claims of property.¹⁶³ Despite perceptions to the contrary, not all delegations believed it was proper to attach such a broad meaning to the vague non-appropriation clause.¹⁶⁴

the sea. *See* UNCLOS, *supra* note 56, art. 17 (granting landlocked states the right to innocent passage through the territorial sea, though not conveying the resources to allow such activities).

159. *See* COPUOS, Legal Subcomm., Rep. on its 5th Sess., July 12-Aug. 4, 1966, annex II at 12, U.N. Doc. A/AC.105/35 (Sept. 16, 1966) (providing text of Article 2 as accepted by the Legal Sub-Committee’s working group); *see also* CHRISTOL, *supra* note 28, at 38-43 (analyzing preparatory work and confirming that OST drafters intended Article 1 to guarantee exploitation when they provided the right to use outer space, but noting that the drafters’ discussion focused more on the potential benefits derived from remote sensing and communications satellites than the issue of resource extraction).

160. *See, e.g.*, COPUOS, 5th Sess., 71st Mtg., *supra* note 52, at 10 (statement of Mr. Herndl of Austria) (arguing that the non-appropriation language was vague, but failing to indicate what the provision might mean).

161. G.A. Res. 1348 (XIII), pmbl., U.N. Doc. A/RES/1348 (XIII) (Dec. 13, 1958).

162. *Compare id. with* OST, *supra* note 30, art. 2 (“Outer space . . . is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.”).

163. *See* COPUOS, 5th Sess., 71st Mtg., *supra* note 52, at 7 (statement of Mr. Bal of Belgium) (noting the Belgian delegation’s acceptance of this interpretation, and observing that such interpretation was “apparently without contradiction” among the delegations).

164. *See, e.g.*, U.N. GAOR, COPUOS, Legal Subcomm., 5th Sess., 63d mtg. at 8, U.N. Doc. A/AC.105/C.2/SR.63 (July 20, 1966) [hereinafter COPUOS, 5th Sess., 63d Mtg.] (statement of Mr. Deleau of France) (claiming that the text of Article 2 failed to clearly establish which types of activities would fall under the term “use” and that the provision should be open to “further textual

For instance, one delegate recognized that it was quite impossible to predict how future technologies would allow for the use of outer space, specifically referencing extraction of lunar resources, and cautioned against premature regulation of such activities.¹⁶⁵

Other delegates, most notably the Soviet representative, agreed with the cautious approach by recognizing that international law should be focused on present realities rather than fictions.¹⁶⁶ This method is not new. For instance, the drafters of the 1958 High Seas Convention did not regulate artificial islands such as oil rigs because it was a fairly immature technology at the time, but by 1982 it was sufficiently developed to warrant inclusion in UNCLOS.¹⁶⁷ Therefore, the preparatory work does little to clarify the Article's meaning because prudence demands that international law regulate realities and impending problems, not possibilities in the distant future.¹⁶⁸

The drafters' commentary on Article 6 reveals even less information regarding the treaty's impact on mineral extraction: meeting records show that the debate revolved around the Article's scope, namely whether the OST should extend to

improvements").

165. *See id.* (stressing that states should clarify the scope of the OST, and avoid attempting to regulate future technologies in the absence of a clear understanding of the "complex issues" those technologies entail).

166. *See id.* at 10-11 (statement of Mr. Morozov of the USSR) (acknowledging that the Soviet Union felt "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 judgement [sic] at the present stage").

167. *Compare* Convention on the High Seas, *supra* note 56, art. 1 (omitting mention of oil rigs or artificial islands on the high seas, or the right to make use of mineral resources located therein), *with* UNCLOS, *supra* note 56, art. 87 (permitting the construction of artificial islands on the high seas subject to the restrictions on mineral extraction enumerated later in the treaty). *See generally* ROSS D. ECKERT, THE ENCLOSURE OF OCEAN RESOURCES: ECONOMICS AND THE LAW OF THE SEA 94-99 (1979) (explaining that the depth of waters for offshore oil wells was limited to about 100 meters in 1965, but significantly increased in depth due to technological advancements by the late 1970s).

168. *See* GANGALE, *supra* note 13, at 87 (arguing that "anticipatory lawmaking" is inappropriate in areas involving complex technologies because lawmakers must rely on assumptions about the future rather than experience, which may lead to the development of legal norms that lack practical effect).

international organizations.¹⁶⁹ This question was important for many states because exploring the heavens was not practical without cooperation with other nations.¹⁷⁰ Thus, Article 6 is a clear recognition that space activities are not limited to states, yet fails to address the nature of such efforts.

The OST's property provisions remain ambiguous after this analysis of the preparatory work. While there was agreement on the fact that Article 1 was focused on the peaceful nature of outer space, the discussions do not reveal whether its drafters contemplated private resource extraction. Instead, the records indicate they focused primarily on claims of territorial sovereignty and did not clarify the extent to which Article 2 governed the use of outer space.

2. *Circumstances of OST's Conclusion*

Sources that are not traditionally considered legal can be valuable for treaty interpretation, as these sources go to the drafters' state of mind.¹⁷¹ Accordingly, the Cold War and concomitant 1960s space race are considerable factors that should be taken into account for analyzing the OST.¹⁷²

This perilous era, when nuclear holocaust occasionally seemed inevitable, influenced the treaty's drafters and the speed with

169. See COPUOS, 5th Sess., 57th Mtg., *supra* note 37, at 13 (statement of Mr. Morozov of the USSR) (explicating the Soviet position that when international organizations act in space, responsibility for compliance with the OST rests on the international organization itself as well as the States Parties).

170. See U.N. GAOR, COPUOS, Legal Subcomm., 5th Sess., 67th mtg. at 3, U.N. Doc. A/AC.105/C.2/SR.67 (July 25, 1966) (statement of Mr. Morozov of the USSR) (observing that "in certain countries activities in space could not be confined to the State"); see also 1 J. KRIGE & A. RUSSO, A HISTORY OF THE EUROPEAN SPACE AGENCY: 1958-1987 9-11 (2000), available at www.esa.int/esapub/sp/sp1235/sp1235v1web.pdf (noting that a ravaged postwar Europe was not able to compete with the Cold War superpowers, thus requiring those states to come together in what became the European Space Agency).

171. See VILLIGER, *supra* note 99, at 445 (arguing that the Vienna Convention allows for scholars to acknowledge "the political, social, and cultural factors" that surround a treaty's conclusion).

172. See generally PETER G. BOYLE, AMERICAN-SOVIET RELATIONS: FROM THE RUSSIAN REVOLUTION TO THE FALL OF COMMUNISM 54-70 (1993) (exploring the historical origins of tensions between the United States and the Soviet Union beginning in the mid-1940s that led up to the Cold War).

which they worked.¹⁷³ Some recognized the dangers of locating weapons of mass destruction in outer space, hoping that at least one sphere of human activity could be free of that horror.¹⁷⁴ Others were apparently more concerned that neither the United States nor the Soviet Union should be allowed to lay claim to the Moon as an extension of their territory.¹⁷⁵

Acknowledging this political environment yields an undeniable result: the drafters did not set out to create a comprehensive legal document to govern space for all eternity. On the contrary, the OST represents a diplomatic stopgap hurriedly prepared before the first landing on the moon could ignite a new theater of Cold War conflict.¹⁷⁶ Given this context, the drafters could not have intended a rule against private extraction of lunar minerals since Cold War-era technology was insufficiently developed to allow for such activities.

3. *Subsequent State Interpretations*

Subsequent practice in the application of a treaty that demonstrates agreement regarding its interpretation may be taken into account when clarifying its meaning.¹⁷⁷ In the case of

173. See, e.g., U.N. GAOR, COPUOS, Legal Subcomm., 5th Sess., 72d mtg. at 3, U.N. Doc. A/AC.105/C.2/SR.72 (Sept. 12 1966) [hereinafter COPUOS, 5th Sess., 72d Mtg.] (statement of Mr. Goldberg of the United States) (declaring that successful steps toward a moon landing, not yet a race clearly won by the United States, demonstrated the urgent need for a treaty on general principles governing outer space). *But see* 113 CONG. REC. 10682 (1967) (statement of Sen. Thurmond) (arguing that a treaty is incapable of preventing nuclear warfare because “the Soviet record indicates that they will violate this treaty as soon as it fits their strategy of world conquest”).

174. See Zell, *supra* note 26, at 489-90 (observing that many people feared that “cold war brinkmanship” would lead to the introduction of nuclear weapons into outer space).

175. See Thomas, *supra* note 32, at 589-91 (reasoning that the United States and Soviet Union agreed to the OST in order to “fix the odds” of the 1960s space race and avoid the possibility of letting their opponent lay claim to the moon).

176. Cf. U.N. GAOR, COPUOS, Legal Subcomm., 5th Sess., 61st mtg. at 7, U.N. Doc. A/AC.105/SC.2/SR.61 (Jul. 18, 1966) (statement of Mr. Bal of Belgium) (recognizing that diplomatic efforts of the 1960s were not expected to produce a definitive codification of space law).

177. Vienna Convention, *supra* note 86, art. 31(3)(b); see also VILLIGER, *supra* note 89, at 429 (explaining that states’ “authentic interpretation” of a treaty

non-appropriation of celestial bodies, there are few acts of commission to show agreement on the issue.¹⁷⁸ States that have sent probes and manned missions to such bodies have indeed recognized the OST's hostility to sovereign claims.¹⁷⁹ Furthermore, states have refused to recognize the claims of Earth-bound citizens who have laid claim to celestial bodies or sold plots of land on the moon.¹⁸⁰ However, none of these examples deals with a private actor who physically traveled to a celestial body and extracted its resources. In the absence of such an example, there is no clear demonstration of state practice regarding the specific issue at hand.

Looking to Article 2's various interpretations in the early era of space law reveals that states shared no common view of the provision's effect. Debates in the U.S. Senate over whether to consent to the treaty's ratification demonstrate the nation's contemporary understanding of the provision.¹⁸¹ Not once did the senators praise, decry, or even recognize the OST's impact on private actors.¹⁸² The only references to Article 2, while not

may alter the treaty's effect).

178. See generally Sheera Frankel, *Writing the Rules to Govern the Cosmos*, CHRISTIAN SCI. MONITOR, Aug. 4, 2004, at 15 (detailing examples of unusual attempts at private appropriation of space, such as when three Yemeni brothers claimed to inherit the planet Mars from their ancestors over 3,000 years ago).

179. See ANNE M. PLATOFF, WHERE NO FLAG HAS GONE BEFORE: POLITICAL AND TECHNICAL ASPECTS OF PLACING A FLAG ON THE MOON (1993), available at <http://www.jsc.nasa.gov/history/flag/flag.htm> (outlining the debate that preceded the Apollo 11 crew's planting of the U.S. flag on the Moon, and acknowledging the purely symbolic value of this gesture in light of the OST's prohibition on national appropriation).

180. See *supra* notes 118-19 and accompanying text (describing a case involving Nemitz, a U.S. citizen, who attempt to assert ownership over an asteroid); see also Letter from Ralph L. Braibanti, Dir., Space & Advanced Tech., U.S. Dep't of State, to Gregory William Nemitz (Jan. 21, 2003), available at <http://www.erosproject.com/exhibit01.html> (stating that the State Department interpreted OST's Article 2 in a manner that prevents private ownership of an entire asteroid).

181. See, e.g., 113 CONG. REC. 2781-82 (1967) (relaying President Johnson's support of the OST and his message to the Senate, which touched primarily on themes of national security, peace, and cooperation).

182. See, e.g., *id.* at 2782 (limiting discussion of the principles in Article 2 to the OST's impact on the space race in Cold War terms, hinting at the benefit of preventing the Soviet Union from being able to claim the moon). While the

explicit, were in the context of national sovereignty.¹⁸³ Moreover, several recognized the treaty's role as a building block to the body of space law, rather than the exclusive document to regulate that area.¹⁸⁴ Given the number of floor speeches regarding the OST, it seems to be a safe conclusion that space mining was not considered at the time.

Outside the United States, states may have attached other meanings to Article 2. Diplomats from non-Anglophone nations explained several years after the OST's adoption that linguistic differences prevented a singular interpretation, for example, a Mexican official noted that Hispanophones and Francophones attach a particular meaning to the common heritage terminology.¹⁸⁵ As a result, several nations apparently believed that the OST had already incorporated the common heritage of mankind.¹⁸⁶

Where conflicting interpretations arise for a treaty authenticated in more than one language, the meaning most in line with the treaty's object and purpose should be adopted.¹⁸⁷ As

President hinted that extraterrestrial resources may solve the problem of resource scarcity on Earth, he made no mention of private actors, choosing instead to couch these statements in terms of nation-building and peace promotion. *Id.*

183. *See, e.g., id.* at 2783 (alluding to Article 2's purpose as a prohibition of national sovereignty claims to the Moon while failing to consider private claims or different types of property).

184. *See id.* at 2781 (acknowledging that the OST was "an interim achievement—a significant, but not a final step forward").

185. *See* U.N. GAOR, COPUOS, Legal Subcomm., 13th Sess., 212th mtg. at 36, U.N. Doc. A/AC.105/C.2/SR.212 (May 10, 1974) (statement of Mr. Vallarta of Mexico) (noting that the Spanish and French terms for the common heritage principle, "patrimoine" and "patrimonio" respectively, signify "the State's property").

186. *See id.* (noting the Mexican delegation's belief that the common heritage principle applied to outer space because similar Spanish terms were used to describe the legal status of the sea-bed and ocean floor during the Conference on the Law of the Sea). *But see id.* at 37 (statement of Mr. Maiorski of the USSR) (asserting that while some delegations believe the OST incorporated the common heritage principle, the Russian text did no such thing, and observing that, in Russian, the concepts of heritage and property are not linked as they are in Spanish).

187. *See* Vienna Convention, *supra* note 86, art. 33 (acknowledging that a precise interpretation may not be possible without reconciling linguistic differences).

the OST's purpose was to establish basic principles regarding outer space and to avoid Cold War complications rather than articulate a new theory of property, the less restrictive *res communis* theory is appropriate because the spacefaring nations were concerned about claims of territorial sovereignty, not the use of mineral resources.¹⁸⁸

4. *Making Use of Other Spheres of Human Activity*

More than forty years after the drafting of the OST, considerable advances in technology have made the prospect of commercial space mining increasingly realistic.¹⁸⁹ Yet, the OST's ambiguity with respect to the question of whether private actors may extract minerals in outer space hinders these developments.¹⁹⁰ Moreover, the international community prefers to avoid such gaps in the law.¹⁹¹ Accordingly, other rules of international law should be considered from spheres of activity without sovereign claims.

a. *Maritime Law*

Many scholars are fond of using UNCLOS to clarify space law because of similarities between the areas: inherent difficulties in exerting exclusive control and a historical basis for non-sovereignty.¹⁹² Such arguments ignore the fact that UNCLOS was adopted more than a decade after the OST and embraced a

188. See discussion, *supra* Parts III.B-C (arguing that, in light of the OST's text and the Cold War context in which the treaty developed, the OST was intended to limit the spread of weapons, rather than apply the new common heritage theory).

189. Zullo, *supra* note 4, at 2438.

190. See Fountain, *supra* note 23, at 1764 (recognizing that mining companies need legal assurance that the fruits of their investment will remain company property).

191. See generally *Military and Paramilitary Activities in and Against Nicaragua (Nicar. v. U.S.)*, 1986 I.C.J. 14, ¶ 51-52 (June 27) (Oda, J., dissenting) (explaining the debate over whether a legal system may recognize a gap in substantive law, and the international community's tendency to avoid such a finding).

192. See, e.g., Thomas, *supra* note 32, at 601-29 (arguing that a modified form of the UNCLOS should be used to govern outer space); see also Zullo, *supra* note 4, at 2442-44 (relying on UNCLOS while ignoring the maritime law that was in place at the time of OST's adoption).

controversial property theory that hindered the treaty's acceptance.¹⁹³ In fact, UNCLOS bears more historical ties to the Moon Treaty, which this Comment has already shown to be of little relevance.¹⁹⁴ Analyses should instead look to the 1958 High Seas Convention because it was a *res communis* treaty in force at the time the OST was adopted.¹⁹⁵

The 1958 treaty shows how liberties resembling limited property rights may exist in a *res communis*.¹⁹⁶ For instance, Article 2 gives states the right to fish the high seas, implying that fishermen retain good legal title over their catch.¹⁹⁷ This supports the idea that resources located within the *res communis* may be separated from the area itself, meaning that under the 1958 legal regime, even if a state could not appropriate the high seas, it could still make use of its resources.¹⁹⁸ While the OST drafters did not contemplate the status of minerals that are physically extracted from the Moon or other celestial bodies, the fishing rights example shows that contemporary international law at least allowed for such distinctions at the time the OST was

193. See discussion *supra* Part II.C (discussing UNCLOS and the subsequent treaty used to modify the original document's interpretation of the common heritage principle).

194. See U.N. GAOR, COPUOS, Legal Subcomm., 12th Sess., 192d mtg. at 11-12, U.N. Doc. A/AC.105/C.2/SR.192 (Mar. 26, 1973) (statement of Mr. Rao of India) (noting the relevance of the Moon Treaty's development to the principles considered by the Committee on the Peaceful Uses of the Sea-Bed and Ocean Floor); see also discussion *supra* Part III.A (dismissing the Moon Treaty's relevance given the fact that it applies to no spacefaring nation).

195. See Vienna Convention, *supra* note 86, art. 32 (allowing for treaties to be interpreted based on contextual information at the time of their conclusion).

196. See Convention on the High Seas, *supra* note 56, art. 2 (embracing the notion that the high seas are free from sovereignty claims); see also discussion *supra* Part II.A (distinguishing the common heritage of mankind and *res communis* theories).

197. See *id.* (allowing for the reasonable use of high seas fisheries); see also ECKERT, *supra* note 167, at 142-45 (recognizing that the right to fish the high seas implies two types of property rights: a limited right in the uncaught fish, and complete ownership over the fish once caught).

198. Cf. ECKERT, *supra* note 167, at 144-45 (arguing that the 1958 treaties created limited property rights in uncaught fish that were ambiguously apportioned among coastal and in-land states, though such rights were not exclusive).

concluded.¹⁹⁹

Furthermore, states were allowed to lay down pipes and cables on the seabed, which would effectively exclude others from accessing that specific area.²⁰⁰ This practice is similar to how a state uses a geostationary satellite, as its orbit inherently excludes others from accessing that area, so there was a basis for distinguishing removable resources from the land (or water) itself.²⁰¹ Therefore, it seems that the OST drafters could have conceived of differences between a *res communis* and its movable resources.

b. Antarctic Treaty

Given the Antarctic Treaty System's historical relationship with the OST, it often is cited in scholarly analysis of the latter's treatment of extraterrestrial resources.²⁰² Textual similarities strengthen the analogy: peaceful use, equal access, and the freedom of scientific investigation are integral principles of both documents.²⁰³ Statements from several OST drafters, however, indicate that as with maritime law, ATS analogies are persuasive but not controlling.²⁰⁴ Therefore, it does not necessarily follow

199. Cf. UNCLOS, *supra* note 56, art. 87(2) (granting the right to fish in the high seas subject to other regulations intended to guarantee that right for all nations).

200. See Convention on the High Seas, *supra* note 56, art. 2(3) (allowing states to place objects on the ocean floor, inherently leading to the conclusion that such action would exclude other states from using the affected area for a similar purpose).

201. See Kurt Anderson Baca, *Property Rights in Outer Space*, 58 J. AIR L. & COM. 1041, 1071-83 (1993) (arguing that in practice the current system of geostationary orbital slot locations grants a limited and temporary set of property rights to a state controlling the slot).

202. See, e.g., Julie A. Jiru, Comment, *Star Wars and Space Malls: When the Paint Chips Off a Treaty's Golden Handcuffs*, 42 S. TEX. L. REV. 155, 162-63 (2000) (citing the Antarctic Treaty System as an example of the United States' reluctance to agree to international resource management treaties).

203. See The Antarctic Treaty, *supra* note 57, arts. 1-2 (providing that Antarctica is to be used peacefully with freedom of scientific investigation); see also discussion *supra* Part II.B (describing the OST's provisions).

204. See, e.g., U.N. GAOR, COPUOS, Legal Subcomm., 5th Sess., 60th mtg. at 4, U.N. Doc. A/AC.105/C.2/SR.60 (July 15, 1966) (statement of Mr. Ruda of Argentina) (rejecting the analogy between Antarctica and outer space on the grounds that states established territorial claims on Antarctica).

that the same arguments over whether Antarctica is the common heritage of mankind or a *res nullius* automatically apply to outer space.²⁰⁵ More to the point, persistent conflict over Antarctica's status prevents a clear example of consistent state practice since the legality of resource extraction largely depends on which property theory applies.²⁰⁶

5. Failure to Overcome the Presumption of Freedom of Use

These supplementary interpretation-methods show there was a great deal of confusion over what activities Article 2 restricted. Its drafters and supporters apparently saw it as a provision to alleviate Cold War tensions, indicating that the right to use outer space currently extends to the right to extract mineral resources. The contextual information does not sufficiently clarify Article 2 so as to override the presumption of free use that was established in Article 1.²⁰⁷

IV. RECOMMENDATIONS

As this Comment illustrates, the OST does not present a clear answer as to whether private actors are forbidden from mining extraterrestrial minerals. Its drafters likely did not even contemplate such a question.²⁰⁸ International law does not accommodate such legal lacuna,²⁰⁹ however, so diplomatic efforts

205. See COPUOS, 5th Sess., 65th mtg., *supra* note 154, at 11 (statement of Mr. Morozov of the USSR) (proclaiming that outer space is a wholly new sphere of human activity therefore limiting the applicability of the Antarctic Treaty System); see also Weaver, *supra* note 27, at 231 (recognizing that few could argue that outer space is a *res nullius* due to the difficulties in controlling outer space).

206. See TRONCHETTI, *supra* note 10, at 145 (describing conflict over the industrialized nations' attempt to allow Antarctic mining, provoking the Non-Alignment Movement to formally request that the United Nations consider the question of Antarctica).

207. See generally CHRISTOL, *supra* note 28, at 38-40 (recognizing that Article 1 created a broad right to use outer space so long as the use complies with both international law and is for the benefit of mankind).

208. See COPUOS, 5th Sess., 63d Mtg., *supra* note 164, at 10-11 (statement of Mr. Morozov of the USSR) (recognizing that it is impossible, or impractical, to attempt to create international law to govern practices that do not yet exist and that upon the creation of new human abilities, new rules must be created).

209. See *supra* note 205 and accompanying text.

1518

AM. U. INT'L L. REV.

[26:5

should be made to research the scientific implications of space mining, ascertain states' opinions, and make recommendations.

A. THE U.N. GENERAL ASSEMBLY SHOULD PASS A RESOLUTION CALLING FOR THE COPUOS LEGAL SUB-COMMITTEE TO STUDY LEGAL PROBLEMS ASSOCIATED WITH THE FUTURE OF SPACE EXPLORATION AND USE.

Legal adaptation does not always happen quickly on the international stage, particularly in the context of treaty negotiations. To facilitate this process, discussions on legal problems due to emerging technologies should begin prior to contentious treaty negotiations.²¹⁰

1. *COPUOS Legal Sub-Committee*

There is precedent for COPUOS to take responsibility in analyzing emerging legal issues.²¹¹ This method is not without its drawbacks; it focuses on diplomatic consensus rather than encouraging a transparent voting process.²¹² Thus, a reiteration of this process may not yield a product any less ambiguous than the OST. Nevertheless, COPUOS would be a legitimate forum to resolve oft-cited space law problems.

a. *Different Regions, Separate Treaties*

The first step toward a satisfactory space law system is to finally acknowledge the inherent differences between outer space and celestial bodies.²¹³ Space is indeed very much like the

210. See U.N. GAOR, COPUOS, 24th mtg. at 2, U.N. Doc. A/AC.105/PV.24 (Nov. 22, 1963) (statement of the Chairman) (lauding the Legal Sub-Committee's work and exchange of ideas, which led to fewer disagreements with respect to the principles of space law as the Committee began drafting the OST).

211. See *id.* (noting the benefits derived from the Committee's discussion of principles set out in the first General Assembly space law resolution).

212. Cf. Nandasiri Jasentuliyana, *The Lawmaking Process in the United Nations*, in *SPACE LAW: DEVELOPMENT AND SCOPE*, *supra* note 29, at 36 (explaining that COPUOS operates on an informal rule that calls for consensus, which arguably causes drawn-out negotiations, the ability for a lone state to prevent the adoption of a treaty, and a forum for extended conflicts between parties who disagree).

213. See Thomas, *supra* note 32, at 606-10 (arguing that outer space should

high seas in that it is physically difficult to maintain exclusive control over a given area.²¹⁴ Given this natural frustration of property rights in any form, the OST's current prescription of free access and non-sovereignty seems a logical conclusion.²¹⁵

Celestial bodies, on the other hand, are different from the vacuum of space because they have mass and composition.²¹⁶ This difference theoretically makes it easier for a private actor to exclude others on such bodies, as one limits access only to a base on the surface. The one similarity between outer space and celestial bodies is that present technology prevents both from being readily accessible to the vast majority of the world. A future treaty system that supplements the OST therefore should divide the issue, much as the 1958 maritime treaties distinguished between the high seas and benefits to be derived from that area.²¹⁷ This resolution will guarantee that legal discussions may accurately reflect scientific realities.

b. Incremental Exploration

A problem with many scholarly recommendations for changes to space law is that they are too broad; authors desire a treaty that either forbids or permits mineral extraction.²¹⁸ There is no middle ground in such arguments, and they advocate the drafting of a treaty prior to the maturation of the relevant technologies or

be divided by a series of zones subject to varying property theories, just as UNCLOS did for the seas).

214. See Weaver, *supra* note 27, at 231 (relying on the historical example that colonial naval powers were unable to support claims of sovereignty over the high seas because the states lacked the ability to assert actual control).

215. See discussion, *supra* Part III.B-C (demonstrating that OST relies on the notion of free access to space subject to various limitations).

216. But see Thomas, *supra* note 32, at 607 (recognizing that even a zoning system for celestial bodies would need to be flexible, as celestial bodies range from Earth-like planets to asteroids to gas giants).

217. Cf. Treves, *supra* note 58, at 1-2 (stating that the 1958 treaties split up perceived problems into several treaties to attract acceptance of some of the Conference's results, if not all of them).

218. See, e.g., Brandon C. Gruner, *A New Hope for International Space Law: Incorporating Nineteenth Century First Possession Principles Into the 1967 Space Treaty for the Colonization of Outer Space in the Twenty-First Century*, 35 SETON HALL L. REV. 299, 344-55 (2004) (proposing that outer space be declared a *res nullius*, subject to the property rule of capture).

at least to a degree that is wholly unrealistic—a problem that the OST drafters wished to avoid.²¹⁹

Accordingly, COPUOS should find a compromise with an incremental perspective that allows for prospecting missions. For instance, states—and by implication, their juridical persons—could pursue limited exploration missions with an economic focus, rather than pure science. Such activities could experiment with mineral extraction on a very limited basis, using small landers and rovers,²²⁰ allowing for states and private actors to determine the feasibility of wide-scale mineral extraction, which would require a further set of diplomatic negotiations.²²¹ In the meantime, however, those entities that undertake such activities could stand to benefit from terrestrial applications of the technologies they develop for space mining.²²²

V. CONCLUSION

International space law must adapt to changing circumstances in order to remain relevant, just as maritime law has evolved in the face of new technologies and practices since Grotius wrote *Mare Liberum*. Unlike the high seas, however, developments in the use of outer space must be preceded by legal changes. Whereas the seas had the benefit of a disorderly international system and relatively simple technologies, space development will require expensive and lengthy missions. Without legal certainty, the private sector may be unwilling to gamble on this new frontier, and without investment in space enterprise,

219. See COPUOS, 5th Sess., 63d Mtg., *supra* note 164, at 10-11 (statement of Mr. Morozov of the USSR) (stressing the imprudence of applying treaties to theoretical problems).

220. Cf. BROWN, *supra* note 76, at 105-06 (describing how an early phase of mineral extraction for the seabed would take the form of prospecting, allowing for actors to explore for deposits of minerals but without acquiring exclusive rights over such resources).

221. See U.N. GAOR, COPUOS, Legal Subcomm., 12th Sess., 204th mtg. at 88-89, U.N. Doc. A/AC.105/C.2/SR.204 (Apr. 18, 1973) (statement of Mr. Yoshida of Japan) (stating that “it was too early to elaborate provisions” for the commercial use of the moon’s natural resources as there was insufficient knowledge as to the “quality and quantity” of such resources).

222. See generally Zell, *supra* note 27, at 494 (recognizing the tangential benefits associated with the 1960s space race, resulting in useful and profitable products for Earth-based markets, such as faster computers).

2011] *EXTRATERRESTRIAL RESOURCE EXTRACTION* 1521

humanity's destiny of exploration will be unfulfilled.