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Starships and Enterprise: Private Spaceflight Companies' Property Rights and the U.S. Commercial Space Launch Competitiveness Act

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NOTES

STARSHIPS AND ENTERPRISE: PRIVATE SPACEFLIGHT COMPANIES' PROPERTY RIGHTS AND THE U.S. COMMERCIAL SPACE LAUNCH COMPETITIVENESS ACT

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INTRODUCTION

Although individual States and the international community spent decades attempting to set up a legal regime in advance of humanity's return to outer space, technology is quickly beginning to outpace law in a race out of the atmosphere. A recent NASA-funded study estimated that the United States, in partnership with private industry, could return humans to the moon in as little as five to seven years for about $10 billion.[1] That same study also contemplated the possibilities of an estimated $40 billion lunar base, which would dramatically cut costs in future missions to Mars.[2]

Private space flight continues to flourish with companies like Planetary Resources and Deep Space Industries beginning programs and launching tests for prospecting lucrative resources housed in asteroids.[3] Further, a study published by The Keck Institute for Space Studies estimated that finding a resource-rich

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[1] *NASA-Funded Study Reduces Cost of Human Missions to Moon and Mars by Factor of Ten*, NSS.ORG (July 20, 2015), http://www.nss.org/news/releases/NSS_Release_20150720_LunarArchitecture.html.

[2] *Id.* (explaining plans to harvest propellant from asteroids, store it in lunar orbit, and use it to resupply spacecraft for further exploration).

[3] James M. Smith, *Space: The Orbital Industry*, THEMARKETMOGUL.COM, http://themarketmogul.com/space-orbital-industry (last visited Sept. 14, 2016).

asteroid and bringing it into Earth's orbit for mining would cost only $2.6 billion.[4] Compare these lowered costs to the potentially enormous rewards in harvesting precious metals, helium-3, and even water, and it becomes rather obvious why both governmental and private entities are already on their way back to the bounty of outer space.[5]

Although the technology surrounding outer space exploration and resource harvesting has dramatically improved, many scholars agree that the surrounding legal regime remains unclear.[6] Without a legal mechanism to ensure property rights in harvested outer space materials, both governments and private companies may hesitate to undertake the high risks and costs of obtaining space resources without assurances that they will truly own them.[7] Alternatively, as this Note discusses, allowing parties to acquire space resources without further clarifying some restrictions has the potential to breach international obligations in the distant future.[8] In response to developing technology and this unclear legal regime, scholars have recommended immediate action to enact more substantive space law before technology has developed the ability to reach celestial bodies.[9]

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[4] *Id.*

[5] *Id.* (discussing the economic potential of precious metals and water on asteroids); Richard B. Bilder, *A Legal Regime for the Mining of Helium-3 on the Moon: U.S. Policy Options*, 33 FORDHAM INT'L L.J. 243, 243–46 (2010) (discussing the potential value of helium-3 as an extremely effective and environmentally friendly isotope for thermonuclear energy). Although all of the celestial bodies with which this Note is concerned are clearly located in "Outer Space," defining where that boundary begins and Earth ends has proven troublesome. *See generally* Theodore W. Goodman, *To the End of the Earth: A Study of the Boundary Between Earth and Space*, 36 J. SPACE L. 87 (2010).

[6] Rosanna Sattler, *Transporting A Legal System for Property Rights: From the Earth to the Stars*, 6 CHI. J. INT'L L. 23, 27–29 (2005); Kyle A. Jacobsen, Comment, *From Interstate to Interstellar Commerce: Incorporating the Private Sector into International Aerospace Law*, 87 TEMP. L. REV. 159, 191 (2014); Blake Gilson, Note, *Defending Your Client's Property Rights in Space: A Practical Guide for the Lunar Litigator*, 80 FORDHAM L. REV. 1367, 1367 (2011).

[7] Henry R. Hertzfeld & Frans G. von der Dunk, *Bringing Space Law into the Commercial World: Property Rights Without Sovereignty*, 6 CHI. J. INT'L L. 81, 81 (2005); Kurt Anderson Baca, *Property Rights in Outer Space*, 58 J. AIR L. & COM. 1041, 1045 (1993).

[8] *See infra* Part IV.

[9] Bilder, *supra* note 5, at 277–80; Sattler, *supra* note 6, at 44. *But compare* Hertzfeld & von der Dunk, *supra* note 7, at 95, *with* Byron C. Brittingham, *Does the World Really Need New Space Law?*, 12 OR. REV. INT'L L. 31, 48 (2010).

In 2015, the House of Representatives offered a legal structure in H.R. 2262, the Spurring Private Aerospace Competitiveness and Entrepreneurship Act of 2015—or the "SPACE Act"—which was later passed under the U.S. Commercial Space Launch Competitiveness Act ("SLCA").[10] Fittingly, the stated purpose of the act is to make regulatory conditions more predictable, and, as stated in a report by the Science, Space, and Technology Committee, SLCA attempts to add some stability to the uncertain legal regime of property rights in space resources.[11]

SLCA seeks to clarify property rights by an amendment to 51 U.S.C.A. § 51303:

> A United States citizen engaged in commercial recovery of an asteroid resource or a space resource under this chapter shall be entitled to any asteroid resource or space resource obtained, including to possess, own, transport, use, and sell the asteroid resource or space resource obtained in accordance with applicable law, including the international obligations of the United States.[12]

Further, the proposed amendments originally included a civil action against harmful interference with asteroid resource operations, provided the aggrieved party: (1) acted in accordance with the international obligations of the United States; (2) was first in time; and (3) acted reasonably for exploration and utilization of asteroid resources.[13] However, that provision has since been removed and replaced with a simple statement that the President shall promote outer space resource recovery free from harmful interference.[14]

Critics of the act have attacked the property rights regime as controversial in light of an uncertain structure of existing space law.[15] Because SLCA relies on meeting international obligations

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[10] U.S. Commercial Space Launch Competitiveness Act § 402, 51 U.S.C.A. §§ 51301–03 (West 2015).

[11] H.R. REP. NO. 114–119, at 8 (2015).

[12] 51 U.S.C.A. § 51303.

[13] SPACE Act, H.R. 2262, 114th Cong. (2015).

[14] 51 U.S.C.A. § 51302(a)(3) (West 2015).

[15] Doug Messier, *House Democrats Slam SPACE Act as "Commercial Space Industry Wish List"*, PARABOLICARC.COM (May 21, 2015, 12:04 PM), http://www.parabolicarc.com/2015/05/21/house-democrats-slam-space-act-commercial-space-industry-list. Objection by both private and public parties to the SPACE Act has been far reaching. However, this Note focuses only on the issue of property rights in outer space resources.

in resource acquisition, these critics raise a legitimate question as to the effectiveness of unilateral grants of space resource property rights.[16] Further, these domestic objections may eventually return as international complaints. However, without imposing some type of regulation by unilateral action, the United States might have found its private companies venturing into outer space without any guiding principles of law except the unclear regime that was already in place.

This Note utilizes SLCA as a focal point to discuss the potential of domestic regulation that grants private companies property rights in harvested outer space resources and how, if at all, these rights can exist within the boundaries of current international obligations. First, it outlines current international obligations in space law, delving into the treaties governing space law and analagous obligations in Antarctica and the deep sea. Second, this Note discusses how SLCA meets those guidelines and where it falls short. This Part draws on the Roman law principles of *res nullius* and *res communis*, the supporting sections of the Act itself, and analogies to the water law regime in the western United States to both support the Act and establish its shortcomings. Finally, this Note concludes that private companies can harvest space resources under SLCA consistently with the United States' international obligations, but a sunset provision on this property rights regime, limiting its duration to a set term of years or until an updated international treaty regime is established, may be necessary to remain in compliance with international obligations.

I. BACKGROUND

In order to determine the international obligations of the United States—and therefore, of its private spaceflight companies under SLCA—it is necessary to explore the unclear boundaries of existing space law and a few analogous treaty regimes.[17] The primary treaty concerning outer space property rights is the Outer Space Treaty, to which the United States is

[16] *See* 161 CONG. REC. H8190 (daily ed. Nov. 16, 2015) (Statement of Rep. Edwards) ("I am concerned that we are rushing to establish policy on space resource mining and utilization without having vetted the range of issues associated with it and without having carried out the necessary due diligence to inform legislation that relates to our international treaty obligations with our international partners.").

[17] *See supra* note 6 and accompanying text.

party.[18] Additionally, the Moon Agreement presents significant context for outer space property rights in international law, although the United States has not signed or ratified the agreement.[19] However, with both treaties in place, the United States has taken unilateral steps to preserve property rights in objects it has harvested from outer space. Finally, looking towards the future of space law, analogous international law and obligations provide some guidance through the Third Law of the Sea Convention[20] and the various treaties comprising the Antarctic Treaty System.[21]

In order to better understand the qualities of property rights under the current treaty regime, background property principles from Roman law help frame the discussion. The Romans defined different categories of things subject to varying types and extents of ownership, including *res communis* and *res nullius*.[22] *Res communis* were meant to be enjoyed and shared by all people in common.[23] *Res nullius* included things not subject to standing ownership, but attainable by the first person to occupy or capture the property.[24] The following international property regimes help to identify the place where resource rights in outer space fall between the two.

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[18] 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 "Outer Space Treaty"].

[19] Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, *adopted* Dec. 5, 1979, 1363 U.N.T.S. 21 [hereinafter "Moon Agreement"].

[20] *See generally* Third United Nations Conference on the Law of the Sea: Final Act, U.N. Doc. A/CONF.62/121 (Dec. 10, 1982), *reprinted in* 21 I.L.M. 1245 [hereinafter "UNCLOS"].

[21] *See generally* Antarctic Treaty, Dec. 1 1959, 12 U.S.T. 794, 402 U.N.T.S. 71; Agreed Measures for the Conservation of Antarctic Fauna and Flora, June 2, 1964, 17 U.S.T. 996; Convention for the Conservation of Antarctic Seals, June 1, 1972, 29 U.S.T. 441, 1080 U.N.T.S. 175; Convention and Conservation of Antarctic Marine Living Resources, May 20, 1980, 33 U.S.T. 3476, 1329 U.N.T.S. 47.

[22] PAUL DU PLESSIS, BORKOWSKI'S TEXTBOOK ON ROMAN LAW 152 (5th ed. 2015).

[23] *Id.*

[24] *Id.*

A. *The Outer Space Treaty*

The Outer Space Treaty, signed in 1967, presents the first international regulation of outer space.[25] According to its annex, the Outer Space Treaty attempts to ensure international cooperation in the peaceful use and exploration of outer space, while prohibiting the presence of nuclear weapons.[26] Aside from Articles I and II, which directly impact property rights, a few other noncontroversial international obligations bind parties to the treaty and possibly bind private enterprises launching from those parties.[27] First dispensing with these noncontroversial provisions, one of the central obligations of the Outer Space Treaty is contained in Article IV, which prohibits the presence of weapons of mass destruction or any military action in outer space.[28] Further, Article V mandates that parties must render all possible assistance to all other parties' astronauts, and inform the United Nations of any conditions that may pose a hazard.[29]

Articles XI and XII impose disclosure requirements, mandating that spacefarers must keep the public informed of their activities, and allow for other parties to visit outer space installations after appropriate notice.[30] Finally, the last major requirement that may affect private entities in outer space comes from Article IX, which expands on the requirements of international cooperation in outer space.[31] Article IX mandates that parties must act with due regard to other nations' interests in outer space and avoid contamination of celestial bodies.[32] Opponents of SLCA may cite the cooperation principles of Article IX to prohibit the act's unilateral grant of resource rights, but

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[25] *See* Outer Space Treaty, *supra* note 18.

[26] *Id.*

[27] Articles VI and VII together provide that States party to the treaty must authorize and supervise the outer space activity of nongovernment entities launching from their territory, further requiring any launching State to accept liability for any damages caused by even private entities. *Id.* arts. VI–VII.

[28] *Id.* art. IV.

[29] *Id.* art. V.

[30] *Id.* arts. XI–XII.

[31] *Id.* art. IX.

[32] *Id.* Some scholars argue that environmental controls and cooperation requirements reflect the inclusion of the "common heritage of mankind" principle in the Outer Space Agreement before its first formal expression in UNCLOS. *See, e.g.*, Jennifer Frakes, *The Common Heritage of Mankind Principle and the Deep Seabed, Outer Space, and Antarctica: Will Developed and Developing Nations Reach A Compromise?*, Note, 21 WIS. INT'L L.J. 409, 420–25 (2003). See *infra* Section III.B., for a full description of the common heritage principle.

United Nations General Assembly Resolution 51/122 allows States to fully determine the extent of their international cooperation in the exploration and use of outer space.[33] While the preceding provisions may not significantly impact parties operating under SLCA, the remaining relevant articles dealing with property in outer space present a greater impediment.

Articles I and II of the treaty provide the sparse property rights regime currently in place. Generally more expansive, Article II plainly states that "[o]uter space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means."[34] Article I remains a bit less clear, dictating that "[t]he exploration and use of outer space . . . shall be the province of all mankind" and that "States shall facilitate and encourage international co-operation," while simultaneously espousing unrestricted development of outer space through "free . . . exploration and use" and "free access."[35] While the less-clear mandates of Article I may restrict outer space property rights in the distant future, the broader restrictions of Article II present a more plain issue.

First, Article II raises concerns over whether a private entity can avoid its authority by claiming private property rights, rather than committing a national appropriation.[36] Generally, private American companies may be bound by the United States's full obligations under Article VI of the Outer Space Treaty, which states that States party are responsible for the actions of private parties launched from their territories.[37] Alternatively, Article II itself limits appropriation by any means, not just national claims of appropriation, and therefore may

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[33] G.A. Res. 51/122, ¶ 2 (Dec. 13, 1996). This definition of cooperation also comes into play regarding Article I, the first provision of the Outer Space Treaty that mandates international cooperation. Outer Space Treaty, *supra* note 18, art. I.

[34] Outer Space Treaty, *supra* note 18, art. II.

[35] *Id.* art. I.

[36] Gilson, *supra* note 6, at 1388–90; Brandon C. Gruner, Comment, *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, 332–33 (2004).

[37] Gilson, *supra* note 6, at 1388–90. "States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities." Outer Space Treaty, *supra* note 18, art. VI.

impact private companies, as well.[38] Article II serves as an even stronger regulation in outer space because, as some scholars have argued, it is given the force of customary international law.[39]

With regards to SLCA, private parties acquire property rights in materials harvested consistent with the "international obligations of the United States."[40] Therefore, even if private companies are not subject to Article II's ban on national appropriation, they must meet the United States's obligations under Article II in order to attain property rights under SLCA. Directly addressing this burden, SLCA has even expressly attempted to avoid the national appropriation issue by affirmatively stating that its authorizations do not constitute a claim of national sovereignty.[41] Even if that statement is ineffective, a few scholars have concluded that Article II does not affect private companies harvesting outer space resources because national sovereignty is not a necessary predicate for private parties to obtain property rights.[42]

Second, Article II fails to resolve whether merely harvesting resources—rather than making territorial claims—constitutes an appropriation, although Article I provides a more direct application to the issue.[43] By its various provisions on free exploration, use, and access, the Outer Space Treaty is very permissive regarding space resources, likely extending into allowing resource acquisition despite the appropriation limits of Article II.[44] Because the Outer Space Treaty is the only space law treaty binding the United States on property rights, there does not appear to be anything preventing outer space resource acquisition.[45] Such a pure lack of property right regulation would lead to a "first in time, first in right" structure of ownership in

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[38] Gilson, *supra* note 6, at 1388–90.

[39] F. Kenneth Schwetje, *Protecting Space Assets: A Legal Analysis of "Keep Out Zones"*, 15 J. SPACE L. 131, 141 (1987) (discussing that Article II may, as customary international law, affect nations that have not ratified the Outer Space Treaty).

[40] 51 U.S.C.A. § 51303 (West 2015).

[41] *Id.* § 403.

[42] Hertzfeld & von der Dunk, *supra* note 7, at 97–98; Alexander W. Salter & Peter T. Leeson, *Celestial Anarchy: A Threat to Outer Space Commerce?*, 34 CATO J. 581, 583 (2014).

[43] Sattler, *supra* note 6, at 28–29.

[44] Baca, *supra* note 7, at 1066.

[45] Hertzfeld & von der Dunk, *supra* note 7, at 83; Bilder, *supra* note 5, at 273–74.

line with the Roman law ownership principle of *res nullius* through possession, as long as parties avoid national appropriations.[46]

However, Article I reserves outer space as the province of all mankind, at least vaguely limiting property rights if not, as some scholars argue, fully reserving resources to common use in line with the Roman law principle of *res communis*.[47] Regardless, some scholars argue that Article I's permissiveness on exploration and use make the treaty amenable to resource acquisition even if it includes some common use principles.[48] This *res communis* principle caused a great deal of controversy when potentially expressed through the term "common heritage of mankind" in the next major treaty to deal with property right in space, the Moon Agreement.[49]

B. The Moon Agreement

The Moon Agreement, opened for signature in 1979 as the most recent multilateral attempt at expanding space law, addresses the need to clarify and expand the legal regime surrounding the use of outer space in its annex.[50] Although it is commonly known as the Moon Agreement, the Agreement also extends to "other celestial bodies," implicitly including asteroids.[51] However, only sixteen States have ratified the Moon Agreement as of January 1, 2015, none of which are spacefaring nations.[52] Although these provisions are not directly binding on the United States, they may provide context for understanding its obligations under the Outer Space Treaty, or may eventually become obligations if the United States should eventually sign and ratify the Moon Agreement.[53]

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[46] Gruner, *supra* note 36, at 345–46. For more on *res nullius*, see *infra* Section III.A.

[47] *See generally* Gruner, *supra* note 36; Gilson, *supra* note 6. For more on *res communis*, see *infra* Section III.A.

[48] Eric Husby, Comment, *Sovereignty and Property Rights in Outer Space*, 3 J. INT'L L. & PRAC. 359, 370 (1994).

[49] *See generally* Bilder, *supra* note 5; Frakes, *supra* note 32.

[50] Moon Agreement, *supra* note 19, 1363 U.N.T.S. at 22.

[51] *Id.*

[52] Committee on the Peaceful Uses of Outer Space, *Status of International Agreements Relating to Activities in Outer Space as at 1 January 2015*, UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS (Apr. 8, 2015), http://www.unoosa.org/pdf/limited/c2/AC105_C2_2015_CRP08E.pdf.

[53] Bilder, *supra* note 5, at 269–70.

The controversy preventing the adoption of the Moon Agreement surrounds Article 11, a provision proposing a substantial property rights regime.[54] Three particularly troublesome sections of Article 11 state:

> 1. The moon and its natural resources are the common heritage of mankind, which finds its expression in the provisions of this Agreement, in particular in paragraph 5 of this article.
> . . .
> 3. Neither the surface nor the subsurface of the moon, nor any part thereof or natural resources in place, shall become property of any State, international intergovernmental or non-governmental organization, national organization or non-governmental entity or of any natural person.
> . . .
> 5. States Parties to this Agreement hereby undertake to establish an international régime, including appropriate procedures, to govern the exploitation of the natural resources of the moon as such exploitation is about to become feasible.[55]

These three sections of Article 11 each provide perceived detriments to the commercial exploitation of outer space that led to the agreement's failure, but also evoke counterarguments that may point to its future success.

First, the United States and other spacefaring States opposed the agreement's use of the *res communis* "common heritage of mankind" principle, especially after that same principle caused UNCLOS to fail.[56] Opponents of the Moon Agreement assert that the meaning of "common heritage of mankind" is fixed in international law and dictates equitable resource sharing under the direction of an international organization, as was proposed in UNCLOS.[57] Supporters counter that the language of Article 11(1) expressly limits the usage of

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[54] Moon Agreement, *supra* note 19, 1363 U.N.T.S. at 25. Although the limitation on property rights expressed in this Article only references the moon, per Article 1, the agreement's provision applies to all celestial bodies in our solar system, aside from earth, until other legal norms are established for those bodies. *Id.* at 22.

[55] *Id.* at 25. Essentially, these three provisions mandate that celestial bodies are the common heritage of mankind, that no part of them are subject to any property right, and that an international organization must manage the natural resources on these celestial bodies.

[56] Carol R. Buxton, *Property in Outer Space: The Common Heritage of Mankind Principle vs. the "First in Time, First in Right" Rule of Property Law*, 69 J. AIR L. & COM. 689, 699 (2004); Bilder, *supra* note 5, at 263–64. For more on UNCLOS, see *infra* Section II.D.

[57] Bilder, *supra* note 5, at 265; UNCLOS, *supra* note 20, 21 I.L.M. at 1271, 1293.

common heritage doctrine to the provisions of the agreement itself.[58] Further, the agreement likely does not bar private entities from harvesting and retaining space resources because that interpretation would contradict the "free exploration and use" of the Outer Space Treaty.[59] Finally, certain provisions of the Moon Agreement itself adjust equitable principles to favor the entities that acquired benefits from outer space.[60]

Second, Article 11(3) caused controversy by, at first glance, prohibiting property rights in space resources.[61] However, the United States proposed the term "in place" to attempt to offer some property rights for resource-harvesting entities.[62] Further, parts of the agreement promote the collection of mineral samples for scientific purposes, and even those resources that are collected for economic purposes will likely include an additional scientific component for the foreseeable future.[63]

Finally, Article 11(5) aroused opposition by subjecting lunar resources to an international organization's control, again similar to deep-sea bed mining in UNCLOS.[64] In response, supporters argue that the Moon Agreement does not dictate the type of resource regime that must exist in this international organization, merely that States party must undertake to establish one.[65] Additionally, any party to the Moon Agreement that does not approve of the organization may refuse to join.[66] Finally, many scholars still support the idea of relying on an international organization to resolve the clarity issues in space law, and the Moon Agreement may provide the best framework to begin such a development.[67]

Returning to SLCA, the United States is not restricted by the Moon Agreement because it is not a signatory. Further, the provisions of the Outer Space Treaty likely allow private entities to acquire space resources.[68] To that effect, multiple United

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[58] Moon Agreement, *supra* note 19, 1363 U.N.T.S. at 25.
[59] Baca, *supra* note 7, at 1066.
[60] Bilder, *supra* note 5, at 268–69.
[61] Moon Agreement, *supra* note 19, 1363 U.N.T.S. at 25.
[62] Bilder, *supra* note 5, at 267–68; Leslie I. Tennen, *Towards a New Regime for Exploitation of Outer Space Mineral Resources*, 88 NEB. L. REV. 794, 813 (2009).
[63] Tennen, *supra* note 62, at 813.
[64] Moon Agreement, *supra* note 19, 1363 U.N.T.S. at 25.
[65] Bilder, *supra* note 5, at 266; Tennen, *supra* note 62, at 814.
[66] Bilder, *supra* note 5, at 267.
[67] *See infra* Section IV.A; Gilson, *supra* note 6, at 1402–05.
[68] *See infra* Section II.A; Hertzfeld & von der Dunk, *supra* note 7, at 83.

States government officials have opined that neither the Outer Space Treaty nor the Moon Agreement would stop private entities from obtaining property rights.[69] However, private harvesting of space resources still may be hampered by the uncertainty of the international regime levied against the substantial cost of space prospecting.[70] Regardless, the United States has its own precedent in supporting the position that property rights in space objects can stay consistent with international obligations.

C. Existing Property Rights in Space Resources

The United States has enforced its own property rights over moon rocks through sting operations on two separate occasions.[71] In one situation that went to trial, *United States v. One Lucite Ball Containing Lunar Material*,[72] the United States succeeded in a forfeiture action to recover a stolen piece of moon rock retrieved on a NASA mission.[73] The moon rock and accompanying plaque were given to Honduras as a gift, stolen from the country's government, and then sold to a United States citizen in Florida.[74] Establishing property rights in the moon rock was essential to the court's analysis because, as the court quoted, "in order for property to be considered 'stolen,' the property must rightfully belong to someone other than the person who has it."[75] After succeeding in its case, the United States returned the moon rock to Honduras.[76]

In the second major sting operation, federal agents and local law enforcement arrested a seventy-four-year-old woman who was attempting to sell a very small piece of moon rock that she claimed Neil Armstrong gave her husband, a NASA employee.[77] The United States further asserted its property rights in harvested lunar material by taking her moon rock, despite the

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[69] Bilder, *supra* note 5, at 271.

[70] *See supra* note 7 and accompanying text.

[71] MATTHEW J. KLEIMAN, THE LITTLE BOOK OF SPACE LAW 158–60 (2013).

[72] 252 F. Supp. 2d 1367 (S.D. Fla. 2003).

[73] *Id.* at 1369.

[74] *Id.* at 1369–70.

[75] *Id.* at 1378 (quoting United States v. Portrait of Wally, No. 99 Civ. 9940 (MBM), 2002 WL 553532, at *19 (S.D.N.Y. 2002)).

[76] KLEIMAN, *supra* note 71, at 159.

[77] *Id.* at 160.

possibility that she may have obtained it legitimately as a gift.[78] Somewhat unsurprisingly, NASA has formally stated that all lunar material obtained on its missions is property of the United States.[79] These types of unilateral property rights claims over harvested outer space resources all have analogous precedent in the United States's treatment of UNCLOS and even some of the development of the treaty system governing Antarctica.

D. Analogous International Law Regimes

Although treaty regimes regarding other high-risk, high-reward mining will not directly regulate the activities of private companies in space, they may provide guidance on expanding those obligations in the future.[80] Therefore, both UNCLOS and the Antarctic Treaty represent potential future influence in outer space mining regimes and assistance in understanding actual space law obligations. Further, the negotiation and ratification history surrounding UNCLOS is relevant because it depicts the United States's rejection of an international regime in favor of domestic regulation respecting certain other aspects of international law.[81] Additionally, the legal framework governing Antarctica is particularly relevant because the Outer Space Treaty drew some of its language directly from the Antarctic Treaty.[82]

1. UNCLOS

In the 1970s, governments and private companies began seriously considering mining the deep sea to monetize the significant mineral deposits available, despite the high costs and risk.[83] UNCLOS opened for signature in 1982 in order to provide clear regulations for deep sea mining.[84] UNCLOS was the first

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[78] *Id.*

[79] *Id.* at 156.

[80] *See, e.g.*, Sattler, *supra* note 6, at 32–37 (discussing the Antarctic treaty system and UNCLOS as examples on which the international community could expand existing space law).

[81] Bilder, *supra* note 5, at 273–74; Buxton, *supra* note 56, at 699.

[82] H. G. Darwin, Note, *The Outer Space Treaty*, 42 BRIT. Y.B. INT'L L. 278, 279 (1967).

[83] Barbara Ellen Heim, Note, *Exploring the Last Frontiers for Mineral Resources: A Comparison of International Law Regarding the Deep Seabed, Outer Space, and Antarctica*, 23 VAND. J. TRANSNAT'L L. 819, 822 (1990).

[84] *Id.* at 825; Sattler, *supra* note 6, at 34.

treaty to formally dispense with resources under the common heritage of mankind principle, and established an International Seabed Authority to do so.[85] These two particular provisions led to the Reagan administration's famous rejection of UNCLOS on the theory that subjecting deep sea resources to an international organization's equitable management would crush free enterprise.[86]

Next, in 1982, the United States passed the Deep Seabed Hard Mineral Resources Act to domestically regulate deep sea mining after rejecting UNCLOS.[87] This law acts as a purely temporary measure to provide licenses to domestic entities seeking to exploit the deep seabed until a successful international regime is created.[88] Even as a merely domestic law, the Act specifies that "commercial recovery of hard mineral resources of the deep seabed are freedoms of the high seas subject to a duty of reasonable regard to the interests of other states," and that any uses should be in line with recognized principles of international law.[89] Passing this law after rejecting the international structure of UNCLOS represents historical precedent of the United States regulating with unilateral action that at least remains conscious of some existing international obligations.[90] The Deep Seabed Hard Mineral Resources Act's domestic licensing structure, in line with international obligations, looks very similar to SLCA, aside from the latter assumedly remaining permanent.

In response to the United States rejecting UNCLOS and promulgating its own deep sea mining structure, the United Nations renegotiated the mining provisions in 1994.[91] This amendment gave the United States several advantages, such as a permanent seat on the international agency, removal of the technology-sharing requirement originally in UNCLOS, and a permit-granting structure including a requirement to mine so entities could not stake an exclusionary claim while unable to

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[85] Sattler, *supra* note 6, at 34–35; Heim, *supra* note 83, at 826–27. For more on the common heritage of mankind principle, see *infra* Section III.B.

[86] Bilder, *supra* note 5, at 263.

[87] Sattler, *supra* note 6, at 35–36.

[88] *Id.*

[89] 30 U.S.C. § 1401(a)(12) (2012).

[90] Bilder, *supra* note 5, at 273–74.

[91] Sattler, *supra* note 6, at 35.

mine.[92] Although the United States signed the 1994 amendment, it has still refused to sign UNCLOS, despite renewed interest in doing so.[93]

2. Antarctic Treaty

Similarly, the Antarctic Treaty System provides an example of an international regime structured to manage resource acquisition in a risky, but potentially fruitful, area.[94] After numerous States had claimed sovereignty over portions of Antarctica, the Antarctic Treaty of 1959 replaced these claims with a new legal regime.[95] The agreement vested power in twenty-seven "Consultative parties," who meet annually to make decisions as long as they continue to undertake a certain amount of activity in Antarctica.[96] Because the treaty includes environmental requirements, research disclosure, and prohibitions against conflict, it is arguable that it implicates the common heritage of mankind principle.[97] Regardless, the treaty only regulates resource rights as far as its other interfering provisions dictate.[98] In this case, the Antarctic Treaty's strict environmental controls effectively prevent resource acquisition rights, despite encouraging research.[99]

In response to the Antarctic Treaty's unsatisfactory resource regime, the United States and thirty-two other countries negotiated the Convention on the Regulation of Antarctic Mineral Resource Activities ("Antarctic Mineral Convention")

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[92] *Id.*

[93] *Id.* at 36–37.

[94] *Id.* at 32; *see generally* Christopher C. Joyner, *The Evolving Antarctic Minerals Regime*, 19 OCEAN DEV. & INT'L L. 73 (1988).

[95] Christopher C. Joyner, *Antarctica and the Law of the Sea: Rethinking the Current Legal Dilemmas*, 18 SAN DIEGO L. REV. 415, 417–20 (1981).

[96] *Id.* at 420; Sattler, *supra* note 6, at 32. For more on the controversy surrounding the format of this agreement, see Frakes, *supra* note 32, at 429–32; Joyner, *supra* note 94, at 420–21 (describing critics' objections to the Antarctic "club").

[97] Frakes, *supra* note 32, at 428; Joyner, *supra* note 94, at 425.

[98] Sattler, *supra* note 6, at 33.

[99] *Id.* This discrepancy is similar to some interpretations of the Outer Space Treaty that view the prohibition on claims of sovereignty fully prohibiting property rights as well. *See supra* Section II.A. In either case, the Antarctic Treaty contains much stricter environmental controls than the Outer Space Treaty because the Antarctic Treaty effectively designated Antarctica as a natural reserve. Sattler, *supra* note 6, at 33.

completely outside of the United Nations.[100] The agreement required mining parties to receive the consent of all other signatories to the treaty and retained substantially all of the environmental protections in the Antarctic Treaty.[101] However, the Antarctic Mineral Convention failed to acquire signatures from all consultative parties—only sixteen at the time—and neither it, nor a significant replacement provision on resource rights, has entered into force to address Antarctic resources.[102] As it currently stands, Antarctic resource acquisition continues to be substantially halted, and less-developed countries continue to push for more participation in an area that arguably can be considered *res communis* and subject to the common heritage of mankind principle.[103]

II. DISCUSSION

Equipped with background knowledge on the current space law regime and analogous international law, a few other legal structures assist in analyzing the U.S. Commercial Space Launch Competitiveness Act's ("SLCA") viability in light of international obligations. First, returning to Roman law property principles assists in pinpointing the limits of SLCA's applicability in the context of the foregoing international obligations. Next, the water law regime in the western United States exemplifies a modern use of classic Roman law property principles, a useful mark against which to examine and categorize SLCA.

A. Res Communis *v.* Res Nullius

Because outer space remains a widely untouched area, a return to early Roman law principles may prove useful in assessing how property rights may be quantified in the context of our current unclear international obligations. Some scholars have already attempted to categorize property rights in outer space as either the *res communis* or *res nullius* paradigm from

[100] Heim, *supra* note 83, at 840.
[101] *Id.* at 841.
[102] *Id.* at 841–45.
[103] *Id.* at 844.

Roman law.[104] As previously stated, these categories represent different classifications for things subject to varying types and extents of ownership.[105]

First, the Romans classified things as *res communis* if the things were meant to be enjoyed and shared by all people in common.[106] This category included air, water, and fish on the high seas, and precluded private ownership or intentional interference with others' use.[107] In stark contrast, *res nullius* included things not subject to standing ownership, but fully available to occupation, for example, by capture.[108] Generally, law students become acquainted with this category in property class because gaining ownership of *res nullius* includes the classic capture of wild animals.[109]

Second, the Roman law principles for obtaining ownership also provide some insight in the context of outer space resource ownership. *Dominium* was the strongest property right in Roman law, acquired only if: (1) the owner had *commercium*, meaning that he was a Roman citizen or an expressly authorized foreigner;[110] (2) the property was able to be privately owned; and (3) the property was obtained by an appropriate method.[111] The property right structure under SLCA mirrors *dominium* well. First, *commercium* parallels the United States's launch licensing, requiring all private entities to obtain a license granted by the government in order to leave orbit at all,[112] just as the Romans needed *commercium* rights to later exercise *dominium*. Second, SLCA endeavors to clarify that resources acquired from celestial bodies are amenable to private ownership, just like the second element of *dominium*.[113] Third, SLCA dictates that resources

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[104] *See generally* Gruner, *supra* note 36; Husby, *supra* note 48.

[105] *See supra* notes 22–24 and accompanying text; DU PLESSIS, *supra* note 22, at 152.

[106] DU PLESSIS, *supra* note 22, at 152.

[107] *Id.*

[108] *Id.*

[109] Pierson v. Post, 3 Cai. R. 175 (N.Y. Sup. Ct. 1805).

[110] DU PLESSIS, *supra* note 22, at 156. *Commercium* was part of the rights granted specifically to Roman citizens. *Id.* Therefore, in order for a foreigner to be able to have *dominium*, he must have been expressly granted the right to hold property as a Roman citizen did. *Id.*

[111] *Id.* at 155–56.

[112] 51 U.S.C. § 50904 (2012).

[113] *Id.* § 50903.

must be acquired in accordance with international obligations, mirroring *dominium*'s appropriate method requirement but providing a—still unclear—standard of those methods.[114]

Alternatively, Roman law provides the concept of *occupatio* for claiming property in *res nullius*.[115] *Occupatio* provided property rights to the individual who first claimed some property that had either never been claimed before or had been abandoned.[116] This principle still exists in several instances of first-in-time, first-in-right claims in property.[117] However, *occupatio* can only apply to *res nullius*, and it is unlikely that outer space can be either purely *res nullius* or *res communis* given the current treaty regime.

B. Methods of Applying Roman Law to Present Day Space Law

First, the *res communis* principle has found a more intense modern expression in the common heritage of mankind doctrine.[118] While common heritage doctrine does not have a generally accepted definition, it implies any combination of five elements: (1) nonappropriation, (2) common management, (3) sharing of benefits, (4) peaceful purposes, and (5) preservation for future generations.[119] Although *res communis* can include all five of these elements, common heritage of mankind doctrine's expression has generally mandated less restrictive versions of each element.[120] Further, others assert that the common heritage structure allows and even encourages resource harvesting.[121] As stated previously, spacefaring nations seemed to reject the common heritage of mankind principle by refusing to sign the Moon Agreement.[122] However, if negotiations produce a

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[114] *Id.*

[115] DU PLESSIS, *supra* note 22, at 190.

[116] *Id.*

[117] *Id.* For example, see *infra* Section III.C on water law.

[118] For examples of the uses of common heritage doctrine in treaties, see *supra* Part II.

[119] The elements' names are somewhat self-explanatory. But see Frakes, *supra* note 32, at 411–13, for a complete description.

[120] *See generally* Bilder, *supra* note 5 (discussing UNCLOS's amendment as the international community limiting the common heritage principle, and the Moon Agreement's language stating that the common heritage principle finds no expression outside of the terms of the agreement itself as a further loosening of the principle).

[121] Gilson, *supra* note 6, at 1393; Husby, *supra* note 48, at 370.

[122] *See supra* Section I.B.

highly limited *res communis* international structure, rather than a potentially restrictive expression under the common heritage principle, such an agreement could be amenable to spacefaring States in the future.

Second, while negotiation tempering the common heritage of mankind principle may relax *res communis* enough to provide a successful international organization, perhaps clarifying rights and increasing regulation on pure *res nullius* principles through SLCA may result in an acceptable starting place for private entities seeking to exploit space resources. In line with the international obligations guiding SLCA, outer space is no longer purely *res nullius*, because the Outer Space Treaty has imposed some environmental restrictions and a requirement of international cooperation.[123] Some scholars have argued that the successful middle ground lies in exclusive zones for States to encourage industry but avoid giving spacefarers free reign.[124] Regardless, SLCA initially mitigates a pure *res nullius* approach by requiring that companies acquire resources consistent with international obligations, not merely by being first in time.[125] Further, it seems as though SLCA would shift ownership acquisition from *occupatio* of *res nullius* to something more analogous to *dominium*, as previously discussed.[126] It seems as though SLCA aims for a *res nullius* approach by granting property rights to whomever is first in time, but does so in outer space, which is more similar to a *res communis* environment in light of the Outer Space Treaty's ban on national appropriation. To better analyze international obligations as limitations on a pure *res nullius* approach, a different analogy is necessary.

C. Harmful Interference and Water Law

Certain States' water law exemplifies significant first-in-time, first-in-right property rights in modern law.[127] In the context of water law, this right is referred to as "prior appropriation," the first element of general property rights in

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[123] Outer Space Treaty, *supra* note 18, art. IX.

[124] Sattler, *supra* note 6, at 41–44; Schwetje, *supra* note 39, at 141.

[125] 51 U.S.C.A. § 51303 (West 2015).

[126] *See supra* Section III.A.

[127] Michael Toll, Comment, *Reimagining Western Water Law: Time-Limited Water Right Permits Based on a Comprehensive Beneficial Use Doctrine*, 82 U. COLO. L. REV. 595, 600–01 (2011).

water.[128] Secondly, an appropriator must put the water to beneficial use in order to maintain property rights.[129] Beneficial use concerns both the type of use and the amount of use.[130] Like the SPACE Act's former harmful interference requirements of reasonableness in mining,[131] beneficial use supplements first-in-time property rights with an assurance that resources are actually being used rather than merely held. Although the former civil action against harmful interference has since been removed, the principle still remains in the act, and points to at least some necessity for reasonable exclusionary rights over companies' mining installations.[132]

The prior appropriation doctrine worked well considering the small population in the western United States; however, as the population grew and the stability of water sources decreased, prior appropriation began to demonstrate its lack of efficiency.[133] Because prior appropriation doctrine protects any beneficial use, even low value uses like growing plants of lower economic value could be prioritized over a subsequent appropriator's need for drinking water.[134] In order to remedy this potential situation, scholars have suggested the need for equitable principles, or at least reevaluating the extent of beneficial uses and issuing some rights pursuant to time-limited permits.[135]

Although space resources are seemingly infinite, some asteroids are more costly to reach than others. As more parties seek resource rights and obtain what may still be construed as exclusionary "harmful interference" rights on the more accessible celestial bodies, this approach will come closer to defeating the free exploration and use driving our space law.[136] Although some water law regimes worked well for a significant length of time, the recent call for change illuminates a potential downfall for

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[128] *Id.* at 597.
[129] *Id.*
[130] *Id.* at 604.
[131] *See supra* notes 13–14 and accompanying text.
[132] *Id.*
[133] Toll, *supra* note 127, at 597–98.
[134] *Id.* at 608–09.
[135] *Id.* at 617; Duane Rudolph, *Why Prior Appropriation Needs Equity*, 18 U. DENV. WATER L. REV. 348, 389 (2015).
[136] Buxton, *supra* note 56, at 700.

SLCA in the distant future. Outer space mining regulations that aim for a *res nullius* approach will likely breach international obligations if outer space ever becomes significantly saturated.[137]

Conversely, Article IX of the Outer Space Treaty itself allows parties to seek consultation if they anticipate "harmful interference" by another party.[138] Because at least some basis of exclusionary rights against harmful interference exist in the international obligations of the United States, the principle under SLCA may ultimately remain consistent with international obligations. This tension keeps the international legality of SLCA just as unclear as the United States's international obligations themselves. However, the suggestion for time-limited permits on a first-in-time basis provides another interesting element for solving the problem before it occurs in outer space.

III. PREVIOUSLY OFFERED SOLUTIONS AND A FURTHER PROPOSAL

Because space law is so sparse, many scholars have offered methods of resolving the ambiguity of property rights in space. These various approaches all present interesting, long-term solutions, but mostly require widespread international cooperation that may be difficult to achieve. However, many of these structures can come to fruition after—or in conjunction with—the U.S. Commercial Space Launch Competitiveness Act ("SLCA"). Ultimately, while an international organization established to manage outer space property rights is a noble goal, SLCA is a more viable short-term option for incentivizing private actors to advance outer space activities, given a few time and event-sensitive restrictions so that it does not outlive its usefulness.

A. Scholars' Proposed Property Regimes in Outer Space

Many scholars offer a variety of broad international solutions to better allocate property rights in space resources.[139] First, many suggestions use existing international structures to guide

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[137] As mentioned throughout this Note, resources must be acquired consistently with international obligations. 51 U.S.C.A. § 51303 (West 2015).

[138] Outer Space Treaty, *supra* note 18, art. IX.

[139] Tennen, *supra* note 62, at 824–30 (compiling various scholars' recommended international organizations); Bilder, *supra* note 5, at 297–99; Sattler, *supra* note 6, at 37–44.

the property discussion, including the framework of the International Space Station Intergovernmental Agreement ("IGA").[140] Under this agreement, NASA has signed a series of agreements with various other States' space programs to share funding and technology for the International Space Station's ("ISS") operation.[141] While NASA conducts the overall administration of this system, each individual funder retains ownership and jurisdiction over its own module and crew.[142] Under this structure, private companies could still fund their own enterprises and reap the benefits, while having NASA or a nongovernmental organization ("NGO") coordinate parties to avoid interference.[143] Further, if bilateral treaties and NGO management become international obligations to which American private parties must conform under SLCA, no compliance issues would seem to arise in ensuring property rights in harvested resources.

Exclusive economic zones as created and defined by UNCLOS present another familiar alternative for ensuring property rights in outer space.[144] In its present form as applied to maritime coastlines, every country has exclusive rights to exploit and manage the maritime resources within a certain distance from its coast, but cannot prohibit other countries from navigating through the exclusive zone.[145] In outer space, an already-existing international organization, like the ITU or INTELSAT, could allocate certain areas on celestial bodies to different States for building installations with the understanding that a certain exclusive economic zone would radiate from that location.[146] While the activities taking place in exclusive economic zones would remain consistent with SLCA's grant of property rights, this structure would require an international organization, the optimal structure of which remains unclear.[147]

Alternatively, an international organization could divide celestial bodies into shares for each country to presently or eventually exploit, as opposed to a system of arising economic

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[140] Sattler, *supra* note 6, at 37.
[141] *Id.* at 37–38.
[142] *Id.* at 38.
[143] *Id.* at 38–39.
[144] *Id.* at 41–42.
[145] *Id.* at 42.
[146] *Id.* at 43–44.
[147] *See infra* Section III.B.

zones.[148] Although this structure would ensure rights for developing nations, it causes the same issues of requiring an international organization to divide celestial bodies in the first place, and seems somewhat unadaptable to mining asteroids—bodies that remain harder to track than planets or moons. Further, this structure may directly interfere with the free exploration and use principles in Article I of the Outer Space Treaty.

Each of these proposals requires some form of international organization, and accession to the Moon Agreement would facilitate its negotiation under Article 11(5).[149] Like most of the other options discussed in this section, the viability of accession remains dependent on examining what a successful international management system would look like.

If spacefaring countries are to negotiate an acceptable international management organization for space resources, they need to include a few key powers.[150] A successful international organization should include mechanisms for registration of claims, notice between parties, and dispute resolution.[151] Additionally, the organization should ensure that private entities can undertake all mining activities necessary to obtain space resources, affirmatively including roles for private companies to bring all interested parties into the structure of the agreement.[152] All of these provisions are consistent with SLCA, with each somewhat represented in the language of the act itself.[153]

Protecting the resource interests of nonspacefaring countries represents a further issue in forming this organization. One possible solution entails language that results in resource sharing only after the entity that obtained the resources makes a fair profit for its risk.[154] Alternatively, this organization could set a flat rate, obtaining a small portion of all resources acquired and distributing them to nonspacefaring members of the

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[148] Jacobsen, *supra* note 6, at 177.

[149] For more on the Moon Agreement, see *supra* Section II.B.

[150] Tennen, *supra* note 62, at 823–24.

[151] *Id.*

[152] Bilder, *supra* note 5, at 280–81.

[153] For more on SLCA, which mentions affirmative grants of property rights in harvested materials, the role of private enterprise, and consistency with international law, see *supra* Part I.

[154] Bilder, *supra* note 5, at 281.

organization.[155] In either case, SLCA would remain in compliance because respecting the rules and decisions of any international organization by which the United States is bound would constitute international obligations of the United States and, therefore, of the private companies themselves.

B. SLCA in Compliance: Synthesizing Short-Term and Long-Term Solutions

While some argue that an international agreement seems to be the best answer to the property rights problem in outer space, that solution may be far on the horizon or overly naïve given the new domestic resource rights under SLCA. Unless a future international obligation alters the current space law structure, the primary obligations that SLCA imports to spaceflight companies in mining remain those under the Outer Space Treaty.[156] As discussed previously,[157] it does not appear that any present international obligations are stopping private spaceflight companies from gaining property rights in harvested resources.[158] However, it is still important to note that, in the future, the upper bounds of the Outer Space Treaty may limit private mining by ensuring that private companies cannot infringe on "free . . . exploration and use by all."[159] Continued unilateral action and the principle of prohibiting harmful interference could eventually lead to excluding other parties seeking to make use of outer space.

Therefore, a permanent, long-term solution must resolve the limitations that SLCA will put on other entities in both time and space. First, although space resources are potentially limitless, the amount of resources currently amenable to harvesting are certainly limited in light of humanity's current technological capacity.[160] Similar to issues faced in water law, the accessible resources in space may eventually become appropriated and inefficiently utilized under SLCA without any potential for use by nations from whom the United States is obligated to allow free

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[155] Jacobsen, *supra* note 6, at 178.

[156] *See supra* Section II.A.

[157] *See supra* note 45 and accompanying text.

[158] Hertzfeld & von der Dunk, *supra* note 7, at 83; Bilder, *supra* note 5, at 273–74.

[159] Outer Space Treaty, *supra* note 18, art. I.

[160] Buxton, *supra* note 56, at 700.

exploration and use.[161] If the vast majority of accessible celestial bodies simultaneously undergo use by private companies authorized by SLCA, these companies may restrict the use of other parties and breach international obligations, contrary to the authorizations of SLCA.

Second, the resource regime under SLCA is similar to water law in that it may eventually become unsustainable without imposing any equitable principles over a longer period of time.[162] Without sustainable regulations in place as early as possible, space could eventually become saturated, excluding future parties from use and exploration by allowing exclusionary rights to prior appropriators. Although it may seem farfetched to prepare a legal regime with such a distant future in mind, a lack of similarly forward thinking led to the present dilemma by leaving outer space property rights vague while the technology to obtain such rights ripened.

In order to allow SLCA to incentivize the development of outer space by private enterprise, but halt growth before it begins to breach international obligations, a sunset provision is an effective solution. Reevaluating SLCA after a twenty to thirty-year term would allow ample time for companies to even more rapidly develop their spacefaring technology, reap some benefits of space resources, and accomplish it all before allowing outer space to become crowded.

An even more effective sunset provision finds precedent in the United States's treatment of UNCLOS.[163] After rejecting UNCLOS, the United States passed its own domestic legislation, stressing that it was a temporary measure until a satisfactory international agreement could be reached.[164] Formalizing this concept into a sunset provision on the property rights reform of SLCA would ensure that the Act's structure would remain in place only until an international organization would render that structure unnecessary. The provision would be simple to craft, effectively terminating SLCA's property rights regime once the United States—and perhaps a certain minimum number of other

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[161] *See generally* Toll, *supra* note 127.
[162] *See generally* Rudolph, *supra* note 135.
[163] *See supra* Section II.D.
[164] *Id.*

States—has ratified an agreement that establishes an international management organization for outer space resources.

CONCLUSION

Ultimately, SLCA's property provisions provide an inelegant, yet acceptable method to affirmatively grant property rights in outer space resources, allaying some fears of the private spaceflight industry. However, some upper boundary on SLCA is necessary in the very long term, before an under-regulated *res nullius* regime causes exhaustion of attainable resources and breaches the "free . . . exploration and use" terms of the Outer Space Treaty. As previously discussed, likely the best way to temper such an aggressive property rights regime while retaining its benefits is through a sunset provision, for a set term of years or until an effective international organization is established, whichever happens first.

Clarified property rights in outer space are necessary, not merely for the financial incentives, but so the attainable wealth can galvanize private enterprise to further develop technology for later use in exploration for the good of all mankind. Although preemptive law granting rights in space rocks may seem like a very narrow goal, the common good of humanity advanced by this small incentive is incalculable.