In November 2015, the Space Resource Exploration and Utilization Act of 2015 ("SREU Act") became law. Private space companies hoping to mine asteroids for commercial gain rejoiced. For years, such private companies had struggled to obtain adequate funding and support for their revolutionary space missions due to a lack of legal certainty regarding property rights in space under the vague legal framework of the Outer Space Treaty ("OST"). The SREU Act purportedly eliminated this uncertainty by explicitly granting U.S. citizens property rights in any asteroid or space resource recovered for commercial purposes from space.

Nevertheless, much tension remains between this unilateral grant of property rights and the international obligations of the United States under the OST. This Note concludes that the SREU Act abrogates the United States’ international obligations and that the United States should have initiated discussions at the international level first to champion a more effective and long-lasting multilateral solution. Finally, this Note finds this abrogation to be all for naught, as the law itself fails to achieve its goal of providing the private space industry with the legal certainty it so desires and requires.

I. INTRODUCTION

I would also like to thank a local hiker and retired aeronautical engineer in Sedona, Arizona for telling me I should study something innovative instead of old laws and thoughts, and Ryan Kim for asking, "Who owns the Moon?" after being forced to listen to endless IL property class anecdotes—and thanks to both for ultimately spurring the idea for this note. *Not licensed to practice in Washington, D.C. (practicing under the direct supervision of a D.C. Bar member).
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I. INTRODUCTION

Several private space companies plan to mine asteroids in outer space
to answer mineral and water needs—not to mention make a pretty profit
while doing so. Considering that a man has not stepped on the Moon in
over forty years, it becomes tempting to dismiss the plan to mine giant
rocks in outer space as a pipe dream of the far future. Surprisingly,
however, this pipe dream is at least 115 years in the making. By 1903, a
self-educated Russian rocket pioneer, Konstantin Eduardovich
Tsiolkovsky, had developed a roadmap for successfully expanding
mankind into space.\textsuperscript{1} Point 12 in his “14 Points” of action read: “exploitation of asteroid resources to achieve autonomy from Earth.”\textsuperscript{2}

Over a century later, one must wonder why Point 12 has yet to come to fruition. Many plausible answers come to mind: a lack of government funding, an absence of necessity, a need for more advanced aerospace technology, and a shortage of knowledge regarding the true nature of asteroids. Strikingly, however, many blame another culprit for slowing the revolutionary road to asteroid mining: the law.\textsuperscript{3} Private companies have long recognized the benefits and profit potential of asteroid mining but, given the unknown, have struggled to raise the capital for such a risky and uncharted venture.\textsuperscript{4} For example, if a venture actually managed to bring resources mined from asteroids back to Earth, would the venture legally “own” the mined resources, or would some government or multinational organization attempt to seize the resources for science?\textsuperscript{5} Without the legal certainty of property rights, the high up-front costs have been an insurmountable barrier to entry. For example, Jim Benson, a retired Washington millionaire and founder of SpaceDev, Inc., was forced to abandon his asteroid mining plans in the late 1990s after finding the venture cost-prohibitive.\textsuperscript{6}

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\textsuperscript{1} John S. Lewis, Asteroid Mining 101: Wealth for the New Space Economy 6–7 (David Gump ed., 2015).

\textsuperscript{2} Id. at 7.

\textsuperscript{3} For an aptly titled example, see William Herkewitz, The Biggest Barrier to Asteroid Mining Isn’t Technical, It’s Legal, Popular Mechanics (Aug. 16, 2016), http://www.popularmechanics.com/space/deep-space/a22347/asteroid-mining-international-law/ [https://perma.cc/497E-HFG8].

\textsuperscript{4} See, e.g., Exploring Our Solar System: The ASTEROIDS Act as a Key Step: Hearing on H.R. 5063 Before the Subcomm. on Space of the H. Comm. on Sci., Space, and Tech., 113th Cong. 13–14 (2014) (statement of Rep. Bill Posey, cosponsor of the bill) (“Today, private companies do not have legal certainty that if they obtain resources from an asteroid that they can own them. The ASTEROIDS Act would provide this certainty to American companies, and companies are empowered to conduct their operations without harmful interference.”).


\textsuperscript{6} Benson would not take any government money in an effort to raise awareness about the need to establish private property rights in space. Id. “Benson would discover, however, that the hardware and computer chipsets required to get a rocket to an asteroid were costly, even for a millionaire, and he was forced to let go of the mission. . . Benson moved on to related ventures, including space tourism.” Id.
At the end of 2015, however, the public and private space community rejoiced as the House and Senate attempted to push legislation through to settle the unknowns once and for all. As put by Representative Kevin McCarthy of California, “[t]his bill will unite law with innovation—allowing the next generation of pioneers to experiment, learn and succeed without being constrained by premature regulatory action.” According to Chris Lewicki, President and CEO of a private space-resource-mining company, “[t]his off-planet economy will forever change our lives for the better here on Earth.” With such promise and upside, the proposed legislation quickly became law in the form of the U.S. Commercial Space Launch Competitiveness Act. To the space community, President Obama’s signature on November 25, 2015 finally provided the legal certainty and industry-friendly regulatory environment necessary to usher in a new era of space exploration, and in turn benefit mankind greatly.

The new U.S. Commercial Space Launch Competitiveness Act both amended previous law and added several completely new and revolutionary provisions. Media buzz has focused on Title I of the Act, aptly named the “SPACE Act.” Nevertheless, Title IV of the Space Resource Exploration and Utilization Act of 2015 (“SREU Act”) actually contains some of the most surprising and revolutionary provisions of the law. The SREU Act entitles any United States citizen to property rights in resources obtained from outer space, including the right to possess, own, transport, use, and sell the resources “in

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8 Id. (quoting Chris Lewicki, CEO, President, and Chief Engineer of Planetary Resources).
accordance with applicable law, including the international obligations of the United States,” presumably in space and back on Earth.  

At first blush, this provision of property rights appears to be a praiseworthy step in the right direction toward giving the legal certainty and incentives necessary for modern-day space exploration and development to flourish. Nevertheless, upon closer review of the historical landscape of space law, this provision of asteroid- and space-resource rights to U.S. citizens looks more like a hasty unilateral move that ignores the basic tenets of international space law and the treaty obligations of the United States. This Note uses treaty interpretation to determine the United States’ international obligations under the Outer Space Treaty (“OST”) and then considers the compatibility of the new SREU Act with these obligations. This Note concludes that the SREU Act abrogates the United States’ international obligations and argues that Congress should have instead initiated discussions at the international level first. Furthermore, this Note finds that despite its potential for praise as a necessary step in the right direction—both incentivizing private industry and stirring international discussion—the SREU Act lacks a coordinating rule to guide actors in establishing the property rights bestowed upon them. Without such a rule, the SREU Act cannot provide any meaningful legal certainty to private space companies regarding the prospect of mining asteroids in the near future and risks souring international trust.

Part II begins by providing an overview of the private space industry, focusing on resource mining in outer space, its untapped benefits for mankind, and why the property-rights debate matters. Part III lays out the legal framework of both international and domestic “space law.” Part IV analyzes whether the OST allows for property rights in space resources; it then considers whether or not the SREU Act complies with the Treaty’s obligations, as well as implications of this determination.

II. BACKGROUND

A. The Industry

Asteroid mining’s benefits are twofold: the innovative activity provides the potential not only to (1) answer current resource needs on Earth either by supplementing current mining efforts or by replacing Earth mining altogether to preserve the fragile environment, but also to (2) provide the resources necessary to make historic deep-space missions a possibility. Over a century in the making, asteroid mining’s potentials and possibilities are quickly becoming realities and must be given the legal landscape to flourish.

The call for the development of the legal landscape comes amidst promising advances in asteroid mining technology. Two private companies in the United States currently have plans to mine asteroids by 2020 to 2025. Planetary Resources boasts founding investors including Larry Page, Eric Schmidt, and Ram Shriram of Google fame, Virgin Group founder Richard Branson, and Ross Perot, Jr. The company’s President and CEO, Chris Lewicki, previously served in pivotal roles at NASA during the Mars Exploration Rovers and Phoenix Mars Lander missions. With such a robust team and coffers, the company has already achieved a significant milestone: in 2015, Planetary Resources successfully deployed its first spacecraft from the International Space Station, a crucial first step to testing asteroid-prospecting technology in orbit. On January 12, 2018, the group successfully launched Arkyd-6, a spacecraft with the technology to detect water resources in outer space.

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The spacecraft is now in orbit. Further, the group plans to launch multiple spacecrafts to “a pre-determined target asteroid to collect data and test material samples.” Silicon Valley-based Deep Space Industries shares similar aspirations to mine asteroids. The company envisions itself “changing the economics of the space industry by providing the technical resources, capabilities and system integration required to prospect for, harvest, process, manufacture and market in-space resources.” Deep Space Industries has yet to launch its own spacecraft, but has partnered with the Luxembourg Government and Société Nationale de Crédit et d’Investissement to develop Prospector-X to test its innovative deep-space technology. Deep Space Industries has also announced plans “to fly the world’s first commercial interplanetary mining mission.” Its Prospector-1 “will fly to and rendezvous with a near-Earth asteroid, and investigate the object to determine its value as a source of space resources.” News outlets report Prospector-X could be launched in early 2018 and Prospector-1 in 2019 or 2020. At the time of this writing no launch has occurred. In order to attract investors to continue to fund these next steps, the industry needs legal certainty for its investors.
In addition to these private companies, the National Aeronautics and Space Administration ("NASA") and other governmental space agencies have themselves recognized the potential rewards of asteroid mining. In 2000, long before Planetary Resource’s probe launch, NASA moved a probe into a near-Earth asteroid’s orbit.\(^\text{28}\) A year later, the NEAR Shoemaker probe made touchdown on the surface of Eros, an S-class asteroid located approximately 355 million kilometers from Earth, and retrieved ten times more data than originally planned.\(^\text{29}\) Furthermore, NASA’s current Asteroid Redirect Mission ("ARM") plans to collect a multi-ton boulder from the surface of a large near-Earth asteroid and place it into orbit around the Moon.\(^\text{30}\) Once in stable orbit, NASA astronauts will explore and return with samples from the boulder. NASA hopes to achieve its mission in the 2020s and is currently cataloguing near-Earth asteroids to find candidates for its mission.\(^\text{31}\) In September 2016, NASA set this mission into action when it successfully launched the OSIRIS-REx space probe, which will spend the next two years travelling to the asteroid Bennu.\(^\text{32}\) After months of observation, the probe will attempt to secure a sample of rocks and dust kicked up using a robotic arm.\(^\text{33}\) This asteroid sample collection would be a first for the United States, though Japan successfully collected a small sample in 2010 during its Hayabusa mission.\(^\text{34}\)

These missions illustrate interest in asteroids, but the question remains: why asteroids and what do they even have to offer? In an age of resource scarcity, asteroids actually offer something crucial: a potential supplement, or even alternative, to the scarce resource pool

\(^{28}\) See Shaer, supra note 5.


\(^{31}\) Id.


\(^{33}\) Id.

here on Earth.\textsuperscript{35} One NASA study found that “an industry could develop to send refined materials, rare metals and even free, clean energy to Earth from asteroids and other bodies.”\textsuperscript{36} Resources of the asteroid belt include ferrous metals, cement, phosphates, nitrogen, sulfur, and sulfides.\textsuperscript{37} Industry experts claim the resources found in one asteroid could be worth trillions of dollars.\textsuperscript{38}

Some critics assert that the so-called need for an extraterrestrial source of minerals is overestimated and overlooks untapped potential on Earth.\textsuperscript{39} These critics must be taken with a grain of salt, as many of them are stakeholders in the traditional earth-mining industry and therefore self-interested.\textsuperscript{40} However, even granting these critiques as irrefutable for argument’s sake, they still fail to diminish the case for asteroid-mining ventures. In fact, the greatest benefit such ventures offer is not

\begin{itemize}
\item See, e.g., Philip T. Metzger et al., Affordable, Rapid Bootstrapping of the Space Industry and Solar System Civilization, 26 J. Aerospace Eng’g 18, 18 (2013) (“There is mounting evidence that these limits are beginning to be felt in some of the nonrenewable energy and mineral resources and that they cannot support current rates of population growth with industrialization for another century.” (citations omitted)); Ian Hedges, Note, How the Rest Was Won: Creating a Universally Beneficial Legal Regime for Space-Based Natural Resource Utilization, 40 Vtl. L. Rev. 365, 367–76 (2015).
\item Steven Siceloff, Study: Asteroids Provide Sustainable Resource, NASA (June 13, 2013), https://www.nasa.gov/mission_pages/asteroids/news/asteroidmining.html [https://perma.cc/L5SL-9CLZ]. This article discusses the implications of Metzger et al., supra note 35, a study completed by a team of researchers led by a physicist at NASA’s Kennedy Space Center.
\item Lewis, supra note 1, at 98–103.
\item Id. (“But firms that make their money mining this planet say the Earth is one big, practically inexhaustible mine, with just as many unexplored corners as outer space.” (emphasis added)). Admittedly, however, many of those touting the immense value of space resources are the space-mining companies themselves. NASA’s work with asteroids does provide the organization with some credibility though. See discussion and accompanying notes, infra Part II.A.
\end{itemize}
necessarily a new and vast resource pool for needs on Earth, but rather an extraterrestrial resource pool to fuel further exploration in space. By utilizing fuel sources and resources already located in space, rather than carrying them from Earth, exploration missions would require exponentially less fuel and would be able to travel farther into deep space and conduct more in-depth studies while there.

In fact, NASA views its ARM program as a necessary step toward a human mission to Mars.\textsuperscript{41} Because “[a] human mission to and from the Mars system could last 500 days or longer, including six to nine months of transit each way[,] [m]issions to Mars will need to be ‘Earth Independent.’”\textsuperscript{42} Planetary Resources explains the exponential benefits of achieving Earth Independence by analogizing current space travel to what a cross-country road trip would look like if it had to be conducted with restraints similar to those facing space exploration missions.\textsuperscript{43} There would be no stopping at gas stations, and thus, any fuel required to make the cross-country journey would have to be carried by the car. In addition to decreasing fuel efficiency, this restraint would also likely prevent the car from even making it across the country. Space missions actually face this restraint from the need to carry fuel, making deep-space exploration difficult, if not impossible, today. Furthermore, the problem is exacerbated because escaping the first 300 kilometers of Earth’s gravity well takes more energy and propellant than the next 300 million kilometers of travel.\textsuperscript{44} Because travel beyond Earth’s gravity well is virtually effortless, the ability to refuel in space, rather than by bringing resources from Earth into space, could open the door to limitless exploration. The prospect of such far-reaching returns is too great to ignore any longer.\textsuperscript{45}


\textsuperscript{42} Id. NASA’s Mars Space Pioneering Challenge in 2015 further illustrates the importance it places on achieving Earth Independence. See NASA, Space Pioneering – Achieving Earth Independence (May 5, 2015), https://www.nasa.gov/feature/space-pioneering-achieving-earth-independence [https://perma.cc/X7DW-585C].

\textsuperscript{43} Planetary Resources, Planetary Resources - The Market Problem and Radical Solution, YouTube (Nov. 21, 2013), https://www.youtube.com/watch?v=VLouRKHknOU [https://perma.cc/YK3M-6C9H].

\textsuperscript{44} Id. at 0:30.

\textsuperscript{45} Id. at 1:28, 1:56 (asserting that electrolyzed water exists in near infinite quantities on asteroids and could provide a fuel source “one thousand times more efficient than the brute force, bring-everything-with-you approach used by the Apollo moon program”), id. at 1:39.
By providing refueling stations and mineral resources in space, asteroid mining would also advance other private space ventures. Some of these other ventures are quite revolutionary. For example, SpaceX, a private company that “designs, manufactures and launches advanced rockets and spacecraft,” first launched its own rocket in 2010 and now regularly runs deliveries to the International Space Station. Elon Musk, founder and CEO of the company, also once announced a desire to terraform the Martian atmosphere by detonating thermonuclear devices over the poles of Mars in the hopes of future colonization. Blue Origin, a private spaceflight company started by Amazon.com founder Jeff Bezos, is developing reusable spaceflight technology. Moon Express, a lunar mining company, just received a favorable ruling from the United States government that grants the company permission to travel beyond Earth’s orbit and land on the Moon. The mission was planned for 2017, but has been pushed to 2018 due to rocket issues. The viability and sustainability of such revolutionary projects would be greatly enhanced by the possibility of Earth Independence promised by mining asteroids.

Although much work remains in developing the technology, immense progress has been made over the past two decades and the technological

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47 Shaer, supra note 5.
groundwork has been laid. However, the legal groundwork up to this point—including the SREU Act—leaves much to be desired and much continued uncertainty for investors.

B. The Scholarship

Although the SREU Act brings attention to the question of whether the current state of international law allows for property rights in space resources extracted for commercial purposes, the debate has long been underway. This debate, however, has always been hypothetical. Never before has domestic legislation sought to impart a bundle of property rights to its citizens in any space resources retrieved for commercial purposes. Never before has there been substantive law to test the property rights prohibited or envisioned by the OST. Previous hypothetical analyses of property rights in space provide a useful starting point for considering the compatibility between the SREU Act and the United States’ international obligations and are oft-cited throughout this Note. Those analyses were unable, however, to take into account the most current legal and scientific information discussed in the congressional hearings related to the SREU Act, not to mention the actual language of the SREU Act and the rights it creates.

Over the course of the writing and publication of this Note, the number of secondary sources discussing the SREU Act has increased steadily—some simply cite to the Act, some provide a high-level overview of the terms of the Act, and some attempt to answer the specific question at hand. Nevertheless, of the sources found, only three engage in a thorough textual analysis and interpretation of the Treaty. This Note offers a unique contribution to current scholarship as

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52 See generally Shaer, supra note 5 (providing an in-depth overview of Deep Space Industries’ and Planetary Resources’ progress).
53 See infra note 111.
54 A “Citing References” search of 51 U.S.C. §§ 51301–51303 and a term search of “Space Resource Exploration and Utilization” in Westlaw illustrates the growth in writing about this subject over time since the bill’s passage, particularly in the last year. See, e.g., infra notes 58–84.
it has access to the most current, relevant information available and takes the time to walk through the steps of treaty interpretation required to properly understand the international obligations of the United States.

The other sources still provide important contributions and illuminating insight.56 For example, Professor Michael Dodge provides an articulate, high-level overview of the entire U.S. Commercial Space Launch Competitiveness Act of 2015 and briefly identifies potential issues and gaps of the SREU Act.57 Additionally, Major Susan J. Trepczynski, Chief of the U.S. Air Force Air and Space Law Division, highlights the value to be found in the United States’ attempts to start filling the vast voids of space law with a domestic legal regime.58 Student authors Kevin MacWhorter and Samuel Roth provide hope for the future by exploring innovative proposals for a legal regime to govern property rights in space. MacWhorter identifies the unknown characteristics of asteroids that still need to be understood to achieve a proper solution,59 while Roth identifies the empirical, scientific

123–27 (2016); see also infra notes 65–84 and accompanying text (discussing the textual analyses in these three sources).

56 For some particularly well-written and insightful commentary, see, for example, Virginie Blanchette-Séguin, Commentary, Reaching for the Moon: Mining in Outer Space, 49 N.Y.U. J. Int’l L. & Pol. 959, 960 (2017) (providing an enlightening discussion of the property rights over space resources questions, but without conducting a treaty analysis applying the rules of the Vienna Convention); Juan Davalos, Comment, International Standards in Regulating Space Travel: Clarifying Ambiguities in the Commercial Era of Outer Space, 30 Emory Int’l L. Rev. 597, 599 (2016) (discussing a variety of ambiguities in the commercial era of outer space).

57 Michael Dodge, The U.S. Commercial Space Launch Competitiveness Act of 2015: Moving U.S. Space Activities Forward, 29 Air & Space Law., no. 3, at 4 (2016) (conducting no textual analysis and reserving in-depth analysis for future consideration); see also Craig Foster, Note, Excuse Me, You’re Mining My Asteroid: Space Property Rights and the U.S. Space Resource Exploration and Utilization Act of 2015, 2016 U. Ill. J.L. Tech. & Pol’y 407 (recognizing the ongoing debate over the compatibility of the SREU Act with the OST as a potential drawback of the law without answering the open question, instead providing an expansive overview of the asteroid-mining industry, the current legal framework, an observant comparison of asteroid mining to deep-sea mining, and suggestions for the future).


59 Kevin MacWhorter, Note, Sustainable Mining: Incentivizing Asteroid Mining in the Name of Environmentalism, 40 Wm. & Mary Envtl. L. & Pol’y Rev. 645, 646 (2016) (focusing on proposals rather than examining the technical compliance with the OST, though recommending an amendment to clarify the property rights ambiguity of the Treaty).
questions that still need answers. Student author Alison Morris sets forth three additional “futures” of international regulation of space property and economics professor Alexander Salter proposes a “purely private legal system for space commerce as an alternative to government-defined and enforced property rights.” Another student author, Stephen DiMaria, contributes to the discussion with an analysis and reconciliation of the short- and long-term benefits and viability of the SREU Act. On the other hand, these pieces simply do not—and were not intended to—address the question this Note seeks to answer: whether or not the United States abrogated its international obligations by passing the SREU Act. Rather than simply identify or swiftly dismiss the tension with Article II of the OST, this Note seeks to contribute to the literature by taking on this once hypothetical, but now live, question.

In order to make this meaningful contribution, this Note must conduct a thorough interpretation of the relevant terms of the OST, just as a court would. As discussed in Part III.B, a proper interpretation of the terms

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60 Samuel Roth, Note, Developing a Law of Asteroids: Constants, Variables, and Alternatives, 54 Colum. J. Transnat’l. L. 827, 840–57 (2016) (discussing the shortcomings of the current international and domestic legal framework and insightfully offering four plausible explanations for the ambiguities left by Title IV of the SREU Act’s grant of property rights in space resources, focusing on policy rather than conducting a legal, textual treaty interpretation analysis).
63 See generally Stephen DiMaria, Note, Starships and Enterprise: Private Spaceflight Companies’ Property Rights and the U.S. Commercial Space Launch Competitiveness Act, 90 St. John’s L. Rev. 415, 438–40 (2016) (finding the SREU Act to be a viable short-term solution to the problem facing private space-mining ventures and concluding that the Act does not conflict with OST Art. II (non-appropriation principle) without conducting a textual analysis of the OST).
64 Many authors thoughtfully and logically consider whether the SREU Act is compatible with the international treaty obligations of the United States. Nevertheless, they often fail to conduct a textual analysis of the OST to determine the baseline of U.S. international obligations in space, a necessary first step in the analysis. See, e.g., Eng Teong See, Commercialization of Space Activities—The Laws and Implications, 82 J. Air L. & Com. 145, 157–63 (2017) (insightfully discussing possible arguments for and against the compatibility of the SREU Act, including possible interpretations of the Treaty and a discussion of its travaux préparatoires); Elliot Reaven, Note, The United States Commercial Space Launch Competitiveness Act: The Creation of Private Space Property Rights and the Omission of the Right to Freedom from Harmful Interference, 94 Wash. U. L. Rev. 233, 236–41 (2016).
of the OST is crucial because the terms establish the obligations of the United States with respect to space. Only after these obligations are accurately identified can it be determined whether the SREU Act breaches them. As mentioned, three other articles have already conducted analyses more in line with this interpretative focus since the passage of the SREU Act. Similar to the analysis that follows, these three pieces recognized the terms of the OST to be quite ambiguous with respect to property rights. The previous authors, however, interpret this ambiguity in favor of compatibility, while this Note concludes the SREU Act to be incompatible with the OST.

In order to come to his conclusion of compatibility between the SREU Act and the OST, student author Andrew Lintner relies on a parsing of the difference between space resources and space resources removed, concluding that the OST’s prohibition against national appropriation applies to the former, but not the latter. This interpretation relies on the assumption that national appropriation occurs when a state approves an individual actor’s claims over real property (which Lintner reads to include resources still in situ), but not when a state approves an individual actor’s removal of resources from the land. As will be shown, this semantic parsing fails to take into account that: (1) the ordinary meaning of “appropriation” envisions taking of resources, not just real property, and (2) traditional international property law requires a nation to have title to resources before it may bestow rights in those resources upon its citizens. Thus, the conclusion that in situ resources are off limits, while extracted resources are not, fails a test of logical consistency and overlooks nuances of the Treaty terms.

Similarly, student author John Myers concludes that the SREU Act does not constitute a breach of international obligations, but for a slightly different reason: Treaty partners did not intend for the OST to govern property rights and, instead, anticipated a future agreement to control. In coming to this conclusion, Myers relies heavily on the

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65 Lintner, supra note 55, at 139; Myers, supra note 55, at 90–107.
66 Lintner, supra note 55, at 140; Myers, supra note 55, at 100, 102.
67 Lintner, supra note 55, at 153; Myers, supra note 55, at 123–24.
68 Lintner, supra note 55, at 147.
69 See infra Subsection IV.A.1.
70 See infra Subsection IV.A.1.
71 Myers, supra note 55, at 100.
purpose of the Treaty as an antimilitarization instrument of the Cold War and committee discussions during negotiations.\textsuperscript{72} Myers utilizes these “travaux préparatoires” in attempts to resolve the ambiguity of the ordinary meaning of the Treaty terms.\textsuperscript{73} However, the analysis fails to recognize and resolve the ambiguities also surrounding the travaux préparatoires materials, such as the purpose of the Treaty and committee discussions of the resources question. For example, the Cold War mentality and peaceful purpose arguments also encompass the prevention of disputes over natural resources, which were historically some of the bloodiest, in addition to preventing nuclear warfare.\textsuperscript{74} Furthermore, the cited committee discussions also contain passages suggesting that Article II and its prohibition against appropriation resolve the property rights dispute in the interim, though a future agreement might arise.\textsuperscript{75} Finally, it does not necessarily follow from the conclusion that the Treaty parties anticipated a future agreement regarding property rights that the OST would permit property rights in space resources in the interim, as an analogy to the Antarctic experience will show.\textsuperscript{76}

Lastly, Professor P.J. Blount and Christian J. Robison urge that critics viewing the SREU Act as incompatible with the OST have misinterpreted the ambiguities of Article II.\textsuperscript{77} According to Blount and Robison, the ambiguities of Article II signal that the drafters of the OST intentionally left a gap between the right to “use” space and the prohibition against “appropriating” space\textsuperscript{78} “so that the law could adapt as the technology emerged.”\textsuperscript{79} As a result, states are free to fill this gap, and the SREU Act is best read as an exercise of such gap-filling ability and as a state interpretation of the content of Article II.\textsuperscript{80} At first blush these arguments are attractive. One would be hard-pressed to disagree that Article II and the OST as a whole are abundantly full of ambiguities or that the technological landscape has vastly changed in the last forty to fifty years. Nevertheless, while Blount and Robison point out areas of

\textsuperscript{72} Id. at 94–100.
\textsuperscript{73} Id. at 100.
\textsuperscript{74} See infra Subsection IV.A.3.
\textsuperscript{75} See infra Subsection IV.A.2.
\textsuperscript{76} See infra Subsection IV.A.3.
\textsuperscript{77} Blount & Robison, supra note 55, at 161–63, 168, 177.
\textsuperscript{78} Id. at 168.
\textsuperscript{79} Id. at 162.
\textsuperscript{80} Id. at 177.
ambiguity, a more systematic analysis of the Treaty language pursuant to the Vienna Convention and other international standards of treaty interpretation might help resolve some of these ambiguities. Further, while the SREU Act’s requirement that resources be “obtained in accordance with applicable law, including the international obligations of the United States”\textsuperscript{81} may admittedly indicate its intent to comply with international law and fill gaps in the law, the presence of this “careful language”—as Blount and Robison call it\textsuperscript{82}—in the statute does not ultimately resolve whether the bundle of property rights is compatible with the OST. Rather, the careful language only seems to indicate that the lawmakers believed the law was compatible. In response, this Note continues to grapple with the ambiguities of the OST by conducting an interpretation of the Treaty and its obligations as a court would. While international treaties are admittedly filled with ambiguity, oftentimes simply because of language differences at the negotiating and drafting table, it does not follow that each ambiguity calls for gap-filling legislation at the individual state level.\textsuperscript{83} If the rule of international law is to mean anything, efforts must be made to parse these difficult ambiguities in depth before waiving the white flag. Furthermore, this Note refuses to accept the “careful language” of the SREU Act as reassurance that the United States has not abrogated its Treaty obligations.\textsuperscript{84}

As these three articles illustrate, the ambiguity of the Treaty terms runs deep. In order to discern the accurate meaning of the Treaty, a more thorough treaty interpretation analysis must be conducted. This Note offers such an analysis by utilizing, as a court would, the treaty interpretation rules discussed in Part III.B and providing an updated, and much-needed, comprehensive analysis of this once hypothetical, now pressing, issue.\textsuperscript{85}

\textsuperscript{82}Blount & Robison, supra note 55, at 180.
\textsuperscript{83} Cf. id. at 179–80 (discussing the role domestic gap-filling plays).
\textsuperscript{84} See infra Section IV.B.
III. LEGAL FRAMEWORK

Although the SREU Act intends to resolve the stifling uncertainty as to the status of property rights over space resources extracted by American companies like Planetary Resources and Deep Space Industries, the question still remains as to whether or not such a grant of rights violates the United States’ international treaty obligations. In order to aid the examination of this issue in Part IV, this Part provides a necessary overview of the current legal framework of space law and treaty interpretation.

A. Space Law

This Section provides an overview of current space law relevant to the question at hand. Additionally, several analogous treaties are considered, as their history and provisions may provide insight regarding the status and interpretation of the OST, the legal authority relevant to the question at hand.

1. The Outer Space Treaty

Commonly known as the Magna Carta of Space, the OST sets out to contribute to “broad international co-operation in the scientific as well as legal aspects of the exploration and use of outer space for peaceful purposes.” In 1967, the Treaty officially became law in the United States after overwhelming Senate approval and ratification by President Lyndon B. Johnson. As of the latest U.N. report, 105 states...
have fully ratified the Treaty and 25 additional states have signed.\textsuperscript{90} Several provisions of the Treaty are considered relevant to the question of property rights in extracted resources. Because the exact language will be crucial for purposes of interpreting the meaning of the Treaty and in turn the United States’ obligations’ arising from the Treaty, the relevant portions are reproduced below verbatim:

**Article I**

The exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind.

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

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

**Article II**

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

**Article III**

States Parties to the Treaty shall carry on activities... in the interest of maintaining international peace and security and promoting international co-operation and understanding.

...  

**Article VI**

States . . . shall bear international responsibility for national activities in outer space . . . whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. The activities of non-governmental entities in outer space . . . shall require authorization and continuing supervision by the appropriate State. 91

The OST does not directly confront individual property rights in space. 92 Nevertheless, there remains traction to the argument that property rights are prohibited by the Treaty, given Article I’s provision that the exploration and use of space shall be “for the benefit and in the interest of all” 93 and Article II’s prohibition against appropriation, as will be discussed in further in Part IV.

2. The Moon Agreement

Almost two decades after enacting the OST, following momentous space events such as the first man on the Moon, the United Nations and its members attempted to resolve the question of property rights once and for all. The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 94 better known as the Moon Agreement, entered into force on July 11, 1984. 95 Unlike its successful predecessor, the Moon Agreement has only been ratified by eighteen nations and signed by an additional four as of January 1, 2017. 96 Despite

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92 See Tronchetti, supra note 15, at 7 (“International space law clearly defines the status of celestial bodies while it leaves that of their resources rather uncertain. Celestial bodies are not subject to appropriation; pursuant to Article II of the 1967 Outer Space Treaty States are forbidden from extending their territorial sovereignty over outer space or any parts of it.” (citations omitted)) (citing to the OST and highlighting its lack of reference to resources of celestial bodies).
94 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 5, 1979, 1363 U.N.T.S. 3 [hereinafter Moon Agreement].
95 Status of International Agreements, supra note 90, at 2.
participating actively in negotiations, both of the stars of the Space Race, the United States and the Union of Soviet Socialist Republics, failed to even sign the Agreement, let alone ratify it.\(^\text{97}\) The Agreement hoped to continue to keep the Moon and outer space free from conflict and update the law based on the progress in space exploration and science.\(^\text{98}\)

The Moon Agreement not only reaffirmed the OST’s nonappropriation principle, but also attempted to explicitly address some of the questions regarding extraterrestrial property rights that still remain uncertain today.\(^\text{99}\) The Moon Agreement specifically provides for the right to collect and remove samples of minerals and other substances from the Moon and other celestial bodies,\(^\text{100}\) but only if the samples remain at the disposal of the state parties causing their collection and are used for *scientific* purposes.\(^\text{101}\) The Agreement does not provide a similar right for use of such resources for commercial activities. Instead, the Agreement provides: “Neither the surface nor the subsurface of the moon [or any celestial body], 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.”\(^\text{102}\) The Agreement does leave the door open to property rights over natural resources in the future by putting the duty on parties to establish an international regime to govern the exploitation of natural resources in space should such practice become feasible.\(^\text{103}\) The impact of this nonbinding instrument will be discussed more in Part IV.

3. *U.S. Domestic Law*

Prior to the passage of the SREU Act, U.S. domestic law regarding nongovernment activities in space did not address resource property

\(^{97}\) Status of International Agreements, supra note 90, at 9, 11.  
\(^{98}\) Moon Agreement, supra note 94, at pmbl., 1363 U.N.T.S. at 22.  
\(^{100}\) Article 1.1 of the Moon Agreement makes clear that all provisions of the Agreement relating to the Moon also apply to other celestial bodies. Moon Agreement, supra note 94, art. 1.1, 1363 U.N.T.S. at 22.  
\(^{101}\) Id., art. 6.2, 1363 U.N.T.S. at 24.  
\(^{102}\) Id., art. 11.3, 1363 U.N.T.S. at 25.  
\(^{103}\) Id., art. 11.5, 1363 U.N.T.S. at 25.
rights. Instead, the laws focused mostly on establishing a procedure for the licensing and regulation of commercial space launches, as well as creating a liability and indemnification regime.\textsuperscript{104} With its provision of property rights to U.S. citizens in resources extracted from asteroids and other spatial bodies, the SREU Act became the first national law authorizing property rights in space.\textsuperscript{105}

The SREU Act explicitly grants property rights to U.S. citizens in any asteroid or space resources recovered for commercial purposes.\textsuperscript{106} The property rights include the right to “possess, own, transport, use, and sell” the resources so long as doing so accords with applicable law and international obligations of the United States.\textsuperscript{107} The Act defines a space resource as “an abiotic resource in situ in outer space . . . including water and minerals” and an asteroid resource as “a space resource found on or within a single asteroid.”\textsuperscript{108} Furthermore, the law purports to require the President to “facilitate” commercial resource exploration and


\textsuperscript{105} Several countries are hot on the heels of the United States. On November 11, 2016, just shy of the one-year anniversary of the SREU Act’s enactment, Luxembourg announced the government’s adoption of “a draft law ensuring that private operators working in space can be confident about their rights to the resources they extract in outer space.” Press Release, Ministry of the Econ. for the Gov’t of the Grand Duchy of Lux., Luxembourg’s New Space Law Guarantees Private Companies the Right to Resources Harvested in Outer Space in Accordance with International Law (Nov. 11, 2016), http://www.spaceresources.public.lu/content/dam/spaceresources/press-release/2016/2016_11_11_PressReleaseNewSpaceLaw.pdf [https://perma.cc/43C4-LNXA]; Jessica Orwig, A Tiny European Country Just Made an Unprecedented Move in the Space Mining Business, Business Insider (Feb. 5, 2016, 5:19 PM), http://www.businessinsider.com/luxembourg-wants-to-cash-in-on-asteroid-mining-2016-2 [https://perma.cc/2UDV-FUUU] (“Luxembourg and the US are the only two countries in the world who have begun to take legal action toward securing property rights for commercial companies who could, one day, collect rare and precious resources from asteroids.”).


\textsuperscript{107} Id. § 402, 129 Stat. at 721 (to be codified at 51 U.S.C. § 51303).

\textsuperscript{108} Id. (to be codified at 51 U.S.C. § 51301).
recovery, “discourage government barriers” to the development of an “economically viable” industry, and “promote” citizens’ rights to commercial exploration and recovery.\(^{109}\) Finally, the Act contains an entire section serving as a “disclaimer of extraterritorial sovereignty,” likely to avoid implicating the nonappropriation principle in Article II of the OST, as will be discussed in Part IV.\(^{110}\)

4. Analogous Treaties

Although scholars have debated the viability of property rights under the OST hypothetically for decades,\(^{111}\) the legality of such rights in space under the Treaty has never actually been put to the test. With little to no precedent, analogous legal regimes lend insight to both the interpretation of the OST and to the normative question of what should be done.\(^{112}\) Despite their terrestrial location, both the sea and Antarctica bear striking similarities to outer space, as they are also international areas governed by treaty systems. Additionally, the deep sea, Antarctica, and outer space all offer bountiful deposits of natural resources, catching the attention of nations and private investors alike. Exploration of each of these regions and the recovery of resources therefrom face an array of similar variables, including inhospitable and difficult-to-travel geography and expensive and still-developing technology, not to

\(^{109}\) Id. (to be codified at 51 U.S.C. § 51302).
\(^{112}\) See, e.g., Sarah Jane Fox, SPACE: The Race for Mineral Rights—‘The sky is no longer the limit’—Lessons from Earth!, 49 Resources Pol’y 165, 168–72 (2016) (discussing the lessons that can be learned from the sea and air legal regimes); Coffey, supra note 111, at 128–32 (briefly identifying analogous features of mining in outer space, oceans, and Antarctica); Johnson, supra note 111, at 1488 (arguing that treaties over the high seas and Antarctica could serve as useful models regarding property rights in space).
mention countless unknown elements. For these reasons, treaties related to the governance of Antarctica and the high seas will be considered in order to aid in interpreting the OST in Part IV.

B. Treaty Interpretation Rules

Because the OST establishes a majority of international space law, questions of treaty interpretation loom particularly large in the issue at hand. The terms of the OST establish the obligations of the United States. Thus, in order to understand the United States’ international obligations with respect to space and, in turn, whether the SREU Act abrogates these obligations, the terms of the Treaty and their meaning must be accurately interpreted. The following provides an overview of the applicable treaty interpretation rules that guide and control this interpretation. Both U.S. and international rules are considered because there are slight nuances between the two approaches that might impact the conclusion depending on whether domestic or international litigation is pursued.

For example, some academic interpretations of the OST simply apply the principles set forth in the Vienna Convention\(^{113}\) in order to determine the status of property rights under the Treaty.\(^{114}\) Nevertheless, because the United States has yet to ratify the Vienna Convention\(^{115}\) and disagreement over the customary international law status of all of the Convention’s provisions persists,\(^{116}\) a more realistic interpretation must also consider U.S. domestic interpretation methods. Despite not ratifying the Vienna Convention, the United States still has deep regard for its tools and the Vienna Convention would play a focal role in the

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\(^{114}\) See, e.g., Johnson, supra note 111, at 1493–94 (focusing exclusively on the Vienna Convention treaty-interpretation rules, though recognizing that customary international law may give rise to legal obligations above and beyond the text of the treaty).

\(^{115}\) See Cong. Research Serv., Treaties and Other International Agreements: The Role of the United States Senate, S. Prt. 106-71, 106th Cong. 2d Sess., at 20 (Comm. Print. 2001) (prepared for committee by the Congressional Research Service, discussing the inability of the Department of State and the Senate Foreign Relations Committee to agree on acceptable conditions despite the committee’s recommendation to advise and consent to ratification with conditions) [hereinafter CRS Treaty Report].

\(^{116}\) Id. at 21.
interpretation of the OST even in a U.S. court. This discussion serves as a reminder that U.S. federal courts and the executive apply similar, but slightly different rules of interpretation that should not be ignored. This domestic interpretation policy could nevertheless be problematic and ultimately risks being disregarded by an international interpretative body, but at least illuminates the discussion and persisting disagreement.

1. The Vienna Convention

Articles 31 and 32 of the Vienna Convention provide rules of interpretation for international treaties. In general, “[a] treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose.” Article 31 goes on to discuss what constitutes “context” for purposes of the general rule. Interestingly, context has a more limited scope than the United States’ traditional notion of legislative history. Rather, context focuses on the treaty document itself, including the text of the preamble and annexes. Subsequent agreements and practice relating to the interpretation and application of the Treaty and any relevant rules of international law that may apply with respect to the relations between the Treaty partners may be considered.

According to the Convention, other supplementary means of interpretation—i.e., means more analogous to U.S. legislative history such as preparatory work and circumstances surrounding the Treaty’s conclusion—may only be used in limited situations. The supplementary means may only be used (1) to confirm the meaning resulting from the application of the aforementioned general interpretation rules or (2) when the general rules lead to an “ambiguous or obscure” meaning or a result which is “manifestly absurd or unreasonable.” The

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117 Id. at 44–45 (discussing the position of the Department of State regarding the status of the Vienna Convention and providing statements of previous Secretary of State William P. Rogers and President Nixon regarding the Convention).
118 Id. at 163–64.
120 Id., art. 31, cl. 1, 1155 U.N.T.S. at 340 (emphasis added).
121 Id., art. 31, cl. 2, 1155 U.N.T.S. at 340.
122 CRS Treaty Report, supra note 115, at 164.
125 Id., art. 32, 1155 U.N.T.S. at 340.
hierarchy set forth by Articles 31 and 32 emphasizes the “dominant position of the text itself in the interpretative process.”

2. Domestic Interpretive Rules

As opposed to following the seemingly rigid hierarchy of the Vienna Convention, U.S. courts are generally more willing to look beyond the instrument to supplementary means in order to determine meaning. In general, domestic interpretation of international treaties “aims at ascertaining the meaning intended by the parties in the light of all relevant factors.” The Reporter Notes in the Restatement (Third) of Foreign Relations Law implore that a United States court or agency must consider preparatory materials made by the United States that might not be considered by international interpretive bodies. These materials may include: committee reports, legislative debates, negotiation documents and statements, unilateral statements of understanding, executive interpretations, and any other documents relating to the formation of an international agreement. Additionally, courts appear to give notable deference to the meanings given to agreements by the executive branch and other governmental departments closely involved with the different stages of the agreements’ creation and enforcement.

3. Further Treaty Interpretation Remarks

Disputes regarding the interpretation of a treaty are usually settled by consultation or negotiation, but if such means prove unsuccessful,

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120 CRS Treaty Report, supra note 115, at 163 (internal quotation marks omitted) (quoting Shabtai Rosenne, Interpretation of Treaties in the Restatement and the International Law Commission’s Draft Articles: A Comparison, 5 Colum. J. Transnat’l L. 205, 221 (1966)).
127 Restatement (Third) of Foreign Relations Law of the United States § 325 cmt. g & rep. n.1 (Am. Law. Inst. 1986) [hereinafter Restatement (Third)].
128 CRS Treaty Report, supra note 115, at 164.
129 Restatement (Third), supra note 127, § 325 rep. n.5.
130 Id.
131 See, e.g., Kolovrat v. Oregon, 366 U.S. 187, 194 (1961) (“While courts interpret treaties for themselves, the meaning given them by the departments of government particularly charged with their negotiation and enforcement is given great weight.”); CRS Treaty Report, supra note 115, at 163–66 discussing the weight of different administrative and congressional interpretations of treaties); Restatement (Third), supra note 127, § 325 rep. n.5(ii).
Parties may resort to more formal dispute settlement procedures.\textsuperscript{132} According to Article XIII of the OST, any questions regarding activities related to the exploration and use of outer space “shall be resolved by the States Parties to the Treaty either with the appropriate international organization or with one or more States members of that international organization, which are Parties to this Treaty.”\textsuperscript{133} Though this provision leaves unclear exactly where a dispute between a domestic court’s interpretation of the Treaty and that of an international body might be resolved, the Vienna Convention suggests that if resolution does not occur within a year of dispute notification to the offending party, the dispute may be referred to the International Court of Justice (“ICJ”).\textsuperscript{134} Despite the possibility of ultimate resolution by a body governed by the Vienna Convention like the ICJ, this Note still insists upon consideration of \textit{travaux préparatoires} (preparatory work) for several reasons. Professor Richard Gardiner, who has done extensive work in the field of treaty interpretation, asserts that applications of the Vienna Convention’s rules, in practice, “reveal a quite loose structure for developing interpretations, rather than a straightjacket or formulaic set of requirements.”\textsuperscript{135} Viewed in light of increased textualism in statutory interpretation by the U.S. courts,\textsuperscript{136} there appears to be somewhat of a convergence of the two approaches,\textsuperscript{137} and both should be given due consideration. Ultimately, perhaps this difficulty and debate in even determining how to interpret the OST simply goes to show that the real legal debate regarding property rights in space resources will not be resolved within the framework of the OST. Instead, the debate will be resolved through normative efforts in the form of unilateral national

\textsuperscript{132} CRS Treaty Report, supra note 115, at 157.
\textsuperscript{133} Outer Space Treaty, supra note 14, art. XIII, 18 U.S.T. at 2418–19, 610 U.N.T.S. at 211.
\textsuperscript{134} Vienna Convention, supra note 113, art. 66(a), 1155 U.N.T.S. at 348.
\textsuperscript{136} Galbraith, supra note 135, at 1510–11.
\textsuperscript{137} Id. at 1511.
laws or, preferably, renewed action at the international level at the United Nations.138

IV. COMPATIBILITY OF THE SREU ACT WITH INTERNATIONAL OBLIGATIONS

Utilizing the existing legal framework of international space law and the treaty interpretation rules and hierarchy discussed in Part III, this Part approaches the question of compatibility between the SREU Act and the international obligations of the United States as a court of law would. First, Section A determines the baseline international obligations of the United States as set forth by the OST. Second, Section B analyzes the compatibility of the new SREU Act with these obligations. Finally, Section C discusses the implications of this court-like analysis and practical shortcomings of the SREU Act.

A. Determining the United States’ International Treaty Obligations Under the Outer Space Treaty

Because a treaty does not legally bind the United States until consented to by a two-thirds vote in the Senate and ratified by the President, the conservative scope of U.S. international obligations with respect to outer space can be limited to those put forth and agreed upon in the OST.139 Additionally, some find the SREU Act controversial simply on the grounds that the United States passed legislation regarding activities in space, an area arguably beyond national jurisdiction.140 While the United States has had national space laws since 1984,141 laws in the past focused on activities more arguably falling within the scope of national jurisdiction, such as space launches from the United States and licensing,142 rather than activities such as mining that actually occur in space and are governed by international law.143 Nevertheless, others

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138 See discussion infra Section IV.C.
139 See U.S. Const. art. II, § 2, cl. 2; id., art. VI, cl. 2.
140 See, e.g., Fox, supra note 112, at 168.
142 See Randolph, supra note 10 (providing an historical overview of U.S. domestic space law).
find the language of the Treaty extremely ambiguous and argue the new law falls within the permissible gaps of the ambiguity.\footnote{Lintner, supra note 55, at 140–41, 147.} Such scholars urge that the terms of the OST should be liberally construed to allow as many uses of outer space as imaginable until the international community explicitly agrees to restrict certain activities, as it has done, for example, with the use of nuclear weapons.\footnote{Id. at 144.}

None of the numerous binding or nonbinding bilateral and multilateral agreements, treaties, or United Nations resolutions regarding space explicitly addresses the exploitation of natural space resources for commercial purposes.\footnote{Shackelford, supra note 111, at 143.} Nevertheless, Articles I and II of the OST shed light on the legality of claiming property rights in space resources. In fact, much of the debate regarding the matter arises due to the tension between these two articles with respect to property rights over the natural resources of the moon and other celestial bodies.\footnote{See, e.g., Johnson, supra note 111, at 1486.} On the one hand, Article I grants a seemingly broad right for all to explore and use outer space, including the moon and other celestial bodies.\footnote{Outer Space Treaty, supra note 14, art. I, 18 U.S.T. at 2412–13, 610 U.N.T.S. at 207–08.} The term “use” itself may encompass the right to use, extract, and exploit the natural resources.\footnote{See, e.g., H.R. Rep. No. 114-153, at 7 (2015) (“[R]emoval is permitted by the article contained in the 1967 Outer Space Treaty which states, inter alia, that ‘Outer Space, including the Moon and other celestial bodies, shall be free for exploration and use by all States . . . .’” (internal quotations omitted) (quoting letter from Secretary of State Cyrus Vance to Sen. Frank Church, Chairman of Senate Foreign Relations Committee (Nov. 28, 1979)).} On the other hand, Article II lays down a strict prohibition against national appropriation of outer space “by claim of sovereignty, by means of use or occupation, or by any other means.”\footnote{Outer Space Treaty, supra note 14, art. II, 18 U.S.T. at 2413, 610 U.N.T.S. at 207–08.} Such a prohibition may prohibit claims of property rights in both real property, such as claiming a plot of land on the Moon, and personal property, such as claiming extracted mineral resources from the surface or subsurface of the Moon or an asteroid. Though the Treaty does not directly address the actions of nongovernment actors, this prohibition

guiding exploration and use of outer space), and XII, 18 U.S.T. at 2418, 610 U.N.T.S. at 211 (governance of visitation of stations, installations, equipment, and vehicles on the Moon and other celestial bodies).
against appropriation likely applies to such actors given the common understanding that the Treaty governs both sovereign states and their entities and individuals.\textsuperscript{151}

In addition to the nonappropriation principle, the common heritage of mankind doctrine possibly prohibits the unilateral grant of property rights in space resources without some sort of sharing mechanism. Article I of the Treaty states that “[t]he exploration and use of outer space . . . shall be carried out for the benefit and in the interests of all countries . . . and shall be the province of all mankind.”\textsuperscript{152} Many developing nations cite this language as an invocation of the common heritage of mankind principle, which requires the sharing of all benefits extracted from a commons.\textsuperscript{153} Today, however, the consensus seems to be that the language of Article I does not create a mandatory obligation that restricts property rights in space in a meaningful way.\textsuperscript{154} Thus, this Note focuses on the interpretation of the tension between the Treaty’s general grant of the right to use space and its non-appropriation principle. Like a court, this Note first considers the ordinary meaning of the relevant terms, and second, considers additional materials such as preparatory materials, historical context, state practice, and state interpretations. Despite the ambiguities revealed by each of these interpretive tools, the great weight of the analysis favors a conclusion

\begin{footnotesize}
\textsuperscript{151} Because Article VI of the OST requires a state party to be responsible for all state activities and activities of their nationals in outer space, non-governmental actors are confined to acting pursuant to the authorization and supervision of the state, which may only authorize and supervise activities that comply with the Treaty. Lyall & Larsen, supra note 86, at 66.

\textsuperscript{152} Outer Space Treaty, supra note 14, art. I, 18 U.S.T. at 2412, 610 U.N.T.S. at 207 (emphasis added).

\textsuperscript{153} Fountain, supra note 111, at 1762; see also Zell, supra note 111, at 495–503 (discussing the interpretation of the common heritage of mankind language in other treaties by developing nations and providing a comprehensive overview of the International Seabed Authority, an authority intended to share the benefits of the sea with all).

\textsuperscript{154} See, e.g., Lyall & Larsen, supra note 86, at 64 (finding it “inappropriate” to interpret Article I as “implying at that stage the existence of the notion of a regime of ‘common heritage’”); U.S. Human Exploration Goals and Commercial Space Competitiveness: Hearing Before the Subcomm. on Space, Sci., and Competitiveness of the S. Comm. on Com., Sci., and Transp., 114th Cong. 64 (2015) (response to written questions submitted by Hon. Bill Nelson to Dr. Scott Page, Director of Space Policy Institute) (stating that the United States does not accept such an interpretation of Article I and that the U.S. State Department’s Office of the Legal Advisor can confirm so); S. Exec. Doc. No. 90-8, at 4 (1967) [hereinafter OST S. Exec. Rep.] (noting that “the committee was assured that no such specific treaty obligations would result” from the language of Article I).
\end{footnotesize}
that the SREU Act is incompatible with the obligations set forth in the OST.

1. Ordinary Meaning

As required by Article 31 of the Vienna Convention and encouraged by many American courts, Treaty terms should first and foremost be read in light of the ordinary meaning of the terms within the four corners of the document.

With respect to the availability of resource property rights under the OST, the key words are “use” and “appropriation” found in Articles I and II, respectively. The following sources will aid in the ordinary meaning interpretation: (1) Webster’s New International Dictionary of the English Language, 1960;155 (2) Black’s Law Dictionary, 1968;156 and, (3) West’s Words and Phrases, discussing cases from various time periods.157 Sources from the time period of the negotiation, drafting, and ratification of the OST are utilized in attempts to accurately interpret the Treaty and its meaning at the time of its adoption. Although these sources shed some light on the potential scope of the obligations of the OST related to property rights, the analysis ultimately highlights the high level of ambiguity of the text on its face—i.e., that the ordinary meaning of the text could be read to either allow or prohibit property rights—and the need to turn to supplementary materials to aid in the interpretation.

Use. Webster’s defines “use” in myriad ways. In the way most relevant to the Treaty, “use” includes the “[a]ct of employing anything” and “[t]he fact of being used or employed habitually.”158 The verb sense of “use” can also mean “[t]o convert to one’s service; to avail oneself of; to employ” (e.g., “to use a plow, a chair, a book”); “[t]o put into operation; to cause to function” (e.g., “he used the same machinery”).159 The Supreme Court has found “use” to mean to “put to use, to employ, or to derive service from.”160 While these definitions of “use” surely

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155 Webster’s New International Dictionary of the English Language (2d ed. 1960) [hereinafter Webster’s].
157 Words and Phrases (West perm. ed. 2004) [hereinafter Words & Phrases].
158 Webster’s, supra note 155, at 2806.
159 Id.
160 43B Words & Phrases 142 (West perm. ed. 2006) (quoting Astor v. Merritt, 111 U.S. 202 (1884)).
seem to encompass the extraction of natural resources to utilize as fuel, building supplies, and nutrients for one’s own purposes while in outer space, none of these definitions strongly assert the right to large-scale harvest of natural resources for commercial sale. If such an action were desired, the drafters of the Treaty might have used a stronger word such as “exploitation,” the ordinary meaning of which seems to go beyond mere use: “[t]o utilize; to make available; to get the value or usefulness out of; as in, to exploit a mine.” Furthermore, the Treaty aligns use with “exploration” in Article I, a term which ordinarily connotes “the activity undertaken to ascertain existence, location, extent or quality of a mineral deposit” when used in the mining context, a pre-exploitation phase. When read in light of its companion term “exploration,” the ordinary meaning of “use” does not seem to rise to the level of commercial exploitation. Nevertheless, a colorable argument in favor of “use” encompassing a bundle of property rights including commercial exploitation of resources still exists, as the ordinary meaning of the term “use” “can be interpreted to encompass both non-economic and economic use.” As indicated by the back-and-forth of this analysis, however, an ordinary-meaning analysis fails to resolve the ambiguities concerning the “use” of outer space in Article I.

**Appropriation.** The term “appropriation” also remains ambiguous. Webster’s defines the verb “appropriate” as “to take to oneself in exclusion of others; to claim or use as by an exclusive or pre-eminent right; as, let no man appropriate a common benefit.” Similarly, Black’s Law Dictionary describes “appropriate” as an act “[t]o make a thing one’s own; to make a thing the subject of property; to exercise dominion over an object to the extent, and for the purpose, of making it

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161 Webster’s, supra note 155, at 898 (defining exploitation by reference to mining).
162 15B Words & Phrases 177 (West perm. ed. 2004) (citing Santa Fe Pac. R.R. Co. v. United States, 378 F.2d 72, 76 (7th Cir. 1967)); see also id. at 177–78 (“[E]xploration’ refers solely to effort to find additional tonnage and consists almost exclusively of . . . drilling and sampling, whereas . . . ‘development’ refers to steps necessarily taken to reach ore in mine so that it can be mined . . . .” (citing State Tax Comm’n v. Eagle Picher Mining & Smelting Co., 241 P.2d 804, 808 (Ariz. 1952))); Webster’s, supra note 155, at 898 (describing exploration as the act of searching or seeking in order to discover).
163 While the use of the conjunctive “and” in Article I does suggest the terms should be read similarly, in light of additional language about scientific investigation, the conjunctive “and” might also suggest that “use” should be read as adding something additional to exploration, i.e., it must mean something different to avoid surplusage.
164 Tronchetti, supra note 15, at 7.
165 Webster’s, supra note 155, at 133.
subserve one’s own proper use or pleasure."\(^{166}\) Oftentimes, appropriation refers to the setting aside of government funds, the taking of land for public purposes, or a tort of wrongfully taking another’s property as one’s own. The term appropriation is often used not only with respect to real property but also with water. According to U.S. case law, a person completes an appropriation of water by diversion of the water and an application of the water to beneficial use.\(^{167}\) This common use of the term “appropriation” with respect to water illustrates two key points: (1) the term applies to natural resources—e.g., water or minerals—not just real property, and (2) mining space resources and putting them to beneficial use—e.g., selling or manufacturing the mined resources—could reasonably be interpreted as an “appropriation” of outer space. While the ordinary meaning of “appropriation” reasonably includes the taking of natural resources as well as land, whether the drafters and parties to the OST envisioned such a broad meaning of the term remains difficult to determine with any certainty. The prohibition against appropriation “by any other means” supports such a reading, though, by expanding the prohibition to other types not explicitly described.\(^{168}\)

As illustrated by this analysis, considerable ambiguity remains after this ordinary-meaning analysis and thus, the question of Treaty obligations and property rights remains unresolved. In order to resolve these ambiguities, an analysis of preparatory materials, historical context, and state practice follows.

2. Preparatory Materials

A review of meeting reports of the Committee on the Peaceful Uses of Outer Space and its Legal Sub-Committee regarding the Treaty reveals little to clear up the ambiguities of Articles I and II of the OST. In fact, the reports indicate that, despite several negotiating states expressing concern about the lack of clarity with respect to the meaning of “use” and the scope of the non-appropriation principle, no meaningful discussion occurred and no consensus was reached.\(^{169}\) Some commentators still conclude that the preparatory work does in fact

\(^{166}\) Appropriate, Black’s Law Dictionary, supra note 156, at 131.

\(^{167}\) 3B Words & Phrases 429 (West perm. ed. 2007) (citing Nebraska v. Wyoming 325 U.S. 589, 614 (1945); Arizona v. California, 298 U.S. 558, 565-66 (1936)).


\(^{169}\) See infra notes 172-76 and accompanying text.
confirm the drafters' intent for "use" to include exploitation.170 These commentators do admit, however, that discussions of the term "exploitation" supporting their conclusion focused on remote sensing and communications satellites rather than on resource extraction.171 Further skepticism about such an intent for "use" to include "exploitation" also arises given the uncertainty amongst negotiating states about the meaning of these terms. A mere few months before the Treaty opened for signature in January 1967, negotiators were still asking questions about the meaning of "use" during the last few Legal Sub-Committee meetings. For example, in July 1966, the representative of France inquired: "Did the latter term ['use'] imply use for exploration purposes, such as the launching of satellites, or did it mean use in the sense of exploitation, which would involve far more complex issues?"172 The representative noted that while some activities such as extraction of minerals were difficult to imagine presently, "[i]t was important for all States, and not only those engaged in space exploration, to know exactly what was meant by the term 'use.'"173 In the same meeting, the representative from the USSR offered an interesting response to the question posed by the representative of France:

[A]dequate clarification was to be found in article II of the USSR draft, which specified that outer space and celestial bodies should not be subject to national appropriation by means of use or occupation, or by any other means. In other words no human activity on the moon or any other celestial body could be taken as justification for national appropriation.174

This response implies that Article II acts as a qualification on Article I's broad provision for free exploration and use of outer space by all. Activity such as resource extraction would be viewed as national

170 Johnson, supra note 111, at 1504 & n.159 (citing Carl Q. Christol, The Modern International Law of Outer Space 38–43 (1982)); see also id. at 1501 (arguing that Article II was intended to prevent territorial claims so that equal access and use would not be frustrated and thus, "use" reasonably allows for exploitation as Article I does not limit such activity).
171 Id. at 1505 n.159 (citing Christol, supra note 170, at 38–43).
173 Id.
174 Id. at 10 (statement of Mr. Morozov, representative of the Union of Soviet Socialist Republics) (emphasis added).
appropriation and such activity cannot be justified given Article II’s prohibition, not even by falling within the ordinary meaning of “use.” Despite this clarification, uncertainty appears to have remained, as lingering concerns were communicated in subsequent meetings by several other states, including Australia, Austria, and France.\(^{175}\) Nevertheless, the committee put the Treaty in front of the General Assembly two months later without final resolution of the ambiguities regarding property rights arising from Articles I and II.\(^{176}\) The preparatory materials ultimately fail to fully clarify the ambiguities of the meanings of “use” and “appropriation.” The statement of the representative of the Soviet Union, one of the two main drafting parties, does, however, help push back on the interpretation of some academics that the nonappropriation principle fails to overcome the presumption of freedom of use.\(^{177}\)

3. Historical Context

Two interrelated, major historical events cannot be ignored when considering the meaning of the OST: (1) the Cold War and (2) the Space Race. The success of Sputnik I in 1957 showed space travel and exploration no longer to be a dream, but a reality.\(^{178}\) While exciting, this news also brought fear in light of the world’s fragile balance of power

\(^{175}\) U.N. GAOR, 5th Sess., 70th mtg. at 14, U.N. Doc. A/AC.105/C.2/SR.70 (Oct. 21, 1966) (statement of Mr. Lemaitre, representative of France) (discussing continued reservations of the French delegation about “the inclusion of the word ‘use’ since it was very difficult to cover exploration and use to the same degree at the present time”); U.N. GAOR, 5th Sess., 71st mtg. at 10, U.N. Doc. A/AC.105/C.2/SR.71 and Add.1 (Oct. 21, 1966) (statement of Mr. Herndl, representative of Austria) (noting that the “idea of non-appropriation was [a] little vague”); id. at 14–15 (statement of Sir Kenneth Bailey, representative of Australia) (emphasizing the importance of ensuring intentions were clearly expressed in the drafting of Article II and agreeing with the French delegation that “the present text did not make it clear that outer space was not subject to national sovereignty and that no one could acquire property rights in outer space”).

\(^{176}\) U.N. GAOR, 21st Sess., 1499th plen. mtg. at 66, 71–72, 13–15 U.N. Doc. A/PV.1499 (Dec. 19, 1966) (taking votes on draft resolutions despite laments from the representative of Tanzania, Mr. Malecela, echoing concerns of Australia, Austria, and France, that asking the General Assembly to commend the draft Treaty should have been deferred “until the Committee on the Peaceful Uses of Outer Space had made greater progress in the study of . . . the definition of outer space and the utilization of outer space and the celestial bodies”).

\(^{177}\) For an example of such an interpretation, see Johnson, supra note 111, at 1504–07, 1513.

\(^{178}\) Lyall & Larsen, supra note 86, at 3.
and tensions between the United States and the Soviet Union.\textsuperscript{179} What if the Soviet Union managed to launch a nuclear weapon into space? What if the United States greedily claimed the Moon as the fifty-first state? To many, the combination of the Cold War and Space Race made the late 1950s and the 1960s a perilous time.\textsuperscript{180} When viewed as a response to this perilous era, the OST begins to look much more like a nuclear arms treaty and an attempt to ease Cold War tensions than a treaty concerned with the issue of property rights in space.\textsuperscript{181} The Treaty’s emphasis on “peaceful purposes” supports this contextual interpretation.\textsuperscript{182}

On the one hand, as many suggest, this context leads to the conclusion that the vague nonappropriation principle of Article II does not prevent private property rights in space resources and the presumption of broad “use” prevails.\textsuperscript{183} Private property rights were simply not a concern of the Treaty drafters and therefore, the Treaty does not address—nor prohibit—such claims. On the other hand, the context surrounding the treaty’s drafting does not necessarily lead to this conclusion. In fact, the emphasis on “peaceful purposes” and reducing international tension might instead suggest a stricter reading of Articles I and II. If things were so unstable and tense on Earth, the drafters may have instead intended Article II as a qualification on the general right to explore and use outer space in Article I, recognizing the simple fact that disputes over property, both land and minerals, have sparked some of history’s bloodiest conflicts.

The Antarctic treaty experience evidences Cold War concern over potential resource rights disputes. Leading up to the finalization of the Antarctic Treaty of 1959,\textsuperscript{184} seven nations had already made official territorial claims over varying portions of the frozen landscape in hopes

\begin{footnotesize}
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\item[179] Tennen, supra note 111, at 803–04.
\item[180] See, e.g., Johnson, supra note 111, at 1507–08; Fountain, supra note 111, at 1753–54 & n. 4.
\item[183] See, e.g., Johnson, supra note 111, at 1513; Reynolds, supra note 181.
\end{enumerate}
\end{footnotesize}
of laying claim to the plethora of resources thought to be located within the subsurface.\(^{185}\) Although the Treaty itself did not directly address rights to mineral resources in the Antarctic,\(^{186}\) the treaty is interpreted to have frozen these claims in the interest of “[f]reedom of scientific investigation in Antarctica and cooperation toward that end.”\(^{187}\) In a manner notably similar to the terms of Articles XI and XII of the OST, the Treaty promotes scientific exploration by encouraging information sharing of scientific program plans, personnel, and observations\(^{188}\) and inspection of stations on a reciprocal basis.\(^{189}\) This Treaty along with several later treaties and protocols constitute the “Antarctic Treaty System,” which as a whole manages the governance of Antarctica.\(^{190}\) In 1991, the Protocol on Environmental Protection to the Antarctic Treaty\(^{191}\) (“Madrid Protocol”) settled the question of property rights for the fifty years following the Protocol’s entry into force.\(^{192}\) The Madrid Protocol provides for “the comprehensive protection of the Antarctic environment . . . [and] designate[s] Antarctica as a natural reserve, devoted to peace and science.”\(^{193}\) Article 7 explicitly—and simply—states “[a]ny activity relating to mineral resources, other than scientific research, shall be prohibited.”\(^{194}\) Though Article 25 allows for the creation of a binding legal regime to determine whether and under what conditions mineral resource activity be allowed, no such international

\(^{185}\) See Lyall & Larsen, supra note 86, at 55–56; Fountain, supra note 111, at 1769–70 (discussing the valuable natural resources of Antarctica and the motivations behind the Antarctic Treaty).

\(^{186}\) Antarctic Treaty of 1959, supra note 184, art. IV, 12 U.S.T. at 796, 402 U.N.T.S. at 74; Lyall & Larsen, supra note 86, at 56.

\(^{187}\) See Lyall & Larsen, supra note 86, at 55–56.


\(^{189}\) Id., art. VII, 12 U.S.T. at 797, 402 U.N.T.S. at 76.

\(^{190}\) Fountain, supra note 111, at 1770, 1770 n.118.


\(^{192}\) Id., arts. 7 & 25, 30 I.L.M. at 1464, 1469. While disagreement may have continued over the question of property rights in resources in Antarctica, the protocol seemingly settled the question by flatly prohibiting any nonscientific mining activity for the next fifty years, or until the states created a binding legal regime to manage the resources. One attempt was made to create such a regime, but it ultimately failed. See Reaven, supra note 64, at 246 (“CRAMRA was convened to establish an international mining regime, only to unsuccessfully conclude in 1988 after six years of negotiation.”).

\(^{193}\) Id., art. 2, 30 I.L.M. at 1462.

\(^{194}\) Id., art. 7, 30 I.L.M. at 1464.
legal regime has been created to date.\textsuperscript{195} The ban on mineral resource exploitation may only be amended by unanimous consent of the parties.\textsuperscript{196} The United States signed and ratified both the Antarctic Treaty of 1959 and the Madrid Protocol.\textsuperscript{197}

The freezing of territorial claims in the Antarctic\textsuperscript{198} by the Antarctica Treaty of 1959\textsuperscript{199} illustrates the existence of true concern over potential resource dispute and conflict during the Cold War, in addition to the major concerns posed by nuclear weapons.\textsuperscript{200} The drafting states also recognized the potential for conflict over property in outer space and drew on the language of the Antarctic Treaty of 1959 to draft the OST.\textsuperscript{201} Given these driving concerns, Article II could be reasonably read as qualifying Article I’s general rule. Under this reading, Article II serves the same qualifying purpose as Article IV regarding military and nuclear weapon use in space. Some might push back on this interpretation by claiming that the drafters could have used language such as that in the Madrid Protocol to explicitly prohibit mining in space. However, this argument is flawed. The Madrid Protocol was not

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\textsuperscript{195} Id., art. 25, para. 5, 30 I.L.M. at 1470; Secretariat of the Antarctic Treaty, Related Agreements, http://www.ats.aq/efsats_related.htm (last visited Jan. 20, 2018) (indicating the most recent agreement making up the Antarctic Treaty System was the Madrid Protocol itself).

\textsuperscript{196} Madrid Protocol, supra note 191, art. 25, para. 1, 30 I.L.M. at 1469; Antarctic Treaty of 1959, supra note 184, art. XII, para. 1(a)–(b), 12 U.S.T. at 799, 402 U.N.T.S. at 82.


\textsuperscript{198} Lyall & Larsen, supra note 86, at 55–56.

\textsuperscript{199} Antarctic Treaty of 1959, supra note 184, art. VII, 12 U.S.T. at 797, 402 U.N.T.S. at 76.

\textsuperscript{200} Id., art. I (providing that Antarctica shall be used for peaceful purposes only and prohibiting any military bases or maneuvers, as well as any weapons testing in the region); id., art. V (prohibiting nuclear explosions). Fountain, supra note 111, at 1770 (“Motivated by concerns to protect the fragile Antarctic environment, to preserve the area for scientific research, and to avoid potential sovereignty disputes arising from pre-existing claims, the United States initiated discussions with the other countries engaged in active research in Antarctica.”) (citing Grier C. Raclin, From Ice to Ether: The Adoption of a Regime to Govern Resource Exploitation in Outer Space, 7 Nw. J. Int’l L. & Bus. 727, 745–46 (1986)).

\textsuperscript{201} See Lyall & Larsen, supra note 86, at 180–81 (discussing that President Eisenhower formally expressed the view that the Antarctica Treaty of 1959 should be used as a model for creating an outer-space legal regime); Fabio Tronchetti, The Exploitation of Natural Resources of the Moon and Other Celestial Bodies: A Proposal for a Legal Regime 136 (2009) (“The [Antarctic] Treaty’s provisions . . . also largely contributed to the development of other fields of international law and influenced the drafting of some successive legal texts such as, for example, the Outer Space Treaty.”).
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written until well after both the original Antarctic Treaty of 1959 and the
OST. Furthermore, the timing of the Madrid Protocol perhaps provides
further evidence that resources in space are not to be harvested until a
subsequent agreement regarding rights over them can be agreed upon
internationally. While the historical context does leave some ambiguity
as to whether the OST permits property rights over space resources, the
Antarctic experience provides a compelling analogy and suggests that
the OST does not allow for property rights in space resources.

4. State Practice

In its Frequently Asked Questions released about the SREU Act, the
House Committee on Science, Space, and Technology forcefully
asserted that the Act does not violate international law. In fact, according to the committee, the Act’s provision of property rights “is
affirmed by State practice and by the U.S. State Department in
[c]ongressional testimony and written correspondence.” Proponents of
this view base their beliefs on several examples. One, “no serious
objection” arose to the United States and the Soviet Union bringing
samples of rocks and other materials from the Moon back by manned and robotic missions in the late 1960s, nor to Japan successfully
collecting a small asteroid sample in 2010. Two, a practice of
respecting ownership over such retrieved samples and a terrestrial market for such items exists, as illustrated by the fact that no one doubts
that the American Museum of Natural History “owns” three asteroids
found in Greenland by arctic explorer Robert E. Peary that are now part
of the museum’s Arthur Ross Hall of Meteorites. Three, Congressmen
also cite to a federal district court case, United States v. One Lucite Ball


203 SPACE Act FAQ, supra note 202.

204 Tennen, supra note 111, at 811; NASA., supra note 34; see also H.R. Rep. No. 114-153, at 8 (2015) (discussing that the United States, Russia, and Japan have all “removed, taken possession, and used in-situ natural resources”).

205 Lyall & Larsen, supra note 86, at 197.
*Containing Lunar Material*, to illustrate state practice in favor of ownership over spaces resources. The case involved an Apollo lunar sample gifted to Honduras by the United States. The sample was stolen and sold to an individual in the United States. When caught during a sting operation intended to uncover illegal sales of imposter samples, the buyer was forced to forfeit the lunar sample after the court concluded the moon rocks had in fact been stolen, basing its decision in part on its recognition of Honduras having national property ownership over the sample.

These examples appear overwhelming, but they are not actually examples of activities of the same “form and content” that the SREU Act approves. These examples all involve collection of samples in limited amounts and for scientific purposes, while the SREU Act approves large-scale collection and for commercial exploitation. The OST explicitly emphasizes a “freedom of scientific investigation in outer space,” and the collection of scientific samples reasonably fall under this enumerated right. Alternatively, the OST says nothing with respect to commercial exploitation, only discussing “benefits” of space in terms of sharing those benefits with all mankind. Furthermore, the American Museum of Natural History and *Lucite Ball* examples relied upon are misleading because they suggest that types of celestial artifacts found or gifted on Earth are subject to the same legal regime as resources mined or collected in space, which may not necessarily be true. The analogy of ownership over fish extracted from the high seas is also often cited in response to this pushback. Much like outer space, the high seas are open to all participants, yet the law of the seas still recognizes the right to title over fish extracted on the high seas by fishermen, who can then sell the fish. But again, this analogy has limited import because both the 1958 Geneva Convention on the High

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207 *One Lucite Ball*, 252 F. Supp. 2d at 1369.

208 Id. at 1374–76.

209 Tronchetti, supra note 15, at 8.


211 Id., art. I, 18 U.S.T. at 2412–13, 610 U.N.T.S. at 207–08. (discussing the exploration and use of space for the “benefit” of all mankind and the “freedom of scientific investigation”).

212 Lyall & Larsen, supra note 86, at 197.
Seas and the United Nations Convention on the Law of the Sea ("UNCLOS") explicitly recognize the right to fish, while the OST grants no such right to exploit space resources.\textsuperscript{213}

Furthermore, state practice relevant to the question of property rights under the OST goes beyond these examples and analogies of ownership of resources taken from commons. State practice regarding property rights in general must be considered. For example, Professor Fabio Tronchetti disagrees with the oft-cited notion that state practice affirms the SREU Act.\textsuperscript{214} According to the professor, "under international law, property rights require a superior authority, a State, entitled to attribute and enforce them."\textsuperscript{215} By granting property rights in the SREU Act, the United States impliedly claims that it has the authority to confer property rights over space resources—an authority traditionally reserved for the owner of a resource. This notion clashes with the nonappropriation principles of the OST. Though there is no consensus regarding whether the nonappropriation principle prohibits claims of sovereignty over resources, a strong consensus at least exists that the principle prohibits states from claiming sovereignty over real property in space.\textsuperscript{216} In some traditional systems of mineral ownership, however, ownership over resources ran with ownership over land.\textsuperscript{217} For example, under Roman law, property rights over subsurface minerals belonged to the landowner.\textsuperscript{218} Thus, if the United States cannot have title in space

\textsuperscript{213} United Nations Convention on the Law of the Sea art. 116, Dec. 10, 1982, 1833 U.N.T.S. 441; Geneva Convention on the High Seas art. 2, April 29, 1958, 13 U.S.T. 2314, 450 U.N.T.S. 82–84. The United States signed UNCLOS, but has yet to ratify it despite support of several presidential administrations. Shackelford, supra note 111, at 128–29. Nevertheless, United Nations records note the United States as one of the states that "notified the Secretary-General of its intention to continue to participate as a member of the International Seabed Authority on a provisional basis." UN Treaty Collection, Multilateral Treaties Deposited with the Secretary-General, Chapter XXI: Law of the Seas, at 6a, https://treaties.un.org/doc/Publication/MTDSG/Volume%20II/Chapter%20XXI/XXI-6-a.en.pdf (status as of Nov. 26, 2016). Dr. Sarah Jane Fox summarizes the United States’ position well: "Whilst the position of the U.S. is that it respects UNCLOS, commentators have indicated that the U.S. will always support the option that allowed it to mine the seabed." Fox, supra note 112, at 172 (also discussing the customary international law status of UNCLOS).

\textsuperscript{214} Tronchetti, supra note 15, at 8.

\textsuperscript{215} Id.

\textsuperscript{216} Lyall & Larsen, supra note 86, at 183–85.


\textsuperscript{218} Id. at 193.
lands under the nonappropriation principle, it cannot have title to the space resources in those lands either. Without title to the resources, the United States cannot bestow such title to its citizens under traditional international property law; by claiming that it can bestow such title, the United States is abrogating Article II of the OST. One could also argue that the in situ resources the Act grants rights in are actually still part of the celestial bodies; thus, the resources are real property prior to their removal, and are off limits under the Treaty.219 Given the limited import of the cited examples of state practice (limited quantity and scientific versus large-scale and commercial), the traditional practice of property rights being conferred from a sovereign to a citizen become incredibly compelling and suggest the SREU Act may abrogate the United States’ treaty obligations.

A final piece of evidence, however, again inserts ambiguity into the interpretation: the sweeping rejection of the Moon Agreement and its limitations on property rights by the international community discussed supra Part III.A.2. On the one hand, the rejection may imply that the international community approved of property rights. On the other hand, however, there were other reasons for the sweeping rejection. For example, Professors Francis Lyall and Paul B. Larsen claim the “main area of controversy”220 actually surrounded the Agreement’s proclamation of the Moon and celestial bodies and their natural resources as the “common heritage of mankind” in Article 11.1,221 rather than the Agreement’s general property-right provisions. Many believed the invocation of the “common heritage of mankind” language would impart actual obligations upon parties to share extracted resources, whereas the “province of all mankind” and “for the benefit and interest of all” language of the OST did not.222

219 See Tronchetti, supra note 15, at 8, 9 n.29 (“While the legal status of resources that are removed from their initial location is debatable, that of resources that are still in their original place is not, in the sense that they cannot be appropriated. Indeed, these resources can be considered as being part of the celestial bodies to which they belong; as under Article II . . . celestial bodies are non-appropriable, the argument has been made that any conferral of property rights over asteroid natural resources in place could amount to a US ownership claim over asteroids, a behavior in adamant violation . . . of Article II and a breach of the US obligations under the treaty.”).
220 Lyall & Larsen, supra note 86, at 183.
221 Moon Agreement, supra note 94, art. 11, 1363 U.N.T.S. at 25.
222 See, e.g., id.; Lyall & Larsen, supra note 86, at 183.
preparatory materials, and historical context, state practice leaves some ambiguities and state interpretations should also be considered.

5. State Interpretations

Much like the preparatory materials discussed supra Part IV.A.1, subsequent state interpretation of the OST fails to fully address the question of the legality of property rights in space resources. On the one hand, the Senate Committee on Foreign Relations found that the drafters intended Articles I, II, and III of the Treaty to be general in nature when reviewing the Treaty,223 which perhaps suggests Article II’s nonappropriation principle does not qualify Article I’s general right to use or act as an exception. Yet, the committee also found the Treaty to be in response to the “potential for international competition and conflict in outer space.”224 To the committee, Articles I, II, and III stressed the importance of free scientific investigation, guaranteed free access to all areas of celestial bodies, and prohibited claims of sovereignty.225 Not only would property rights in natural resources potentially ignite and exacerbate conflict in space, but they also seemed somewhat incompatible with scientific investigation, free access, and the prohibition on sovereignty. During its hearing on the Treaty, the Senate Committee on Foreign Relations focused a majority of its discussion of Article I on whether or not the language “province of all mankind” imparted strict obligations, while devoting little to no time to the issue of the meaning of “use.”226 Former Justice Arthur Goldberg, then U.S. ambassador to the United Nations, did note the goal of the article was to “not subject space to exclusive appropriation by any particular power.”227 Nevertheless, this statement fails to resolve whether natural resources may be exploited, as such exploitation could be carried out in an inclusive manner.

The committee’s review of Article II consumes only eight lines of the hearing transcript, merely adding that the Article is complementary to Article I and that space cannot be claimed for the country (likely

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224 Id.
225 Id.
227 Id. at 10.
referring to land rather than resources). A different exchange between Ambassador Goldberg, Senator Lausche, and the Chairman leaves further ambiguity regarding the use of natural resources in space:

Mr. Goldberg: We wanted to establish our right to explore and use outer space.

Senator Lausche: Yes. That is, any one of the signatory nations shall have the right to the use of whatever might be found in one of the space bodies.

Mr. Goldberg: No, no. It doesn’t mean that. It means that they shall be free on their own to explore outer space.

The Chairman: Or to use it.

Mr. Goldberg: To use it.

The Chairman: But not on an exclusive basis.

Mr. Goldberg: Everyone is free.

At first, Ambassador Goldberg appears to have refuted the notion that a signatory could simply “use” anything found in one of the space bodies, such as a mineral, implying Senator Lausche’s example exceeded the scope of Article I. He then went on to emphasize exploratory activities. But then, Ambassador Goldberg backtracked and reasserted the right to use without clarifying his initial qualification.

This sense of ambiguity remains today despite Congress signing off on the SREU Act. While sponsors of the bill and statements from

\[228\] Id. at 21.
\[229\] Id. at 65.
resource extraction companies emphasized the broad scope of the right to “use” outer space and state practice in support of the legality of property rights, several expert witnesses expressed genuine concern that obligations under the Treaty remain unclear and require additional analysis.

B. Compatibility

Employing the treaty interpretation tools of ordinary meaning, preparatory materials, historical context, state practice, and state interpretation offers many possible understandings of the obligations imparted by Articles I and II of the OST. For example, while the ordinary meaning of “use” could reasonably include the exploitation of materials, the meeting summaries of the Fifth Session of the U.N.

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231 See, e.g., Asteroids Act Hearing, supra note 230, at 67 (testimony of Ms. Joanne Gabrynowicz, Professor Emerita, Director Emerita, Journal of Space Law Editor-in-Chief Emerita, University of Mississippi) (“The treaty regime seems to allow private-sector entities to extract resources if those activities are consistent with international law and United States obligations. However, the ownership status of the extracted resources is unclear.”); id. at 78 (written statement of testimony of Ms. Joanne Gabrynowicz) (warning that political and legal challenges to its terms should be expected if adopted); id. at 93 (response of Dr. Jim Bell, Professor of Earth and Space Science Exploration, Arizona State University, and President, Board of Directors, The Planetary Society to Rep. Schweikert’s questions) (stating that with respect to how legal certainty of ownership may be provided in a world in which the United States has treaty obligations, “it is not clear that there is a straightforward solution but it is going to take time and it is going to have to be consistent with our international treaty obligations. So I don’t think it is going to happen quickly.”); H.R. Rep. No. 114-153, at 20 (2015) (minority views expressed in statement of Rep. Eddie Bernice Johnson) (asserting that the subcommittee is “not at all close” to resolving the issues relating to international treaty obligations and reiterating Professor Gabrynowicz’s testimony at the hearing).
Committee on the Peaceful Uses of Outer Space Legal Sub-Committee make clear that no consensus was ever reached regarding whether “use” includes large-scale exploitation of space resources, let alone fee-simple ownership and the ability to sell commercially. State practice dealing with extraterrestrial samples also sheds little light on the confusion, as the examples cited all deal instead with scientific samples of limited quantity. The international community’s rejection of the Moon Agreement also fails to bring clarity. While on the one hand the rejection could be read as a rejection of the idea that the OST prohibits private property rights, it could also be read as a rejection of the common heritage of mankind doctrine. Finally, the prospect of private-venture space mining and extraterrestrial resource extraction remained far off and futuristic at the time of the Treaty’s negotiation, making drawing legal conclusions about the legality of these revolutionary activities extremely difficult.

Overall, however, the Treaty’s structure and its purposes (preserving peace and avoiding international conflict in outer space) ultimately indicate that private property rights in space resources are prohibited by Article II’s non-appropriation principle, at least until future international delegation determines otherwise (like in the Antarctic). The Treaty’s structure confirms this interpretation. Article I lays down a general rule for activity in space. Subsequent articles of the Treaty then lay out more specific requirements of and qualifications to this general rule. Much like Article IV restricts the use of nuclear weapons in space, Article II restricts the use of space in ways that might result in potentially controversial property claims. Historically, claims to mineral rights have resulted in just as contentious conflict as those over sovereign lands. Treaty efforts to avoid conflicts in Antarctica and the high seas reflect similar sentiments. The Soviet Union’s representative even hinted at this structural relationship between Articles I and II during Treaty negotiations. 232 In light of the imminent need to ease Cold War tensions, the potential for conflict over property, and the final structure of the Treaty, this Note concludes that the large-scale extraction of space resources is incompatible with the non-appropriation principle of Article II of the OST. 233 As a result, the United States’ provision of property

232 See supra note 174 and accompanying text.
233 But see Asteroids Act Hearing, supra note 230, at 75–76 (written responses of Professor Gabrynowicz) (“Taken together, the plain meaning of the word ‘use’ in all of these provisions as well as the clearest and most important treaty provisions indicates that the
rights to its citizens to possess, own, transport, use, and sell space and asteroid resources extracted through the SREU Act contraveses its international obligations established by the OST.

Despite this conclusion, some may be tempted to argue that the Act itself does not violate the OST based on a technicality of sorts. Section 51303 only grants property rights in space resources “obtained in accordance with applicable law, including the international obligations of the United States.” Further, the required follow-up letter to the Act from the Executive Office of the President reasserted that only missions that do not violate international obligations would receive authorization. Thus, the argument goes that until the United States implements the Act by officially approving an asteroid-mining mission, it will not violate its international obligations. Nevertheless, this tempting technicality is premised merely on the inclusion of boilerplate language service to the United States’ international obligations. If the United States were to fully honor its international obligations, it would have resolved any ambiguities before passing the SREU Act instead of punting the question down the road. Furthermore, international case law exists suggesting that a mere acknowledgement in a treaty by a state of a right to breach international treaty law in the future constitutes a breach in and of itself. Therefore, this “technicality” argument fails to alter

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drafters and the signatories approved of the use, including extraction, of outer space resources. [But what] remains unclear is the ownership status of the resources when they are collected.” (citations omitted), Johnson, supra note 111, at 1513 (concluding that Article II does not clearly override the right to extract mineral resources).


236 In the Open Skies cases, the European Court of Justice (“ECJ”) considered a tax-discrimination claim. Under the treaty between the United Kingdom and the United States, the United States had the right to deny treaty benefits based on the nationality of the taxpayer. In the proceeding, the United Kingdom argued that its law did not discriminate, but rather that the United States’ conduct gave rise to the discrimination when the United States chose whether or not to extend the benefits. The ECJ disagreed, instead viewing the United Kingdom’s acknowledgment of the United States’ right to deny the benefits in the treaty terms as discrimination in and of itself. See Case C-466/98, Comm’n v. United Kingdom, 2002 E.C.R. I-9427; see also Case C-467/98, Comm’n v. Denmark, 2002 E.C.R. I-9519; Case C-468/98, Comm’n v. Sweden, 2002 E.C.R. I-9575; Case C-469/98, Comm’n v. Finland, 2002 E.C.R. I-9627; Case C-471/98, Comm’n v. Belgium, 2002 E.C.R. I-9681;
the conclusion that the United States abrogated its international obligations when it passed the SREU Act.

C. Implications

While the commercial space industry may not view this conclusion with particular fondness, the industry should not necessarily view the SREU Act itself with particular fondness either. Perhaps the Act’s abrogation of international obligations—arising from a decades-old, ambiguous Treaty to boot—might be justifiable or understandable to Treaty partners if the Act truly solved the legal-certainty problem plaguing private mining companies across the globe. Aside from stirring the pot by bringing attention to the issue, however, the Act fails to provide any more legal certainty to actors than does the current regime, as it lacks a crucial component: a coordinating rule.

Coordinating rules provide certainty by stipulating a straightforward rule for actors about what actions will lead to a specific legal result. For example, in the classic property case, Pierson v. Post,237 a property dispute resulted over the ownership of a hunted fox. The plaintiff pursued the fox with hounds, but the defendant intervened, killed the fox, and took it for himself. The plaintiff argued the traditional rule of capture resulted in his ownership over the fox, as he controlled it in pursuit. The court, however, laid down a clearer coordinating rule: capture required a mortal wounding while still in pursuit or corporal possession.238 Whether right or wrong, this coordinating rule provided individuals with the knowledge of what actions were necessary to result in property ownership and a test for courts to apply to easily resolve property disputes in the future.

The SREU Act provides no such coordinating rule. While the Act provides that property rights will arise in asteroid and space resources “obtained,” the Act fails to provide any meaningful definition for this word. Must a commercial mining company effectively occupy and use a mining site before the resources extracted from that site become theirs? Or can any actor quite literally enter a mine in the future and walk away

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237 3 Cai. 175 (N.Y. Sup. Ct. 1805).
238 Id. at 178–79.
with a resource since they have arguably "obtained" the resource? Because the OST provides free access to all of outer space, these concerns could very well come to fruition. Even though Deep Space Industries and Planetary Resources may be rejoicing that property rights are possible, considerable uncertainty remains regarding the protection of their mining sites and investment once on the surface of the asteroid. Unlike grants of mining rights over resources on public lands on Earth, the United States has no proposal to manage the locations of such missions or for dispute-resolution mechanisms. Its mission-approval process may be able to prevent conflict between U.S. companies, but the process does not control missions of foreign entities, nor does it clarify which agency has the authority to provide approval.239 These uncertainties illustrate that the SREU Act—though a step in the right direction—leaves much to be desired and that space-mining companies may have rejoiced too quickly.

Perhaps most frustrating, the writings of legal academia provide countless model coordinating rules and mechanisms, the inclusion of any one of which in the SREU Act would have provided a more stable and promising economic environment for the private space-mining industry and its investors, as well as a more understandable justification for abrogating international obligations.240 However, that would have

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239 Asteroids Act Hearing, supra note 230, at 70 (written responses of Professor Gabrynowicz) ("Private sector asteroid resource exploration and utilization is an unprecedented enterprise. It will raise novel issues requiring a wide range of entrepreneurial, technical, economic, legal, policy, space situational awareness, and diplomatic expertise. No one agency houses all that will be needed. Absent a clearer statement of which agency is responsible for what kind of regulation, an unpredictable over-regulated environment that relies on ad hoc dispute resolution could be created. It will produce unnecessary risk that is counterproductive to industry.") (emphasis added); Office of Sci. and Tech. Policy Letter, supra note 235, at 6 (failing to identify the exact scope of responsibilities of each agency).

240 See Coffey, supra note 112, at 133–47 (providing a helpful overview of several legal frameworks for resource property rights in outer space, discussing drawbacks of each and ultimately providing a new proposal); Myres S. McDougall et al., The Enjoyment and Acquisition of Resources in Outer Space, 111 U. Pa. L. Rev. 521, 633–34 (1963) (conducting an insightful in-depth analysis of whether various resources in outer space should be open for inclusive use or closed for exclusive use before the OST was even concluded and recommending the adoption of a system similar to those employed by many states in their allocation of domestic mineral resources and to that proposed to resolve the international Spitsbergen Island Controversy); Tennen, supra note 111, at 825–30 (providing a wonderful overview of alternative mechanisms for the allocation of property rights in space, including the Lunar Economic Development proposal, auctions similar to those of orbital slots, and allocation by a near-earth, object specific international authority); see also
required more research—and, most importantly, more time—on the part of Congress.

In the coming months, the United States should use its leadership to encourage the adoption of a coordinating rule on the international level. Such a rule could supply the legal certainty interested parties truly desire and provide the peace of mind that the wonderful prospects of space mining will not meet their demise as a result of international conflict and competing claims. Negotiations may be difficult and time-consuming, in part because of the likely call from developing nations for some sharing mechanism, as illustrated by UNCLOS. Nevertheless, the success of the Antarctica Treaty System and the prospect of asteroid mining’s exponential benefits to space exploration provide hope.

V. CONCLUSION

As shown through an in-depth treaty interpretation, the Space Resource Exploration and Utilization Act of 2015 contravenes the international obligations of the United States established by the Outer Space Treaty. Furthermore, although the Act at least resulted in the international community discussing the issue again and spurred Luxembourg to pass its own version of the law, the Act at its core fails to provide any meaningful, substantive legal certainty in the form of a coordinating rule to private space companies regarding the prospect of mining asteroids in the near future. Before approving any asteroid-mining missions, the United States should use its influence and leadership to seek resolution of remaining uncertainties and develop a strong coordinating rule with the international community at large. Though respecting the rule of law, especially the international rule of law, may not always be the easiest means to a desired end, “the law is what holds the fabric of society together. Otherwise, there is chaos and

anarchy.” Entering the unknowns of deep space without such glue would be unwise.

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Hon. B. Waugh Crigler, Remarks at the University of Virginia School of Law (Dec. 7, 2016).