DERIVING MEANING THROUGH TREATY INTERPRETATION OR IS IT TIME FOR NEW INNOVATIVE SPACE GOVERNANCE INSTRUMENTS FOR SPACE RESOURCES?

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INTRODUCTION

One of the current and future issues in global space governance is whether it is legally feasible to have an enforcement of transactional rights to space resources. This matters because of the stated goal of various actors to find and use resources in space to further their mission, known as in situ resource use (ISRU).[1] There is an interesting question on whether there is a distinction between the use of these resources for ISRU for the furtherance of space exploration (scientific missions) or for commercial exploitation more broadly. As highlighted by Anderson et al.,

> Using space resources in space increases the longevity and decreases the cost of space exploration. . . . [S]pace mining will likely begin with the extraction of water from the moon and accessible [Near-Earth Asteroids]. Hydrogen can be extracted from water to be used for jet fuel. Water can also be used for drinking and food production as well as providing protection from radiation.[2]

In essence then, the first use case may be extraction of water in support of human space exploration, a mission of national space agencies. These agencies, however, could contract for the provision of these services to private actors. Based on the terrestrial

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[1] *See Overview: In-Situ Resource Utilization*, NAT'L AERONAUTICS & SPACE ADMIN., https://www.nasa.gov/isru/overview [https://perma.cc/JB9B-4FLG] (Apr. 3, 2020); INT'L SPACE EXPL. COORDINATION GRP., THE GLOBAL EXPLORATION ROADMAP 23, 32 (2018), https://www.nasa.gov/sites/default/files/atoms/files/ger_2018_small_mobile.pdf [https://perma.cc/2U44-2V47].

[2] Scot W. Anderson et al., *The Development of Natural Resources in Outer Space*, 37 J. ENERGY & NAT. RES. L. 227, 233 (2019).

experience as laid down by Anderson et al.,[3] "[a]n international mining company will consider the following key issues when determining whether to proceed with a mining project," the first one being: "[s]ecurity of tenure: Can the mining company secure the legal right to explore for and develop the mineral properties?"[4] Secondly, as at least fourteen national space agencies have identified ISRU as a needed capability for long-duration missions,[5] it is apt to remember that self-interest in securing access to natural resources is at the root of many terrestrial disputes. According to former UN Secretary-General Ban Ki-moon, "since 1990, at least 18 violent conflicts have been fueled by the exploitation of natural resources such as timber, minerals, oil and gas. Sometimes this is caused by environmental damage and the marginalization of local populations who fail to benefit economically from natural resource exploitation."[6] Without legal clarity and certainty, one cannot disregard the possibility that as well as stifling the development of a new in-space economy, future conflict or rivalry could arise due to the competition for these resources. De Man highlights that the following conditions act as complicating factors:

> the applicable multilateral treaties (a) have been concluded a long time ago; (b) contain general and ambiguously phrased provisions that require subsequent agreement and practice for their clarification; (c) concern pioneering activities performed by or under control and supervision of a limited number of States; and (d) provide no apparent incentive among governments to pursue further action at the multilateral level.[7]

In terms of general international law, there are two things to note here about what De Man argues:

First: that the age of a treaty doesn't necessarily impact its applicability[8]—plenty of far older treaties are interpreted today (like the Universal Postal Union, whose treaty enables us to send our

[3] *See id.* at 255–56.
[4] *Id.* at 256 (emphasis omitted).
[5] *See* INT'L SPACE EXPL. COORDINATION GRP., *supra* note 1, at 23, 32.
[6] *The EU-UN Partnership on Land, Natural Resources and Conflict Prevention*, UNITED NATIONS, https://www.un.org/en/land-natural-resources-conflict/ [https://perma.cc/U2H5-YUDZ].
[7] Philip De Man, *State Practice, Domestic Legislation and the Interpretation of Fundamental Principles of International Space Law*, 42 SPACE POL'Y 92, 92 (2017).
[8] *See id.* at 95.

mail!).[9] In fact, in the grand scheme of things, fifty-four years isn't old at all!

Second: De Man points out that the treaty is ambiguous.[10] The issue then boils down to one of treaty interpretation, to which the Vienna Convention on the Law of Treaties (VCLT) speaks.[11] The legal standards and rules for treaty interpretation are set out in Articles 31 and 32 of the Vienna Convention on the Law of Treaties.[12] This piece of international law states that as well as taking into account subsequent agreement, practice and meaning, "[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."[13] Also, "[r]ecourse may [also] be had to supplementary means of interpretation, including the preparatory work of the treaty and the circumstances of its conclusion," in essence, the historical record.[14]

So, the VCLT provides for ambiguity—that's exactly when we have to pull out the history, rather than reinvent the wheel and define the provision ourselves. According to Benedict Abrahamson Chigara, though, "[s]ources of law should not end up as only technical lawyering mechanisms. Rather, they should chiefly be practical tools for enhancing states' mutual conduct in pursuit of particular outcomes."[15] As such, it is arguable that "[t]reaty law ought to allow the correction of any imperfections that become apparent in a treaty regime," through subsequent state practice.[16] In essence, "treaty texts begin, but do not end, the process of lawmaking."[17] Doctrine says we look to history, but also to look to subsequent practice. So, what do we do when they contradict?

The Artemis Lunar Exploration Program, led by the National Aeronautics and Space Administration (NASA), aims to land the first woman and the next man on the Moon by 2024.[18] NASA sees Artemis

[9] *See History, Universal Postal Union*, https://www.upu.int/en/Universal-Postal-Union/About-UPU/History [https://perma.cc/Q4W6-T92T].
[10] *See* De Man, *supra* note 7, at 96.
[11] *See* Vienna Convention on the Law of Treaties, art. 31–32, *opened for signature* May 23, 1969, 1155 U.N.T.S. 331.
[12] *See id.*
[13] *Id.* art. 31(1), (3).
[14] *Id.* art. 32.
[15] Benedict Abrahamson Chigara, *Treaty-Text Loyalists' Burden with Subsequent State Practice*, 68 NETH. INT. L. REV. 61, 67 (2021).
[16] *Id.* at 68 (emphasis omitted).
[17] Melissa J. Durkee, *Interpretive Entrepreneurs*, 107 VA. L. REV. 431, 492 (2021).
[18] *See* NAT'L AERONAUTICS & SPACE ADMIN., ARTEMIS PLAN: NASA'S LUNAR EXPLORATION PROGRAM OVERVIEW 13 (2020).

as key to the success of its "Moon to Mars exploration approach."[19] According to NASA, the Artemis program seeks to pave the way for a "new and sustainable lunar economy—"therefore commercial exploitation is foreseeable.[20] The U.S. National Space Policy released on December 9, 2020, clearly states that "[t]he United States will pursue the extraction and utilization of space resources in compliance with *applicable law*, recognizing those resources as critical for sustainable exploration, scientific discovery, and commercial operations."[21] The policy also highlights that "[a]s established in international law, 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."[22] With this statement, Article II of the Outer Space Treaty (OST),[23] the perhaps erroneously so-called "'constitution' of outer space,"[24] is cited; and this reference makes clear that it aims to apply, rather than complete, the international space treaty framework.[25] However, it is not internationally accepted that the United States' assertion of its right to pursue space resources is in fact a legitimate legal right or in compliance with that provision of the OST.[26]

But is the United States acting in good faith by acting unilaterally? Is it even possible to truly do so in the context of a domain that has "*erga omnes*" obligations? There is no common understanding or ordinary meaning to *space benefit* and appropriation[27] and the dependence of legal interpretation on legal standards is relatively limited and superficial.[28] As Greenberg argues, it is impossible to address the job of legal interpretation—"without addressing the central jurisprudential question of *how* the content of the law is

[19] *Id.* at 9.
[20] *See id.*
[21] U.S. OFF. OF SPACE COM., NATIONAL SPACE POLICY OF THE UNITED STATES OF AMERICA 3 (2020) (emphasis added).
[22] *Id.*
[23] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, art. II, *opened for signature* Jan. 27, 1967, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty].
[24] *See* Robert A. Ramey, *Armed Conflict on the Final Frontier: The Law of War in Space*, 48 A.F. L. REV. 1, 74 (2000).
[25] *See* U.S. OFF. OF SPACE COM., *supra* note 21, at 3.
[26] *See* Gershon Hasin, *Developing a Global Order for Space Resources: A Regime Evolution Approach*, 52 GEO. J. INT'L L. 77, 110–11 (2020).
[27] *See* Outer Space Treaty, *supra* note 23, art. I–II.
[28] *See* Mark Greenberg, *What Makes a Method of Legal Interpretation Correct? Legal Standards vs. Fundamental Determinants*, 130 HARV. L. REV. F. 105, 106 (2017).

determined."[29] This of course depends on who gets asked or gets a say.

As Durkee highlights, taking a critical approach to international law that observes treaty interpretation as a value-laden one, it is important to care about "the process of interpretation in order to understand who is included in and excluded from the process of developing meaning" because "[u]nderstanding the process of interpretation is one way to excavate the levers of power."[30] The important question therefore to ask is "[h]ow do contests for meaning take place?"[31] What levers of influence do non state actors use in the process and what difference does all of this make for the determination of the law?[32]

This Article shows one example of the trend that advanced spacefaring States, pushed by their commercial representatives, are increasingly resorting to the adoption of domestic legislation that implements their international obligations according to an interpretation that best serves their own interests. The argument is that that approach accomplishes the goal of stimulating the space economy quicker and more efficiently than protracted multilateral negotiation processes that are cumbersome and unpredictable. The United States, in particular, has taken an expansive approach using multiple instruments and techniques, from actions taken by Congress, to the Executive branch, bilateral agreements at the agency level to innovations in contracting, with the objective of ensuring its own certainty about its interpretation of international law and to sell its vision to and influence the international community.[33] This matters because Article 31(3)(b) VCLT stipulates that there shall be taken into account, in addition to and together with other elements, "any subsequent practice in the application of the treaty which establishes the agreement of the parties regarding its interpretation."[34] This subsequent practice is important because it is not clear that any of the methods of treaty interpretation speak to the immediate issue at hand, however it is arguable that current practices are not that significant as "subsequent practice in the

[29] *Id.* (emphasis added).
[30] Durkee, *supra* note 17, at 450.
[31] *Id.* at 456.
[32] *See* Gregory Shaffer & Tom Ginsburg, *The Empirical Turn in International Legal Scholarship*, 106 AM. J. INT'L L. 1, 1 (2012).
[33] *See, e.g.*, The National Space Policy, 85 Fed. Reg. 81755, 81756 (Dec. 16, 2020); U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114-90, 129 Stat. 704 (2015) (codified in scattered sections of 51 U.S.C.).
[34] Vienna Convention on the Law of Treaties, *supra* note 11, art. 31(3)(b).

application of the treaty which establishes the agreement of the parties regarding its interpretation", or as state practice and evidence of opinion juris for the purposes of customary international law.

Despite these significant unilateral approaches, we must conclude that there is an important role for international law to backstop, strengthen, and compel domestic law and institutions to have the common interest in the foreground.[35] This would ideally lead to a proliferation of national regimes that serve humankind as a whole, and eventually an international regime that solidifies the best practices from the implementation of those national practices.

This Article proposes that space law and governance must be looked at from a systems perspective. There are dynamics at every level of the space governance system, which comprise looking at developments in the international landscape, as well as how these international developments filter down to national regulators, public policies and then how the stakeholders will accept or implement given rules. The benefit of this systems lens is that it facilitates forecasting of how the law will develop. We are now beyond simply delivering opinions about what the law is, the focus now is on how laws are to be interpreted and applied to new activities and how "norm entrepreneurship" is evolving as the stakeholders diversify.

The Article is organized in six sections. Section I introduces the international landscape of space governance. Section II describes the US Congressional actions with respect to regulating space resources actives. Section III highlights Executive Actions promulgated to buttress Congressional positions. Section IV emphasizes the role of bilateral arrangements while Section V describes the implications of the latest contracting initiatives established to cement the state position. Section VI concludes.

I. THE INTERNATIONAL LANDSCAPE

During the Cold War, the specific details of commercial exploitation of natural resources of outer space were beyond the immediate codification objectives of United Nations negotiators of the constitution of Outer Space (known as the Outer Space Treaty of 1967).[36] But, that is not to say that other actors did not deliberate

[35] *See* Anne-Marie Slaughter & William Burke-White, *The Future of International Law is Domestic (or, The European Way of Law)*, 47 HARV. INT'L L.J. 327, 328 (2006).

[36] *See* Outer Space Treaty, *supra* note 23, art. II, IX.

upon or envision the potential for commercial exploitation.[37] In fact, since the 60s, as Myres McDougal and others were to explain, they foresaw Outer Space as a myriad of resources of varying kinds, in which everything from solar radiation, magnetic and gravitational forces, wave lengths, geostationary locations through to meteors tracking through the solar system came to be conceptualized in terms of their ultimate value or utility.[38] Even actors from the Global South weighed in on this, though as articulated by Cris van Eijk, the impact of this history is largely forgotten, as we perceive space commercialization as a new thought.[39]

While the treaty set forth that space and celestial bodies are free for exploration and use by all states in conformity with international law and subject to the condition that it be used for the benefit and in the interests of all countries, it prohibits ownership of the bodies themselves.[40] It also qualifies that space activities by private entities must be authorized and continuously supervised by the appropriate state.[41] However, the Treaty does not deal clearly with whether space resource extraction is a lawful enterprise under its terms.[42] Namely, Article II of the OST declares that "[o]uter space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means."[43] However, the term "national appropriation," is not defined in the treaty.[44]

The continued use and possible exploitation of resources was envisioned more directly under the Moon Agreement of 1979[45]—which has not been ratified by any of the three major spacefaring countries (United States, Russia and China).[46] However, it has

[37] *See* Myres S. McDougal et al., *The Enjoyment and Acquisition of Resources in Outer Space*, 111 U. PENN. L. REV. 521, 538–39 (1963).

[38] *See id.* at 523–24, 526–27, 595–96.

[39] *See* Cristian van Eijk, *Unstealing the Sky: Third World Equity in the Orbital Commons*, 47 AIR & SPACE L. (forthcoming 2022) (manuscript at 9, 15, 18) (on file at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3909536) [https://perma.cc/5V7M-KD4N].

[40] *See* Outer Space Treaty, *supra* note 23, art. 1.

[41] *Id.* art. VI.

[42] *See generally id.* art. I–II.

[43] *Id.* art. II.

[44] *See id.*

[45] *See generally* Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, *opened for signature* Dec. 18, 1979, 18 I.L.M. 1434 [hereinafter Moon Agreement].

[46] *See* Sujata Porwal, *Moon Agreement, 1979*, LEGAL DESIRE INSIGHTS (June 13, 2020), https://legaldesire.com/moon-agreement-1979/ [https://perma.cc/B4AK-WXNH]; *see also* Michael Listner, *The Moon Treaty: Failed International Law or Waiting in the Shadows?*, SPACE REV. (Oct. 24, 2011), https://www.thespacereview.com/article/1954/1 [https://perma.cc/XF5J-GT92].

eighteen ratifications and accessions and has been ratified by Australia and signed by France and India,[47] which are not insignificant space-exploring countries.[48] It calls for establishment of an international regime "to govern the exploitation of the natural resources of the moon as such exploitation is about to become feasible."[49] The controversy is that Article 11 of the Moon Agreement provides that the moon and its natural resources shall be the "common heritage of mankind."[50]

> This common heritage of mankind concept, [and, in particular,] the lack of a clear definition of what it entails and the fact that it might lead to mandatory benefit sharing, is perceived by many to be the most significant obstacle towards achieving widespread support for the Moon Agreement within the international community.[51]

According to Huang, "the non-space Powers wanted to have a share of the fruits of space exploration and exploitation"[52] and state parties undertook in the Moon Agreement through Article 11.7 of the Moon Agreement that there should be

> [E]quitable sharing by all States Parties in the benefits derived from those resources, whereby the interests and needs of the developing countries, as well as the efforts of those countries which have contributed either directly or indirectly to the exploration of the moon, shall be given special consideration.[53]

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[47] *See* Agreement Concerning the Activities of States on the Moon and Other Celestial Bodies, Dec. 5, 1979, 1363 U.N.T.S. 3.

[48] *See, e.g.*, *ESA and CNES Plan European Space Transportation Hub*, SPACEWATCH (Nov. 25, 2021), https://spacewatch.global/2021/11/esa-and-cnes-plan-european-space-transportation-hub/ [https://perma.cc/6UFN-YJ5A]; *ISRO to Chalk Out Plans to Increase Launches and Satellite Manufacturing*, BUS. STANDARD, https://www.business-standard.com/article/current-affairs/isro-to-chalk-out-plans-to-increase-launches-and-satellite-manufacturing-122031600213_1.html [https://perma.cc/9FUU-BWHE].

[49] Moon Agreement, *supra* note 45, art. 11(5).

[50] *Id.* art. 11(1).

[51] Timiebi Aganaba, *Innovative Instruments for Space Governance*, CTR. FOR INT'L GOVERNANCE INNOVATION (Feb. 8, 2021), https://www.cigionline.org/articles/innovative-instruments-space-governance/ [https://perma.cc/SRD7-NT8G]; *see also* Carol R. Buxton, *Property in Outer Space: The Common Heritage of Mankind Principle vs. the First in Time, First in Right, Rule of Property*, 69 J. AIR L. & COM. 689, 691–93, 699, 705–06 (2004).

[52] Jiefang Huang, The Common Interest Principle in Space Law 186 (June 1985) (LLM Thesis, McGill University) (on file at eScholarship@McGill).

[53] *Id.* at 189.

He argues that "even if the value of the Moon Treaty per se is open to serious doubt, the tacit or express reaffirmation to the common interest principle by the two Space Powers and other countries during the entire process of negotiation can hardly be repudiated."[54] He concludes therefore that "the Moon Treaty is an existing international legal instrument which strengthens the force of the [C]ommon [I]nterest principle" in Article I of the OST.[55] The future regime which the Moon Agreement anticipated is yet to materialize and there is no clear understanding of how the sharing of benefits could be implemented in the context of exploiting natural resources from celestial bodies. This does not mean the Moon Agreement is dead, despite popular sentiment.[56] Interestingly, it was the United States, the most vocal critic, that introduced the common heritage (CHM) nomenclature into the Moon Agreement, so things can always evolve.[57] What is important to note is that the legal content of the expression "CHM" can only be found in the Moon Agreement itself and as such, other domains that use that nomenclature can not be relied upon for meaning.

These agreements were negotiated at the Legal Subcommittee (LSC) of the Committee on the Peaceful Uses of Outer Space (COPUOS),[58] but the forum arguably has become less effective in recent decades with respect to the progressive development of law,[59] mainly due to political gridlocking, the requirement for consensus in decision making, and the variety of interests competing for priority on their agenda.[60] It may be noted that of 2017, five of the last seven items to be added to the agenda of the LSC dealt with general exchanges of information and views.[61] According to De Man, "[s]uch discussions are generally not intended to result in new binding rules

[54] *Id.* at 191 (emphasis omitted).
[55] *Id.*
[56] *See* Thomas Cheney, *Space Resources at the UN*, WORDPRESS: THOMAS' BLOG (Apr. 9, 2019), https://thomascheneyblog.wordpress.com/2019/04/09/space-resources-at-the-un/ [https://perma.cc/44EH-X32A].
[57] *See* Jessy Kate Schingler, *Common Heritage Concerns Have No Clothes?*, SUBSTACK: MOON WONK (Jan. 18, 2021), https://moonwonk.substack.com/p/common-heritage-concerns-have-no [https://perma.cc/RT3R-KMSL].
[58] Tare Brisibe, *Parliamentary Diplomacy in the United Nations and Progressive Development of Space Law*, 18 EUR. J.L. REFORM 6, 6 (2016).
[59] *See id.* at 8–9.
[60] *See id.* at 7, 18–19, 24, 29.
[61] *See* Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Fifty-Sixth Session, Held in Vienna from 27 March to 7 April 2017, at 1–2, U.N. Doc. A/AC.105/1122 (Apr. 18, 2017).

of international space law, or even in the multilateral clarification of existing principles."[62]

Agenda item fourteen on the "[g]eneral exchange of views on potential legal models for activities in exploration, exploitation and utilization of space resources"[63] is noteworthy because, at its fifty-eighth session (held from April 1-12, 2019), the LSC agreed to convene "scheduled informal consultations" on the issue of the exploration, exploitation and utilization of space resources.[64] "[T]he aim of those consultations was to have a broad and inclusive exchange of views on the future deliberations concerning the exploration, exploitation and utilization of space resources, including the possible establishment of a working group under the relevant agenda item."[65] According to the International Institute of Space Law (IISL), "[w]hether the United States' interpretation of Art. II of the OST is followed by other states will be central to the future understanding and development of the non-appropriation principle."[66] At the 2021 session of the LSC "the Moderator and Vice-Moderator held eight rounds of scheduled informal consultations during the plenary meetings of the Subcommittee," and the conclusion was that an official working group was confirmed[67] following four more meetings at the main COPUOS plenary in Aug-Sept 2021 which finalized the mandate, workplan, terms of reference and method of works.[68]

II. U.S. CONGRESSIONAL ACTION

> Currently, the U.S. government owns 842 pounds of lunar material. There is little question that NASA and the U.S. government consider this material, as well as other space

[62] De Man, *supra* note 7, at 102.
[63] Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Fifty-Eighth Session, Held in Vienna from 1 to 12 April 2019, at 3, U.N. Doc. A/AC.105/1203 (2019).
[64] *Id.* at 38.
[65] *Id.*
[66] INT'L INST. OF SPACE L., POSITION PAPER ON SPACE RESOURCE MINING 3 (Dec. 20, 2015), https://iislweb.space/wp-content/uploads/2020/01/SpaceResourceMining.pdf [https://perma.cc/Q9QG-YZG5].
[67] *See* Comm. on the Peaceful Uses of Outer Space Legal Subcomm. on its Sixtieth Session, Held in Vienna from 31 May to 11 June 2021, at 33, U.N. Doc. A/AC.105/1243 (Jun. 24, 2021).
[68] *See* Comm. on the Peaceful Uses of Outer Space, Proposal on the Mandate, Term of Reference, and Workplan and Methods of Work for the Working Group Established Under the Legal Subcomm. Agenda Item Entitled "General Exchange of Views on Potential Legal Models for Activities in the Exploration, Exploitation, and Utilization of Space Resources," at 1, U.N. Doc. A/AC.105/2021/CRP.11/Rev.1 (Sept. 1, 2021).

> materials collected by American astronauts, to be government [artifacts].[69]

As highlighted by Pershing, "NASA explicitly endorses U.S. property rights over these moon rocks, stating that '[l]unar material retrieved from the Moon during the Apollo Program is U.S. government property.'"[70] But, as Israel highlights, "[w]ith the prospect of private space missions that go beyond what even governments have done in space, national legislatures [have begun to] wad[e] into controversies over the interpretation and application of the [Outer Space Treaty] in parallel with[—]or even ahead of[—]international lawmaking processes."[71] In the U.S. context, business actors lobbied legislators to adopt domestic legislation that takes an aggressive interpretative position on whether mining and commercial exploitation of outer space materials is permitted under the treaty.[72] As Durkee highlights, this is interpretation aimed at state response.[73]

The United States enacted the Commercial Space Launch Competitiveness Act on November 25, 2015, which seeks to address the foundations if not the specifics of the issues above.[74] It consists of seven Subtitles, and Subtitle IV is named "Programs Targeting Commercial Opportunities."[75] The provision establishes a basis for ownership of extracted space resources.[76] This Title contains provisions that recognize the property rights of U.S. citizens in space resources derived from celestial bodies.[77] Section 402 states that

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[69] Abigail D. Pershing, *Interpreting the Outer Space Treaty's Non-Appropriation Principle: Customary International Law from 1967 to Today*, 44 YALE J. INT'L L. 149, 158 (2019); *see also NASA's Recommendations to Space-Faring Entities: How to Protect and Preserve the Historic and Scientific Value of U.S. Government Lunar Artifacts*, NAT'L AERONAUTICS & SPACE ADMIN. (July 20, 2011), https://www.nasa.gov/pdf/617743main_NASA-USG_LUNAR_HISTORIC_SITES_RevA-508.pdf [https://perma.cc/H63X-SWRS].

[70] Pershing, *supra* note 69, at 158.

[71] Brian R. Israel, *Space Resources in the Evolutionary Course of Space Lawmaking*, 113 AM. J. INT'L L. UNBOUND 114, 116 (2019), https://www.cambridge.org/core/journals/american-journal-of-international-law/article/space-resources-in-the-evolutionary-course-of-space-lawmaking/C139472F946BC6C48304C268062F419A [https://perma.cc/2PWJ-D5C7].

[72] *See* Matthew Shaer, *The Asteroid Miner's Guide to the Galaxy*, FOREIGN POL'Y (Apr. 28, 2016), https://foreignpolicy.com/2016/04/28/the-asteroid-miners-guide-to-the-galaxy-space-race-mining-asteroids-planetary-research-deep-space-industries/ [https://perma.cc/ZWG8-42YP].

[73] *See* Melissa J. Durkee, *Interstitial Space Law*, 97 WASH. U. L. REV. 423, 464–65 (2019).

[74] *See generally* U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114-90, 129 Stat. 704 (codified in scattered sections of 51 U.S.C.).

[75] *See* 51 U.S.C. § 51303.

[76] *See id.*

[77] *See id.*

> [a] United States citizen engaged in commercial recovery of an asteroid resource or a space resource under this chapter shall be entitled to any asteroid resource or space resource obtained, including to possess, own, transport, use, and sell the asteroid resource or space resource obtained in accordance with applicable law, including the international obligations of the United States.[78]

For the first time, this Act makes provision for private property rights in space natural resources.[79] While some applaud this legislative action designed to stimulate exploration and exploitation of space natural resources, others believe that the Act is contrary to the provisions of Article II of the OST.[80] Because the term "national appropriation," is not defined in the treaty,[81] it is possible to argue that the extraction, or even the sale, of space resources is not prohibited and is therefore already permitted, because the emphasis is on the resource extracted and not the land itself.

To defuse the criticism of possible appropriation by the United States, the Act contains a disclaimer to the effect that "by the enactment of this Act, the United States does not thereby assert sovereignty or sovereign or exclusive rights or jurisdiction over, or the ownership of, any celestial body."[82] This is important, as Article 27 VCLT provides that a State "may not invoke the provisions of its internal law as justification for its failure to perform a treaty"[83] and "includes an ongoing obligation to bring its internal legislation in line with international obligations whenever a conflict may arise in the future."[84]

It remains to be seen if such renunciation will be sufficient to satisfy those who believe that this U.S. legislation constitutes an appropriation of celestial bodies. The 2016 session of the COPUOS witnessed a negative reaction to the Act,[85] but the acceleration of

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78 *Id.*

79 *See id.* §§ 51302–03; Durkee, *supra* note 73, at 461.

80 *See, e.g.*, 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 J.L., TECH. & POL'Y 407, 423; Israel, *supra* note 71, at 116.

81 *See* Outer Space Treaty, *supra* note 23, art. II.

82 U.S. Commercial Space Launch Competitiveness Act § 403, 129 Stat. at 722.

83 Vienna Convention on the Law of Treaties, *supra* note 11, art. 27.

84 Antonino Salmeri, *The Integration Between National and International Regulation of Space Resource Activities Under Public International Law*, 43 J. SPACE L. 60, 71 (2019).

85 *See* Comm. on the Peaceful Uses of Outer Space, Rep. on Its Fifty-Ninth Session, U.N. Doc. A/71/20, at 30 (2016).

funding for private space programs suggests that resistance to the interpretation has been ineffective.[86] In fact, there is a slow-emerging trend toward this interpretation as evidenced by Luxembourg, the United Arab Emirates and Japan enacting similar laws.[87] This is important as it is argued that national legislation may be relied upon to clarify the meaning of an international provision. As highlighted by Masson-Zwaan & Palkovitz:

> [A] national law such as the US law can be a possible interpretation of treaty law; however, it is not necessarily the only correct interpretation. State practice will have to evolve further. This can happen through the enactment of national legislation, but also by other means, such as statements in UNCOPUOS or responses to questionnaires of UNCOPUOS Working Groups.[88]

But, put another way,

> The fact that States implement a treaty differently does not, as such, permit a conclusion about the legal relevance of this divergence. Such difference can reflect a disagreement over the (one) correct interpretation, but also a common understanding that the treaty permits a certain scope for the exercise of discretion in its implementation.[89]

The limitation in the United States' approach is its circularity. As Israel points out:

> [T]he Act simply points back to the United States international obligations without opining on the content of those obligations. Congress abstained from interpreting the Treaty to expressly delineate the contours of permissible space resource utilization activities. It left this to the Executive Branch, which evaluates non-governmental space

[86] Andrew Chatzky et al., S*pace Exploration and U.S. Competitiveness*, COUNCIL ON FOREIGN RELS., https://www.cfr.org/backgrounder/space-exploration-and-us-competitiveness [https://perma.cc/P44L-CWGG].

[87] Sayuri Umeda, *Japan: Space Resource Act Enacted*, LIBR. OF CONG. (2021), https://www.loc.gov/item/global-legal-monitor/2021-09-15/japan-space-resources-act-enacted/ [https://perma.cc/6H5P-NCYX].

[88] Tanja Masson-Zwaan & Neta Palkovitz, *Regulation of Space Resource Rights: Meeting the Needs of States and Private Parties***,** 35 QUESTIONS INT'L L. 5, 14 (2017).

[89] De Man, *supra* note 7, at 98.

> activities for conformity with the United States' international obligations through federal licensing processes.[90]

In essence, with this void, Article VI of the Outer Space Treaty is pressed into service. If there is no mechanism to ensure conformity with the treaty, missions cannot be approved.[91]

III. EXECUTIVE ACTION

On April 6, 2020, President Donald Trump issued an executive order on "Encouraging International Support for the Recovery and Use of Space Resources."[92] It cites Title IV of the U.S. Commercial Space Launch Competitiveness Act as the authoritative basis for the executive order but goes even further.[93] The key points are that the United States:

- supports the right for commercial "recovery" and "use" of space resources;
- "is not a party to the Moon Agreement," and rejects the Moon Agreement as a basis for any space resources governance regime;
- rejects the notion that the Moon Agreement is reflective or expresses customary international law;
- repudiates the notion that space is a "commons;" and
- will seek international support for the exploitation and "use" of space resources.[94]

So, the executive order largely restates existing U.S. policy and law but goes further, and is significant because a debatable legal position was clarified in an executive order. It could represent both state practice and evidence of *opinion juris* (the belief that an action was taken out of legal obligation), which has significance for any developing customary international law regarding space resources. As Wasser and Jobes point out, the United States and the Soviet Union were able to establish the basis of the customary international

[90] Brian R. Israel, *Space Governance 3.0*, 48 GA. J. INT'L & COMPAR. L. 715, 719 (2020).
[91] Brian Egan, *The Next Fifty Years of the Outer Space Treaty*, U.S. DEP'T STATE, https://2009-2017.state.gov/s/l/releases/remarks/264963.htm [https://perma.cc/UR37-L9CU].
[92] Exec. Order No. 13914, 85 Fed. Reg. 20381, 20381 (Apr. 6, 2020).
[93] *See id.*
[94] *See id.*

law for their appropriation of extracted resources simply by asserting ownership over moon rocks they brought back from space.[95]

The executive action however did not perform a crucial step, which is to determine what the licensing process would be for private companies.[96] As such, in the United States, there is a regulatory gap for unprecedented on-orbit space activities like mining.[97] The closest the United States got to this was in August 2016, when a private company, Moon Express, was authorized to land its robotic mission on the Moon in 2017.[98] The company's declared mission "aim[ed] to fly commercial missions to Earth's nearest neighbor and help exploit its resources."[99] The Federal Aviation Administration, however, was clear to state that "[t]he FAA made a favorable payload determination for this particular mission, however, not all non-traditional space missions may lend themselves to favorable payload determinations under the payload review authority in 51 U.S.C. 50904."[100]

The novel step that the executive order did achieve, however, was to direct the State Department to lead interagency efforts to encourage other countries to adopt the U.S. position that both public and private organizations have the right to use space resources.[101] The order called for doing so through a series of bilateral or multilateral agreements.[102]

IV. BILATERAL AGREEMENTS

The Artemis Accords[103] were therefore proposed in May 2020 and elaborated further in October 2020 by NASA as a series of bilateral

[95] *See* Alan Wasser & Douglas Jobes, *Space Settlements, Property Rights, and International Law: Could a Lunar Settlement Claim the Lunar Real Estate It Needs to Survive?*, 73 J. AIR L. & COM. 37, 63 (2008).

[96] *See generally* Exec. Order No. 13914, *supra* note 92.

[97] *See, e.g.*, Liu Hao & Fabio Tronchetti, *The American Space Commerce Free Enterprise Act of 2017: The Latest Step in Regulating the Space Resources Utilization Industry or Something More?*, 47 SPACE POL'Y 1, 1, 5 (2019); *see also* Wasser & Jobes, *supra* note 95, at 57.

[98] *See* Mike Wall, *Moon Express Approved for Private Lunar Landing in 2017, a Space First*, SPACE.COM (Aug. 3, 2016), http://www.space.com/33632-moon-express-private-lunar-landing-approval.html [https://perma.cc/UA5F-8EPU].

[99] *Id.*

[100] *Moon Express Payload Review Determination*, FED. AVIATION ADMIN., (Aug. 3, 2016) https://www.faa.gov/newsroom/moon-express-payload-review-determination [https://perma.cc/BFL7-AJGP].

[101] *See* Exec. Order No. 13914, *supra* note 92, at 20381–82.

[102] *See id.* at 20382.

[103] The Artemis Accords, *opened for signature* Oct. 13, 2020, https://www.nasa.gov/specials/artemis-accords/img/Artemis-Accords-signed-13Oct2020.pdf [https://perma.cc/L2R6-VWAN].

executive political agreements between the United States and other countries that want to cooperate on the Artemis program.[104] The memorandums of understanding, which have now been signed by twenty-one states, as of July 2022,—Australia, Bahrain, Brazil, Canada, Colombia, France, Israel, Italy, Japan, Luxembourg, Mexico, New Zealand, Poland, Korea, Romania, Singapore, Saudi Arabia, Ukraine, the United Arab Emirates, the United Kingdom (extended to the Isle of Man)[105] and the United States—set a normative framework based on the OST that covers all kinds of activities involved with lunar exploration.[106] "[S]ubsequent practice by States is considered an authentic means of interpretation, for 'it constitutes objective evidence of the understanding of the parties as to the meaning of the treaty.'"[107] As highlighted by De Man, "[t]his suggests, according to the International Law Commission (ILC), that such subsequent agreement and practice of the parties are 'often, but not necessarily always, particularly important factors for the interpretation of treaties.'"[108]

The rights and duties expressed therein take the form of expectations rather than legally enforceable provisions. NASA highlights that the Accords follow the OST, and I agree that they do so in regards to the sections on "Peaceful Purposes," "Emergency Assistance," "Registration of Space Objects," "Transparency," and "Release of Scientific Data."[109] However, the provision in reference to space resources is worth illuminating, particularly the addition of the text that the extraction of space resources does not "inherently" constitute national appropriation, stating in section 10(2) that

> [t]he Signatories emphasize that the extraction and utilization of space resources, including any recovery from the

[104] *See id.*; Jessy Kate Schingler, *Imagining Safety Zones: Implications and Open Questions*, THE SPACE REV. (June 8, 2020), https://www.thespacereview.com/article/3962/1 [https://perma.cc/2F3J-E7P5].

[105] *Artemis Accords to Be Extended to the Isle of Man*, ISLE OF MAN GOV'T (July 27, 2021), https://www.gov.im/news/2021/jul/27/artemis-accords-to-be-extended-to-the-isle-of-man/ [https://perma.cc/J3NL-VFCL].

[106] *See* The Artemis Accords, *supra* note 103, at 2; *Brazil Signs Artemis Accords*, NAT'L AERONAUTICS & SPACE ADMIN. (June 15, 2021), https://www.nasa.gov/feature/brazil-signs-artemis-accords [https://perma.cc/JTM4-AZKM]; *Israel Signs Artemis Accords*, NAT'L AERONAUTICS & SPACE ADMIN. (Jan. 27, 2022), https://www.nasa.gov/feature/israel-signs-artemis-accords [https://perma.cc/UXM3-2EVP]; *France Becomes Twentieth Nation to Sign the Artemis Accords*, U.S. DEP'T STATE, https://www.state.gov/france-becomes-twentieth-nation-to-sign-the-artemis-accords/ [https://perma.cc/UEY9-MUQA].

[107] De Man, *supra* note 7, at 95.

[108] *Id.*

[109] The Artemis Accords, *supra* note 103, at 2–4.

> surface or subsurface of the Moon, Mars, comets, or asteroids, should be executed in a manner that complies with the Outer Space Treaty and in support of safe and sustainable space activities. The Signatories affirm that the extraction of space resources does not inherently constitute national appropriation under Article II of the Outer Space Treaty, and that contracts and other legal instruments relating to space resources should be consistent with that Treaty.[110]

The use of "inherently" here obviously adds some ambiguity. Other significant innovations in the Artemis Accords that go beyond the OST are sections on interoperability, protecting lunar heritage, orbital debris and spacecraft disposal, and the controversial Section 11 on "Deconfliction of Space Activities,"[111] which call for "safety zones" around sites of activity,[112] which calls for space mining operations to provide notification of their activities and coordinate with other actors to avoid "harmful contamination." This could itself amount to appropriation because it will involve some measure of exclusion and alienation.[113]

It is contended that the benefit of the Accords is that they are flexible and can respond quickly to change, unlike the treaty regime.[114] It is also important to note the relevance of the fact that the U.S. has made historical use of instruments that grant authorizations, without formal declarations. Others have argued that it is odd to see NASA began the process to define proper behavior in space on its own and that NASA's action as a "diplomatic surrogate for the United Nations is a significant—and potentially harmful—milestone in the commercialization of outer space."[115] China and Russia are particularly notable absences from the Accords, and other notable absences, such as Germany and India, are unsure of the

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[110] *Id.* at 4.
[111] *Id.* at 3–6.
[112] *Id.* at 5–6; *see also* Schingler, *supra* note 104.
[113] *See Safety Zones: A Work in Progress, Moon Dialogues*, at 01:24 (July 22, 2021), https://www.moondialogs.org/events/safety-zones [https://perma.cc/J5SY-TQVN]; Ted Adam Newsome, The Legality of Safety and Security Zones in Outer Space: A Look to Other Domains and Past Proposals 109 (Aug. 2016) (LLM Thesis, McGill University) (on file at eScholarship@McGill).
[114] Space Thoughts, *Episode 25 Update on The Artemis Accords*, YOUTUBE, at 28:19 (Oct. 15, 2020), https://www.youtube.com/watch?v=-keMy1tRAKM&t=1618s [https://perma.cc/2RLX-LVJY].
[115] Stephen Buono, *For Sale: The Moon*, THE HILL (Oct. 20, 2020, 3:30 PM), https://thehill.com/opinion/technology/521864-for-sale-the-moon [https://perma.cc/MZC5-FL3Y].

merits of joining.[116] While China has been largely silent,[117] Russia has declared that the Artemis Accords are "too US-centric,"[118] despite its discussions with the United States about participation in the Lunar Gateway,[119] the orbital outpost of the Artemis program.[120]

Declared as a response to the U.S. Artemis Program, in March 2021, Russia's Roscosmos and China's National Space Administration (CNSA) announced a preliminary agreement to jointly develop the research facility, known as the International Lunar Research Station, or ILRS.[121] Statements from Roscosmos and CNSA underline that the project will be "open to all interested countries and international partners."[122] According to media reports, speaking at the Global Space Exploration Conference (GLEX) in St. Petersburg, Russia on June 16, 2021, "Chinese and Russian space officials said they were already in negotiations with international partners including the European Space Agency (ESA), Thailand, the United Arab Emirates and Saudi Arabia to join their endeavor."[123] As some important states, including Germany and India have hesitated becoming signatories to the Artemis Accords, China and the Russian Federation are arguably leveraging this hesitancy to "bring these states and others into cooperative agreements," which commentators argue "would challenge future legal structures endorsed and based on the Artemis Accords."[124]

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[116] *See* Christopher Newman, *Artemis Accords: Why Many Countries are Refusing to Sign Moon Exploration Agreement*, THE CONVERSATION (Oct. 19, 2020, 7:45 AM), https://theconversation.com/artemis-accords-why-many-countries-are-refusing-to-sign-moon-exploration-agreement-148134 [https://perma.cc/SND3-A9YV].

[117] Paul Stimers & Audrey Jammes, *The Artemis Accords After One Year of International Progress*, THE SPACE REV. (Oct. 18, 2021), https://www.thespacereview.com/article/4267/1 [https://perma.cc/22FD-CPQN].

[118] *See* Loren Grush, *Head of Russian Space Program Calls for More International Cooperation in NASA's Moon Plans*, THE VERGE (Oct. 12, 2020, 11:48 AM), https://www.theverge.com/2020/10/12/21512712/nasa-roscosmos-russia-dmitry-rogozin-artemis-moon-interntational-cooperation [https://perma.cc/2LTE-W9RB].

[119] *See* Joey Roulette, *Pivoting from NASA, Russia Partners with China for Lunar Space Station*, THE VERGE (Mar. 9, 2021, 11:27 AM), https://www.theverge.com/2021/3/9/22321114/lunar-moon-space-station-russia-china-agreement-nasa [https://perma.cc/6PRP-EGGW].

[120] *Gateway*, NAT'L AERONAUTICS & SPACE ADMIN., https://www.nasa.gov/gateway/overview [https://perma.cc/TK3K-DUNV] (Apr. 4, 2022).

[121] *See* Mike Wall, *Russia and China Just Agreed to Build a Research Station on the Moon Together*, SPACE.COM (Mar. 10, 2021), https://www.space.com/russia-china-moon-research-station-agreement [https://perma.cc/3DJK-Q22Q].

[122] *Id.*

[123] Tereza Pultarova, *Russia, China Reveal Moon Base Roadmap but No Plans for Astronaut Trips Yet*, SPACE.COM (June 17, 2021), https://www.space.com/china-russia-international-lunar-research-station [https://perma.cc/EHY5-STLJ].

[124] Michael Listner, *"The Three Warfares": China's Lunar and Mars Ambitions Bolster Larger Strategic Vision*, CTR. FOR SEC. POL'Y (June 29, 2021), https://centerforsecuritypolicy.org/the-

Would another Artemis Accords-like governance regime be developed as an alternative? The result is diversity in that there would be a gradual emergence of numerous decision-making centers (governance centers) producing numerous, partially overlapping, issue-specific regimes.[125] This creates a polycentric governance, regime complex and fragmentation scenario as articulated by Tepper.[126] He and others[127] argue that space governance is and should be moving towards polycentricism.[128] "Nevertheless, the appeal of using polycentricity thinking is hampered by the lack of clear principles for how to operationalize it. There are several examples of various [attempts] at cross-scale collaboration, but very few analyses assessing their impact on governance."[129] Polycentric governance also has challenges, including "dealing with resolving political conflict and the potentially skewed benefits of common resources, but also so-called 'scale-shopping[,]' where groups dissatisfied with politics at one scale simply approach a more favourable political venue in which to frame their interests."[130] This will only be addressed if there is a way for regimes or nodes to actually talk to each other and adopt what Philosopher Kant has called "the universal law of hospitality" in the name of what Professor Janda describes as "a certain emancipatory justice that would unconditionally provide for and forgive the debts we owe each other."[131]

What seems clear is that likely all governance regimes that will be established will declare to have their foundation based on the OST. Significant efforts are expended by U.S. officials to communicate that U.S.-led governance instruments are not seen as replacing international instruments, with section 10(4) of the Accords setting forth that "[t]he Signatories intend to use their experience under the

three-warfares-chinas-lunar-and-mars-ambitions-bolster-larger-strategic-vision/ [https://perma.cc/97VD-2K8N].

125 *See generally* Harald Köpping Athanasopoulos, *The Moon Village and Space 4.0: The 'Open Concept' as a New Way of Doing Space?*, 49 SPACE POL'Y 101323 (2019).

126 Eytan Tepper, The Big Bang of Space Governance: Towards Decentralized Regulation of Space Activities 3 (2019) (DCL thesis, McGill University) (on file at eScholarship@McGill).

127 *See, e.g.*, Maria Lucas Rhimbassen & Lucien Rapp, *New Space Property Age: At the Crossroads of Space Commons, Commodities and Competition*, 13 J. PROP., PLAN. & ENV'T L. 88 (2021); *see generally* Lukas Kuhn, *Introduction to Polycentricity: A Backgrounder*, OPEN LUNAR FOUND (May 19, 2021) https://www.openlunar.org/library/introduction-to-polycentricity [https://perma.cc/XJ7C-TSBY].

128 *See* Tepper, *supra* note 126, at 3–4.

129 *Principle Seven: Promote Polycentric Governance*, GRAID, https://applyingresilience.org/en/principle-7/ [https://perma.cc/F24A-9PYC].

130 *Id.*

131 Richard Janda, *Toward Cosmopolitan Law*, 50 MCGILL L.J. 967, 967 (2005).

Accords to contribute to multilateral efforts to further develop international practices and rules applicable to the extraction and utilization of space resources, including through ongoing efforts at the COPUOS." (emphasis added)[132] An interesting observation arises from this. Though an adaptive governance framework is proposed by scholars[133] so that regimes adapt as we learn more, how do we validate or trust what has been learned by one party, especially when taking into consideration how phenomenology applies to "experience."[134]

Israel suggests that the way forward is rules made through inter-operator negotiation. Essentially, "private law regimes constructed from contracts between spacecraft operators (and spacecraft, in some cases) in which all space actors, public and private, play on a level field[,]"[135] in the Space Governance 3.0 era.

V. CONTRACTING INITIATIVES

Coming at this from all angles, the latest innovation from NASA is in contracting and public-private partnership instruments, which has the effect of norm setting through private sector activity. In September 2020, NASA announced it would buy lunar soil obtained by commercial landers as a token purchase (on the order of $25,000 for a few hundred grams) intended to set a precedent.[136] Local and international companies selected for space resources contracts will collect a small amount of lunar soil from any location on the Moon's surface and "provide imagery to NASA of the . . . collected material, along with data that identifies the collection location."[137] After NASA receives the information, the company will "conduct an 'in-place' transfer of ownership of the lunar regolith" to the agency, completing the commercial transaction; 80% of the payment is to be made on delivery.[138] The payment is a nominal amount, but the transfer of

[132] The Artemis Accords, *supra* note 103, at 5.

[133] Michael R. Migaud et al., *Developing an Adaptive Space Governance Framework*, 55 SPACE POL'Y 101400 (2021).

[134] Luigina Mortari, *Reflectivity in Research Practice: An Overview of Different Perspectives*, INT'L J. QUALITATIVE METHODS (2015).

[135] Brian R. Israel, *Space Governance 3.0*, 48 GA. J. INT'L & COMPARA. L. 715, 721 (2020).

[136] *See* Jim Bridenstine, *Space Resources are the Key to Safe and Sustainable Lunar Exploration*, NAT'L AERONAUTICS & SPACE ADMIN. BLOGS (Sept. 10, 2020), https://blogs.nasa.gov/bridenstine/2020/09/10/space-resources-are-the-key-to-safe-and-sustainable-lunar-exploration/ [https://perma.cc/FRE7-7YZM]; Mike Wall, *NASA Wants to Buy Moon Dirt from Private Companies*, SPACE.COM (Sept. 10, 2020), https://www.space.com/nasa-buy-moon-dirt-private-companies.html [https://perma.cc/V6AE-9ACE].

[137] Bridenstine, *supra* note 136.

[138] *Id.*

ownership and the act of selling something collected on the Moon sets a precedent that an in-orbit transaction does not amount to appropriation. "After ownership transfer, the collected material becomes the sole property of NASA for [the agency's] use" under the Artemis program.[139] On, December 3, 2020, NASA announced the companies it selected to collect these lunar resources.[140] Twenty-two proposals were received but only eight were eligible, and four of these bids—from Lunar Outpost, from Golden, Colorado; ispace Japan; ispace Europe; and Masten Space Systems, from Mojave, California—were successful, with contract awards ranging from $1 to $15,000.[141] The funding is so low because NASA is paying solely for the collected material, without footing the bill for any of the companies' development costs. "NASA Administrator Bill Nelson presented Justin Cyrus, CEO of Colorado-based space startup Lunar Outpost, with the first payment ever issued to a company as part of a space resource contract on [August 23, 2021] . . . at the 36th annual Space Symposium.[142] The check was "just 10 cents, or 10 percent of Lunar Outpost's $1 bid."[143]

While the countries that these companies are registered in are all Artemis Accord signatories, it begs the question: If they had not been nationals of signatories, how would such action have bound their countries? After all, Article VI of the OST states:

> States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. The activities of non-governmental entities in outer space, including the moon and other celestial bodies, shall require authorization and

139 *Id.*

140 Jeff Foust, *NASA Selects Four Companies for Lunar Sample Purchases*, SPACENEWS (Dec. 3, 2020), https://spacenews.com/nasa-selects-four-companies-for-lunar-sample-purchases/ [https://perma.cc/K43Y-BV5G].

141 *See id.*

142 Chelsea Gohd, *NASA Just Cut a 10-cent Check to Kick-Start Moon Mining Tech*, SPACE.COM (Aug. 30, 2021), https://www.space.com/nasa-lunar-outpost-check-moon-resources [https://perma.cc/X86K-N78M].

143 *Id.*

> continuing supervision by the appropriate State Party to the Treaty.[144]

According to Durkee, "[w]hen space companies launch, extract, and sell outer space resources, they force their home states and others into a reactive posture, increasing the likelihood that their chosen legal principles will prevail and harden into law."[145] She argues that the space law case study thus shows how private actors can force the development of uncodified international law on two levels.[146]

> On a doctrinal level, in the narrow instances when private conduct is attributed to the state, the private behavior itself becomes state practice that can inform the meaning of a treaty or the development of customary international law. Descriptively, this argument is important not just because it is plausible, but because it can be used as a tool in the hands of those who would argue for a commerce-friendly rule. On a realpolitik level, those private actors can nudge the law toward their preferred interpretations by simply acting as though their preferred rules were already law. Because states make uncodified law by actual practice and belief, rather than a process of multilateral lawmaking, private entities can place states in reactive postures, greatly increasing the likelihood that their chosen rules will prevail. On this second level—the level of lawmaking by nudge—private entities make law even beyond the narrow instance when private conduct is attributed to the state.[147]

Any new regulations that take a position on the meaning of the OST do so with heightened stakes because those regulations will either facilitate or quash the intentions of an array of heightened businesses.

This contracting approach raises a number of significant governance questions. To start: How will NASA verify a contract has been fulfilled by photos, and how will they ensure the collected material remains in their possession after the images have been taken? And how will the lunar resources be managed, considering sustainability and stewardship?

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144 Outer Space Treaty, *supra* note 23, art. VI.
145 Durkee, *supra* note 73, at 429.
146 *See id.* at 434–35.
147 *Id.* at 472–73.

A non-profit organization has launched a project to answer some of these questions. On the heels of the NASA announcement of the awards, the California-based Open Lunar Foundation has established a perpetual purpose lunar resources trust they call "Breaking Ground," intended to "steward and demonstrate formal and effective institutional management of lunar resources between different stakeholders."[148] The trust will be governed by a committee that the foundation says will "operationalize efforts including the purchasing of lunar regolith"—the fine, powdery soil on the surface of the Moon[149]—"and stewarding those resources, facilitating participatory consultative processes to involve many stakeholders in determining, identifying and advocating for clear new resource management regimes as a result of these efforts."[150] Further, "[t]he trust seeks to make multiple purchases which may each explore different management treatments."[151] In essence,

> It conceived of the idea to pursue the same contracts as NASA, except that the purchases would be held in a trust, rather than by the government. The resulting rights and interests would then be assessed by experts and civil society, with the aim of maturing the bundle of rights framework for the Moon.[152]

In December 2020, Breaking Ground signed its first Memorandum of Understanding with Intuitive Machines, a provider and supplier of space products and services, and in July 2022 signed a letter of intent for a regolith donation from Orbit Fab, a company creating an in-space propellant supply chain.[153] While the trust is a laudable initiative because of its focus on stewardship, it's worth noting that this initiative is encouraged by the United States as a further buttress for their intentions and does nothing to address the main challenge to the U.S. position on space resource exploitation.

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[148] Chelsea Robinson et al., *"Breaking Ground"- A Lunar Resources Trust*, OPEN LUNAR FOUND. (June 3, 2021), https://www.openlunar.org/library/announcing-breaking-ground-a-lunar-resources-trust [https://perma.cc/87J6-XE2Z].

[149] *See* Matt Williams, *What is Regolith?*, UNIVERSE TODAY (May 28, 2015), https://www.universetoday.com/20360/lunar-regolith/ [https://perma.cc/F9JH-VUZY].

[150] Robinson et al., *supra* note 148.

[151] *Id.*

[152] *Behind the Scenes - Building Sustainable Stewardship of Lunar Resources through a Trust,* BREAKING GROUND, https://breakingground.space/library/18xn9gt8y5p5rf1gzf5knzbhf99brf [https://perma.cc/TKA3-4564].

[153] Héloïse Vertadier, *Breaking Ground Signs First MOU with Intuitive Machines*, BREAKING GROUND, https://breakingground.space/library/breaking-ground-signs-first-mou-with-intuitive-machines [https://perma.cc/GPK6-TSEJ].

One significant civil society challenge is aptly expressed in a recent article published in *Science* by University of British Columbia professors Aaron Boley and Michael Byers, who argue that promoting national regulation of space mining rather than multilateral governance risks a "race to the bottom" and that because acquiescence is often treated as consent in international law, even NASA's purchase of lunar soil would, "if not protested by other nations, strengthen the U.S. interpretation."[154] "Case law of the [International Court of Justice] and other courts applying the VCLT confirm that the acceptance of practice by other States 'can be brought about by silence or omission.'"[155]

As highlighted by Durkee, "interpretative entrepreneurship can lead to formal or informal entrenchment of the entrepreneurial interpretation."[156] Boley and Byers argue that "NASA's actions must be seen for what they are—a concerted, strategic effort to redirect international space co-operation in favor of short-term U.S. commercial interests, with little regard for the risks involved."[157] Tobin observed that "interpretation . . . is ultimately an act of persuasion: an attempt to persuade the relevant interpretive community that a particular interpretation is the most appropriate meaning to adopt."[158] Thus, Boley and Byers have continued their advocacy and led an effort in August 2020 to ask the United Nations to draft an international treaty that would set uniform rules.[159] They sent a letter asking UN General Assembly president Tijjani Muhammad-Bande to "seek a resolution that would initiate multilateral negotiations;" it was endorsed by more than 140 scientists, former politicians and diplomats.[160]

Shared understandings within communities determine whether an interpretation succeeds. However, an interpretive community populated by advocacy networks, legal academics and other

154 Aaron Boley & Michael Byers, *U.S. Policy Puts the Safe Development of Space at Risk*, 370 SCIENCE 174, 174 (2020).

155 De Man, *supra* note 7, at 98.

156 Durkee, *supra* note 17, at 492.

157 Boley & Byers, *supra* note 154, at 175.

158 John Tobin, *Seeking to Persuade: A Constructive Approach to Human Rights Treaty Interpretation*, 23 HARV. HUM. RTS. J. 201, 203–04 (2010).

159 *See* Steven Chase, *Canadian-led Effort Asking United Nations to Draw Up Global Space Mining Treaty Attracts Significant Endorsements*, The GLOBE & MAIL (Aug. 24, 2020), https://www.theglobeandmail.com/politics/article-canadian-led-effort-asking-united-nations-to-draw-up-global-space/ [https://perma.cc/Z3K3-HJ3K]; Boley & Byers, *supra* note 154, at 174 nn.1–2; Letter from Aaron Boley et al., to Dr. Tijjani Muhammad-Bande (Aug. 2020), http://www.outerspaceinstitute.ca/docs/InternationalOpenLetterOnSpaceMining.pdf [https://perma.cc/BZ2D-DVPJ].

160 Chase, *supra* note 159.

organizations may offer a different interpretation than an interpretative community populated by States.[161] Does this matter? Is this a case where all voices need to be heard, whether governmental or non-governmental, national or international, technologically capable or aspirant? But it's important to ask, will there be a conflict of interest issue if private interpreters are competing with sovereigns or displacing authoritative interpretations? Climate change serves as an interesting case study in this issue.[162]

VI. CONCLUSION

It seems space law making is at a crossroads. Clearly, the United States has set in motion a series of initiatives that have moved the dialogue along at a pace that supersedes that of the multilateral process. When national legislation is being pursued at the same time that proceedings at the intergovernmental level appear stagnated, the danger for modification through State conduct becomes real. The United States and US companies are uniquely positioned to influence the development of customary international law concerning the conduct of Space mining, including through actual mining and safety zones, subject only to an unidentified international duty to consult. It is clear, though, that Article IV of the Outer Space Treaty continues to be an important provision.

Commodity integration will be the key issue. To what markets in the short term *on Earth* will those resources apply? Missions like the NASA led Psyche Mission are of interest because this metallic asteroid may be made of significant amounts of nickel, and the underlying factor influencing the increasing production of cobalt, lithium manganese and natural graphite is the rising demand for electric vehicles.[163] As such, discourse around the Psyche Mission, has led to outlandish headlines like: "This Metal-Rich, Potato-Shaped Asteroid Could Be Worth $10 Quintillion."[164] There are specific

[161] *See generally* Michael Waibel, *Interpretive Communities in International Law*, *in* INTERPRETATION IN INTERNATIONAL LAW 147, 148–54 (Andrea Bianchi et al. eds., 2015).
[162] *See generally* Brook M.R. Dambacher et al., *Clearing the Air: Avoiding Conflicts of Interest Within the United Nations Framework Convention on Climate Change*, 32 J. ENV'T L. 53 (2020).
[163] *See generally*, United Nations Conference on Trade and Development, Commodities at a Glance: Special Issue on Strategic Battery Raw Materials (2020).
[164] Elizabeth Gamillo, *This Metal-Rich, Potato-Shaped Asteroid Could be Worth $10 Quintillion*, SMITHSONIAN MAG., https://www.smithsonianmag.com/smart-news/asteroid-16-psyche-may-be-worth-more-than-planet-earth-at-10-quintillion-in-fine-metals-180979303/ [https://perma.cc/DZ2W-99Y9].

regimes for how precious resources are excavated for and how the value is integrated into the market, and all countries follow these because of the consequences on the global market. However, despite this, there are few common sets of standards and metrics to govern the mining process, consistent with international labor and human rights standards.[165] This might lead space mining companies to pay little attention to equity considerations, if attention is paid at all.[166] Just as a window, Environmental, Social and Governance (ESG) reporting on "Space Sustainability" leaves a lot to be desired.[167]

Finn Robinsen's prediction, however, that "[t]he future of space governance is increasingly less international and characterized by coercion, coalition building and the pursuit of hegemony," need not be so.[168] To act on this is consensus building is a security imperative. Leigh Foster and Namrata Goswami warn that state behavior in other areas beyond national jurisdiction is a cause for concern[169] and shows us what could happen if states continue with a first-come, first-served "scramble for the skies"[170] mentality rather than see space as a global commons for humanity. It is important to recognize, however, that the determination and designation of space as a "commons" is not agreed upon as a *legal* concept.

The absence of a centralized, authoritative mechanism for adjudicating divergent interpretations suggests that there will be more variability in national approaches. But with a new administration in the United States as of January 20, 2021,[171] and all

[165] Jack Lifton, *Ethics of Cobalt Mining Must be Taken Seriously by Traders*, FIN. TIMES (Mar. 22, 2022), https://www.ft.com/content/77011f71-6619-4c49-ac80-d1de033e4b74 [https://perma.cc/GY57-29Y8]; Jack Lifton, *Ethics of Cobalt Mining Must be Taken Seriously by Traders*, FIN. TIMES (Mar. 22, 2022), https://www.ft.com/content/77011f71-6619-4c49-ac80-d1de033e4b74 [https://perma.cc/GY57-29Y8].

[166] Andrea Owe, *Space Expansion Must Support Sustainability – On Earth and in Space*, RUSI (June 15, 2022), https://rusi.org/explore-our-research/publications/commentary/space-expansion-must-support-sustainability-earth-and-space [https://perma.cc/T624-Q2M2].

[167] Gursharan Sandhu, *You Manage What You Measure: Achieving Space Sustainability and Self-Regulation of the Outer Space Industry Through Environmental, Social, and Governance Corporate Disclosure*, MARY ANN LIEBERT PUBLISHERS (Aug. 25, 2022), https://www.liebertpub.com/doi/full/10.1089/space.2022.0002 [https://perma.cc/2ETQ-YWRE].

[168] Finn Robinsen, *The State of and Prospects for Space Governance: A Critical Deliberation*, E-INT'L RELS. (Oct. 26, 2020), https://www.e-ir.info/pdf/88231 [https://perma.cc/YJM7-VT5Q].

[169] *See* L.M. Foster & Namrata Goswami, *What China's Antarctic Behavior Tells Us About the Future of Space*, THE DIPLOMAT (Jan. 11, 2019), https://thediplomat.com/2019/01/what-chinas-antarctic-behavior-tells-us-about-the-future-of-space/ [https://perma.cc/KZZ9-PSPN].

[170] NAMRATA GOSWAMI & PETER A. GARRETSON, SCRAMBLE FOR THE SKIES: THE GREAT POWER COMPETITION TO CONTROL THE RESOURCES OF OUTER SPACE (2020).

[171] *See* Toluse Olorunnipa & Annie Linskey, *Joe Biden is Sworn in as the 46th President, Pleads for Unity in Inaugural Address to a Divided Nation*, WASH. POST (Jan. 20, 2021), https://www.washingtonpost.com/politics/joe-biden-sworn-in/2021/01/20/13465c90-5a7c-11eb-a976-bad6431e03e2_story.html [https://perma.cc/F4DC-8BSF].

the delays recorded, the 2024 politically motivated goal set for the Artemis Moon landing will not be reached, so moving at the speed of light is no longer necessary.[172] As much as it may chafe the spirit of innovation, time must be taken so that diverging views are heard and stakeholders are consulted to determine a multilateral approach, while still ensuring that the momentum gathered from the preceding five years of action is not wasted.[173] "While there is some legal uncertainty surrounding the field, consensus seems to be growing among space-faring nations that commercial resource extraction is compliant with international law" and there is a lot of promise for this new COPUOS working group to gain some consensus.[174] In the words of Vice Chair of the Working Group, Steven Freeland,

> we did reach consensus on a really tough, sensitive, geopolitically-based issue. We got consensus amongst countries who are not going to agree on anything else in the current climate. And it's just the beginning. But I would say to people who are skeptical about a multilateral process, that, you know, the only way they will succeed, whatever success means, in their endeavors, is where there's a process that others can also succeed, if they wish to. That's not being idealistic, that's not being optimistic, is being realistic.[175]

But as highlighted by Anderson et al., based on the decision-making process for earth-bound mine development, it is likely that space mining companies and their investment partners are likely to require a more sophisticated and complete legal and commercial structure before committing to a space mining venture.[176] After all, the two companies instrumental in driving the U.S. regime (Planetary Resources and Deep Space Industries) are no longer in existence,[177] in part, because the thorny issue of "allocation" of rights

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[172] *See* U.S. Off. of Space Com., *supra* note 21, at 23.

[173] Kiran Vazhapully, *Space Law at the Crossroads: Contextualizing the Artemis Accords and the Space Resources Executive Order*, OPINIO JURIS (July 22, 2020), http://opiniojuris.org/2020/07/22/space-law-at-the-crossroads-contextualizing-the-artemis-accords-and-the-space-resources-executive-order/ [https://perma.cc/X2M6-SSXZ].

[174] Anderson et al., *supra* note 2, at 258; *see* Vazhapully, *supra* note 173.

[175] Steven Freeland, *World Space Week Association Podcast*, https://www.worldspaceweek.org/news/world-space-week-association-podcast-steven-freeland-on-space-law/ [https://perma.cc/HHF4-ZV54].

[176] Anderson et al., *supra* note 2, at 258.

[177] *See* Jeff Foust, *Asteroid Mining Company Planetary Resources Acquired by Blockchain Firm*, SPACE.COM (Nov. 2, 2018), https://www.space.com/42324-asteroid-mining-company-planetary-resources-acquired.html [https://perma.cc/APJ3-8ZHT]; Jeff Foust, *Deep Space*

to resources "in place."[178] This will take time to develop. More relevant for now is that serious early discussion for commodities markets is being discussed at forums, such as, the U.S. National Space Council Use Advisory Group, which proposes a strategic in-space propellant reserve modelled on petroleum reserve.[179]

Using the U.S. example to express how the diversification of space actors affects governance, non-state influences have been significant, acting as norm and interpretative entrepreneurs and using nudging or forcing behavior as one among a suite of tools to push entrepreneurial interpretations of existing law.[180] This is important because "[i]n a world where financial power can translate into persuasive power . . . frequently located in the Global North and in the private sector, the meanings that stick might be the meanings backed by capital, which are also the meanings that entrench capital."[181]

Vladimir Kopal, writes:

> [I]t is not possible to accept that the exploitation of space resources should be left only to national regulations of those countries, which would be able to conduct such activities. . . . In the development of space law as a whole, the establishment of an appropriate legal regime to govern commercial activities in the exploitation of space resources should be affected on both tracks, international and national.[182]

"[A] delicate balance between a multilateral interpretation of treaty provisions reflecting the intentions of all States Parties and a possible reinterpretation of such provisions on the basis of

Industries Acquired by Bradford Space, SPACENEWS (Jan. 2, 2019), https://spacenews.com/deep-space-industries-acquired-by-bradford-space/ [https://perma.cc/FHD4-VRD7].

178 *See* Matthew Weinzierl & Angela Acocella, *Planetary Resources Inc., Property Rights, and the Regulation of the Space Economy*, HARV. BUS. SCH., https://www.hbs.edu/faculty/Pages/item.aspx?num=52547 [https://perma.cc/2UH9-66WT].

179 *See generally* NAT'L SPACE COUNCIL, ASSESSING THE UTILITY OF A U.S. STRATEGIC IN-SPACE PROPELLANT RESERVE: ECONOMIC DEVELOPMENT IN LOW EARTH ORBIT AND CISLUNAR SPACE (2020).

180 *See* Elizabeth Pollman & Jordan M. Barry, *Regulatory Entrepreneurship*, 90 S. CAL. L. REV. 383, 392 (2017).

181 Durkee, *supra* note 17, at 489.

182 Aganaba, *supra* note 51.

subsequent practice by a selection of States Parties" will therefore unfold.[183]

> Devolving the interpretation and application of the Outer Space Treaty to multiple intra-state negotiations makes it much more difficult to maintain a single, coherent international regime for all actors in the space domain. The worst-case scenario is legislative outcomes completely divorced from available interpretations of the Treaty, fracturing the regime.[184]

But considering the obstacles today to multilateral treaty making, interpretive contests over existing treaty law may do more work in updating the law for current circumstances than major new agreements, necessitating further research about how these interpretive contests unfold, who participates in them for what purposes and for what effects.[185]

What is clear is that the legitimacy and fairness of international law will be judged, first by the degree to which the rules satisfy the participants' expectations of justifiable distribution of costs and benefits, and secondly by the extent to which the rules are made and applied in accordance with what the participants perceive as right process. It is required therefore to identify that core of shared assumptions about fairness—or, more exactly, *unfairness*—which, once identified and agreed upon, will enable the community to embark on the fairness discourse in the first place and to proceed with negotiations which address specific allocation problems.[186] Despite the perceived benefits of a polycentric governance approach as highlighted above, Freeland highlights that wrong process is the root of all challenges,

> [w]e need if we're going to go forward in any big way in space, and also in other areas of global activities, and understanding space is not unique in this, but if we're going to go, it has to be in a way, where everybody has had the ability to participate in the discussions. Because you know, it's all about processes. Well, if you attempt to impose a set of rules, countries will say,

183 De Man, *supra* note 7, at 93.
184 Israel, *supra* note 90, at 719.
185 *See* Durkee, *supra* note 73, at 460, 463.
186 *See* THOMAS M. FRANCK, FAIRNESS IN INTERNATIONAL LAW AND INSTITUTIONS 484 (1995).

> "Well, I'm sorry, you know, I just don't agree. And I've not been involved in this. So why should I accept that?" Countries do that all the time. Or even worse, if you're going to say, "well, this group of countries is going to operate under these rules, this group of countries is going to operate under another set of rules, etc[.]" then that is a recipe for conflict, misunderstanding, miscalculation, confrontation, and worse, and issues about resources for example.[187]

As stakeholders in the evolving global space governance regime, we have two tasks. First, we must protect outer space from claims of sovereignty and their unequitable and unsustainable exploitation by individual states and their nationals. Second, we need to protect the interests of future generations in these resources, while recognizing that the current generation need to benefit from their ingenuity. To be successful in either task, we must first create a sensible working relationship between international and national laws. I suggest we collectively work towards the building blocks of a benefits sharing regime, which I believe pragmatic industry executives would open to as a cost of doing business.[188] Unfortunately, this may be more difficult than need be as it is an ideological issue for governments, and there is currently no model on an Earth of an obviously successful benefit sharing regime in areas beyond national jurisdiction.

[187] *World Space Week Association Podcast—Steven Freeland on Space Law*, WORLD SPACE WEEK, https://www.worldspaceweek.org/news/world-space-week-association-podcast-steven-freeland-on-space-law/ [https://perma.cc/AWT6-P2AZ].

[188] *Timiebi Aganaba on Law and Governance in Space,* SEAN CARROLL (Oct. 3, 2022), https://www.preposterousuniverse.com/podcast/2022/10/03/213-timiebi-aganaba-on-law-and-governance-in-space/ [https://perma.cc/6MRU-PRX7].