

“Who Dares, Wins:” How Property Rights in Space Could be Dictated by the Countries Willing to Make the First Move

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Abstract

In June 2021, Japan became the fourth country to pass a domestic law giving private property rights over extracted space resources to its citizens. Many observers within the international legal community consider these laws to be in direct contravention to the Outer Space Treaty, the international law governing space activities. This Comment argues that as more countries pass domestic legislation addressing property rights in space, international space law will need to change to accommodate these laws. This Comment considers the four countries that have passed domestic legislation: the United States, the United Arab Emirates, Luxembourg, and Japan. Based on what is contained within each law, this Comment predicts what a new international treaty governing space mining would entail and how the domestic laws would shape this law. This Comment concludes that an international licensing regime will likely be necessary and supported by all four countries. This regime will need to include rules for biological material and will also need to state that entire celestial bodies cannot be claimed. Finally, resource sharing will be a point of contention; for non-space faring countries to sign onto the agreement, larger nations may need to compromise on this point.

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I. INTRODUCTION

In September 2020, NASA announced that it would be signing contracts with private companies to buy resources that the companies extract from the Moon.¹ This desire to move into the space mining industry is unsurprising given that some scholars estimate that the asteroid belt could contain over a quintillion United States (U.S.) dollars of rare minerals and metals.²

Currently, four countries—the U.S., the United Arab Emirates (U.A.E.), Japan, and Luxembourg have domestic laws allowing for private property rights over resources extracted from space.³ Japan is the most recent, with its legislation coming into force on December 23, 2021.⁴ The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (the Moon Agreement)⁵ is the current legal framework that discusses space resource exploitation.⁶ But the Agreement only has twenty-two State Party signatures, with the U.S., the U.A.E., Japan, and Luxembourg notably absent.⁷

Unlike the Moon Agreement, the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (the Outer Space Treaty) has most countries as parties.⁸ This treaty establishes basic policies concerning activities in space. Many provisions of this treaty, however, do not have one set interpretation.⁹

This Comment argues that existing international space law is not equipped to deal with space mining and that a new treaty will be necessary, sooner rather than later. To avoid a “wild west” situation, an international regime should be

¹ See Alex Gilbert & Morgan Bazilian, *The Era of Commercial Space Mining Begins*, PAYNE INST. COMMENTARY SERIES: VIEWPOINT 1 (Sept. 23, 2020), <https://perma.cc/2TZ9-MU9T>.

² Robert Heins, *Shoot for the Moon, If You Miss You'll Land Among Valuable Asteroids: An Analysis of the Legal Ramifications of Asteroid Mining*, 61 JURIMETRICS 219, 234 (2021).

³ See Juan Pons, *US, Luxembourg, Emirates and Now Japan Take the Lead to Exploit Space Mining*, ATALAYAR (Jul. 28, 2021) <https://perma.cc/SH4S-YGVZ>.

⁴ See *Japan: Space Resources Act Enacted*, LIBR. CONG., <https://perma.cc/WS9J-QZKS>.

⁵ The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 5, 1979, 1363 U.N.T.S. 3 [hereinafter the Moon Agreement].

⁶ See *id.*

⁷ See *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies*, U.N. TREATY COLLECTION (Oct. 24, 2021), <https://perma.cc/J6VZ-TEY7>.

⁸ The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, art. I, Jan. 27, 1967, 18 U.S.T. 2410 [hereinafter the Outer Space Treaty].

⁹ See, e.g. 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, 155 (2019) (discussing whether private actors are included in the ban of the national appropriation principle). Further, even if there is a current agreement over an interpretation, countries may soon feel pressure to revisit their positions to accommodate companies trying to get more advantageous legal regimes.

implemented. As the title of this Comment implies,¹⁰ the countries who are daring enough to test the bounds of international treaties are the ones who have the power in shaping future international treaties. Individual countries are already starting to create their own domestic legislation. These countries are unlikely to sign onto a new treaty unless they find it necessary or helpful to them. To reach an agreement, the treaty will need to avoid straying too far from the disparate domestic laws in place. Therefore, those involved in developing any treaty should study these domestic laws in an effort to harmonize the treaty with them.

Section II of this Comment discusses international laws currently in place that deal with space and how they are being interpreted. Then, Section III will discuss the domestic laws of each of the four countries and present a comparative analysis of those domestic laws. In Section IV, this Comment concludes with a discussion about what will likely be important to the international community in a possible future treaty.

II. DISCUSSION OF CURRENT INTERNATIONAL LAW

Five main treaties currently govern space: the Outer Space Treaty,¹¹ the Rescue Agreement,¹² the Liability Convention,¹³ the Registration Convention,¹⁴ and the Moon Agreement.¹⁵ This Comment will only discuss the Outer Space Treaty and the Moon Agreement in detail. It will also discuss the Artemis Accords, a set of nonbinding multilateral and bilateral agreements between thirteen countries. However, none of these treaties establish a framework for obtaining space resources.

A. The Outer Space Treaty

The Outer Space Treaty discusses general principles for States Parties to follow, including allowing “free access to all areas of celestial bodies,”¹⁶ and noting that “[o]uter space, including the moon and other celestial bodies, is not subject

¹⁰ “Who dares, wins” is a saying made famous by the British Special Air Services, meaning that if one has the courage to take risks, they will succeed in life. See Harvey Sullivan, *Who Dares Win Meaning – Where Does the Phrase Come From and What is the History Behind the SAS Motto?*, SUN (Jan. 20, 2019), <https://perma.cc/PWR5-MQSX>.

¹¹ The Outer Space Treaty, *supra* note 8.

¹² The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, Apr. 22, 1968, 19 U.S.T. 7570 [hereinafter Rescue Agreement].

¹³ The Convention on International Liability for Damage Cause by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389 [hereinafter Liability Convention].

¹⁴ The Convention on Registration of Objects Launched into Outer Space, Jan. 14, 1975, 28 U.S.T. 695 [hereinafter Registration Convention].

¹⁵ The Moon Agreement, *supra* note 5.

¹⁶ The Outer Space Treaty, *supra* note 8, art. I.

to national appropriation.”¹⁷ While most countries have signed onto this Treaty,¹⁸ it does not clearly regulate a country’s rights and duties. Over fifty years later, the meaning of many of the provisions in the Treaty are still being debated.

One main issue is whether the national appropriation principle¹⁹ outlaws private individuals from claiming property rights on top of the ban on countries claiming the property.²⁰ Another issue is what kind of property rights are outlawed: only claims of sovereignty over entire celestial bodies, or the appropriation of resources (e.g. mining) in addition to these claims.²¹ As customary international law has changed, some scholars have argued that the Outer Space Treaty now has a narrower meaning than at its signing, and that the appropriation of extracted space resources is now allowed.²² This is important because if the customary international law has changed once, it can continue to evolve to allow for mining as more countries make domestic laws that provide for private property rights in space.

Both countries and scholars further disagree about what it means to use outer space for the benefit and interest of all countries. Some believe that “[t]echnologically advanced countries should use outer space not only for their own interests, but also for the benefit and interests of all countries because most countries do not have the space technology and capability” and that “seeking personal benefit or one country’s benefits at the expense of the rights and interests of other States in the exploration and use of outer space is not allowed.”²³

Thus, the effectiveness of the Outer Space Treaty is limited in light of these differences in interpretation and the lack of an enforcement mechanism, although

¹⁷ *Id.* art. II.

¹⁸ *See Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies*, U.N. TREATY SERIES <https://perma.cc/TN4X-CQST>.

¹⁹ “Outer space . . . is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.” The Outer Space Treaty, *supra* note 8, art. II.

²⁰ *See* Pershing, *supra* note 9, at 155 (discussing scholarship that argues that private actors are implicitly included in the national appropriation ban); 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 (2008) (arguing that private actors were purposely kept out of the treaty and are therefore not bound in the same way that States Parties are); Leslie I. Tennen, *Towards a New Regime for Exploitation of Outer Space Mineral Resources*, 88 NEB. L. REV. 794, 805 (2010) (arguing that “[t]he mere recognition of [private property] claims by a state would constitute de facto exclusion of other states and their nationals and thereby constitute a form of national appropriation”).

²¹ *See* Pershing, *supra* note 9, at 156 (stating that some countries have voiced their position is that signing the Outer Space Treaty showed a prohibition of *any* claim of sovereignty or property rights in space).

²² *See id.* at 158. A change in customary international law is evidenced by the U.S., Russia, and Japan all retrieving resources from space and claiming ownership over those resources without the international community acknowledging any contravention of the Outer Space Treaty.

²³ Yan Ling, *Is Selling Land on the Moon Allowed in China?*, 53 PROCEEDINGS INT’L INST. SPACE L. 134, 138 (2010).

it is still considered to be a success as there are over one hundred State Parties and many of the provisions are now considered to be customary international law.²⁴

B. The Moon Agreement

The Moon Agreement is another treaty which, contrary to its short name, extends to all celestial bodies within the Solar System.²⁵ This agreement was made to further specify what country obligations are in space. While some consider this agreement to be a hinderance to any retrieval or use of the Moon's resources, only twenty-two countries are parties to the Moon Agreement, none of which are main space powers or one of the four countries discussed in this Comment.²⁶

The Moon Agreement has largely failed as an international treaty because most countries consider it too restrictive of activities allowed in space. For example, Article 11 of the Moon Agreement, commonly known as the “common heritage principle,” states that “[t]he moon and its natural resources are the common heritage of mankind.”²⁷ This is considered to be a stronger statement of communal property rights than the language contained within the Outer Space Treaty, which states that space is the “province of all [hu]man kind.”²⁸

Unlike the Outer Space Treaty, the Moon Agreement contains provisions concerning the exploitation of resources, specifically outlawing property rights of celestial bodies.²⁹ Since the Joint Statement on the Benefits of Adherence to the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies of 1979 by States Parties to that Agreement (Joint Statement) (discussed below) allows mining, this passage must be interpreted to mean that if the property is still in place on the celestial body, it cannot be claimed (i.e., real property

²⁴ See Thomas Cheney, *There's No Rush: Developing a Legal Framework for Space Resource Activities*, 43 J. SPACE L. 106, 110 (2019). These provisions include the first, second, and third articles, which have to do with national appropriation, exploring and using space to benefit all of humankind, and exploring and using space in accordance with international legal obligations. Paul B. Larsen, *Asteroid Legal Regime: Time for a Change*, 39 J. SPACE L. 275, 289 (2014).

²⁵ See The Moon Agreement, *supra* note 5, art. 1(1).

²⁶ Comm. On the Peaceful Uses of Outer Space, Status of International Agreements Relating to Activities in Outer Space as at 1 January 2021, U.N. Doc. A/AC.105/C.2/2021/CRP.10.

²⁷ The Moon Agreement, *supra* note 5, art. 11.

²⁸ Cheney, *supra* note 24, at 114. Another difference between the two treaties is the Moon Agreement's inclusion of the phrase “[t]he moon and *its natural resources*.” The Moon Agreement, *supra* note 5, art. 11 (emphasis added). The inclusion of “natural resources” implies that any extraction will still need to fit within the common heritage principle, suggesting that a private company could not extract, sell, and keep the profits for themselves.

²⁹ See The Moon Agreement, *supra* note 5, art. 11(3) (“[N]either the surface nor the subsurface of the moon, nor any part thereof or natural resources in place, shall become property of any State, international intergovernmental or non-governmental organization, national organization or non-governmental entity or of any natural person.”).

ownership is not allowed). However, because extracting the property is legal,³⁰ the Moon Agreement permits ownership of that property once it has been removed from the celestial body.

To encourage more countries to sign on, the States Parties created the Joint Statement.³¹ The Joint Statement “points out that the Moon Agreement does not preclude any modality of exploitation, by public or private entities, or prohibit the commercialization of such resources, provided that such exploitation is compatible with the principle of a common heritage of mankind.”³²

Article 11 of the Moon Treaty sets up an international body for the oversight of the exploitation of space minerals once “exploitation is about to become feasible.”³³ Specifically, the Moon Agreement states that the international regime will be established with a main purpose of “[a]n equitable sharing by all States Parties, in the benefits derived from those resources whereby the interests and needs of the developing countries . . . shall be given special consideration.”³⁴ This feature is one of the major concerns that the U.S. had with the Moon Agreement and is cited as why they decided not to sign the treaty.³⁵

C. The Artemis Accords

The Artemis Accords are a series of thirteen provisions that the U.S. established in 2020 in conjunction with Australia, Canada, Italy, Japan, Luxembourg, the U.A.E., and the U.K.;³⁶ other countries have subsequently joined.³⁷ Through ten principles on space exploration and property rights,³⁸ the Accords set forth these countries’ goals and beliefs about the current state of international space law as it has to do with exploitation and exploration.

³⁰ While retrieving resources from space may be allowed in theory, one commentator stated that the delegates all understood the Moon Agreement to require the consent of the States Parties in order for a country to engage in commercial exploitation of the Moon and other celestial bodies. *See* Pershing, *supra* note 9, at 156.

³¹ Joint Statement on the Benefits of Adherence to the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies of 1979 by States Parties to that Agreement, U.N. Doc. A/AC.105/C.2/2008/CRP.11, at 3 (Apr. 2, 2008) [hereinafter Joint Statement].

³² Rene Lefebvre, *Relaunching the Moon Agreement*, 41 AIR & SPACE L. 41, 42 (2016).

³³ The Moon Agreement, *supra* note 5, art. 11(5).

³⁴ The Moon Agreement, *supra* note 5, art. 11(7)(d).

³⁵ *See id.*

³⁶ *See* The Artemis Accords: Principles for Cooperation in the Civil Exploration and Use of the Moon, Mars, Comets, and Asteroids for Peaceful Purposes, Oct. 13, 2020; Rossana Deplano, *The Artemis Accords: Evolution or Revolution in International Space Law?*, 70 INT’L & COMP. L.Q. 799, 799 (2021).

³⁷ *See* Park Si-soo, *Singapore Signs the Artemis Accords*, SPACENEWS (Mar. 29, 2022), <https://perma.cc/2NDV-JFKS>.

³⁸ *See* Elya A. Taichman, *The Artemis Accords: Employing Space Diplomacy to De-Escalate a National Security Threat and Promote Space Commercialization*, 11 NAT’L SEC. L. BRIEF 112, 113 (2021).

Importantly, the Accords have set forth specific goals that some scholars, as well as governments, think contradict the requirements of the Outer Space Treaty. One of the delineated goals of the Accords is to add a permanent human settlement on the Moon. The U.S. has stated it wants to add a permanent human settlement on the Moon, which could be considered a claim of appropriation under the Outer Space Treaty. Some scholars argue that the U.S. is seeking to legitimize this by having others in the international community sign onto the Accords so the potential breach would seem less blatant.³⁹

The Accords make clear that extraction is not outlawed as national appropriation as defined in the Outer Space Treaty.⁴⁰ However, the Artemis Accords are not legally binding instruments⁴¹ and are only meant to show a “political understanding.”⁴² This means that while the countries are trying to show an agreement about their views on the legality of extraction, the Accords do not change the international law itself, and the Outer Space Treaty is still controlling.

An important part of the Artemis Accords is that they require signatories to share scientific information “resulting from their space activities with the public and the scientific community on a good faith basis and ‘consistent with Article XI of the Outer Space Treaty.’”⁴³ Countries who have agreed to the Artemis Accords most likely consider sharing scientific information from their activities as fulfilling the Outer Space Treaty’s requirement that the “use” of outer space be beneficial to the whole world.

III. DISCUSSION OF EACH COUNTRY’S DOMESTIC LAW

Individual countries have recently decided to take steps on their own to allow for private mining and ownership of space resources. In order to provide a solution to the gap in international law, it is important to evaluate domestic law. A comparative analysis of these laws will show what is important to each country as well as the direction towards which international law may be heading.

³⁹ See Deplano, *supra* note 36, at 800.

⁴⁰ See Artemis Accords, *supra* note 36 § 10.2.

⁴¹ Deplano, *supra* note 36, at 801.

⁴² Artemis Accords, *supra* note 36, pmb1.

⁴³ Deplano, *supra* note 36, at 802.

A. United States Domestic Law: Space Resource Exploitation and Utilization Act

In 2015, lobbying by various companies culminated⁴⁴ in the U.S. Commercial Space Launch Competitiveness Act,⁴⁵ sometimes referred to as the Spurring Private Aerospace Competitiveness and Entrepreneurship (SPACE) Act.⁴⁶

The purpose of this Act is “[t]o facilitate a pro-growth environment . . . by encouraging private sector investment and creating more stable and predictable regulatory conditions.”⁴⁷ This was the first instance of a national law recognizing that private entities could have property rights over space resources.

There are four main parts of the Act, but only the final part, the Space Resource Exploitation and Utilization Act (SREUA), is relevant here.⁴⁸ This part guarantees that U.S. citizens “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.”⁴⁹

The SREUA gives property rights for resources in space (specifically including asteroid mining) but does not allow any claim of property in situ. It does this by stating that recovery of asteroid resources or space resources will confer a property right. An asteroid resource is “a space resource found on or within a single asteroid.”⁵⁰ A space resource is any “abiotic resource in situ in outer space.”⁵¹ Both of these provisions state that the resource in question is located on or within the celestial body, implying that the celestial body itself is not covered by the property regulations.

Within the section outlining the obligations of the executive, SREUA acknowledges the need to comply with the requirements of international law. In discouraging any barriers to the industry, the president must do so “in manners consistent with the international obligations of the United States.”⁵² This same

⁴⁴ See generally Isabel Feichtner, *Mining for Humanity in the Deep Sea and Outer Space: The Role of Small States and International Law in the Extraterritorial Expansion of Extraction*, 32 LEIDEN J. INT'L L. 255 (2019).

⁴⁵ See *id.*

⁴⁶ See Gbenga Oduntan, *Who Owns Space? US Asteroid-Mining Act Is Dangerous and Potentially Illegal*, CONVERSATION (Nov. 25, 2015), <https://perma.cc/5CWJ-YY9C>.

⁴⁷ U.S. Commercial Space Launch Competitiveness Act, Pub. L. 114-90.

⁴⁸ Space Resource Exploration and Utilization Act of 2015 § 402 (codified as amended at 51 U.S.C. § 51303).

⁴⁹ 51 U.S.C. § 51303.

⁵⁰ 51 U.S.C. § 51301(1).

⁵¹ 51 U.S.C. § 51301(2)(A).

⁵² 51 U.S.C. § 52302(a)(2).

language is used when requiring the president to promote the right to engage in commercial activities.⁵³ Further, Congress stated that “[i]t is the sense of Congress that by the enactment of this Act, the United States does not thereby assert sovereignty or sovereign or exclusive rights or jurisdiction over, or ownership of, any celestial body.”⁵⁴

B. Luxembourg: Law on the Exploration and Use of Space Resources

After the U.S. enacted its law, Luxembourg soon followed suit with the Law on Use of Resources in Space Act⁵⁵ and the creation of the Luxembourg Space Agency.⁵⁶ The law’s main objective is to provide “legal certainty as to the ownership of minerals and other valuable space resources identified in particular on asteroids.”⁵⁷ Luxembourg’s law also tries to provide a cheap legal regime by having moderate fees and low tax rates.⁵⁸

Luxembourg’s law starts out by making clear that space resources can be appropriated.⁵⁹ It does not define “space resources,” but the explanatory document that was published with the draft law states that the U.S. definition of “space resources” is the common definition.⁶⁰ The law then states that only licensed activities are allowed, and a license cannot be transferred.⁶¹ The law also states that the licensed activities must be done in accordance with Luxembourg’s international law obligations.⁶²

Luxembourg allows anyone who wants to incorporate or set up their company in that country to be protected by their domestic space laws.⁶³ Two U.S. companies have set up shop in Luxembourg to take advantage of their laws.⁶⁴ If a company is incorporated in Luxembourg or has its central administration office in Luxembourg and is incorporated in Europe, it can apply for a license.⁶⁵ The

⁵³ 51 U.S.C. § 52302(a)(3).

⁵⁴ Pub. L. No. 114-90, § 403, 129 Stat. 772 (2015).

⁵⁵ Loi du 20 juillet 2017 sur l’exploration et l’utilisation des ressources de l’espace [Law of July 20th 2017 On The Exploration and Use of Space Resources], art. 1–2, LUX. SPACE AGENCY [hereinafter The Luxembourg Law].

⁵⁶ See Pons, *supra* note 3.

⁵⁷ Feichtner, *supra* note 44.

⁵⁸ See Feichtner, *supra* note 44.

⁵⁹ See The Luxembourg Law, *supra* note 55, art 1.

⁶⁰ Cheney, *supra* note 24, at 118–19.

⁶¹ The Luxembourg Law, *supra* note 55, art. 2(2)–3, 5.

⁶² *Id.* art. 2(3).

⁶³ *Id.* art. 4.

⁶⁴ Feichtner, *supra* note 44.

⁶⁵ *Id.*

only requirement is that if the applicant company has a shareholder with more than a 10% interest (in capital or in voting rights), the shareholder's "quality" will be taken into account to make sure that the operation is "sound and prudent."⁶⁶

When discussing how its domestic law fits within the limitations of the Outer Space Treaty, Luxembourg argues that mining is merely a "use" of space.⁶⁷ Article I of the Outer Space Treaty states that "[o]uter space . . . shall be free for exploration and use by all States."⁶⁸ Luxembourg acknowledges requirements of the Outer Space Treaty,⁶⁹ but does not set aside any amount of profits for redistributive purposes,⁷⁰ which some states consider to be an obligation for mining nations.⁷¹

C. United Arab Emirates: Federal Law No. 12 of 2019 on the Regulation of the Space Sector

In December 2019, the U.A.E. passed Federal Law No. 12 on the Regulation of the Space Sector. This law covers many different activities in space, including the launch of vehicles into space, the transportation of resources, and space mining.⁷²

The U.A.E. law applies to people who "hold the nationality" of the U.A.E. and to companies that are headquartered in the country.⁷³ It also defines "space resources" as "[a]ny non-living resources present in outer space, including minerals and water."⁷⁴ Interestingly, the law does not directly state that space resources can be exploited—rather, it includes in its list of regulated space activities both "Space Resources exploration or extraction activities" and "[a]ctivities for the exploration and use of Space Resources for scientific, commercial or other purposes."⁷⁵

⁶⁶ The Luxembourg Law, *supra* note 55, art. 8(1).

⁶⁷ Feichtner, *supra* note 44.

⁶⁸ The Outer Space Treaty, *supra* note 8, art. I.

⁶⁹ *See* Feichtner, *supra* note 44.

⁷⁰ *See id.*

⁷¹ *See* Section II.B.

⁷² Federal Law No. 12 on the Regulation of the Space Sector, art. 4 (Dec. 19, 2019) (U.A.E.) <https://perma.cc/L32M-WKCT> [hereinafter the U.A.E. Law]. This law further regulates the Emirates Space Agency. It allows the Agency to "[c]ontribute or participate in national and international projects in the space field" and to "[s]uggest concluding bilateral or international agreements with the relevant entities in the Space Sector." *Id.* art. 7.

⁷³ *Id.* art. 3(3).

⁷⁴ *Id.* art. 1.

⁷⁵ *Id.* art. 4.

The law also requires a permit from the Agency in order to engage in space activities.⁷⁶ Procedures put out by the Council of Ministers are required to address how the permits will regulate the exploitation of space resources as well as their “acquisition, purchase, sale, trade, transportation, [and] storage.”⁷⁷ Permits are not allowed to be transferred except with prior approval.⁷⁸

This law, unlike the other domestic laws that came before it, includes liability provisions. Article 14 states that “[i]f the Operator . . . causes damage to others, thus resulting in international claims against the State, the Operator shall compensate the State.”⁷⁹ In theory, if the international community decided that the U.A.E. broke the Outer Space Treaty, the operator could be held liable.

D. Japan: Act on Promotion of Business Activities Related to the Exploration and Development of Space Resources⁸⁰

In 2021, Japan became the fourth country to enact a domestic law governing property rights resulting from space resource exploitation; The Act on Promotion of Business Activities Related to the Exploration and Development of Space Resources (Act No. 83 of 2021).⁸¹

Under this law, companies can gain property rights over space resources “if the government approves their notified objectives, timing and methods of research.”⁸² Space resources are defined as “water, minerals, and other natural resources that exist in outer space including the moon and other celestial bodies.”⁸³ The law does not define what “natural resources” includes and does not mention if the resources may be inanimate or abiotic. The law also does not differentiate between resources that are on or within a celestial body and the celestial body itself. However, the law does acknowledge requirements to comply with international laws, possibly implying a limitation on claiming a right over an entire celestial body.

⁷⁶ See *id.* art. 14(1).

⁷⁷ *Id.* art. 18(1).

⁷⁸ See *id.* art. 14(7).

⁷⁹ The U.A.E. Law, *supra* note 72, art. 26.

⁸⁰ No official English translation of this law is available, so other sources were used to determine what the law states. These sources are cited as I define and explain various provisions of the law. When necessary, Google translate was used to fill in the gaps. Where this occurred, the citation will be to the Japanese Law itself. This is different from the Act on Launching Spacecraft, for which an English translation was available.

⁸¹ *Japan: Space Resources Act Enacted*, *supra* note 4.

⁸² Keisuke Katori & Shiori Ogawa, *New Legislations Gives Companies Legal Rights to Lunar Resources*, ASAHI SHIMBUN (Sept. 1, 2021) <https://perma.cc/3929-5JJ8>.

⁸³ *Japan: Space Resources Act Enacted*, *supra* note 4.

Article Six of the law requires that, when entities take action under the Act, they must take care to not interfere with Japan's international commitments.⁸⁴ Further, this Article states that nothing in the Act unreasonably harms the interests of other countries in their exercise of their freedom to explore or use space.⁸⁵ The law also requires Japan to work with the international community to establish a consistent system for exploration and development of space resources.⁸⁶

The Act also requires a permit in order to engage in any space activities, which specifically includes space resource mining.⁸⁷ The permit is required by a prior law, the Space Activity Act, but the 2021 law adds to the requirements that the application for the permit must contain.⁸⁸ Under the Space Activity Act, the only people who can apply for a permit to conduct space activities are those who want to launch a spacecraft from Japan's land or those who want to control a spacecraft and have the spacecraft control facility within the boundaries of Japan.⁸⁹ Similar to the U.A.E.'s law, permits cannot be transferred without prior approval from the prime minister.⁹⁰

Finally, the Space Resources Act not only allows for permits for space activities, but also explicitly details property rights that the permit holder will have. Article 5 states that a person who gains possession of space resources through activities conducted pursuant to their permit owns those resources when they "possess the resource with an intention to own it."⁹¹ Japan is explicit in recognizing a private party's ability to own resources extracted from space.

The laws discussed above are summarized in Table 1 below.

⁸⁴ See 宇宙資源の探査及び開発に関する事業活動の促進に関する法律 [Act on Promotion of Business Activities Related to the Exploration and Development of Space Resources (Act No. 83 of 2021)], art. 6 (June 23, 2021), <https://kanpou.npb.go.jp/old/20210623/20210623g00141/20210623g001410004f.html> (last accessed Apr. 28, 2022) [hereinafter The Japanese Law].

⁸⁵ See *id.*

⁸⁶ See The Japanese Law, *supra* note 84, 7(1).

⁸⁷ See *id.* art. 2(2).

⁸⁸ Taijiro Suzuki, *Japan: Legal Issues in Space Business in Japan – Volume 2*, BAKER MCKENZIE (July 9, 2021), <https://perma.cc/FAQ7-XMU9>.

⁸⁹ See The Japanese Law, *supra* note 84.

⁹⁰ See *id.* art. 10.

⁹¹ Suzuki, *supra* note 88.

Table 1: Comparison of States' Domestic Space Resources Laws				
	United States	Luxembourg	United Arab Emirates	Japan
Legality of appropriation	Activities in law are not claims of ownership or sovereignty over the celestial body	Explicitly states that resources can be appropriated	States desire to comply with international law	States desire to comply with international law
International obligations	President must discourage barriers and promote right to exploit	No requirements on national government	Emirates Space Agency must support conclusion of international agreements that help the objectives of their law	Government must facilitate international system that allows development of space resources
Space resources definition	Abiotic resources in or on celestial body	Acknowledges U.S. definition as the common definition	Non-living resources	Water, mineral, and natural resources
Who can have property rights	Citizen, national, or organized in the country	Citizen, national, or organized in the country	Citizen, national, or organized in the country	Launch and control must be within their borders
Licenses	Required through another statute	Required without ability to transfer	Required with ability to transfer with consent	Required with ability to transfer with consent

E. Comparing the Domestic Laws

It is important to notice the differences within the domestic laws to determine what is important to each country, and therefore, what they would fight for in an international treaty. It is also important to note similarities, as such provisions will be easier to work into international law.

One of the main differences is how each country acknowledges the controversy over the interpretation of the appropriation principle in the Outer

Space Treaty. For instance, the Luxembourg law directly states that resources can be appropriated.⁹² This contrasts with the U.S. law, which does not mention “appropriation”⁹³ and only states that Congress believes the activities are not a claim of ownership or sovereignty of the celestial body itself.⁹⁴ The U.A.E. and Japan also do not mention appropriation directly. Instead, they only discuss the desire to be transparent and to be in compliance with international obligations.⁹⁵

The laws refer to future international cooperation in the same vein. The Luxembourg law does not have any requirements for the government to engage with the international community. The other three countries do. In the U.S., the president is required to discourage barriers and promote the right to engage in exploitation free from harmful interference.⁹⁶ The U.A.E. requires the Emirates Space Agency to support the conclusion of international agreements that help achieve the objectives of their law.⁹⁷ Finally, Japan’s law requires the country’s government to engage with the international community to facilitate a consistent system wherein people can develop space resources.⁹⁸

There are also differences in what each law governs. In each one, “space resources” are allowed to be mined, but definitions of this term differ. The U.S. and Luxembourg define space resources as the abiotic resources found in or on a celestial body, including asteroids. By denoting that the resources must be *in* or *on* the body, it implies that the body itself is not a “space resource” and therefore cannot be claimed as a whole. Japan, however, defines space resources as water, mineral, and natural resources. This could be read to include everything in outer space. The U.A.E.’s law is more expansive than those of the U.S. and Luxembourg, but not quite as expansive as Japan’s, as it restricts its definition to non-living resources that are in outer space.

The rules over who can get property rights in each country are similar, with the exception of Japan. Japan requires the launch and control of the activities to be done within its borders. The other three countries require that the person be a citizen or national of their country or that the company is organized under their country’s laws.

The last point of analysis between the laws concerns licenses. Luxembourg, Japan, and the U.A.E. all include the requirement of a license or a permit to retrieve space resources within their statutes. The U.S., in its comparatively short law, does not mention licenses, but this requirement can be found in another

⁹² See The Luxembourg Law, *supra* note 55, art 1.

⁹³ See generally 51 U.S.C. § 51303.

⁹⁴ See Pub. L. No. 114-90, § 403, 129 Stat. 772 (2015).

⁹⁵ See The U.A.E. Law, *supra* note 72, art. 2; The Japanese Law, *supra* note 84, art. 6.

⁹⁶ See 51 U.S.C. § 51302.

⁹⁷ See The U.A.E. Law, *supra* note 72, art. 7.

⁹⁸ See The Japanese Law, *supra* note 84, art. 7(1).

chapter of the U.S. Code.⁹⁹ They all have specific requirements to obtain a license, such as showing the ability to execute their plan. A common restriction on licenses is that they cannot be freely transferred to other parties. Luxembourg outlaws the transfer without exception. The U.A.E. and Japan do allow transfer if the party gets the consent of the government.

IV. A FUTURE INTERNATIONAL AGREEMENT

Overall, the domestic laws are more similar to than different from each other. There are a few differences that could turn out to be important. However, it would likely be beneficial for the countries to get the international community to agree on a new international treaty so that company or the countries themselves can mine in space with confidence in their rights and obligations. If a company does not feel confident in the legality of their actions, those companies may not engage in space ventures, resulting in that country losing out on possible financial benefits. Other countries might also benefit from signing onto an international treaty because they will have their opinions taken into account, shaping the industry in a way that is as beneficial as possible to them.

While the U.S., the U.A.E., Luxembourg, and Japan have all acknowledged to some extent that international law is unclear on whether space mining is allowed under the Outer Space Treaty, each has made their view clear by enacting domestic laws. This could be helpful for them, as putting their own interpretations into domestic laws could likely impact the future development of international law.¹⁰⁰

A future international regime will likely not get the support of these countries if it contains a common heritage principle that requires sharing the resources retrieved with other nations. They have no incentive to sign onto a treaty with this requirement. Instead, the countries might want to explicitly state that while space belongs to everyone generally, the extracted resource belongs to the entity that extracts it. None of the domestic laws mention any indication of a willingness to help other countries along, except for sharing scientific discoveries.

Less economically viable nations and nations without capabilities to go to space are unlikely to agree to only sharing in scientific and technological advancement. Instead, they will likely also want a system in which they receive some of the economic benefits. One route for compromise that the poorer countries may want to argue for is that they get a form of support from either a

⁹⁹ See *Space Licensing in the United States*, AUSTRALIAN NAVIGATIONAL GUIDE EXPLAINING LAWS SPACE (ANGELS), <https://perma.cc/KD7V-YYW6>.

¹⁰⁰ In fact, at a meeting for the U.N., one delegation expressed concern that this focus on interpretations had the “apparent aim of resolving broad legal implication of one of the most dramatic evolutions in modern spacefaring so as to be determined by the subsequent practice of only a handful of States.” COPUOS-LSC, Report of the Legal Subcommittee on its Fifty-seventh Session, A/AC 105/1177, 30 April 2018, ¶ 247.

tax or a fee when companies apply for licenses. The poorer nations would need to argue that the new international treaty would provide enough confidence in property rights to outweigh the costs that would be incurred. This compromise would allow the companies to profit from the venture while also helping the other countries develop technology to eventually engage in space exploration.

Another important interest to the international community will likely be the creation of some sort of licensing system. An international licensing system would provide clarity and certainty over the property rights entities will be allowed to claim under the new treaty.¹⁰¹ The U.S., U.A.E, Luxembourg, and now Japan all have licensing procedures in place, so they may support the idea of international licensing if they are confident that they will not lose too much control or rights under a new system that is controlled by an international body.

Having a licensing system will also require a governing body that oversees and approves the licenses. An international body is necessary because while individual nations may respect property rights, “enforcement is key to the effectiveness of a property rights regime.”¹⁰² This means that an international body is necessary to provide an international enforcement mechanism. While the U.S. does not have criminal penalties in its space law, Luxembourg, the U.A.E., and now Japan do. These criminal penalties would be the necessary enforcement mechanism to the licensing system. Japan adding to the strength of this requirement could make it so that international enforcement is just a requirement for individual countries to have national laws criminalizing space activities without a license through the governing body.

Other countries will also want to make clear what resources are available for exploitation. The U.A.E. and Japan state that space resources are anything in space, while the language in the U.S. law more clearly aligns with the Outer Space Treaty. Japan’s law could potentially move the conversation around the definition of space resources to be more expansive. In a broad interpretation, Japan’s law allows for claims over an entire asteroid, which supports the U.A.E’s definition rather than the U.S.’s and Luxembourg’s more limiting definition, which only allow extraction of resources on or in the celestial body. Without Japan’s new law, the U.A.E.’s difference in definition may have been ignored. However, now that Japan has joined the conversation, a more involved discussion may be needed in order to settle what would be allowed under international law.

Within the space resources definition, there could be a debate concerning biological material. Luxembourg’s and the U.S.’s definitions only include abiotic material, while Japan’s and the U.A.E.’s did not make this distinction. The world

¹⁰¹ See generally Tyler Conte, *Property Rules for Martian Resources: How the Space Act of 2015 Increases the Likelihood of a Single Entity Controlling Access to Mars*, 84 J. AIR L. & COM. 187 (2019) (proposing a licensing regime for resource production on Mars).

¹⁰² Cheney, *supra* note 24, 117–18.

has yet to find this type of material in space, but the possibility of its discovery should not be overlooked by regulation. Countries would likely want it used for scientific purposes, and giving property rights to the company could preclude this option. On the other hand, if the company is itself involved in the science industry and would use the matter in the way wanted by the rest of the world, maybe they should be granted the ability to profit from their expenditure. A possible way to regulate this would be to require handing over the material, but if the company then has a plan to study it, they would be given right of first refusal to execute the plan.

V. CONCLUSION

Evaluating the current state of domestic legislation is an important first step in determining how an international law regulating property rights would develop in the future. After Japan's recent entrance into the discussion, assessing its domestic law is necessary to determine the direction of the debate. The law's similarity to other regimes is important because it helps solidify those provisions as necessary in any future framework. There are ways that the law differs, however, and this highlights important discussion points in determining international treaty language. The definition of "space resources" for Japan, for example, might be broader than what the U.S. or Luxembourg originally intended.

As the potential to mine in space looms on the horizon, the international community will become more and more interested in laying out property rules that parties must follow when they venture into space. As it stands, international laws are not equipped for this future, but by studying these domestic laws, a possible new treaty comes to light.