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FROM THE EDITOR

The cadence of space launches continues to increase. And thank goodness for that as humans continue to dream up innovative new ways to use space to benefit humanity on Earth and harness space resources to propel further discovery. Space is infinite and holds infinite promise and possibility. However, the space closest to us, our orbit and our Moon, is not. Thus, as we continue our exploration and use of the space around us, we have to be mindful of our impact on space – and our impact on each other in space. Over the next few years, we will need to seriously consider, as articulated by the United Nations Committee on the Peaceful Uses of Outer Space, the “ways and means of maintaining outer space for peaceful purposes.” One way is to prevent (as much as possible) the escalation of conflicts. And the means to that end includes developing standards and norms to define and guide responsible behaviors for space actors, whether national or private.

This issue of the *Journal* shares research and analysis touching upon fault-based liability for damages elsewhere than on the surface of the Earth, the making of international law on the Moon as well as a deep-dive on the legal issues surrounding small-scale missions to the Moon and the lunar orbit. We have included an analysis of the United States Artemis Program specifically with respect to its compatibility with the Outer Space Treaty as well as articles assessing the important effect non-binding legal instruments and commercial behaviors will have on space law. The final contribution offers a review of the evolution of European space policy. As always, we distribute this with pride as well as gratitude and deep appreciation for our authors. We know that decisions we make today will indelibly impact humanity’s future and we remain humbled to be a trusted platform in which to inform those choices.

Michelle L.D. Hanlon
Editor-in-Chief
Oxford, Mississippi
September 2022

PROVIDING CLARITY FOR FAULT-BASED LIABILITY IN INTERNATIONAL SPACE LAW: A PRACTICAL APPROACH THROUGH PRINCIPLES OF GENERAL INTERNATIONAL LAW

*Major Tyler J. Sena**

I. INTRODUCTION

The number of satellites in orbit has grown vastly in the last decade, and indications suggest that space use and space traffic will continue to grow. Non-governmental entities, such as SpaceX, are deploying mega-constellations that increase the amount of space objects from private actors in space.¹ SpaceX alone has launched 1,443 satellites for its Starlink constellation, and the constellation could increase to 42,000 spacecraft based on current projections.² More mega-constellations are planned from other non-government entities, which will significantly increase space traffic and congest

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¹ Bill Beyer & Nicholas Nelson, *Viewpoint: Space Congestion Threatens to 'Darken Skies'*, NAT'L DEF. INDUS. ASS'N (Jun. 28, 2018), <https://www.nationaldefensemagazine.org/articles/2018/6/28/viewpoint-space-congestion-threatens-to-darken-skies>.

² Darrell Etherington, *SpaceX launches 60 more Starlink satellites, now at 300 launched in just over one month*, TECHCRUNCH, <https://techcrunch.com/2021/04/07/spacex-launches-60-more-starlink-satellites-now-at-300-launched-in-just-over-one-month/> (last visited Nov. 11, 2021).

sought after orbits.³ Additionally, the availability of smaller satellites and decreasing launch costs is opening further access to space use.

Increasing space traffic and objects naturally increases the risk for collisions. “In September 2019, the European Space Agency (ESA) performed evasive maneuvers with one of its satellites in order to avoid a collision” with a cluster of small satellites operated by SpaceX.⁴ ESA’s satellite was equipped with an anti-collision device, but the device was not activated.⁵ Fortunately, adequate supervision and control allowed ESA to fire the satellite’s thrusters, increase its altitude and avoid a collision.⁶ This instance of successfully performing an emergency maneuver to avoid a collision with active satellites was a first for ESA, but it will not be the last.⁷ ESA noted that the maneuver was a time-consuming operation that will not be possible as additional manmade objects enter space.⁸

The international community has considered responsibility for space activity since nearly the beginning of the space age. In 1963, the United Nations’ Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space included provisions about both State responsibility and liability.⁹ The Declaration noted that a State is internationally responsible for national activities in outer space carried on by the State’s government or non-government entities.¹⁰ Additionally, the Declaration noted that “each State which launches or procures the launching of a [space] object”, or from whose “territory or facility a [space] object

³ See Sorge, Marlon, *Space Traffic Management: The Challenge of Large Constellations, Orbital Debris, and the Rapid Changes in Space Operations 187-200* (Sept. 2020), https://aerospace.org/sites/default/files/2021-05/Aerospace_CompilationBk_20210401_Web.pdf.

⁴ Corinne Baudoin et al., *The Space Legal Issues with Mega-Constellations*, SPACE LEGAL ISSUES (Nov. 3, 2020) <https://www.spacelegalissues.com/mega-constellations-a-gordian-knot/>.

⁵ *Id.*

⁶ *ESA satellite forced into ‘first ever’ emergency maneuver to avoid crash with SpaceX constellation*, RT, Sept. 3, 2019, <https://www.rt.com/news/467848-esa-satellite-collision-spacex-maneuver/>.

⁷ *Id.*

⁸ *Id.*

⁹ Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, UNGA Res. 1962 (XVIII) (Dec. 13, 1963), ¶¶ 5, 8 [hereinafter Declaration].

¹⁰ *Id.* ¶5.

is launched,” would be internationally liable for damage caused by such objects.¹¹ How such liability would be established was left unexplained. The Declaration also identified international responsibilities for States, including authorizing and providing continuing supervision of non-governmental activities in outer space by “the State concerned.”¹² Numerous important words and phrases were left undefined.

In 1967, the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Outer Space Treaty) provided the basis for international space law.¹³ Principles regarding State responsibility, liability and the obligations to authorize and provide continuing supervision from the 1963 Declaration were incorporated into the treaty with only minor changes in wording.¹⁴ Although the Outer Space Treaty expanded on the Declaration, key terms were again left undefined. A standard to assign liability was also not provided.

A *lex specialis* governing liability, the Convention on International Liability for Damage Caused by Space Objects (Liability Convention), came in 1972.¹⁵ The Liability Convention provided a regime of absolute liability for damage caused by space objects on the surface of the Earth and to aircraft in flight.¹⁶ For damage caused by space objects to another State’s space objects, or persons or property on such space objects, the Liability Convention established a fault-based liability regime.¹⁷ However, what exactly constitutes fault was left unclear and questions still loom around this issue today.

As the likelihood of damage from increased space activity rises, States and non-governmental entities alike should have a better understanding of fault-based standards as they relate to

¹¹ *Id.* ¶8.

¹² *Id.* ¶5.

¹³ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty].

¹⁴ Compare *Id.* at art. VI., with Declaration, *supra* note 9, at 5.

¹⁵ Convention on the International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.D.T. 2389, 961 U.N.T.S. 187 [hereinafter Liability Convention].

¹⁶ *Id.* at art. I.

¹⁷ *Id.* at art. III.

liability for space activity. In the *Rainbow Warrior* arbitration, the Tribunal noted a fundamental principle of international law concerning State responsibility, stating “any violation by a State of any obligation, of whatever origin, gives rise to State responsibility and consequently, to the duty of reparation.”¹⁸ This article draws upon fundamental principles of international law to demonstrate how failing to meet international obligations, such as the fundamental duties of authorizing and supervising non-governmental entities’ space activity, when a State knows or should know that the obligation has been triggered, constitutes an internationally wrongful act, and thereby establishes fault of the responsible State.

This article focuses on fault-based liability for damages elsewhere than on the surface of the Earth or to aircraft in flight. The article begins by discussing three avenues of recovery for damage caused by space related activities and highlights relevant considerations for where fault is a factor in determining liability. Section III discusses the international responsibilities that accompany authorizing and providing continuing supervision for non-governmental entities’ space activities and who the “appropriate State” for such responsibilities may be. Next, Section IV discusses artificial intelligence (AI) and autonomous capabilities as these technologies relate to State obligations for authorizing and supervising space activity. Finally, Section V applies principles of international law to demonstrate that failing to authorize or supervise requisite space activities constitutes a wrongful act in breach of an international obligation, and that such conduct renders the responsible State at fault for purposes of establishing fault-based liability for relevant damage.

II. LIABILITY FOR DAMAGE CAUSED BY SPACE OBJECTS: THREE AVENUES FOR RECOVERY

There are at least three theories, excluding a resort to domestic legal systems, under which a State whose natural or juridical persons suffer damage from another State’s space object could obtain compensation. Although this article focuses on fault-based liability, which is only explicitly part of the Liability Convention, each

¹⁸ France v. New Zealand, 82 I.L.R. 500, ¶75 (France-New Zealand Arb. Trib. 1990), http://legal.un.org/riaa/cases/vol_XX/215-284.pdf, [hereinafter, *Rainbow Warrior*].

of the theories for recovery are briefly discussed both for context and because fault-based liability may apply to other avenues for recovery. Notably, while responsibility and liability in international space law overlap, the two are not attributed based on the same criteria.¹⁹ States are responsible for their national activities in outer space, but liability is imposed through Article VII of the Outer Space Treaty and the Liability Convention on launching States.²⁰ Further, the type of damage suffered, what is damaged and where the damage occurs demand different requirements for proof—a wrongful act may be required in some circumstances while in other contexts causing damage alone triggers liability.

A. State Responsibility Theory

A victim State could seek to recover for damages caused by another State's space activities through the concept of State responsibility. Perhaps the least mentioned or contemplated method, as Franz van der Dunk states, is "there is no principled reason why the more general concept of State responsibility could not be used also for obtaining compensation for damage in cases where the liability concept may not offer a particular relief."²¹ Through the State responsibility theory, a harmed State could seek compensation from another State that was responsible for damage by failing to meet responsibilities specified in Article VI of the Outer Space Treaty. The responsible State would not need to meet the technical requirements of Article VII of the Outer Space Treaty or the Liability Convention.²² Such technical requirements include a responsible State not meeting the definition of a launching State, or damage that is beyond the scope of the Liability Convention's definition.²³

In general international law, States are responsible for internationally wrongful acts or omissions attributable to the State.²⁴ An

¹⁹ Frans von der Dunk, *International Space Law*, in HANDBOOK OF SPACE LAW 29, 52 (Frans von der Dunk & Fabio Tronchetti eds., 2015).

²⁰ Outer Space Treaty, *supra* note 13, arts. VI -VII; Liability Convention, *supra* note 15, art. II.

²¹ See Von der Dunk, *supra* note 19, at 51-2.

²² *Id.* at 52.

²³ Liability Convention, *supra* note 15, art. I.

²⁴ Int'l Law Comm'n, Draft Articles on the Responsibility of States for Internationally Wrongful Acts, with commentaries, arts. 1-2 [hereinafter ILC Draft Articles], in Int'l Law Comm'n, Rep. on the Work of Its Fifty-Third Session, U.N. Doc. A/56/10, at 26

internationally wrongful act must constitute breach of the State's international obligation and the act or omission must be attributable to the State.²⁵ "The general rule is that the only conduct attributed to the State at the international level is that of its organs of government, or of others who have acted under the direction, instigation or control of those organs, i.e., as agents of the State."²⁶ An international obligation is breached when an act of the State fails to conform with what is required of the State by the obligation, "regardless of its origin or character."²⁷ Obligations may arise from a treaty, a rule of customary international law "or by a general principle applicable within the international legal order."²⁸

The Outer Space Treaty's Article VI contains two fundamental international obligations. These obligations are for States to authorize and provide "continuing supervision" of the space activities of their non-governmental entities.²⁹ The obligations apply to State parties to the treaty, and the obligations may also apply to States who are not parties as a matter of customary international law.³⁰ Article VI of the Outer Space Treaty reverses the general rule that States usually are not responsible for actions of their private citizens not acting under the direction or control of States. According to Article VI, State parties "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."³¹ What exactly

(2001). The full text and commentaries of the ILC's Draft Articles are also found in JAMES CRAWFORD, *THE INTERNATIONAL LAW COMMISSION'S ARTICLES ON STATE RESPONSIBILITY: INTRODUCTION, TEXT, AND COMMENTARIES* (Cambridge University Press 2002) [hereinafter CRAWFORD, ILC ARTICLES].

²⁵ ILC Draft Articles, *supra* note 24, art. 2.

²⁶ CRAWFORD, ILC ARTICLES, *supra* note 24, at 91. *See also* JAMES CRAWFORD, IX BROWNIE'S PRINCIPLES OF PUBLIC INTERNATIONAL LAW 524-551 (9th ed. 2019) [hereinafter CRAWFORD, BROWNIE'S PRINCIPLES].

²⁷ ILC Draft Articles, *supra* note 24, art. 12.

²⁸ CRAWFORD, ILC ARTICLES, *supra* note 24, at 126. *See also* North Sea Continental Shelf (Den. v. Neth.), Judgment, 1969 I.C.J. 3, 38-39, ¶63 (Feb. 20); Military and Paramilitary Activities in and against Nicaragua (Nicar. v. U.S.), Judgment, 1986 I.C.J. Rep. 14, 94-95, ¶177 (June 27) (noting that identical international treaty laws and customary international laws may exist); International Fisheries Co. (U.S. v. Mexico) (1931), 4 R.I.A.A. 691, 701 ("some principle of international law"); Armstrong Cork Co. Case (U.S. v. Italy) (1953) 14 R.I.A.A. 159, 163 ("any rule whatsoever of international law").

²⁹ Outer Space Treaty, *supra* note 13, art. VI.

³⁰ *See infra* notes 90-91 and accompanying text.

³¹ Outer Space Treaty, *supra* note 13, art. VI.

constitutes “national activities” is unclear—it is an example of an ambiguous term in the Outer Space Treaty.³² However, Article VI of the Outer Space Treaty does make clear that States bear responsibility in outer space for actions of their private actors, thus the space activities of non-governmental entities are attributable to the State.³³ Further, after the English version of the Outer Space Treaty notes *responsibility* for national activities in Article VI, it then specifies in Article VII that a State is *liable* for damage caused by space objects when the State is a launching State of the space object.³⁴

The nuance of this first theory of liability relates to the difference in terms used for accountability—“responsibility” and “liability.”³⁵ Unlike the English version of the Outer Space Treaty, the same generic phrase was used for both terms in the Russian, Spanish and French versions, which are equally authentic.³⁶ In international law, “responsibility” means answerability, “authorship of an act or omission.”³⁷ Liability is a subset of responsibility.³⁸ If a legal rule is breached and the result is damage to another, a legal obligation (legal responsibility) attaches to the breaching party to restore the victim, ordinarily to the extent possible through reparations, to the position the victim would have likely been in if the breach had not occurred.³⁹ The term “liability” is “merely one aspect of responsibility and a consequence of responsibility in case the person responsible breaches an obligation that is incumbent upon it and, in doing so, causes damage to another.”⁴⁰

A mere accident would not likely suffice for liability in the State responsibility theory. Absolute liability is the exception, not the rule, in international law.⁴¹ However, an argument can be made

³² BIN CHENG, STUDIES IN INTERNATIONAL SPACE LAW 487 (1997) [hereinafter CHENG, INTERNATIONAL SPACE LAW]

³³ Outer Space Treaty, *supra* note 13, art. VI.

³⁴ Outer Space Treaty, *supra* note 13, arts. VI, VII.

³⁵ See Von Der Dunk, *supra* note 19, at 50-53, for a discussion of liability and responsibility.

³⁶ *Id.* at 51; Outer Space Treaty, *supra* note 13, art. XVII.

³⁷ CHENG, INTERNATIONAL SPACE LAW, *supra* note 32, at 603.

³⁸ *Id.* at 604.

³⁹ *Id.* at 603 (citing *The Factory at Chorzów* (Ger. v. Pol.), Judgment, 1928 P.C.I.J. (ser. A) No. 17, at ¶268.).

⁴⁰ *Id.* at 604.

⁴¹ Von Der Dunk, *supra* note 19, at 89.

that space activities are ultra-hazardous activities for which absolute liability is appropriate under certain circumstances.⁴² More likely, the standard—absolute liability or some degree of fault—would depend upon where the damage occurred and what was damaged. If the damage occurred on the surface of the Earth or to aircraft in flight, the standard may likely be absolute liability, while damage between space objects or damage occurring in space would probably be fault-based.⁴³ The probable standard for damage on the surface of the Earth and to aircraft in flight reflects the principle that an actor creating circumstances with “the possibility of acute and catastrophic danger is liable without proof of fault to pay compensation if that danger eventuates.”⁴⁴ Similarly, the probable standard requiring some degree of fault, but not absolute liability, for damages occurring among space objects or elsewhere than on the Earth’s surface or to aircraft in flight reflects “sharing these risks among those engaged in space activities.”⁴⁵

A harmed State may attempt to recover through a State responsibility theory because it offers advantages over other theories of liability in certain circumstances. One such advantage includes not having a limited scope of compensable damages.⁴⁶ For example, the harmed State may incur damage “by electronic interference and indirect, consequential and loss-of-revenue types of damage,” that is likely excluded in the Liability Convention.⁴⁷ Another practical reason this theory would be pursued is in the case of a private actor from a non-launching State purchasing or otherwise acquiring a space object, such as a satellite, from a launching State and taking over all operation and control of the satellite. If the satellite subsequently causes damage to the harmed State, the harmed State may wish to pursue a claim against the acquirer’s State, arguing that the acquirer’s State is a responsible State under Article VI of the Outer Space Treaty for its non-governmental entity’s activities in

⁴² *Id.* at 88-89.

⁴³ *Id.* at 87-89; CHENG, INTERNATIONAL SPACE LAW, *supra* note 32, at 291; Liability Convention, *supra* note 15, arts. II-III; FRANCIS LYALL & PAUL B. LARSEN, SPACE LAW: A TREATISE 99-100 (2016).

⁴⁴ LYALL & LARSEN, *supra* note 43, at 99.

⁴⁵ *Id.* at 100.

⁴⁶ Von Der Dunk, *supra* note 19, at 53. See Liability Convention, *supra* note 15, art. I(a).

⁴⁷ Von Der Dunk, *supra* note 19, at 53.

outer space.⁴⁸ Although the launching State remains liable for damage caused by the satellite pursuant to both the Outer Space Treaty and Liability Convention, the harmed State could seek to recover from the responsible State that does not meet the Outer Space Treaty and Liability Convention requirement that a liable party must be a launching State.⁴⁹ The responsible State theory may be a more attractive option if the “responsible State” has deep pockets and the launching State does not.

B. Liability Pursuant to Article VII of the Outer Space Treaty

The second method of recovery comes from the Outer Space Treaty. In 1967, the Outer Space Treaty memorialized the foundation for space related liability in Articles VI and VII. These articles mostly incorporated principles five and eight of the United Nations 1963 Declaration on Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space.⁵⁰ Article VI renders a State responsible for the national activities in outer space, including the Moon and other celestial bodies, of its government entities, non-government entities and international organizations in which the State participates.⁵¹ Article VI also places the responsibility on States to authorize and provide continuing supervision for space activities of their non-government entities.⁵² According to Article VII,

Each State Party to the Treaty that launches or procures the launching of an object into outer space, including the Moon and other celestial bodies, and each State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air space or in outer space, including the Moon and other celestial bodies.⁵³

Neither Article VII nor the rest of the Outer Space Treaty define “damages,” thus the scope of damages that Article VII applies

⁴⁸ Outer Space Treaty, *supra* note 13, art. VI.

⁴⁹ *Id.* at art. VII.

⁵⁰ CHENG, INTERNATIONAL SPACE LAW, *supra* note 32, 289-291.

⁵¹ Outer Space Treaty, *supra* note 13, art VI.

⁵² *Id.*

⁵³ *Id.* at art. VII.

to is broader than damages contemplated in the Liability Convention with its specified definition of damages.⁵⁴

Although the Outer Space Treaty established the general principle that a State is liable for the damage caused by its space objects or the objects' component parts, the Outer Space Treaty left many questions about what the standard for liability is.⁵⁵ Is absolute liability the standard, or is the standard merely some degree of fault? Does the standard differ for damage caused in outer space, in air space, or on the surface of the Earth? It is unclear whether Article VII applies to objects that fail to reach outer space and how liability is to be shared when more than one launching State may be liable for damage caused.⁵⁶

Bin Cheng noted that under the Outer Space Treaty, liability "is sometimes assumed to be absolute and not based on fault," but he points out that "the article itself refrains from saying so."⁵⁷ The assumption of absolute liability is based on customary international law applying absolute liability for "damage caused by space objects to third parties on the surface of the earth and celestial bodies, and to their aircraft in flight."⁵⁸ Additionally, the assumption of absolute liability as it relates to damage on the surface of the Earth aligns with the 1952 Rome Convention on Damage Caused by Foreign Aircraft to Third Parties on the Surface.⁵⁹ However, Cheng notes that it is questionable whether the assumption of absolute liability also applies to collisions between space objects, regardless of where the collision occurs.⁶⁰ Despite the assumptions, doubt remains "whether the article implies fault or no-fault liability."⁶¹ The Liability Convention's distinction between absolute and fault-based liability depending on where damage is caused, and the general international consensus when establishing the related Articles in the

⁵⁴ See *infra* note 65 and accompanying text.

⁵⁵ Outer Space Treaty, *supra* note 13, art. VII.

⁵⁶ See CHENG, INTERNATIONAL SPACE LAW, *supra* note 32, at 291.

⁵⁷ *Id.*

⁵⁸ *Id.*

⁵⁹ Convention on Damage Caused by Foreign Aircraft to Third Parties on the Surface, Oct. 7, 1952, 310 U.N.T.S. 181-182 [hereinafter Rome Convention]. See also LYALL & LARSEN, *supra* note 43, at 99 n.128 (discussing limited areas in international law where absolute liability is applied).

⁶⁰ CHENG, INTERNATIONAL SPACE LAW, *supra* note 32, at 291.

⁶¹ *Id.* at 613.

Liability Convention,⁶² further supports that fault-based liability may be the applicable standard under Article VII for damage not caused on the Earth's surface or to aircraft in flight.

C. The Liability Convention

In 1972, the Liability Convention expanded on foundations for liability existing in international law on the basis of the *Trail Smelter Arbitration* (1938, 1941),⁶³ the *Corfu Channel Case* (1949),⁶⁴ and the Outer Space Treaty. The Liability Convention defined “damage,” and “space object,” and it clarified that a launch includes an attempted launch.⁶⁵ Notably, damages contemplated by the Liability Convention include “loss of life, personal injury or other impairment of health; or loss of or damage to property of States or of persons, natural or juridical, or property of international intergovernmental organizations.”⁶⁶ Similar to the Outer Space Treaty, a space object “includes the component parts of a space object as well as its launch vehicle and parts thereof.”⁶⁷ “Launching State” is defined consistently with the Outer Space Treaty and other space related treaties. States are considered a launching State through one of four ways:

- i) The State that launches the space object, its component parts, its launch vehicle or parts thereof;
- ii) The State that procures the launch of a space object, its component parts, its launch vehicle or parts thereof;
- iii) The State from whose territory a space object, its component parts, its launch vehicle or parts thereof is launched;

⁶² See *infra* notes 72, 82 and accompanying text.

⁶³ *Trail Smelter Arbitration* (U.S. v. Can.), 3 R.I.A.A. 1905, 1963 (Apr. 16, 1938, Mar. 11, 1941) (addressing the obligation to prevent transborder damage by air pollution, the Tribunal stated, “A State owes at all times a duty to protect other States against injurious acts by individuals from within its jurisdiction.”).

⁶⁴ *Corfu Channel Case* (U.K. v. Alb.) 1949 I.C.J. 4 (Apr. 9) (referencing a “State’s obligation not to allow knowingly its territory to be used for acts contrary to the rights of other States”).

⁶⁵ Liability Convention, *supra* note 15, art. I.

⁶⁶ *Id.* at art. I(a).

⁶⁷ *Id.* at art. I(d).

iv) The State from whose facility a space object, its component parts, its launch vehicle or parts thereof is launched.⁶⁸

Since the Liability Convention is more recent in time than the Outer Space Treaty and specific to the issue of liability, it is the applicable treaty to determine liability claims for incidents where a potentially liable State and a State suffering compensable damages are both parties to the Liability Convention.⁶⁹ While the *pacta tertiis* principle prevents a State that is not party to the Liability Convention from invoking the treaty or having the Liability Convention applied to itself, the principles of the Liability Convention may apply if proved to be rules of customary international law.⁷⁰ Despite the Liability Convention providing additional clarity, there are still important, unanswered questions related to liability for space related activities.

1. Damage on the Surface of the Earth or to Aircraft in Flight – Absolute Liability

The Liability Convention imposes absolute liability for damage caused by space objects on the surface of the Earth or to aircraft in flight, providing a clear legal standard not based on fault.⁷¹ The Legal Sub-Committee of the United Nations Committee on the Peaceful Uses of Outer Space (UN COPUOS) did not encounter significant opposition to agreement in principle on Article II of the Liability Convention.⁷² The lack of opposition likely reflects that the standard already had international support, as reflected by the 1952 Rome Convention on Damage Caused by Foreign Aircraft to

⁶⁸ *Id.* at art. I(c).

⁶⁹ Vienna Convention on the Law of Treaties, art. 30, May 23, 1969, 1155 U.N.T.S. 331 [hereinafter Vienna Convention] (stating the general rule that later treaties take precedence except when in conflict with the United Nations Charter. Although the US is not party to the Vienna Convention, the US Dept. of State has stated that the US believes many of the rules as stated in the Vienna Convention reflect customary international law on the law of treaties.

⁷⁰ CHENG, INTERNATIONAL SPACE LAW, *supra* note 32, at 306.

⁷¹ Liability Convention, *supra* note 15, art. II.

⁷² CHENG, INTERNATIONAL SPACE LAW, *supra* note 32, at 326; Comm. On the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. On Its Sixth Session, U.N. Doc. A/AC. 105/37, ¶17 (1967).

Third Parties on the Surface⁷³ and the notion of the “ultrahazardous nature of space activity, as well as the fact that a space object poses nonreciprocal risks to those on the surface of the Earth.”⁷⁴ The Liability Convention provides for a launching State’s “exoneration from absolute liability” to the extent the claimant State suffers damages as a result of its own or its natural or juridical persons’ gross negligence or act or omission done with intent to cause damage.⁷⁵

2. Damage Caused Elsewhere Than on the Earth’s Surface – Fault Based Liability

Article III of the Liability Convention provides a fault-based liability standard for damage caused by a space object to another State’s space object, or to the persons or property on board another launching State’s space object “elsewhere than on the surface of the earth....”⁷⁶ A State will be at fault if damage is “due to its fault or the fault of persons for whom it is responsible.”⁷⁷ Notably, Article III of the Liability Convention applies fault based liability in both airspace and outer space when damage is caused by a launching State’s space object to another launching State’s space object, or to persons or property on board the other State’s space object.⁷⁸ Also recall that, pursuant to Article VI of the Outer Space Treaty, States are responsible for the space activities of not only their government entities, but their non-government entities and international organizations in which they participate.⁷⁹ Additionally, the appropriate State is responsible to authorize and provide continuing supervision for the space activities of non-government entities, although

⁷³ See Rome Convention, *supra* note 59, at 181-182; see also LYALL & LARSEN, *supra* note 43, at 99 n. 128 (discussing limited areas in international law where absolute liability is applied).

⁷⁴ Paul S. Dempsey, *Liability for Damage Caused by Space Objects Under International and National Law*, 8 (2011) (unpublished comment) (on file with McGill University).

⁷⁵ Liability Convention, *supra* note 15, art. VI.

⁷⁶ *Id.* at art. III.

⁷⁷ *Id.*

⁷⁸ *Id.*

⁷⁹ Outer Space Treaty, *supra* note 13, art. VI.

ambiguity exists regarding the term “appropriate State.”⁸⁰ The Liability Convention fails to elaborate further on elements needed to prove liability, especially as to what constitutes fault.⁸¹

Similar to Article II, agreement in principle on Article III in the Liability Convention did not encounter significant difficulty.⁸² The reasoning for the lack of opposition, and more broadly for fault-based liability when damage by space objects is caused elsewhere than on the surface of the Earth, is represented by rationale from Judge Manfred Lachs. Judge Lachs reasoned that the underlying premise for fault-based liability “is obviously that once space objects (including any that may suffer damage) have left the ground all launching States may be presumed to have taken similar risks. Thus none is favoured by the law.”⁸³ The rationale that States engaging in space activity should be liable for damages to each other in a fault-based regime, and absolutely liable to States not engaged in space activities and suffering damage on the Earth’s surface or to their aircraft in flight, is also informative and reasonable for liability considerations under a State responsibility theory or Article VII Outer Space Treaty theory.

Finally, Article III of the Liability Convention has two potential meanings.⁸⁴ First, it may mean that “a launching State is liable only to the extent of its fault.”⁸⁵ Alternatively, it could mean “a State becomes liable for the totality of the damage as soon as it has been established that there is fault on its part, and there is a causal connection between this fault and the damage.”⁸⁶ In either case, some degree of fault must be proven, but what could constitute such fault is unclear. Regardless of which meaning is correct, fault must

⁸⁰ *Id.*; CHENG, INTERNATIONAL SPACE LAW, *supra* note 32, at 659 (stating clarity is needed to determine who is the appropriate state to authorize and provide continuing supervision).

⁸¹ Dempsey, *supra* note 74, at 8.

⁸² CHENG, INTERNATIONAL SPACE LAW, *supra* note 32, at 326. *See* Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Seventh Session, U.N. Doc. A/AC.105/45 ¶10 (1968); Comm. on the Peaceful Uses of Outer Space, Summary Record of the Ninetieth to the Hundred and First Meetings, U.N. Docs. A/AC.105/C.2/SR.91, 92 and 94 (1968).

⁸³ MANFRED LACHS, THE LAW OF OUTERSPACE: AN EXPERIENCE IN CONTEMPORARY LAW-MAKING, 117 (1972).

⁸⁴ CHENG, INTERNATIONAL SPACE LAW, *supra* note 32, at 328.

⁸⁵ *Id.*

⁸⁶ *Id.*

be proven. Unfortunately, “[f]ault’ as such, however, has not been defined” or what could constitute fault for purposes of establishing liability.⁸⁷

3. Joint and Several Liability and Apportionment

The Liability Convention contemplates more than one State being liable for damages caused by space activities. Article IV of the Liability Convention allows a claimant State to hold a launching State or States jointly or severally liable for damages.⁸⁸ Such liability remains absolute for damage caused on the surface of the Earth or to aircraft in flight.⁸⁹ For damage caused not on the Earth’s surface to a space object of the claimant State or to persons or property on board that space object, liability is based on the fault of either the launching States or the fault of the persons for whom a launching State is responsible.⁹⁰ The burden of compensation for damage is apportioned between launching States “in accordance with the extent to which they were at fault,”⁹¹ but if that extent cannot be ascertained, “the burden of compensation shall be apportioned equally between them.”⁹² Again, “fault,” or what constitutes it, is not defined.

Regardless of the avenue that a harmed State pursues to recover for damage suffered by it or its natural or juridical persons, if the damage occurs elsewhere than the surface of the Earth or to aircraft in flight, fault-based liability will likely be applied, and a wrongful act will need to be proven for liability to attach to the responsible State or States.

III. RESPONSIBILITIES FOR SPACE RELATED ACTIVITIES

A general principle of international law is that breach of an international obligation entails the responsibility of the State in breach.⁹³ Such responsibility often concerns reparations for damages caused by the unlawful act or omission in breach of an

⁸⁷ Von Der Dunk, *supra* note 19, at 88.

⁸⁸ Liability Convention, *supra* note 15, art. IV.

⁸⁹ *Id.* at art. IV 1(a).

⁹⁰ *Id.* at art. IV 1(b).

⁹¹ *Id.* at art. IV 2.

⁹² *Id.* at art. IV 2.

⁹³ CRAWFORD, BROWNIE’S PRINCIPLES, *supra* note 26, at 524.

obligation.⁹⁴ While entirely lawful acts related to space activities can still be the basis for liability,⁹⁵ as is the case with absolute liability for damage caused by a space object on the surface of the Earth or to aircraft in flight, damage caused elsewhere by space objects entails fault-based liability.⁹⁶ Even where an activity is lawful and fault-based liability is applicable, States may incur responsibility for “damage caused by poor judgment or poor management in carrying out the [lawful] activity,” let alone a State’s responsibilities.⁹⁷ For example, a lack of due diligence regarding a State’s lawful space activities, or fulfilling its responsibilities, could result in liability.⁹⁸

This section will focus on State obligations for space activities as specified in Article VI of the Outer Space Treaty. The Outer Space Treaty lacks clarity related to the scope and requirements for authorization and continuing supervision. Additionally, it is unclear within the Outer Space Treaty who the appropriate State responsible for authorizing and supervising required space activities is, or whether there can be more than one appropriate State. Clarity is not provided in the current space treaties.

A. Responsibilities

Article VI of the Outer Space Treaty not only “removes all doubts concerning imputability” for activities carried out in outer space by non-governmental entities,⁹⁹ and it obligates States to ensure space activities of their non-governmental entities are authorized and supervised.¹⁰⁰ Specifically, “the appropriate State” is required to authorize and provide continuing supervision of all activities of non-governmental entities in outer space.¹⁰¹

⁹⁴ *Id.*

⁹⁵ *Id.*

⁹⁶ Liability Convention, *supra* note 15, arts. II-III. See discussion *supra* Section II.C.2.

⁹⁷ CRAWFORD, BROWNLIE’S PRINCIPLES, *supra* note 26, at 544.

⁹⁸ *Id.*

⁹⁹ LACHS, *supra* note 83, at 114.

¹⁰⁰ *Id.*

¹⁰¹ Outer Space Treaty, *supra* note 13, art. VI.

B. Authorization

Article VI of the Outer Space Treaty obligates States to authorize non-governmental entities' space activities, but the depth of the obligation and how it should be conducted was not specified.¹⁰² Though the Outer Space Treaty applies only to its numerous State parties, several of its obligations may apply to all States because the obligations have crystallized into rules of customary international law.¹⁰³ According to some scholars, State responsibility for national activities and the activities of its nationals in outer space, along with the accompanying obligation to authorize such activities of its nationals in outer space as reflected in Article VI of the Outer Space Treaty, are customary international law.¹⁰⁴ Thus, regardless of whether a State is a party to the Outer Space Treaty, it likely has an international obligation to authorize the space activities of its nationals.

The responsibility of States for the activities of its non-governmental entities reflects a compromise between the Soviet Union and the United States. The Soviet Union wanted to forbid private activities in outer space, while the United States wanted to allow for such possibilities.¹⁰⁵ The two States agreed to allow private activities in outer space but place ultimate responsibility for the private space activities on the States.¹⁰⁶ Notably, State responsibility in this context differs from its meaning in general international law where it refers to attribution.¹⁰⁷ State responsibility for non-government entities in the context of Outer Space Treaty Article VI duties

¹⁰² *Id.*

¹⁰³ ROUTLEDGE HANDBOOK OF SPACE LAW, 8 (Ram S. Jakhu & Paul Stephen Dempsey eds., 2017) ("There is general agreement that many of these principles contained in the Outer Space Treaty are also customary in nature, since they hail from the 1963 U.N. Declaration of Legal Principles Governing Activities of States in the Exploration and Use of Outer Space.").

¹⁰⁴ LYALL & LARSEN, *supra* note 43, at 64; Ram S. Jakhu & Steven Freeland, *The Relationship Between the Outer Space Treaty and Customary International Law*, 59th I.I.S.L. Colloquium on the Law of Outer Space (2016) (stating "it appears that the prerequisite tests of consistent state practice and *opinio juris* have been met, and the terms of article VI have become a part of customary international space law applicable to all states.").

¹⁰⁵ Irmgard Marboe, *National Space Law*, in HANDBOOK OF SPACE LAW 127, *supra* note 19, at 131.

¹⁰⁶ *Id.*

¹⁰⁷ *Id.*

refers to a State's international obligations—duties to ensure space activities by non-government entities comply with Outer Space Treaty obligations.¹⁰⁸ Although it does not mandate States to ensure compliance through enacting national legislation, “Article VI of the Outer Space Treaty represents the most important legal basis for national space legislation.”¹⁰⁹

A State's obligation to authorize or refuse to authorize space activities affords the State an opportunity to ensure specific conditions are met and evaluate risk.¹¹⁰ The authorization process also provides an opportunity to minimize the risk for damage¹¹¹ and for adequate consideration of relevant factors for new and emerging technology prior to engaging in space activities. Relevant considerations should include “safety, public order, protection of the environment, international obligations and policy interests of the respective states,”¹¹² as well as adequate insurance.¹¹³

The Legal Sub-Committee of the United Nations Committee on the Peaceful Uses of Outer Space (UN COPUOS) established a working group on the topic of national legislation relevant for the peaceful exploration and use of outer space.¹¹⁴ This group determined that its final report should provide a basis for recommendations on national space legislation.¹¹⁵ Consensus on the recommendations was reached, and the recommendations included eight elements for States to consider when enacting national space legislation.¹¹⁶ Included in the elements is “the authorities and procedures”

¹⁰⁸ *Id.* at 132.

¹⁰⁹ *Id.*

¹¹⁰ *Id.* at 185.

¹¹¹ *Id.* at 138.

¹¹² *Id.* at 185.

¹¹³ *Id.*

¹¹⁴ Comm. On the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Forty-Sixth Session, U.N. Doc. A/AC.105/891, ¶136 (2007), https://www.unoosa.org/pdf/reports/ac105/AC105_891E.pdf.

¹¹⁵ Comm. On the Peaceful Uses of Outer Space, Rep. of the Working Group on National Legislation Relevant to the Peaceful Exploration and Use of Outer Space on the Work Conducted Under Its Multi-year Workplan, UN Doc. A/AC.105/C.2/101, ¶6 (2012), https://www.unoosa.org/pdf/reports/ac105/C2/AC105_C2_101E.pdf [hereinafter Workplan].

¹¹⁶ Comm. On the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Fifty-First Session, UN Doc. A/AC.105/1003, Annex III (2012), https://www.unoosa.org/pdf/reports/ac105/AC105_1003E.pdf.

and “conditions for authorization.”¹¹⁷ The national legislation of numerous States, including major spacefaring States like the United States, Russia and China, contain conditions for authorization of space activities.¹¹⁸

Similarly, the International Law Association’s (ILA) Committee on Space Law began work on a model law in 2008 related to commercialization of outer space.¹¹⁹ The committee used its “building blocks” from its 2004 work that considered the building blocks to be “essential cornerstones of future space legislation in view of the international law obligations of States stemming from the Outer Space Treaty and the Liability Convention.”¹²⁰ The building blocks included “authorization of space activities” among four other key components.¹²¹ Based on the building blocks, a model law was completed with 14 articles, including articles on authorization and conditions for authorization.¹²² Notably, definitions for key terms were included. These terms include authorization, supervision and space activity.¹²³ The committee also provided comments indicating what responsible authorization entails. Prior to authorization, an applicant should establish a secure financial position.¹²⁴ Additionally, “requirements of foreign policy, national security, public safety, international telecommunication regulations and insurance should be fulfilled.”¹²⁵ The committee’s work is now known as the Sofia Guidelines for a Model Law on National Space Legislation.¹²⁶

Although there is no international obligation requiring States to have national space legislation, consideration of international requirements and State practice demonstrates the need for such

¹¹⁷ *Id.* at Appendix.

¹¹⁸ Marboe, *supra* note 105, at 180, 183; See also Comm. On the Peaceful Uses of Outer Space, Schematic Overview of National Regulatory Frameworks for Space Activities, U.N. Doc. A/AC.105/C.2/2012/CRP.8 (2012), https://www.unoosa.org/pdf/limited/c2/AC105_C2_2012_CRP08E.pdf [hereinafter Schematic].

¹¹⁹ Marboe, *supra* note 105, at 181.

¹²⁰ *Id.*

¹²¹ *Id.*

¹²² Comm. On the Peaceful Uses of Outer Space, Information on the Activities of International Intergovernmental and Non-governmental Orgs. Relating to Space Law, U.N. Doc. A/AC.105/C.2/2013/CRP.6, at 1 (2013), https://www.unoosa.org/pdf/limited/c2/AC105_C2_2013_CRP06E.pdf [hereinafter Information].

¹²³ *Id.* at art. 2.

¹²⁴ *Id.* at art. 4.

¹²⁵ *Id.*

¹²⁶ Marboe, *supra* note 105, at 184.

legislation. For States with non-government entities engaging in space activities, the requirements to authorize and continuously supervise space activities makes national space legislation addressing these requirements “necessary and at least advisable.”¹²⁷ Additionally, the growing number of States with national space legislation and the resources available, including the Sofia Guidelines for a Model Law on National Space Legislation, the building blocks that the model law was based off of, and the elements for consideration proposed by the UNGA resolution on national space legislation further support the necessity of national space legislation that at least addresses international obligations related to space activities of non-governmental entities. The lack of legislation to ensure responsible authorization is not a violation of the State’s authorization obligation, but it certainly casts doubt on whether the State is exercising due diligence in authorizing space activities of non-government entities in the absence of established legislation or at least similar administrative regulations.

C. Continuing Supervision

Article VI of the Outer Space Treaty also obligates States to provide continuing supervision of non-governmental entities’ space activities.¹²⁸ Similar to authorization, no further detail is given regarding continuing supervision or how the duty is to be executed. Scholars argue that the obligation has crystallized into a rule of customary international law, as did its companion obligation to provide authorization.¹²⁹ If true, whether or not States are party to the Outer Space Treaty, they are responsible for the actions of their nationals in outer space and obliged to authorize and provide continuing supervision for such activities.¹³⁰

¹²⁷ *Id.* at 138.

¹²⁸ Outer Space Treaty, *supra* note 13, art. VI.

¹²⁹ LYALL & LARSEN, *supra* note 43, at 64; ROUTLEDGE, *supra* note 103, at 9 (“teachings of the most highly qualified publicists” as a subsidiary source of international law when primary sources are insufficient. Statute of the International Court of Justice art. 38(1)(d), Jun. 26, 1945, 33 U.N.T.S. 993. The teachings of highly qualified publicists, amongst other resources, may be instrumental in identifying when a rule of customary international law has crystalized, such as the obligations in Article VI of the Outer Space Treaty.”).

¹³⁰ Vienna Convention, *supra* note 69, art. 38.

Similar to authorization, there is no requirement for national legislation to ensure the continuing supervision duty is met. However, the UNGA has encouraged States conducting space activities to enact and implement “national laws authorizing and providing for continuing supervision of the activities in outer space of non-governmental entities under their jurisdiction.”¹³¹ State practice and prudence also suggest the necessity for national legislation related to continuing supervision is no less important than for ensuring responsible authorization.¹³² The UN COPUOS Legal Sub-Committee’s recommendations for national space legislation included ways and means of supervision of space activities as an element.¹³³ Additionally, supervision of space activities is part of the building blocks and the ILA Committee on Space Law’s Sofia Guidelines for a Model Law on National Space Legislation.¹³⁴ The model law notes that continuing supervision shall be conducted according to “an implementing decree or regulation.”¹³⁵ Supervision is part of numerous States’ national space legislation, including major space faring States like the United States, Russia and China.¹³⁶

Responsible continuing supervision should ensure the underlying conditions for authorization continue to be met during and after space activities are conducted. Continuing supervision provides States with an opportunity to minimize risk for damage, ensure compliance with international obligations, and make sure appropriate conditions are met for space activities.¹³⁷ Indeed, the initial authorization goes together with continuing supervision. Relevant national legislation and regulations help ensure compliance with international obligations, responsible use of outer space, and that those involved in space activities are “technically, financially and operationally fit, and [have] proper compliance disposition with relevant law, including environmental and safety regulation.”¹³⁸

¹³¹ G.A. Res. 59/115, Application of the Concept of the Launching State (Jan. 25, 2005).

¹³² See discussion *supra* Section III.B.

¹³³ Workplan, *supra* note 115, at 10.

¹³⁴ Information, *supra* note 122, at 1, art. 5.

¹³⁵ *Id.* at art. 5.

¹³⁶ Marboe, *supra* note 105, at 183; See Schematic, *supra* note 104, at 4,8.

¹³⁷ Marboe, *supra* note 105, at 138, 185.

¹³⁸ Dempsey, *supra* note 74, at 3 n.8.

D. The Appropriate State(s)

Article VI of the Outer Space Treaty places responsibility for authorization and continuing supervision of non-governmental activities in outer space squarely on “the appropriate State Party to the Treaty.”¹³⁹ If Article VI of the Outer Space Treaty has crystallized into a rule of customary international law, then the same responsibilities exist for non-State parties to the Outer Space Treaty too.¹⁴⁰ The Article VI obligations, combined with related Articles VII and VIII in the Outer Space Treaty, make transfers of space objects with private parties challenging.¹⁴¹ Additionally, Articles VII and VIII lead scholars in different directions as to what State, or States, should be the appropriate State for Article VI obligations.

Article VII of the Outer Space Treaty, consistent with other major space treaties, including Article I(c) of the Liability Convention, contemplates the possibility of multiple States being defined as launching States and thereby being subject to liability for damages caused by their space objects.¹⁴² Some scholars argue that the appropriate State should be a launching State because Article VII places liability on launching States.¹⁴³ However, defining the appropriate State as a launching State raises the problem of what to do when there are multiple launching States, despite the singular use of “State” in Article VI.

Article VIII of the Outer Space Treaty ensures jurisdiction and control over a space object and its personnel, if any, is retained by the State of registry. Notably, there can only be a single State of registry, which must also be a launching State.¹⁴⁴ Some scholars argue that the State of registry is the appropriate State in Article VI because the State of registry retains jurisdiction and control of the space object and its personnel.¹⁴⁵ However, Bin Cheng pointed

¹³⁹ Outer Space Treaty, *supra* note 13, art. VI.

¹⁴⁰ LYALL & LARSEN, *supra* note 43, at 64; ROUTLEDGE, *supra* note 103, at 8.

¹⁴¹ LYALL & LARSEN, *supra* note 43, at 415.

¹⁴² Outer Space Treaty, *supra* note 13, art. VII; Liability Convention, *supra* note 15, art. I(c); Convention on Registration of Objects Launched into Outer Space art. I, Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15 [hereinafter Registration Convention].

¹⁴³ H.L. Van Traa-Engelman, *Commercial Utilization of Outer Space* 62-63 (1993).

¹⁴⁴ See Outer Space Treaty, *supra* note 13, art. VIII; Registration Convention, *supra* note 142, art. I(c).

¹⁴⁵ Gijsbertha Cornelia Maria Reijnen, *The United Nations Space Treaties Analysed* 114 (1992).

out major flaws with the State of registry approach to defining the appropriate State.¹⁴⁶ First, if responsibility for Article VI obligations rests solely on the State of registration when other launching States exist for a space object, the other launching States would not have international responsibility for the space activities of their non-governmental entities.¹⁴⁷ As Cheng notes, the result “would obviously not be what Article VI has in mind.”¹⁴⁸ The second major issue is that States may choose a poorer State for registration to mitigate their own financial liability.¹⁴⁹ Thus, using a State of registry to determine the “launching State” for Article VI obligations could incentivize a “registry of convenience.”¹⁵⁰

Both the launching State and State of registry concepts share a major disadvantage—the launching State designation cannot be shed at a later time.¹⁵¹ In modern times, space objects are “bought and sold in orbit on a regular basis,” which was not envisioned by the drafters of the Outer Space Treaty.¹⁵² If a transfer of a space object divests an original launching State from any practical interest in a space object, it is illogical that the original launching State should maintain the obligations of authorization and continuing supervision—such obligations should belong to a State to whose non-governmental entity the space object was transferred to and is controlling the space object. The rigidity of the launching State concept has led some scholars to argue it “should not be used to interpret the much more flexible concept of the ‘appropriate State.’”¹⁵³

Unlike the definition of launching State or State of registry, the Outer Space Treaty or subsequent space treaties do not expand on who the appropriate State is or whether there can be more than

¹⁴⁶ Bin Cheng, *Article VI of the 1967 Space Treaty Revisited – “International Responsibility”, “National Activities”, and “The Appropriate State,”* 26 J. SPACE L. 7, 21-22 (1998) (Cheng’s concerns were raised in the context of defining “national activities” under Article VI of the Outer Space Treaty, but his concerns equally apply to defining the appropriate state for Article VI obligations since a failure to meet such obligations would likely incur responsibility and, where damage occurs because of the breach of the international obligation, liability.) [hereinafter Cheng, *Space Treaty Revisited*].

¹⁴⁷ *Id.* at 21.

¹⁴⁸ *Id.*

¹⁴⁹ *Id.* at 22.

¹⁵⁰ *Id.*

¹⁵¹ Marboe, *supra* note 105, 133.

¹⁵² *Id.* at 134.

¹⁵³ *Id.*

one appropriate State. Paragraph 5 of the 1963 UN Declaration of Legal Principles Concerning the Activities of States in the Exploration and Use of Outer Space is substantially similar to Article VI of the Outer Space Treaty.¹⁵⁴ However, the term “State concerned” from the 1963 UN Declaration became “the appropriate State Party to the Treaty” in Article VI of the Outer Space Treaty.¹⁵⁵ Noting the singular form used in both the 1963 UN Declaration and the Outer Space Treaty, Lyall and Larsen argue that regardless of “how one may interpret ‘concerned’ or ‘appropriate’ it is clear that the concept is in the singular and that the drafters intended only one state to authorise and supervise, and therefore be responsible for a particular private space activity.”¹⁵⁶

Despite the singular term in the 1963 UN Declaration and the 1967 Outer Space Treaty, Bin Cheng made a practical argument that the singular terms do not preclude a plurality of appropriate States.¹⁵⁷ Cheng argues that every State that may be held responsible under Articles VI or VII of the Outer Space Treaty “should not be entitled, or even under a duty, to subject its national activities in space to its authorization and continuing supervision,” thereby making each State an “appropriate State.”¹⁵⁸ In one scenario, State A’s nationals could procure the launching of a space object in State B, unbeknownst to State A if State B is not a mature or responsible State.¹⁵⁹ Such actions could still place responsibility for Article VI Outer Space Treaty obligations on State A, even though State A was wholly unaware of the actions based on no fault of State A. Placing responsibility on State A, even though it technically is responsible for Article VI Outer Space Treaty obligations related to its national’s space activities, makes little sense when State B could be a second appropriate State and thereby the State that should be held international responsible for failing to meet international obligations related to the space activity that State A’s national procured in State B.

¹⁵⁴ Compare Declaration, *supra* note 9, at ¶5, with Outer Space Treaty, *supra* note 13, art. VI.

¹⁵⁵ *Id.*

¹⁵⁶ LYALL & LARSEN, *supra* note 43, at 415.

¹⁵⁷ Cheng, *Space Treaty Revisited*, *supra* note 146, at 28.

¹⁵⁸ *Id.*

¹⁵⁹ *Id.*

Nothing prohibits relevant States from agreeing to which State or States will authorize and provide continuing supervision for a certain space activity. However, any State concluding such an agreement should remember that, regardless of the agreement and its provisions related to which State or States will authorize and supervise a space activity, States cannot delegate their responsibility and liability from the Outer Space Treaty or Liability Convention.¹⁶⁰ “Once a launching state, always a liable one.”¹⁶¹

IV. THE IMPACT OF AUTONOMOUS SYSTEMS AND ARTIFICIAL INTELLIGENCE ON STATE RESPONSIBILITY AND LIABILITY

The role of computer technology and software cannot be understated in its importance to space use and exploration. Such technology has supported human spaceflight, humans landing on the Moon and exploration of the Solar System. Additionally, advancements in multiple areas, including computer technology and software, has led to a massive global space economy. In 2018, the global space economy was valued at approximately \$350 billion.¹⁶² That value is projected to increase to as much as \$1 trillion in the 2040s.¹⁶³ With the significant economic impact and projected growth of the global space economy, it is reasonable to expect increased space traffic and utilization.

Space objects are likely to include more autonomous operating systems and AI as these technologies offer increased capabilities and safety mechanisms. The technical complexity of systems grows in tandem with the systems’ autonomy, shifting more decisions and actions from human operations to the systems.¹⁶⁴ As such, States (at least the “appropriate State” for each space object) will be internationally responsible to ensure authorization and continuing

¹⁶⁰ *Id.*; Liability Convention, *supra* note 15, art. V.

¹⁶¹ Von Der Dunk, *supra* note 19, at 52.

¹⁶² Jeff Foust, *A Trillion-Dollar Space Industry Will Require New Markets*, SPACENEWS, July 5, 2018, <https://spacenews.com/a-trillion-dollar-space-industry-will-require-new-markets/>; Michael Sheets, *The Space Industry Will Be Worth Nearly \$3 Trillion In 30 Years, Bank Of America Predicts*, CNBC, Oct. 31, 2017, <https://www.cnbc.com/2017/10/31/the-space-industry-will-be-worth-nearly-3-trillion-in-30-years-bank-of-america-predicts.html>.

¹⁶³ Foust, *supra* note 162.

¹⁶⁴ Leslie Jane Smith, *Legal Aspects of Satellite Navigation*, in HANDBOOK OF SPACE LAW 554, *supra* note 19, at 610.

supervision of more non-governmental space activities with autonomous systems and AI in the space objects.

Both the Outer Space Treaty and the Liability Convention provide that States are liable for damages caused by their space objects or the component parts of such objects.¹⁶⁵ “Component parts” is an ambiguous term in the context of the Outer Space Treaty and Liability Convention.¹⁶⁶ One meaning is that the term in its context is meant to just cover physical damage from a component part colliding with another space object or persons or property on such space object. Alternatively, the term may include damage caused when a component part malfunctions, thereby resulting in damage. One example of the latter is the case of a space object’s autonomous system or other part using AI, such as a collision avoidance system, causing the space object to collide with another State’s space object on orbit. This section will explore the impacts of autonomous systems and AI on States’ authorization and supervision responsibilities and relevant liability concerns.

A. Automation, Autonomous Systems and Artificial Intelligence

A detailed history of automation, autonomous systems and AI is beyond the scope of this article, but understanding basic concepts about them is necessary to understand their impacts on responsibilities and liability. While conventional automatic systems generally perform one repetitive task, autonomous systems can react to external stimuli and decide how best to react.¹⁶⁷ There is no universally accepted definition of AI, although several proffered definitions exist.¹⁶⁸ A helpful definition from Nils Nilsson, is that “artificial intelligence is that activity devoted to making machines intelligent, and intelligence is that quality that enables an entity to function appropriately and with foresight in its environment.”¹⁶⁹ AI

¹⁶⁵ Outer Space Treaty, *supra* note 13, art. VII; Liability Convention, *supra* note 15, art. I(d).

¹⁶⁶ See Vienna Convention, *supra* note 69, art. 31.1-31.4.

¹⁶⁷ Smith, *supra* note 164, at 610.

¹⁶⁸ STUART RUSSELL & PETER NORVIG, ARTIFICIAL INTELLIGENCE, A MODERN APPROACH 5 (1995), (stating eight definitions from different textbooks representing differing historical approaches to defining the concept).

¹⁶⁹ NILS J. NILSSON, *THE QUEST FOR ARTIFICIAL INTELLIGENCE: A HISTORY OF IDEAS AND ACHIEVEMENTS* 13 (Cambridge, UK: Cambridge University Press, 2010), <https://ai.stanford.edu/~nilsson/QAI/qai.pdf>.

also includes multiple subfields, such as machine learning, that increase the capacity for machines to exhibit intelligent behavior. Machine learning “includes abstruse statistical techniques that enable machines to improve at tasks with experience.”¹⁷⁰

Another way to think of AI is to consider algorithms as part of the evaluation process within a system that helps the system process stimuli (including learning from experience) and output a decision or reaction.¹⁷¹ Algorithms are essentially step-by-step instructions for a computer to follow.¹⁷² When algorithms are chained together, the product is AI—“a domain-specific illusion of intelligent behavior.”¹⁷³ There are two important considerations for AI algorithms. First, AI “algorithms typically deal with probabilities rather than certainties.”¹⁷⁴ The second consideration is the role of the programmer related to the algorithms.¹⁷⁵ For traditional algorithms, a programmer tells the algorithm what instructions to follow.¹⁷⁶ In AI, the programmer does not tell the algorithm what to do through preprogrammed instructions, but how to train itself what to do.¹⁷⁷ To make such a determination, the AI algorithm will rely on data and the rules of probability.¹⁷⁸

Another important consideration for autonomous systems is rationality. A system (or other actor) is rational if it does the “right thing.”¹⁷⁹ To do the right thing, the system needs to be programmed to know what the right thing to do is or how to make such an assessment. Additionally, to act rationally a system needs parameters and criteria to assess expected outcomes for potential actions. Such criteria are called performance measures.¹⁸⁰ Thus, a rational system will use its built-in knowledge and experience it has gathered

¹⁷⁰ *What You Need to Know About Artificial Intelligence*, CALIPSA (Oct. 22, 2019), <https://www.calipsa.io/blog/what-you-need-to-know-about-artificial-intelligence>.

¹⁷¹ NICK POLSON & JAMES SCOTT, *AIQ: HOW ARTIFICIAL INTELLIGENCE WORKS AND HOW WE CAN HARNESS ITS POWER FOR A BETTER WORLD* 3 (2018).

¹⁷² *Id.*

¹⁷³ *Id.*

¹⁷⁴ *Id.* at 4.

¹⁷⁵ *Id.*

¹⁷⁶ *Id.*

¹⁷⁷ *Id.*

¹⁷⁸ *Id.*

¹⁷⁹ RUSSELL & NORVIG, *supra* note 168, at 4.

¹⁸⁰ *Id.* at 32.

to select an action that allows it to be most successful in light of its performance measure(s).¹⁸¹

B. Considerations for Authorization and Continuing Supervision for Space Activities Including Autonomous Systems and AI

Keen insights for ensuring responsible authorization and continuing supervision of space objects with autonomous systems and AI can be drawn from numerous sources. Some scholars have noted the importance of real-time monitoring for anomaly detection.¹⁸² For “AI, this means scanning a stream of data points and identifying ones that don’t match the typical pattern.”¹⁸³ To adequately do this, one must understand what is expected on average and normal variability around the average.¹⁸⁴ The concept is not hard, sports teams, race car teams, banks and governments, amongst many others, do this on a daily basis.¹⁸⁵ The key is that there is a reliable understanding of what the expected average is and an understanding of variability around the average. Similar considerations apply to monitoring autonomous systems.

Max Tegmark notes lessons learned from various sectors, four of which are pertinent to this discussion. First, verification that the system is built right is critical.¹⁸⁶ Verification is the process of “ensuring software completely satisfies all the expected requirements,” and verification should be thoroughly completed.¹⁸⁷ Verification should catch “bugs” in software, thereby avoiding preventable mishaps. Even simple software glitches for space activities can have catastrophic results. The European Space Agency’s Ariana 5 rocket in 1996, and NASA’s Mariner 1 mission to Venus exploded shortly after launch because of faulty software (for the Mariner 1, the problem was as simple as an incorrect punctuation mark).¹⁸⁸ NASA’s

¹⁸¹ *Id.*

¹⁸² POLSON & SCOTT, *supra* note 171, at 148.

¹⁸³ *Id.*

¹⁸⁴ *Id.* at 148, 164.

¹⁸⁵ *Id.*

¹⁸⁶ MAX TEGMARK, *LIFE 3.0: BEING HUMAN IN THE AGE OF ARTIFICIAL INTELLIGENCE*, 95-97 (2018).

¹⁸⁷ *Id.*

¹⁸⁸ *Id.*; Jaques-Louis Lions et al., Ariane 501 Inquiry Board, Ariane 5: Flight 501 Failure 12, Jul. 19, 1996, <http://esamultimedia.esa.int/docs/esa-x-1819eng.pdf>; Arthur G.

Mars Climate Orbiter accidentally veered into Mars' atmosphere and burned up due to a software error affecting its "rocket-engine thrust control."¹⁸⁹ For verification, software is both the issue and the solution since advancements and improvements in AI can "improve the verification process."¹⁹⁰ Demonstration of verification is imperative for responsible authorization of space activities including the use of autonomous systems and AI because verification provides an opportunity to avoid significant and preventable harm.

Second, validation ensures the right system is built for the intended purpose.¹⁹¹ "[A]utomatic trading programs from many companies found themselves operating in an unexpected situation" on May 6, 2010.¹⁹² The systems' "assumptions were not valid," leading to the so-called trillion dollar "Flash Crash."¹⁹³ The cause of the Flash Crash teaches that there must be assurance that systems will not rely on "assumptions that may not always be valid."¹⁹⁴ Validation seeks to ensure the right system for the expected activities is built, and to properly handle situations where the system will encounter uncertainty.¹⁹⁵ Reasonable assurance that space activities including systems with automation and AI have been validated to ensure systems will not rely on faulty assumptions and can properly handle uncertainty should be a factor for responsible authorization. Responsible continuing supervision may also entail assurance that assumptions remain valid, especially when new or significant information that could affect such assumptions becomes available.

Control is the third important lesson—the "ability for a human operator to monitor the system and change its behavior if necessary."¹⁹⁶ Verification and validation alone may not be enough to

Stephenson et al., Mars Climate Orbiter Mishap Investigation Board Phase I Rep. 6, Nov. 10, 1999, http://sunnyday.mit.edu/accidents/MCO_report.pdf.

¹⁸⁹ TEGMARK, *supra* note 186, at 95 (The issue was traced to an incorrect hand-transcription of a single mathematical symbol (a missing overbar)); Peter Neumann, *Mariner I – no holds BARred*, 8 THE RISK DIGEST 75(1989), <http://catless.ncl.ac.uk/Risks/8.75.html#subj1>.

¹⁹⁰ TEGMARK, *supra* note 186, at 95.

¹⁹¹ *Id.* at 97.

¹⁹² *Id.* at 96.

¹⁹³ *Id.*

¹⁹⁴ *Id.* at 97.

¹⁹⁵ TEGMARK, *supra* note 186, at 96-7.

¹⁹⁶ *Id.* at 99.

prevent an accident, thus having a human on the loop that can take control of a system is important.¹⁹⁷ Control requires both the ability for effective human-machine communication and a user-friendly interface. Effective sensors leading to simple warning lights and noises can contribute to effective communication, as is commonly seen with lane assist and related automobile technology today.¹⁹⁸ Air Inter Flight 148's tragic crash in France demonstrates the importance of non-confusing interfaces.¹⁹⁹ Due to the pilots' screen being too small to show the mode their system was in, when they entered "33" on the plane's keypad intending to descend at a 3.3 degree angle, the autopilot interpreted their command to mean descend at 3,300 feet per minute, resulting in the death of all 87 persons on board.²⁰⁰ Adequate assurance that circumstances warranting transfer to human control have been identified as space objects include more autonomous systems and AI will be an important consideration prior to authorization. Similarly, proper planning and capability for timely transfers will also be important. Continuing supervision should include reasonable assurance that non-governmental entities maintain adequate control of space objects and ensure proficiency should human operator intervention become necessary.

Even where responsible actors validate, verify and have proper abilities for human control of space objects with AI and autonomous systems, poor security could lead to foreseeable, preventable mishaps. Drawing lessons learned from numerous hacking and malware incidents, Tegmark points out the need for security against "deliberate malfeasance."²⁰¹ Although significant emphasis must be placed by designers and builders of space objects on functionality, cybersecurity should not be overlooked, and reasonable safeguards should be a prerequisite for authorization of space activities involving autonomous systems.²⁰² Likewise, continuing supervision should ensure reasonable safeguards are maintained after a space object is launched.

¹⁹⁷ *Id.*

¹⁹⁸ *Id.*

¹⁹⁹ *Id.* at 100.

²⁰⁰ TEGMARK, *supra* note 186, at 100.

²⁰¹ *Id.* at 103.

²⁰² JACOB G. OAKLEY, *CYBERSECURITY FOR SPACE: PROTECTING THE FINAL FRONTIER* 1-2 (2020).

C. Space Debris Mitigation Guidelines and Authorization and Continuing Supervision of Space Activities Including the Use of Automation and AI

In 2001, UN COPUOS asked the Inter-Agency Space Debris Coordination Committee (IADC) to develop space debris mitigation guidelines. Subsequently, the IADC presented to the Scientific and Technical Sub-Committee (STSC) of UN COPUOS in 2003.²⁰³ The STSC thereafter established the Working Group on Space Debris in 2004.²⁰⁴ The working group was charged with developing debris mitigation guidelines on the basis of the IADC's previously submitted guidelines and consider comments from States about the guidelines.²⁰⁵ The STSC did so, and both the STSC and the UN COPUOS accepted the new guidelines in 2007.²⁰⁶ Further, the UN General Assembly endorsed the guidelines in 2007, noted that the guidelines reflected existing practices by multiple national and international organizations, and invited member States to implement the guidelines.²⁰⁷

Although the Space Debris Mitigation Guidelines are not legally binding, guideline three informs prudent design of spacecraft using automation and AI.²⁰⁸ According to guideline three, which focuses on limiting the probability of accidental collisions in orbit, "[i]n developing the design and mission profile of spacecraft and launch vehicle stages, the probability of accidental collision with known objects during the system's launch phase and orbital lifetime should be estimated and limited."²⁰⁹ Use of autonomous systems and AI for collision avoidance systems may reduce the risk of accidental collisions in orbit, especially when combined with proper control protocols and procedures for humans to change the behavior

²⁰³ See Comm. On the Peaceful Uses of Outer Space, Rep. of the Sci. & Tech. Subcomm. on Its Thirty-Eighth Session, U.N. Doc. A/AC.105/761, ¶130 (2001), https://www.unoosa.org/pdf/reports/ac105/AC105_761E.pdf; See also Comm. on the Peaceful Uses of Outer Space, Space Debris Mitigation Guidelines, ST/SPACE/49, iii (2010), www.oosa.unvienna.org/pdf/publications/st_space_49E.pdf [hereinafter SDMG].

²⁰⁴ SDMG, *supra* note 203, at iv.

²⁰⁵ *Id.*

²⁰⁶ *Id.*

²⁰⁷ *Id.*; G.A. Res. 62/217, ¶27, International Cooperation in the Peaceful Uses of Outer Space (Feb. 1, 2008).

²⁰⁸ See discussion *infra* Section V.D.

²⁰⁹ SDMG, *supra* note 203, at 3.

of space objects when necessary. During the design phase, and as a prerequisite for authorization, verification and validation that software includes the known location and trajectory of space debris (and space objects) and has been programmed with valid assumptions to avoid collisions would meet the intent of guideline three. Additionally, continuing supervision should include verification that systems receive regular updates of newly identified space objects and debris.

The existence and location of all space debris that could result in an accident or loss of control of a space object is unknown, so engineering and programming should account for how space objects using autonomous systems and AI will address the uncertainty. Coordination and industry standards will be necessary for autonomous space objects to make valid assumptions leading to rational actions that will avoid collisions when autonomous systems encounter each other. Lastly, the importance of continuous monitoring of space objects so that a human that can take control, if necessary, is vital to reducing the risk of avoidable collisions.

V. A PRACTICAL FRAMEWORK TO ANALYZE FAULT-BASED LIABILITY RESULTING FROM STATES FAILING TO AUTHORIZE OR PROVIDE CONTINUING SUPERVISION

Proof of fault is essential to establish liability under Article III of the Liability Convention. However, regardless of which theory of recovery a harmed State seeks to recover for damage caused by a space object of another State elsewhere than on the surface of the Earth or to aircraft in flight, fault will likely be a key element for a liability determination.²¹⁰ Thus, determining what constitutes fault is imperative. This section argues that fault may be shown by, *inter alia*, a State's knowing, or in circumstances where a State should have known, failure to uphold its international obligation to authorize or provide continuing supervision for the space activities of its non-governmental entities. Even when a State does authorize and supervise relevant space activities, failing to do so with due diligence may also breach a State's international obligation, and thereby constitute fault when damage results from such failure.²¹¹

²¹⁰ See discussion *supra* Section II.

²¹¹ Cheng, *Space Treaty Revisited*, *supra* note 146, at 18.

Although this article focuses on the international obligations of authorizing and supervising space activities, the analysis in this section would be the same for other breaches of international obligations that otherwise cause relevant damage.

A. The ILC's Articles on State Responsibility as a Framework for Analysis

The ILC's Articles on State Responsibility provides valuable insight to analyze a State's responsibility and liability resulting from damages caused by a State's failure to meet its responsibilities of authorization and supervision. The Articles on State Responsibility are not binding, but they provide a widely accepted approach to determine State responsibility for internationally wrongful acts.²¹² Referring to the Draft Articles on State Responsibility provisionally adopted by the ILC at the time, the International Court of Justice (ICJ) in the *Gabčíkovo-Nagymaros Project* case declared that it is "well established that, when a State has committed an internationally wrongful act, its international responsibility is likely to be involved whatever the nature of the obligation it has failed to respect."²¹³

The Articles on State Responsibility are the product of nearly forty years of work to codify State practice and custom on State responsibility.²¹⁴ The Articles were adopted by the International Law Commission in 2001, and subsequently referred to the UNGA at its fifty-sixth session the same year.²¹⁵ Since then, the Articles have been discussed numerous times, especially in the Sixth Committee. The Sixth Committee of the General Assembly of the United Nations is the primary forum to consider legal questions in the

²¹² CRAWFORD, BROWNLIE'S PRINCIPLES, *supra* note 26, at 524 (the ILC's Draft Articles "have been much cited and have acquired increasing authority as an expression of the customary law of state responsibility"); *Id.* at 524 n.7 (citing U.N. reports identifying 154 cases and an additional 56 decisions, as of 2013, referring to the Articles on the Responsibility of States for Internationally Wrongful Acts); ROUTLEDGE, *supra* note 103, at 8 n.43.

²¹³ *Gabčíkovo-Nagymaros Project* (Hung./Slovk.), Judgment, 1997 I.C.J. Rep. 35, ¶47 (Sept. 25).

²¹⁴ CRAWFORD, ILC ARTICLES, *supra* note 24, at ix.

²¹⁵ *Id.*; *Sixth Committee (Legal)—71st session*, UNITED NATIONS, https://www.un.org/en/ga/sixth/71/resp_of_states.shtml (last visited Nov. 1, 2021).

General Assembly.²¹⁶ During meetings of the Sixth Committee in the seventy-first session in 2016, delegations noted that the Articles have become “a useful and authoritative statement of the rules on State responsibility.”²¹⁷ Further, delegations noted that “reference to the articles in the practice of States, as well as in the decisions of various international courts, tribunals and other bodies, demonstrated the general acceptance of the articles in the international community.”²¹⁸ Delegations also noted that the Articles reflect “a widely shared consensus” in their present form.²¹⁹ The IJC also found a general rule of law on State responsibility stated in the Articles’ text.²²⁰ Thus, the Articles provide a useful framework for analyzing fault as it pertains to liability for space activities and State responsibility.

Article 1 recognizes that “Every international wrongful act of a State entails the international responsibility of that State.”²²¹ According to Article 2, an internationally wrongful act of a State has 2 elements. First, the action or omission must be “attributable to the State.”²²² Typically States conduct authorization and supervision through government agencies, which would satisfy this requirement. Second, the action or omission must constitute “a breach of an international obligation of the State.”²²³ Such international obligations may arise from a treaty, a rule of customary international law, or a “general principle applicable within the international legal order.”²²⁴ As previously identified, States have obligations to authorize and provide continuing supervision for their non-governmental entities’ space activities.²²⁵ A State is in breach of its international obligation when its conduct “is not in conformity with

²¹⁶ *Sixth Comm. (Legal) of the U.N.G.A.*, UNITED NATIONS, <https://www.un.org/en/ga/sixth/>.

²¹⁷ *Sixth Committee. (Legal)*—71st session, *supra* note 215.

²¹⁸ *Id.*

²¹⁹ *Id.*

²²⁰ Application of the Convention on the Prevention and Punishment of the Crime of Genocide (*Bosn. & Herz. v. Serb. & Montenegro*), Judgment, 2007 I.C.J., ¶431 (Feb. 26) (finding that Article 14 paragraph 3 stated “a general rule of the law of state responsibility” and set out text of that provision in its decision).

²²¹ ILC’s Draft Articles, *supra* note 24, art. 1.

²²² *Id.* at art. 2(a). See Velasquez-Rodriguez Case, Judgment Inter-Am. C.H.R., OEA/ser.C/4, ¶170 (July 29, 1988).

²²³ ILC’s Draft Articles, *supra* note 24, art. 2(b).

²²⁴ CRAWFORD, ILC ARTICLES, *supra* note 24, at 127.

²²⁵ See discussion *supra* Section III.B.

what is required of it” by the international obligation.²²⁶ Lastly, failing to authorize or supervise with due diligence may also breach the international obligation and constitute a wrongful act entailing international responsibility.²²⁷

B. Fault-based Liability Pursuant to Article III of the Liability Convention

A showing of fault is an essential element to establishing liability pursuant to Article III of the Liability Convention. Under Article III of the Liability Convention, the harmed State must prove that its damage is due to a launching State’s fault or the fault of persons for whom it is responsible.²²⁸ States are responsible for their agents’ space activities, as well as the space activities of their non-governmental entities and international organizations of which they are part.²²⁹ As discussed, there is no specified standard for establishing fault in international space law. By looking to principles of general international law as reflected in the ILC’s Articles on State Responsibility, fault should be proven when a harmed State shows that a responsible State’s act or omission breached an international obligation of the State, thereby constituting a wrongful act.²³⁰

Authorizing and providing continuing supervision of non-governmental entities space activities, per Article VI of the Outer Space Treaty for State parties to the treaty, and as a matter of customary international law for all States, are indeed international obligations.²³¹ Failure to subject non-governmental space activities to authorization and continuing supervision, or not doing so with due diligence, fails to conform to international obligations, thereby breaching the international obligations, for which the breaching State is responsible.²³² Such a wrongful act should also naturally constitute fault for purposes of assigning liability when relevant damage occurs.

²²⁶ ILC’s Draft Articles, *supra* note 24, art. 12.

²²⁷ Cheng, *Space Treaty Revisited*, *supra* note 146, at 18.

²²⁸ Liability Convention, *supra* note 15, art. III.

²²⁹ See *supra* notes 90-91 and accompanying text.

²³⁰ ILC’s Draft Articles, *supra* note 24, art. 2.

²³¹ See discussion *supra* Section III.B.

²³² Cheng, *Space Treaty Revisited*, *supra* note 146, at 13-14.

C. Liability Pursuant to Article VII and State Responsibility Theories

Although not as clear as the Liability Convention, establishing liability through Article VII of the Outer Space Treaty for damage caused by a responsible State's space objects to a harmed State in space may also require proof of fault.²³³ Establishing the element of fault for purposes of Article VII of the Outer Space Treaty should be no different than doing so pursuant to Article III of the Liability Convention. If a harmed State can show that a responsible State failed to conform to its international obligation to authorize and supervise a non-governmental entity's space activities, such conduct constitutes a wrongful act in breach of an international obligation. As a result, the responsible State is at fault, and thereby liable for damage caused by the wrongful act.

Similarly, through a State responsibility theory, an internationally wrongful act or omission that breaches an international obligation will be an essential element to ultimately establish liability.²³⁴ If a harmed State seeks recovery through a State responsibility theory, then the harmed State should seek to prove that the failure to authorize or supervise was an international obligation either as a matter of a treaty, if the relevant States are party to the Outer Space Treaty, or as customary international law if a relevant party is not party to the Outer Space Treaty. The harmed State should establish that the responsible State either failed to authorize, supervise, or use due diligence when doing so for a non-governmental entity's space activity. A violation of the international obligations to authorize or provide continuing supervision would constitute a wrongful act, or omission, for breaching an international obligation. Therefore, the responsible State for the wrongful act would then have the corresponding "obligation to make full reparation for the injury caused by the internationally wrongful act."²³⁵

D. General Principles Within the International Legal Order

Actions contrary to or inconsistent with general principles applicable within the international legal order may also constitute

²³³ See discussion *supra* Section II.B.

²³⁴ See discussion *supra* Section II.A.

²³⁵ ILC's Draft Articles, *supra* note 24, art. 31.1.

fault.²³⁶ Even if the Article VI duties of authorization and continuing supervision of space activities of non-governmental entities have not crystallized into rules of customary international law, violation of these norms of behavior may still constitute fault if it can be established that they are principles applicable within the international legal order. At the very least, not acting in conformity with such widely accepted principles dating back to at least 1963 with unanimous UNGA adoption certainly indicates deviation from universally accepted international norms that exist for the purpose of, *inter alia*, ensuring the freedom of exploration and use of outer space for the benefit and in the interest of all countries, and reasonable apportionment of responsibility for engaging in such space related activities.

Similarly, a State not acting in conformity with the Space Debris Mitigation Guidelines may constitute fault. A report from the United Nation's Office of Outer Space Affairs (UN OOSA) Legal Subcommittee in 2019 noted that the Space Debris Mitigation Guidelines "could be an indicator of fault for the purposes of determining the liability of the launching state..."²³⁷ The context of this view was regarding intentional destruction of spacecraft contrary to the SDMGs.²³⁸ However, such a view is still notable because it represents acceptance from the international community of means to provide a meaning for fault. Additionally, the third guideline's requirement to estimate and limit the probability of accidental collisions with known objects during the launch phase and orbital lifetime of spacecraft could be a significant aspect of meeting the international obligation to authorize the space activity of a non-governmental entity.²³⁹ If a State wholly fails to authorize the space activity, or fails to consider in its authorization procedures whether the development of the design and mission profile of a space object complies with the third guideline, such a failure may breach a State's

²³⁶ CRAWFORD, ILC ARTICLES, *supra* note 24, at 126; International Fisheries Co., *supra* note 28, at 701 ("some principle of international law"); Armstrong Cork Co., *supra* note 28, at 163 ("One must consider as illicit actions... all actions of a State which are in contradiction with any rule whatsoever of international law.").

²³⁷ Comm. On the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Fifty-Eighth Session, U.N. Doc. A/AC.105/1203, ¶183 (2019), <https://undocs.org/pdf?symbol=en/A/AC.105/1203>.

²³⁸ *Id.*

²³⁹ SDMG, *supra* note 203, at 3

international obligation, and constitute a wrongful act for which the State would be internationally responsible. As a result, “[t]he responsibility of the State would entail the obligation to repair the damages suffered to the extent that said damages are the result of the inobservance of the international obligation.”²⁴⁰

E. Objective Standard Required

States should not be responsible for authorizing or supervising their non-governmental entities’ space activities unless States know or should have known about the activities. The *Corfu Channel Case* sheds light on fault-based standards.²⁴¹ In the *Corfu Channel Case*, the ICJ noted “every State’s obligation not to allow knowingly its territory to be used for acts contrary to the rights of other States.”²⁴² Use of the term “knowingly” indicates that States’ responsibility in cases where the actions of individuals it is responsible for “remains based on fault.”²⁴³ Similarly, a State can be responsible for inaction when it fails “to take appropriate steps” under circumstances when the State is aware such action is requisite.²⁴⁴ Thus, a State may need to knowingly fail to authorize or provide continuing supervision of its non-governmental entity for the State to be responsible and thereby at fault for the actions or omissions of the non-governmental entity.

To illustrate the issue, assume Canada’s SpaceZ Inc., a fictitious Canadian non-governmental entity, procures the launching of a satellite in the Democratic People’s Republic of Korea (DPRK) at the Sohae Satellite Launching Station. SpaceZ’s satellite will provide commercial uses benefitting SpaceZ and DPRK. DPRK fails to authorize the space activity, or fails to adequately consider the design, mission profile and other key features and aspects of SpaceZ’s space object. Desiring to retain jurisdiction and control over the satellite and have the object or any of its component parts found beyond DPRK jurisdiction returned to the DPRK in accordance with Article VIII of the Outer Space Treaty, DPRK registers the object

²⁴⁰ Armstrong Cork Co., *supra* note 28, at 163.

²⁴¹ Corfu Channel Case, *supra* note 64, at 22-23.

²⁴² *Id.* at 14.

²⁴³ Cheng, *Space Treaty Revisited*, *supra* note 146, 612.

²⁴⁴ US Diplomatic and Consular Staff in Tehran (U.S. v. Iran), Judgement, 1980 I.C.J. 31, ¶61 (May 24).

consistent with the requirements in the Convention on Registration of Objects Launched into Outer Space.²⁴⁵ After the object is launched, it collides with the satellite of a third State, and a subsequent investigation is able to determine that the crash would have been avoided if DPRK had fulfilled its obligation to adequately authorize the space activity of SpaceZ. During the investigation, Canada first learned (or had reason to learn) about SpaceZ's activities in DPRK. As an equitable matter, Canada should not be responsible for failing to authorize or supervise its non-governmental entity that secretly procures the launching of a space object from another State when, through no fault of Canada, it neither had knowledge or any reason to know of SpaceZ's activity. Additionally, the harmed State is not without recourse from a State that should have properly authorized the space activity of a non-governmental entity originating from DPRK territory.²⁴⁶

F. The Appropriate State

The previous example of SpaceZ raises again the issue of who constitutes the appropriate State or States. In SpaceZ's example, the equitable solution to the appropriate State to provide authorization (and continuing supervision) is DPRK. In that example, DPRK is a launching State since the launch took place from its territory, and DPRK is the single registering State of the space object. If there can only be one "appropriate State" as some scholars argue, DPRK should be the appropriate State given it has likely enjoyed economic benefits from allowing the launch, it expects continued commercial benefits from SpaceZ's satellite, and it retains jurisdiction and control of the satellite. In short, DPRK, or any similarly situated State, should not enjoy the benefits of space activities without the burden of associated responsibilities. Canada, or any other similarly situated State without knowledge or reason to know of a non-governmental entity's space activities in another State, does not have requisite knowledge to trigger its corresponding international obligations. Unlike in the *Corfu Channel* case, where Albania had knowledge of dangerous mines in its territorial waters and

²⁴⁵ Registration Convention, *supra* note 142.

²⁴⁶ It is an entirely separate matter as to whether the responsible State has the financial means to provide adequate reparations to the harmed State.

failed to warn the British, Canada had no knowledge or reason to know of its non-governmental entity's secret space activities in a foreign State.²⁴⁷

If more than one "appropriate State" is possible, then the obligation to authorize and supervise is incumbent upon all States who know or should know of relevant space activities. Failure to authorize or provide continuing supervision of non-governmental space activities cannot likely be excused by claiming that another State is more appropriate, if every relevant State is deemed an "appropriate State."²⁴⁸ Even if multiple States with a responsibility for a non-governmental entities' space activity arrange for one State to authorize and/or supervise the space activity, the agreement does not divest the other State's or States' responsibility for the obligations.²⁴⁹ Therefore, States should be cautious to ensure that if their non-governmental entities' space activities are authorized or supervised by another State, such authorization and supervision meets at least minimal standards to comply with international obligations.

G. Limitation on the Extent of Recovery

An internationally wrongful act triggers both State responsibility and a new international obligation upon the responsible State to make reparations for damage caused by the wrongful act.²⁵⁰ Failing to authorize or provide continuing supervision as a basis for establishing fault does not necessarily mean that the extent of the responsible State's liability is unlimited. Instead, the extent of liability is directly related to the damage resulting from the wrongful act.²⁵¹ As such,

²⁴⁷ The example is simplistic to illustrate the key concepts. In reality, media coverage and corporate announcements for activities in most countries and involving significant companies would likely give a State reason to be aware of space activities by a State's non-governmental entity in other States. However, scenarios are possible where a State would have no reason to know of such activities until a space object is already in space or damage has occurred.

²⁴⁸ Cheng, *Space Treaty Revisited*, *supra* note 146, at 14.

²⁴⁹ *Id.*

²⁵⁰ See *Armstrong Cork Co.*, *supra* note 28, at 163; CRAWFORD, ILC ARTICLES, *supra* note 24, at 201.

²⁵¹ See *Chorzów Factory*, *supra* note 39, at 47; *Armstrong Cork Co.*, *supra* note 28, at 163.

“[t]he essential principle contained in the actual notion of an illegal act—a principle which seems to be established by international practice and in particular by the decisions of arbitral tribunals—is that reparation must, as far as possible, wipe-out all the consequences of the illegal act and re-establish the situation which would, in all probability, have existed if that act had not been committed.”²⁵²

VI. CONCLUSION

This article represents an effort to provide greater understanding to fault-based liability in international space law. As the growth in space use and traffic increases, collisions between space objects will almost certainly occur. States and private entities alike should have better predictability to understand how liability may be assigned when damage is not determined through absolute liability. By understanding how liability would likely be apportioned, States can make better informed decisions regarding how to regulate the space activities of their non-governmental entities and apportion risk. Similarly, private actors and other parties with an interest in space activities can make better informed decisions related to the apportionment of financial obligations with greater fidelity regarding liability standards.

Despite the initial legal principles regarding liability for space activity being accepted nearly 60 years ago, and the subsequent *lex specialis* in 1972, fault-based liability standards remain unclear. The application of well-established principles in general international law supplies clarity. While the exact details of what is required to provide responsible authorization or continuing supervision likely depends on the circumstances of each case, wholly omitting effort to meet either of these obligations, or failing to fulfill the obligations with due diligence, is a wrongful act when the responsible State knows or should know that its duties are triggered. Such a wrongful act entails responsibility of the State, thereby adequately establishing fault and liability for damage resulting from the wrongful act.

Despite this article’s focus on the obligations to authorize and supervise non-governmental entities’ space activities, the same fault-based liability standards would apply to violating other

²⁵² Chorzów Factory, *supra* note 39, at 47.

international obligations that cause damage in space. The particular circumstances of each case, including whether the relevant States are party to various space treaties, will impact the methods through which a harmed State may seek recovery. When fault-based standards are applicable, a lack of specificity in international space law alone does not mean such standards cannot be adequately determined. To add clarity, one should recall Bin Cheng's admonition that, "in pursuing any special interests in international law, it is essential to remain firmly attached to the discipline as a whole."²⁵³ International law is rich with rules of customary international law, treaties and general principles within the international legal order to draw insight from. With the benefit of such insight and application of relevant principles, clarity can be distilled for a practical approach to fault-based liability in international space law.

²⁵³ CHENG, INTERNATIONAL SPACE LAW, *supra* note 32, at viii.

THE PERILS OF PLURALITY: REVISITING THE MAKING OF THE INTERNATIONAL LAW OF THE MOON

*S.G. Sreejith**

ABSTRACT

The story of the negotiations leading up to the Moon Agreement is a story of the politics of State interest and the failure of diplomacy. Scholarship on the negotiating history of the Agreement informs that subjective political interests of States foiled the formation of binding legal norms. However, this article argues that what appeared as politics of State interest was, in fact, the subjective interplay of various understandings of international law by the States. States acted under the misperception that international doctrines are understood by all States alike, and did not take into consideration the plurality of international law. The subsequent scholarship which evolved around the Agreement also fails to consider this fact. The joint and cumulative effect of the damage caused by failing to recognize the plurality of international law may prove perilous to future negotiations on the Moon Agreement, if any at all.

I. INTRODUCTION

The Common Heritage of [Hu]mankind (CHM) clause in the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies¹ (Moon Treaty or Moon Agreement) has often been considered a cause of the failure of the Agreement.² The

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¹ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 18, 1979, 1362 U.N.T.S. 3 [hereinafter Moon Agreement].

² 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 (2004).

CHM and its troubled existence in the Moon Agreement has been the subject matter of an impressive amount of research, which has studied the CHM-story from various perspectives: realpolitik, market efficiency, legal doctrine, property rights and North-South divide.³ This author believes that all such analyses are praiseworthy as they individually and collectively advance one's understanding of the CHM clause and the Moon Agreement and the failure of both to become widely accepted by the international community. However, there is one perspective that is rarely if ever addressed: that of diverging doctrinal approaches.

During the negotiation of the Moon Agreement, many States embraced a "normative approach" to international law. That is to say, they considered international law as a "set of norms (or rules) that have a characteristically legal quality and extend beyond the boundaries of internationally recognized entities in terms of both their jurisdiction and their grounds of legitimacy."⁴ For States which adopt this normative approach, international law influences State behavior through objective standards, both general and particular. This approach entails faith in the normative and regulatory power of treaties, the self-ordering and self-regulating potential of international custom and the ability of general principles recognized by legal systems to influence international norms.

Another set of States embraced a "rational approach" to international law. They understood international law as guidelines for rational behavior.⁵ They held the realist position that State interest is causal to State behavior. For such States, international law, rather than constraining behavior, provides necessary information on the *status quo*, which helps States to rationally modify their

³ See e.g., MARCUS G. SCHMIDT, COMMON HERITAGE OR COMMON BURDEN (1989); Gbenga Oduntan, *International Spaces: Legal Moral Basis of the Common Heritage Principle in Space Law*, in GLOBALIZATION AND COMMON RESPONSIBILITIES OF STATES (Koen de Feyeter, ed., 2013); Scott J. Shackelford, *The Tragedy of the Common Heritage of Mankind*, 20 STAN. ENVTL. L. J. 109 (2009); Stephen Gorove, *The Concept of Common Heritage of Mankind: A Political, Moral, or Legal Innovation*, 9 SAN DIEGO L. REV. 390 (1982).

⁴ AARON FICHTELBERG, LAW AT THE VANISHING POINT: A PHILOSOPHICAL ANALYSIS OF INTERNATIONAL LAW 41 (2008).

⁵ Rational approach refers to the stream of thinking which considers State behavior as driven by the self-interest of States over any other considerations. For details on the various credos of this stream, see e.g., JACK L. GOLDSMITH & ERIC A. POSNER, THE LIMITS OF INTERNATIONAL LAW (2005).

behavior to obtain outcomes that best fulfill State interests. They participated in the negotiations to obtain outcomes that increased their payoffs. Their behavior sometimes did not meet the normative standards set by international law; sometimes it was coincidentally met. Ultimately, rationalist States do not concern themselves whatsoever with normative compliance, unless such compliance is in their interest.

There was also a third approach exhibited during the negotiations. It was an “idealistic approach” that generally stems from the universalizing possibilities of international law. As per this approach, international law is a “universalizing system which reconceives the infinite particularity of human willing and acting.”⁶ International law is seen to have the potential to reimagine and reconstitute human society by “universalizing all the particulars of human behavior and transactions, translating them into general and abstract patterns.”⁷ This idealistic approach is not unique to any State—it was taken by many States during the negotiations.

This article submits that there was no meeting of minds between State parties to the Moon Agreement negotiation. Each State failed to understand the other States’ point of view due to their diverse approaches to international law. It is submitted that the plurality of approaches was not recognized by States and throughout the negotiations, States remained under the misperception that international doctrines are understood by all States in the same way.

While negotiations were marred by misperceptions and false assessments, the problem of pluralities did not end there. The negotiations and all that transpired therein became the raw material for scholarly articulation on the international law of the Moon.⁸ Scholars viewed the negotiations and recorded them through their respective internalizations of international law informed by the respective traditions to which they belong. The subjectivity of their analyses caused by their subjective understanding of international law led to their accounts misconstruing actual

⁶ PHILIP ALLOTT, *THE HEALTH OF NATIONS: SOCIETY AND LAW BEYOND THE STATE* 290 (2002).

⁷ Philip Allott, *Five Steps to a New World Order*, 42 VAL. U. L. REV. 99, 101 (2007).

⁸ Although the international law of the Moon is not a disciplinary category or specialized branch of international law, the expression is used herein in an epistemological sense of a set of laws on the Moon such that an analytical category is created.

State intentions and positions. What subsequently became the international law of the Moon became a travesty of reality.

To anyone skeptical about the presence of the three approaches to international law during the Moon Agreement negotiations as an all-inclusive, self-sustaining, unitary epistemological consciousness; it is submitted that the approaches, though not present then in their typological attributes, existed as constituent-stuff of an otherwise disorganized unity.⁹ In other words, the approaches were not present *qua* approaches but they were present *qua* fragments of ideologies, culture and laws of States. This article, however, brings those fragments under discernible approaches—*normative*, *rational* and *idealistic*, and situates the imbroglíos surrounding the Moon Agreement in a new analytical framework.

In Part II, the article, by drawing on various State positions, confirms that the said three approaches were present during the negotiations around the Moon Agreement. By juxtaposing State positions, Part III demonstrates how States failed to assess the positions of other States due to their respective internalization of a given approach to international law. These failures caused States to misinterpret other State positions and respond misguidedly to them. Part IV presents the epistemological problem of scholars subjectively evaluating the negotiations by falling into the trap of pluralities. It is their discourses that ultimately became the international law of the Moon. In Part V, the article emphasizes how the assessment problem and epistemological problem are likely to impact future efforts, if any, to revamp the Moon Agreement.

This article engages with a negotiating history and relevant historical materials. However, this methodology does not limit the relevance of the analysis to a historical context only. The analysis does not disaffirm the continued presence of the plurality of approaches discussed here. States might have been understanding international law through one or another of the approaches, even before the negotiations and even after the negotiations. The plurality could be a fact even in contemporary times, although the article does not explicitly advance this point due to its limited analytical

⁹ On the constituents and qualities of epistemological consciousness, *see generally*, MIKAHAIL MIKAILOVICH BAKHTIN, *ART AND ANSWERABILITY: EARLY PHILOSOPHICAL ESSAYS* (Michael Holquist & Vadim Liapunov eds., Kenneth Brostrom & Vadim Liapunov trans., 1st ed. 1990).

focus. However, this analysis is meant to become a case in point for the plurality of international law.

II. ILLUSTRATING THE PRESENCE OF APPROACHES

A. *The Specificity of Normative Approach*

The Moon Agreement, known as “the ‘fifth star’ in the constellation of outer space treaties”¹⁰ was adopted by the United Nations (UN) General Assembly in 1979¹¹ and entered into force in 1984.¹² However, the first law on the Moon was contained in the Treaty on Principles Governing the Activities of States in The Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, 1967, popularly known as the “Outer Space Treaty” (OST).¹³ In the OST the Moon is considered a definite region of the outer space and is, as outer space is, the “province of all [hu]mankind.”¹⁴ In a nutshell, under the OST: the exploration and use of the Moon and outer space is to be for the “benefit and in the interest of all countries [and] free for exploration and use by all States;”¹⁵ neither the Moon nor outer space is “subject to national appropriation by claim of sovereignty;”¹⁶ activities in space, and on the Moon, are governed by international law;¹⁷ the Moon and other celestial bodies are to be used “exclusively for peaceful purposes;”¹⁸ States are responsible for the activities of even their non-government entities therein;¹⁹ all activities must be implemented with due regard for the activities of others; and finally States must conduct activities in

¹⁰ Statement by Ambassador Richard W. Petree, U.N. Gen. Assembly Special Political Comm. on the Report of the U.N. Outer Space Comm. and the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, (Nov. 1, 1979) *reprinted in* 9 J. SPACE L. 161, 162 (1981)[hereinafter Petree Statement].

¹¹ G.A. Res. 34/68 (Dec. 5, 1979).

¹² Status of International Agreements relating to Activities in Outer Space as at 1 Jan. 2022, 2, U.N. Doc. A/AC.105/C.2/2022/CRP.10) See Carl Q. Christol, *The Moon Treaty Enters Into Force*, 79 AM. J. INT’L L. 163 (1984).

¹³ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty].

¹⁴ *Id.* at art. I.

¹⁵ *Id.*

¹⁶ *Id.* at art. II.

¹⁷ *Id.* at art. III.

¹⁸ *Id.* at art. IV.

¹⁹ *Id.* at art. VI.

such a manner as to avoid harmful contamination of the space environment.²⁰

In 1970, in the Legal Subcommittee on the Peaceful Uses of Outer Space (LSC), Argentina proposed that since the OST “does not establish regulations specifically for activities in the use of the natural resources of the Moon and other celestial bodies,”²¹ provisions must be established “with respect to the legal system for activities in the use of such resources.”²² In its proposal, Argentina also added that the principle of CHM with all its moral constituents shall be the dominant doctrine of the regime.²³

What may have prompted Argentina, is the need to have a certain level of specificity regarding the lunar regime, which was clouded by a complex interrelatedness and interdependence to the regime for outer space under the OST. N. Jasentuliyana and Roy S.K. Lee concisely articulate the surprising generality attributed to Moon in the OST:

The Moon and other celestial bodies come under the scope of application of the Treaty. It was perhaps presumptuous and inappropriate to consider in one single instrument such separate elements as outer space (which is not a res but an infinite ocean of ether), the Moon (only natural satellite of earth) and other celestial bodies (which represent finite and microcosmic entities). It was also surprising that the Moon and all the other celestial bodies were considered together ...²⁴

²⁰ *Id.* at art. IX.

²¹ Draft Agreement on the Principles Governing Activities in the Use of Natural Resources of the Moon and Other Celestial Bodies Preamble, U.N. Doc. A/AC.105/C.2/L.71 and Corr. 1, in U.N. Doc. A/AC.105/196, Annex 1, 21 (Apr. 11, 1977) [hereinafter Draft Agreement of Argentina].

²² *Id.* See Carl Q. Christol, *The 1979 Moon Agreement: Where It is Today?*, 27 J. SPACE L. 6, 7 (1999); FABIO TRONCHETTI, THE EXPLOITATION OF THE NATURAL RESOURCES OF THE MOON AND OTHER CELESTIAL BODIES: A PROPOSAL FOR A LEGAL REGIME 47 (2009).

²³ Draft Agreement of Argentina, *supra* note 21, art. 1. For the constituents of CHM, see CARL Q. CHRISTOL, THE MODERN INTERNATIONAL LAW OF OUTER SPACE 286-87 (1982).

²⁴ N. JASENTULIYANA & ROY S.K. LEE, MANUAL ON SPACE LAW VOL. 1 253 (1979)(citation omitted)..

The call for specificity is in actuality a call for greater and “exclusionary normativity.”²⁵ The call for specificity is also a call for details.²⁶ And quite naturally, Argentina, through its draft agreement on the Moon, suggested that it sought a normatively rigid and impregnable regime—which has what Samantha Besson calls, “the *prima facie* reasons for action”—for the exploitation of the natural resources of the Moon which belong to the [hu]mankind.²⁷ The effort was likely designed situate the Moon in the normative landscape of international law with a certain sense of “authority” to the latter.²⁸

B. The Social-Philosophical Process of the Idealist Approach

As said, what was a “fascinating and controversial issue,” which triggered polemical debates in the LSC during the Moon Agreement negotiations, was the concept of CHM.²⁹ It was again Argentina which initially proposed that “the natural resources of the Moon and other celestial bodies shall be the common heritage of all [hu]mankind.”³⁰ But since its introduction in the LSC, philosophical and ethical meanings were attached to CHM, which created a “romantic attraction” towards the concept.³¹ Over it, there came to exist a postcolonial melancholy amid the anxieties of a possible deprivation. The author, capturing the mood of States during the Moon Agreement negotiations as they are appeared from the negotiating history, has noted, “[t]he emerging state of affairs betokened a new imperialism aimed at the new frontier, one that

²⁵ The view that specificity strengthens normativity is supported by the contention that a specific standard as against a general standard is a “future-directed” intension to comply, whereas intention to comply with a general standard is a matter of “personal policy.” See DAVID COPP, *MORALITY, NORMATIVITY AND SOCIETY* 85-87 (1995). See generally Samantha Besson, *Theorizing the Sources of International Law*, in *THE PHILOSOPHY OF INTERNATIONAL LAW* (Samantha Besson & John Tasioulas, eds., 2010).

²⁶ See DAVID COPP, *supra* note 25, at 85-87. See generally Besson, *supra* note 25.

²⁷ Besson, *supra* note 25, at 173. See also Draft Agreement of Argentina, *supra* note 21, art. 1.

²⁸ See JEAN D’ASPREMONT, *FORMALISM AND THE SOURCES OF INTERNATIONAL LAW: A THEORY OF THE ASCERTAINMENT OF LEGAL RULES* 31 (2011).

²⁹ TRONCHETTI, *supra* note 22, at 85.

³⁰ Draft Agreement of Argentina, *supra* note 21, art. 1.

³¹ MARIA GAVOUNELI, *FUNCTIONAL JURISDICTION IN THE LAW OF THE SEA* 140 (2007) (referring to CHM under the law of the sea).

appeared to be part of a natural order of the world and a game in which they [Third World States] were to be mere pawns.”³²

Possibly to resist this concept of lunar imperialism, some Third World States demanded a legal regime for the exploitation and redistribution of lunar resources. For example, in 1973, India proposed to establish a regime for the “orderly and safe development and rational management of the resources of the” Moon and “to ensure the equitable sharing by all States in the benefits derived therefrom, taking into particular consideration the interests and needs of developing countries.”³³ In its note to the Subcommittee, Argentina also emphasized that the profits accruing from the exploitation of the Moon must be equitably shared in “consideration of the needs and interests of developing countries.”³⁴ However, while some Third World States wanted a mechanism for the equitable distribution of the wealth of the Moon under the normative framework of international law, their claim was not driven by normative ambitions, but rather by an egalitarian idealism for a new international law.³⁵ As Kemal Baslar holds, the CHM-issue “can be seen as a reflection of slowly evolving egalitarian international law as a result of the demands of the newly decolonized Third World towards further changes in international law.”³⁶

What was that newness—the change—which some Third World States wanted to bring to international law through CHM? The claim for locating CHM in the normative landscape of international law was not to provide the concept of legality characteristic to global commons.³⁷ Nor was the claim for declaring the Moon CHM, as generally portrayed, a “sinister” claim for natural resources and technology transfer.³⁸ Rather it was a claim for a

³² S.G. Sreejith, *International Space Law: A Saga of Mankind's Lost Aspirations—Introductory Episode*, 2 AALCO Q. BULL. 1, 9 (2006).

³³ India Working Paper, Draft Treaty Relating to the Moon, U.N. Doc. A/AC.105/101, ¶ 21, in U.N. Doc. A/AC.105/196, Annex 1, 11 (Apr. 11, 1977)

³⁴ Argentina Working Paper, Draft Treaty Relating to the Moon, U.N. Doc. A/AC.105/101, ¶ 21, in U.N. Doc. A/AC.105/196, Annex 1, 13 (Apr. 11, 1977)[hereinafter Argentina's Reply].

³⁵ KEMAL BASLAR, THE CONCEPT OF THE COMMON HERITAGE OF MANKIND IN INTERNATIONAL LAW 164 (1998).

³⁶ *Id.*

³⁷ See SARAH WHATMORE, HYBRID GEOGRAPHIES: NATURES CULTURES SPACES 104-05 (2002).

³⁸ BASLAR, *supra* note 35, at 165.

“collective we,” a “we-ness” – not due to any extrinsic universe but due to an ontological oneness of humanity.³⁹

However, the emphasis of the States on the oneness of humanity through CHM was not a fall of international law into transcendental depths. It was rather a Hegelian approach that the long-lost experience of humanity of the oneness of the self and the other, the ontological unity, needs a “second-order representation” in the form of law for recreating it.⁴⁰ This Hegelian socio-idealism is espoused in the social-philosophical process of international law to transform the abstractedness of ontological universalism into an international social fact. In this process, some Third World States saw in international law a means to re-form the human consciousness.⁴¹ It was thus a transformation, intended in every way, of human consciousness through the actualizing potential of international law. This idealistic approach is quite explicit from the statement made by Argentina on CHM in the Subcommittee:

When the aspirations and needs of the peoples of the world arrive at a way of expressing themselves—in other words, when the point is reached where it is possible to establish what is desired—the matter enters into the legal sphere. What is desired necessarily tends to find expression in a principle or a norm which, on this issue, is always international.⁴²

The doctrine of CHM which found final inclusion in Article 11 of the Moon Agreement⁴³ (and the Third Worldism surrounding it) is thus a logical result of a “structural metamorphosis” of international law carried out by Third World States through the revolutionary social idealism of actualizing the ideal through law.⁴⁴

³⁹ WHATMORE, *supra* note 37, at 104.

⁴⁰ See WILLIAM E. CONKLIN, THE INVISIBLE ORIGINS OF LEGAL POSITIVISM: A RE-READING OF A TRADITION 47 (2001).

⁴¹ See Philip Allott, *Mare Nostrum: A New International Law of the Sea*, in FREEDOM FOR THE SEAS IN THE 21ST CENTURY: OCEAN GOVERNANCE AND ENVIRONMENTAL HARMONY 49, 49 (Jon. M. Van Dyke et al. eds., 1993).

⁴² Argentina's Reply, *supra* note 34, at 30.

⁴³ Moon Agreement, *supra* note 1, art. 11 (“The moon and its resources are the common heritage of [hu]mankind.”).

⁴⁴ See generally Philip Allott, *Globalization from Above: Actualizing the Ideal Through Law* 26 REV. INT'L STUD. 61 (2000); ALLOTT, *supra* note 6, at 84.

C. The Realist Resistance to the CHM

The claim for declaring the Moon as CHM, however, found resistance from the Soviet Union and the United States.⁴⁵ The Soviet opposition primarily related to the “legal content” of CHM and hence, reflects little of a policy-oriented, preference-driven State position characteristic to realism.⁴⁶ The United States (US) found the CHM principle detrimental to the interests of the United States.”⁴⁷ In a typical realist fashion of determining State interest (and State preferences thereof) through domestic influences, the US found CHM to “represent[] restraints on the US intention to harvest and exploit resources beyond any national jurisdiction.”⁴⁸ The anti-free-market approach of CHM was also found unfavorable to the interests of the US.⁴⁹

US opposition to the CHM in the LSC was also a result of larger undercurrents in American domestic circles. Some interest groups and stakeholders in the US did not want an agreement that declared the Moon as CHM and provided a mechanism for the redistribution of profits from lunar exploration.⁵⁰ Professional bodies in law, aeronautics and astronautics such as the American Aeronautical Society (AAS), the American Institute of Aeronautics and Astronautics and the American Bar Association (ABA) also took dissuading, if not opposing, stances towards the Moon Agreement for similar reasons.⁵¹ The same was the approach of industrial interest groups like the National Association of Manufacturers, the Aerospace Industries Association and the National Ocean Industries Association.⁵²

⁴⁵ BIN CHENG, *STUDIES IN INTERNATIONAL SPACE LAW* 365 (1997).

⁴⁶ Union of Soviet Socialist Republics Working Paper, Draft Relating to the Moon A/AC.105/101, ¶ 21 (Mar. 28, 1973), in U.N. Doc. A/AC.105/196, Annex 1, 11 (Apr. 11, 1977)[hereinafter *The Soviet Opposition*].

⁴⁷ TRONCHETTI, *supra* note 22, at 59.

⁴⁸ *Id.*

⁴⁹ *Id.*

⁵⁰ A noteworthy example in this regard is the oppositions of L5 Society, a US based group of space enthusiasts. See CHRIS DUBBS & EMELINE PAAT-DAHLSTROM, *REALIZING TOMORROW: THE PATH TO SPACE FLIGHT* 27-30 (2011).

⁵¹ Thomas Gangale, *Common Heritage in Magnificent Desolation*, 46th AIAA Aerospace Sciences Meeting and Exhibit, 7-10 Jan. 2008, Reno, Nevada, at 6 (on file with the author).

⁵² M.J. PETERSON, *INTERNATIONAL REGIMES FOR THE FINAL FRONTIER* 167 (2005).

What prompted such opposition was the socio-economic costs the accession to the Moon Agreement might have brought upon the US Government. M.J. Peterson explains the then policy considerations at the governmental level: “Material calculations and normative considerations intertwined during the resource contention in ways that require careful disentangling before coming to firm conclusions about their relative impact on preference formation.”⁵³ Serious considerations were given to questions such as whether “Governments’ positions were generally consistent with a utility-maximizing comparison of net benefit under an open-access resource regime and under a controlled access resource regime administered by a global intergovernmental agency.”⁵⁴ And, as far the US was concerned, accession to the Treaty “would involve directly and indirectly the expenditure of large sums of money derived from the US taxpayer subject to no control by the United States.”⁵⁵

The US position on CHM and its resistance thereof to give precommitment to the Moon Agreement was a question of honoring domestic commitments to the US populace. Moreover, what the US saw in the claim for declaring the Moon as CHM was an imposition of costs on it.⁵⁶ That is, the US saw the claim as a strategic move—a strategic precommitment—by certain States to constrain the US and to make the US act in such a way that a zero-sum situation is obtained.⁵⁷ Baslar’s account of the CHM-claim makes it obvious that US concerns were not unfounded:

[T]he aim of the developing world was to formulate the common heritage of [hu]mankind in such a way that the result would be inimical to the *laissez-faire* mentality of the West. What the Third World wanted was not to share the minerals which are abundantly available under their feet, but to force the West through General Assembly resolutions to halt commercial mining activities on the moon.⁵⁸

⁵³ *Id.*

⁵⁴ *Id.*

⁵⁵ BASLAR, *supra* note 35, at 128 (citation omitted).

⁵⁶ Steven R. Ratner, Precommitment Theory and International Law: Starting a Conversation, 81 TEXAS L. REV. 2055, 2058, 2059 (2003).

⁵⁷ *Id.*

⁵⁸ BASLAR, *supra* note 35, at 165.

The US, however, made an effort in the LSC to avoid a zero-sum outcome by demanding a production sharing mechanism on market-friendly lines, as stated by Herbert Reis in the LSC: "On the broadest level of generality, it seems right to state that such resources are part of the 'common heritage of all [hu]mankind' ... [However] we would need to contemplate a special treaty-drafting conference in the event of the discovery of commercially exploitable resources."⁵⁹ As far as the US was concerned, if not for the immediate creation of a mechanism for the commercial exploitation of lunar resources, at least a right to free scientific exploration of the Moon would provide Pareto improvement conditions and a Pareto progression.⁶⁰ This effort was to fail in the LSC, however, as was made obvious from the statement of Arnold Frutkin, Director of International Programs, NASA:

[N]atural resources of celestial bodies should be the common heritage of [hu]mankind, [] their *use for scientific purposes should continue to be unimpeded*; and [] parties should declare their willingness to participate in a conference on the international sharing of the benefits of utilization of those resources *at such time as utilization might appear to become practicable*.⁶¹

Whatever was the outcome of the CHM negotiations, what becomes a matter of interest is that legal considerations of the negotiating parties can be brought under one or another approach towards international law, which also can be seen reflected in the diplomatic stances taken by the parties. The naivety of viewing the others' position in one's discursive contexts and falling into the functional repertoire of their respective sphere, be it the deontological reasoning of normative approaches or the rational choices, are seen as leading to misconstructions which have the risk of

⁵⁹ Statement by US Representative Herbert Reis on the Work of the 1972 Session United Nations Outer Space Legal Subcommittee, US Mission, Geneva, Switzerland, May 3, 1972, *reprinted in pertinent part in* STAFF OF S. COMM. ON COMMERCE, SCI. & TRANS., 96TH CONG., REP. ON AGREEMENT GOVERNING THE ACTIVITIES OF STATES ON THE MOON AND OTHER CELESTIAL BODIES, PARTS 1 AND 2 14 (1980) [hereinafter SENATE REPORT ON THE MOON AGREEMENT].

⁶⁰ *See id.* at 24, 25.

⁶¹ Press Release, United States Mission to the United Nations, *Statement by Arnold W. Frutkin, Alternate US Representative before the U.N. Outer Space Committee*, 5 (Sept. 7, 1972)(emphasis added).

prompting false assessments about State behavior. More details of this process are in order.

III. FAILURE OF ASSESSMENTS IN THE NEGOTIATIONS

On a broader level of specificity, during the LSC discussion, three distinct positions concerning the Moon Agreement were demonstrated. First, the Soviet Union's opposition to the semantic construction of the CHM doctrine.⁶² Second, the US's opposition to the CHM for it being antithetical to the market liberalism advocated by the US.⁶³ And third, Third World States' desire for a CHM-regime – a normative framework for the exploitation, allocation and redistribution of lunar resources.⁶⁴ Of these three positions, it was the respective positions of the Soviet Union and Third World States that first came in conflict with each other. This was much before the US opposition to the CHM surfaced to challenge the socio-political standing of the Moon Agreement. As part of capturing the problem of false assessments by States of other States' approaches, this article first presents the negotiating positions—bargains, concessions, compromises and results—of the Soviet-Third World differences on the CHM doctrine. Later on, it presents the diplomatic conflict between the United States and the Third World bloc.

A. *The Third World Bloc versus the Soviet Union*

i. The Soviet Union's Idealist Approach

For the Soviet Union, the concept of CHM raised terminology issues.⁶⁵ What, according to the Soviet Union, was problematic about the CHM was, first, the effort to import bourgeois notions of property, inheritance and ownership into the CHM through the

⁶² For example, in his address to the Subcommittee Ambassador Piradov stressed that “we have referred to the juridical and political vagueness and lack of specificity in the concept [of CHM] ...” Comm. On the Peaceful Uses of Outer Space, Verbatim Record of its One Hundred and Fifty-Eighth Meeting, 8-10, U.N. Doc. A/AC. 105/PV.158, 8-10 (June 22, 1976).

⁶³ Arthur M. Dula, *Free Enterprise and the Proposed Moon Treaty*, 2 HOUSTON J. INT'L L. 3, 3 (1979).

⁶⁴ GUNNAR SKIRBEKK & NILS GILJE, A HISTORY OF WESTERN THOUGHT: FROM ANCIENT GREECE TO THE TWENTIETH CENTURY 104-05 (2001).

⁶⁵ The Soviet Opposition, *supra* note 46, at 12.

civil law notions of “heritage,”⁶⁶ and second, the effort to diminish the relevance of class struggle in the social process by homogenizing “[hu]mankind.”⁶⁷

The Soviet Union raised strong resistance to the term “heritage.” In its statement to the Subcommittee, the Soviet Union pointed out that “[w]e do not use the term ‘heritage’ in civil law. We use this word in the philosophical, rather than the legal sense.”⁶⁸ The Soviet statement further clarified that heritage entails a succession to property and subsequently leads to claims of ownership over the property.⁶⁹ And, the OST “unequivocally” prohibits any claim of ownership on the property,⁷⁰ rendering the Moon, including its natural resources, “a thing that belongs to nobody.”⁷¹ Thus, according to the Soviet Union, a prohibition on ownership of property and possession of heritage—a property, in fact—is illogical.⁷² Hence, in its Draft Treaty Concerning the Moon, 1971, the Soviet Union attributed *res extra commercium* status to the Moon.⁷³

The Soviet position was backed by strong ideological convictions. That is, the concepts of property and ownership for the Soviet Union were based on the Marxian view that any property which is privately owned supports only the bourgeois regimes.⁷⁴ Hence, the Soviets stood for the destruction of all private-owned property, read as bourgeois-owned property, which is used in the means of production controlled by the bourgeois.⁷⁵ However, under the Soviet system, there were circumstances when private ownership of property was socially legitimate, such as in the cases of state-owned property, ownership in consumer goods and when a property is

⁶⁶ *Id.* See J.I. Gabrynowicz, *The ‘Province’ and the ‘Heritage’ of Mankind Reconsidered: A New Beginning*, 2nd Conference on Lunar Bases and Space Activities, CDSITC Aerospace 691, 693 (1992). See also The Soviet Opposition, *supra* note 46.

⁶⁷ The Soviet Opposition, *supra* note 46, at 12. See generally Emilio Jaksetic, *Peaceful Uses of Outer Space: Soviet Views* 28 AM. U. L. REV. 482 (1979).

⁶⁸ The Soviet Opposition, *supra* note 46, at 12.

⁶⁹ *Id.*

⁷⁰ *Id.*, referencing the Outer Space Treaty, *supra* note 13, art. II.

⁷¹ The Soviet Opposition, *supra* note 46, at 12.

⁷² *Id.*

⁷³ USSR, *Draft Treaty Concerning the Moon*, art. VIII, Preparation of an International Treaty Concerning the Moon, U.N. Doc. A/C.1/L.568 (Nov. 5, 1971)[hereinafter USSR Draft Treaty].

⁷⁴ John N. Hazard, *Soviet Property Law* 30 CORNELL L. REV. 466, 467 (1945).

⁷⁵ *Id.* at 467.

collectively owned under a cooperative scheme.⁷⁶ If private ownership existed in forms other than these, the State, by virtue of the Soviet Constitution, could abolish such ownerships.⁷⁷

In the case of CHM, lunar property was certainly not open for private appropriation. Instead, the Moon and its natural resources were meant for “the undivided and common use of all States on earth.”⁷⁸ However, the Soviet Union held that, while international space law provides for the common use of lunar property, it does not provide for joint ownership of such property by the States under a cooperative scheme.⁷⁹ Moreover, the space law which governs the lunar property was the law of a “ruling class” devoid of any scope for the class struggle between the socialists and capitalists, a conflict that is the hallmark of the Soviet concept of law.⁸⁰ It is the dialectical possibility—the possibility for contestation and debate—of law that becomes the “means for achieving the goals of communism and advancing and extending revolutionary and national liberal movements.”⁸¹ Therefore, a law which is the will of a dominant class had nothing in it to prompt the Soviet Union to enter into an international cooperative framework such as the Moon Agreement. Emilio Jaksetic explains that it was very natural for the Soviet Union to reject the Moon Agreement because it deemed space law as “inconsistent with its notions of contemporary international law ... The Soviets can be expected to pursue their goal of establishing a ‘progressive law’ of outer space, including a progressive concept of the peaceful uses of outer space.”⁸²

What was the nature of that progressive space law envisioned by the Soviet Union? For the Soviets, an ideal space law would be informed by the proletarian struggle against bourgeois oppression and a proletarian urge for a social revolution to establish a socialist order for the peaceful use and exploitation of outer space.⁸³ Such a

⁷⁶ See generally *id.*

⁷⁷ *Id.* at 469.

⁷⁸ The Soviet Opposition, *supra* note 46, at 12.

⁷⁹ *Id.*

⁸⁰ See Jaksetic, *supra* note 67, at 484-90.

⁸¹ *Id.* at 488.

⁸² *Id.* at 492.

⁸³ See generally, Jaksetic, *supra* note 67. *Contra*. Robert D. Crane, *Basic Principles in Soviet Space Law: Peaceful Coexistence, Peaceful Cooperation, and Disarmament*, 29 L. & CONTEMPORARY PROBLEMS 943 (1964) (arguing that the seeming innocuous

stance, it should be presumed, was a natural reflection of the Soviet concerns about a bourgeois imposition of the capitalist means of production and modes of control with regard to space. However, the “dictates of expediency,” as Leon Lipson assesses, prompted the Soviet Union to accept in theory the international legal framework dominated by the ruling class.⁸⁴ Even then, the Soviet Union retained its conviction that law is a means of keeping alive the class struggle, that is, the struggle for ideological dominance between the socialist and capitalist class in which the former will triumph.⁸⁵ The triumph of the socialist class will see the twilight of the bourgeois law and the systems associated with it.⁸⁶

The abovementioned futurism of the Soviet Union is reminiscent of the idealist approaches’ revolutionary ambitions.⁸⁷ And for the Soviets, a law meant an “epistemological material” to be utilized for the reality of socialism to surpass the unreality of capitalism, very much as is in the idealist approach that law is a means for transcending the social materialist conceptions of human reality to a higher intellectual reality.⁸⁸ After transcending to the socialist bliss, law withers or becomes obsolete.⁸⁹

In its intermediary existence in law, the Soviet Union adopted a “compromise formula” according to which international law is “the complex of norms that regulate relations between states in the process of their *struggle and collaboration*, or *conflict and cooperation* and so on.”⁹⁰ The compromise formula was an assurance of Soviet participation in international affairs.⁹¹ To ensure that participation, the Soviets shaped the doctrine of “peaceful coexistence” which is a conceptual space for socialism to remain in a continuing struggle for dominance with other competing ideologies.⁹²

doctrines of Soviet space law is part of a social manifesto to import nationalist goals in space law).

⁸⁴ Leon S. Lipson, *The Soviet View on International Law*, 1 READINGS IN INT’L L. FROM THE NAVAL WAR COLLEGE REV. 101, 102 (1980).

⁸⁵ *Id.*

⁸⁶ *Id.* at 101.

⁸⁷ See generally, BAKHTIN, *supra* note 9.

⁸⁸ *Id.*

⁸⁹ *Id.*

⁹⁰ Lipson, *supra* note 84, at 103 (emphasis in original).

⁹¹ *Id.*

⁹² See Nikita S. Khrushchev, *On Peaceful Coexistence*, 38 FOREIGN AFF. 53, 56 (1959).

It is with such ideological convictions and revolutionary zeal that the Soviet Union came to the Moon Agreement negotiations. That is, for the Soviet Union, the Moon Agreement was an opportunity to participate in an ideological debate, intending to produce a corrective outcome for the ideological differences.⁹³ Their disagreement on the concept of heritage exemplifies this stance, as Carl Q. Christol writes: the Soviet opposition to the constituents of CHM such as heritage, inheritance and property “was based on an unwillingness to introduce concepts found in civil law into international law.”⁹⁴ What the Soviets were actually onto was contrasting the socialist notions of *property as a means for subsistence through labor production* with the capitalist notions of *property as private capital which controls the means of production*.⁹⁵ In other words, the Soviets, by exploring the dialectical potential of the Moon Agreement, wanted to generate the antithesis of labor and capital, the very antithesis of socialism and capitalism, leaving the proletarian struggle for dominance alive.

In what is closest to the idealist approach, the Soviet effort was to give form to the shared expectation of the proletariat, by making use of the constitutive potential of law, and preparing an environment for revolution and a social takeover—human self-constituting *through* social self-constituting *through* the mutuality of shared expectations.

ii. The Normative Response to the Soviet Position

The Soviet resistance was appropriately responded to by a set of States including Third World States. First, they took issue with the Soviet declaration of the Moon as a *res extra commercium* and then with the Soviet opposition to the term “heritage,” and finally with the Soviet’s supporting of the concept of common province of [hu]mankind.

a. *Opposition to Res Extra Commercium*

Article VIII of the Soviet Draft Treaty on the Moon declared that: “[n]either States, international intergovernmental or non-

⁹³ See Jaksetic, *supra* note 67, at 489.

⁹⁴ CHRISTOL, *supra* note 23, at 292.

⁹⁵ *Id.*

governmental organizations and national organizations having the status of juridical persons or not, nor natural persons, may claim the surface or subsoil of the Moon as their property⁹⁶ This clause is an attribution of *res extra commercium* status to the Moon, an effort to abolish ownership of all forms under a legal system that the Soviet Union deemed as being controlled by the ruling class.⁹⁷ The Soviet Union further extended the *res extra commercium* status:

The emplacement of vehicles or equipment on the surface of the Moon or in the subsoil thereof, including the construction of installations integrally connected with the surface or subsoil of the Moon, shall not create a right of ownership over portions of the surface or subsoil of the Moon.⁹⁸

Here is an effort to prevent the private holding of property and commercial exploitation of the Moon by the capitalist means of production and control. However, natural resources were kept outside the scope of Article VIII because the Soviet Union felt that it was too premature to regulate the use of natural resources of the Moon, that is, before lunar mining becomes feasible.⁹⁹

But many State delegations watered down the *res extra commercium* status attributed by the Soviet Union to the Moon to mean *res communis* status.¹⁰⁰ Then, they criticized the Soviet Union for restricting the scope of Article VIII to the “surface or subsoil” of the Moon.¹⁰¹ The essence of their criticism was that the Soviet Union had excluded “natural resources” from the purview of Article VIII’s waiver of claims of ownership of lunar property.¹⁰² What the Third World and other delegations saw in the Soviet move was an effort to excluding natural resources from the purview of what they wanted to be *in toto* a CHM, rendering the natural resources of the

⁹⁶ USSR Draft Treaty, *supra* note 73, art. VIII(1).

⁹⁷ But see CHRISTOL, *supra* note 23, at 261 (arguing that declaring Moon as a zero-ownership zone renders it a *res communis*).

⁹⁸ USSR Draft Treaty, *supra* note 73, art. VIII(1).

⁹⁹ Comm. On the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Eleventh Session, U.N. Doc. A/AC.105/C2/SR.187, 8 (1972).

¹⁰⁰ *Id.*

¹⁰¹ CHRISTOL, *supra* note 23 at 262.

¹⁰² *Id.*

Moon *res nullius*.¹⁰³ These States were taken to a normative hermeneutical faith typical to normative legal systems that the narrower the semantics, the lesser the normative scope; and a “semantic broadening” in all probability enhances the normative scope.¹⁰⁴ And particularly in the case of treaties, the more expansive the text, the greater the interpretative scope to make the treaty fulfill its purpose.¹⁰⁵

This semantic-normative concern of certain States and the semantic solutions to normative problems that they have found in the Subcommittee is concisely captured by Christol:

The 1971 Soviet proposal sought only to prevent the “surface or subsoil” of the Moon from becoming the property of juridical and natural persons. It focused on tangible resources.

. . .

Article 8, par. 1 [sic] of the Soviet draft would have [] prevented States and other natural and juridical persons from obtaining property rights in the surface and subsoil of the Moon ... [However] [b]oth the Austrian drafts and the 1979 revision of the Legal Sub-Committee, [semantically] added considerably to the 1971 Soviet proposal.¹⁰⁶

The Soviet Union, however, resisted the diplomatic pressure. In this regard, speaking before the Subcommittee in 1974, Ambassador Piradov reiterated: “[T]here *should not be included* in the draft moon treaty a provision concerning the régime for the use and exploitation of the moon’s natural resources.”¹⁰⁷ But, subsequently, the Soviet Union was forced to considerably revise its draft to include the natural resources of the Moon within the scope of Article VIII.¹⁰⁸

¹⁰³ *Id.*

¹⁰⁴ Normative hermeneutics has to it acts of broadening and narrowing, that is, the act of particularizing a general for the particular to become again part of the general corpus of laws. SKIRBEKK & GILJE, *supra* note 64, at 104-05.

¹⁰⁵ For a discussion on the dynamics of texts, their interpretation and its normative effect, see ANTONIO CASSESE, *INTERNATIONAL LAW*, SECOND EDITION 178, 179 (2005).

¹⁰⁶ CHRISTOL, *supra* note 23, at 261.

¹⁰⁷ Comm. on the Peaceful Uses of Outer Space, Verbatim Record at Its One Hundred and Thirty-First Meeting, U.N. Doc. A/AC.105/PV.131, at 66 (1974) (emphasis added).

¹⁰⁸ CHRISTOL, *supra* note 23, at 262.

Indeed, Third World and other State delegations triumphed. As Christol puts it, “[t]he amendments to the Soviet proposal allowed for the acquiring of property rights in removable natural resources taken from the Moon.”¹⁰⁹ However, while the Soviet Union might have felt greater normative pressure to broaden the scope of Article VIII, as diplomatic records tell us, what prompted the Soviet Union to accept the inclusion of natural resources of the Moon to the *res nullius* status was the simple reason that lunar mining was a distant possibility, and that when it would become possible, the Soviet Union could go for a regime for the cooperative ownership and sharing.¹¹⁰ This is apparent from the optimism reflected in the statement of Mr. Maiorski, the USSR delegate to the LSC, made in 1977: “on the question of the status of the natural resources of the moon ... there should be prepared a separate legal document, let us say in the form of an additional protocol to the draft treaty relating to the moon.”¹¹¹

The Soviet Union also ensured that the final draft on the Moon Agreement had in it the Soviet reservation about the regime for the exploitation and sharing of natural resources. Thus, Article XI, paragraph 3 of the Moon Agreement was ultimately redrafted to read: “[t]he foregoing provisions are without prejudice to the international regime referred to in [] this article.”¹¹²

Thus, the Soviet Union agreed to the demands of Third World and other State delegations to include natural resources within the scope of its waiver of any claims of ownership because of the possibility they foresaw in the Moon Agreement for a socialist means of production, control and distribution of resources. That is, in a Marxian and social idealistic fashion, the Soviets saw in the treaty a dialectical possibility for resolving conflicts of ideas and interests so that such conflicts and interests “re-enters the general social process as a new datum,” which re-starts the treaty-making process yet again.¹¹³ The Soviet plan was to take advantage of the provision for the establishment of a Conference of the State Parties laid down in Article 18 of the Moon Agreement for reviewing the application

¹⁰⁹ *Id.*

¹¹⁰ *Id.*

¹¹¹ Comm. On the Peaceful Uses of Outer Space, Verbatim Record of its One Hundred and Seventy-Fifth Meeting, U.N. Doc. A/AC.105/PV.175, 38-40 (July 25, 1977).

¹¹² Moon Agreement, *supra* note 1, art. 11(3).

¹¹³ Philip Allott, *The Concept of International Law*, 10 EUR. J. INT'L L. 31, 43 (1990).

of the Agreement.¹¹⁴ With treaties having such a continuing potential, the Moon Agreement would be a continuing process of the particularization of what has been laid down as a matter of general interest.¹¹⁵

However, for Third World and other delegations, bringing the Soviet Union to their terms could be seen as a diplomatic victory. And that victory was achieved through a process of *norm broadening through a semantic broadening* to include certain material facts under the proscriptions of the Moon Treaty. The States in question here seem to have acted on a Kelsinian credo that there is a causal connection between the semantics and normativity such that a “semantic interiorization” of “natural resources” within the waiver of ownership by States has created unassailable norms for the Soviet Union.¹¹⁶ That was, however, not in fact the case.

Responding to the Soviet position on natural resources, Third World and other States acted based on a “legal determinism” (normative absolutism) regarding the ways of the normative order. Nonetheless, the outcome of the negotiations was a *favorable* one, i.e., a case of a positive equilibrium. Even then, there was a stage when the Soviet Union’s idealist ambitions were assessed by certain States as a case of non-conformity with the norms which requires a normative treatment of semantic care. The normatively informed remedial action of semantic widening coincided with the Soviet Union’s assessment of the situation as fit to be kept in the “dialectical space” until the situation regarding lunar mining ripens to introduce public ownership of the means of production and distribution of lunar resources through cooperative enterprises.

*b. Resistance to the Soviet Opposition to the Expression
“Heritage”*

As said above, the main reason for Soviet opposition to the CHM was that the capitalist notions of property in international space law (and the concept of CHM to which it is interlinked) were

¹¹⁴ Moon Agreement, *supra* note 1, art. 18.

¹¹⁵ On the particularizing potential of treaties which are otherwise universals, See Allott, *supra* note 113, at 43.

¹¹⁶ On the causal connection between semantics and norms in the Kelsinian scheme of things, see Ulises Schmill, *Jurisprudence and the Concept of Revolution*, in LAW, MORALITY, AND LEGAL POSITIVISM 121, 124-26. (Kenneth Einar Himma, ed., 2004).

in contradiction to the socialist notions of property. According to the Soviets, property, except those which are used in the means of production, could be owned only under a joint ownership scheme like ownership through cooperative society.¹¹⁷ Therefore, the Soviets held that the Moon and its resources are not items that could be privately owned, and any claims of ownership, unless there is a scheme of cooperative ownership, were illegal *per se*.

However, the Soviet discontent with CHM's bourgeois base was put forward through the term "heritage" in the concept of CHM.¹¹⁸ They pointed out that in the socialist legal system, the term heritage is used in a *philosophical* sense.¹¹⁹ And by this, the Soviets were pitting the socialist notions of property against the civil law meaning of property, opening up room for a dialectical contrast. The Soviet position in this context is also idealist. That is, the utility that the Soviets attribute to law is an instrumental utility. That is to say, law in a Soviet system is a means of actualizing ideals through a dialectical tension, as Allott puts it in a social idealist vein: through dialectical possibilities, the law helps international society to transcend the confines of parochialism.¹²⁰ Allot further observes that "[l]aw achieves this wonderful feat of dialectical integration in an amazingly efficient way, day after day, year in, year out, like some marvelously engineered machine."¹²¹

The Soviet opposition was strongly responded to by Argentina with a sense of normative legalism by asserting that the term heritage in its philosophical sense is also used in international law: "[t]he Spanish term 'heritage' (*patrimonio*) is also used by modern international law in referring, for instance, to the 'patrimonial sea' (*mar patrimonial*)."¹²² Argentina also pointed out that "the whole substantive field of international law relating to State succession was available for guidance as to the meaning of heritage."¹²³ Their point was that there is hardly any substance in the Soviet Union's opposition to the term heritage for it being of a philosophical

¹¹⁷ See generally, Hazard, *supra* note 74.

¹¹⁸ See Gabrynowicz, *supra* note 66. See also The Soviet Opposition, *supra* note 46.

¹¹⁹ The Soviet Opposition, *supra* note 46, at 12.

¹²⁰ See Philip Allott, *The True Functions of Law in the International Community*, 5 IND. J. GLOBAL LEGAL STUD. 391, 398 (1998).

¹²¹ *Id.*

¹²² Argentina's Reply, *supra* note 34, at 14.

¹²³ CHRISTOL, *supra* note 23, at 293. See also *id.*

category, as Argentina would, later on, emphasize, “[t]here is no need to create anything new. The idea of heritage—which can even be tangible—has existed since olden times.”¹²⁴ On balance, Argentina’s explanations regarding the normative legacy of concepts and their semantics contexts missed the revolutionary teleology of “socialist legalism” of the Soviet Union.¹²⁵ Argentina’s assessment of and response to the Soviet position is a case of assessing State behavior prompted by idealism through a normative approach.¹²⁶

c. State Response to the Soviet’s Preference for the Common Province of [Hu]mankind

Interestingly, the Soviet Union, which opposed the CHM, did not object to declaring the Moon a province of humankind.¹²⁷ This was likely because “province” does not invoke the same property notions as “heritage,” as province is more of a large non-localized spatial expanse not open to claims of centrality. J.I. Gabrynowicz appropriately contextualizes the “general belief” that the concept of the common province of humankind “inhibits private enterprise because it interferes with an individual or corporate entrepreneur’s right to profit from the fruits of his or her labor in space.”¹²⁸ Moreover, the Soviets were well aware that in space law, the concept of common province of humankind is only declaratory in nature and has no doctrinal significance to bind any State under its authority.¹²⁹ What the Soviets wanted was to keep the Moon free from the private ownership system of market economies which the civil law-based CHM was threatening to lead to.

However, Argentina and the Third World bloc sensed an expansionist urge (superpower imperialism) on the part of the Soviet Union to keep the Moon open for private exploitation.¹³⁰ Not only that, Argentina felt that the concept of common province of

¹²⁴ Argentina’s Reply, *supra* note 34, at 14.

¹²⁵ On the niceties and nuances of “socialist legalism,” see Eric Engle, *Socialist Legalism in the Early USSR: A Formal Rule of Law State?*, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1268555.

¹²⁶ *Id.*

¹²⁷ The Soviet Opposition, *supra* note 46, at 12.

¹²⁸ Gabrynowicz, *supra* note 66, at 692.

¹²⁹ *Id.*

¹³⁰ See E. Van Bogaert, *Moon Treaty: Achievements and Future Problems*, 34 *STUDIA DIPLOMATICA* 655, 659-60 (1981).

humankind was too nebulous on the question of a regime for the equitable allocation of resources.¹³¹ Therefore, along with the Third World bloc they asserted that a regime for international control (collective State ownership), and for the redistribution of wealth and technology among the nations is essential.¹³² The solution was found in CHM. Christol explains the position:

Argentina indicated that the CHM principle took into account the expectation that economic profits would be realized, that there would be an equitable sharing of such profits, that the needs of the LDCs would be taken into account in the sharing of profits, that this would necessitate the formation of a suitable international regime, and that this might lead to the creation of either international machinery or an international authority to give effect to such expectations.¹³³

Argentina's position is informed by its normative approach to international law. That is to say, Argentina displayed a "postcolonial syndrome" which is an obsessive faith in the subordination to rule of law. This faith in the rule of law was laid down in the Delhi Declaration, 1959, which held that under the rule of law, life, liberty and property of the people are safeguarded.¹³⁴ The Declaration also linked the fulfillment of the "legitimate aspirations" of the people with human dignity.¹³⁵ As per the normative approach to international law, this linkage between the aspirations of the people and the promises of law generates normativity.

In such a normative vein, Argentina and the Third World bloc persuaded the Soviet Union to accept the CHM, hoping to bring the Soviet Union under rule of law and thereby bind it tightly with the thick thread of normativity.¹³⁶ Argentina stated: "[t]he major merit of replacing the vague expression 'province of [hu]mankind' by the more meaningful expression 'common heritage of all [hu]mankind'

¹³¹ See Draft Agreement of Argentina, *supra* note 21, art. 1.

¹³² Timothy Nelson, *The Moon Agreement and the Private Enterprise: Lessons from Investment Law*, 17 ILSA J. INT'L & COMP. L. 393, 397 (2011).

¹³³ CHRISTOL, *supra* note 23, at 293-294.

¹³⁴ *The Rule of Law in a Free Society*, Clause I, in Report on the Int'l Congress of Jurists, New Delhi, India, Jan. 5-10, 1959, <https://www.icj.org/wp-content/uploads/1959/01/Rule-of-law-in-a-free-society-conference-report-1959-eng.pdf>.

¹³⁵ *Id.*

¹³⁶ See Argentina's Reply, *supra* note 34.

is that in so doing one has specified the commencement of an action, replacing an abstract statement by means of operating, within a specified legal framework.¹³⁷

Argentina's proposal to adopt the phrase "common heritage of all [hu]mankind was endorsed by Brazil, Chile, Indonesia, Mexico, Nigeria, Venezuela and a few other States.¹³⁸ They jointly asserted that an international regime for the equitable sharing of the benefits derived from lunar resources *inter alia* must be established.¹³⁹

As for the Soviet Union, rule of law was an unknown notion; for them, law is transient and, as E.B. Pashukanis held, exists for the sole purpose of being expended.¹⁴⁰ Hence, the Soviet Union viewed the proposed international regime as unfavorable towards its sentiments. Responding to the idea of an international regime under the rule of law, Ambassador Piradov pointed out that the idea of the Third World bloc is to internationalize space activities and to provide a supra-State nature to whatever body guides those activities.¹⁴¹ However, Mr. Kolossov clarified that his government agreeing to a CHM-based special international regime is "very doubtful."¹⁴² It is to be noted here that the Soviet Union was not *per se* against an international regime but was only against a regime which has CHM as its base, as is apparent from the statement of Mr. Kolossov: "doubts do arise ... with regard to the close link which ... exists between the proclamation of this principle [CHM] and the need to create a special international regime."¹⁴³

Later on in this LSC session, Austria submitted its own draft of the Moon Agreement¹⁴⁴ (Austrian Draft). While Article X, paragraph 4 of the Austrian Draft provided for the establishment of an

¹³⁷ *Id.* at 16.

¹³⁸ Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on its Fifteenth Session, U.N. Doc. A/AC.105/171, at 5-6 and Annex I, pp. 2-3 (1976).

¹³⁹ *Id.* at Annex I, p. 3.

¹⁴⁰ This position of Pashukanis is as it is presented in M.D.A. Freeman, *The Rule of Law: Conservative, Liberal, Marxist and Neo-Marxist: Wherein Lies the Attraction?* in PERESTROIKA AND THE RULE OF LAW 37, 38 (W.E. Butler, ed., 1991)

¹⁴¹ Comm. On the Peaceful Uses of Outer Space, Verbatim Record of its One Hundred and Sixty-Fourth Meeting, U.N. Doc. A/AC. 105/PV.164, 8-11 (June 25, 1976).

¹⁴² Comm. On the Peaceful Uses of Outer Space, Verbatim Record of its One Hundred and Eighty-Fifth Meeting, U.N. Doc. A/AC. 105/PV.185, 21 (July 11, 1978) [hereinafter Statement by Kolossov].

¹⁴³ *Id.*

¹⁴⁴ Austria, *Draft Treaty Relating to the Moon*, art. VIII, U.N. Doc. A/AC.105/L.74 (July 5, 1973).

international regime, regarding the CHM, paragraph 8 reserved the application of the doctrine for the decision of the conference of parties to be convened by the depository governments.¹⁴⁵ The Soviet Union had no qualms in accepting the Austrian Draft and it considered the Draft as “not a bad basis for a compromise solution.”¹⁴⁶ However, the Soviet representative stated that “we [] think that this text does need further study by our competent bodies.”¹⁴⁷

For Argentina and the Third World bloc, their effort in creating a rule of law regime was nearing fulfillment. They were in all optimism that at the conference of parties a normatively strong CHM regime could be established.¹⁴⁸ However, the Soviet Union perhaps saw in the compromise deal prospects of a cooperative enterprise in which each one shall, as per the Marxian dictum, “contribute according to his ability and receive according to his needs.”¹⁴⁹ But such a supreme socialist phase would be possible only after the increase of the productive forces with all-round development of the individual and the working class.¹⁵⁰ In the context of the Moon, the Soviets knew that such conditions simply do not exist and it would be appropriate to wait until favorable conditions of production come to exist. This position does not, however, mean that there would necessarily be desolation in the Soviet camp. The Soviet Union likely would have felt triumphant about whatever it had been able to achieve because as long as a CHM-based regime is not established, private ownership on the means of production remains unrealized—it is the first phase of socialism. This will be followed by governmental and collective undertakings under governmental control, which the Soviet Union hoped to achieve in the conference of parties.¹⁵¹

The Soviet Union’s effort at ideological contestation and correction, however, yielded international cooperation as they coincided with the normative goals of Argentina and the Third World

¹⁴⁵ *Id.*

¹⁴⁶ Statement by Kolossov, *supra* note 142, at 21.

¹⁴⁷ *Id.*

¹⁴⁸ *See generally*, Argentina’s Reply, *supra* note 34, at 14-16.

¹⁴⁹ *See* KARL MARX, CRITIQUE OF THE GOTH A PROGRAM 27 (2008).

¹⁵⁰ *See id.* at 26, 27.

¹⁵¹ *See* Vladimir Gsovski, *The Soviet Concept of Law*, 7 FORDHAM L. REV. 1, 36-37 (1938).

bloc. While assessments of each other's behavior were false, the outcomes, coincidentally, were favorable.

B. The United States Approach

Its actions and statements made it apparent that the United States did not want a CHM-regime for the Moon. However, the US disagreement with the CHM-regime had far more to it than the generally passed on information that the Moon Agreement and the regime it proposed was antagonistic to the *laissez faire* ideology and to the ways and means through which the United States could forge an unchallenged economic supremacy.¹⁵² As a result of its opposition to the Moon Agreement, conspiracy theorists have, among other things, accused the US defeating of being solely responsible for defeating the Treaty.¹⁵³

This section reviews the various American positions on the Moon Agreement and shows that the United States' positions were driven by rationalist considerations. It then pits the US position against Third World responses to show that the former was a shift between normative and idealist approaches.

1. Moratorium or No Moratorium? False Assessments and an Uninformed Non-Consensus

It is known that notwithstanding its objection to a CHM-based regime, the United States did not want a moratorium on any type of activities on the Moon.¹⁵⁴ This is apparent from the declaration of the US delegate that "his country was not ready to agree on an 'expressed or implied' prohibition on exploiting the lunar natural resources prior to the international conference meeting and agreeing on the 'appropriate machinery.'" ¹⁵⁵ What in fact the US wanted, according to the reports, was that the resources of the Moon be made available in "appropriate quantities" for scientific

¹⁵² See e.g., BASLAR, *supra* note 35, at 162.

¹⁵³ See generally Gangale, *supra* note 51.

¹⁵⁴ VIRGILIU POP, WHO OWNS THE MOON? EXTRATERRESTRIAL ASPECTS OF LAND AND MINERAL RESOURCES 147 (2008).

¹⁵⁵ *Id.* (citation omitted).

investigation, so that through “orderly attempts” there would mark an “experimental beginning.”¹⁵⁶

The reason for this US stance is likely to be primarily reputational, for space activities have always been performed for the sake of power, international prestige and reputation.¹⁵⁷ It is the case that such reputational payoffs are at their highest for private market transactions,¹⁵⁸ although their value in other domains such as research and development, national security and sports and games cannot be discounted. In the case of the Moon Agreement, the US position was that if the US opposition to the CHM leads to a moratorium on all commercial space activities, the United States would find itself part of a zero-sum situation.¹⁵⁹ If it agreed on the CHM, there would be an overall positive-sum situation due to the equitable allocation system of the proposed CHM-regime.¹⁶⁰ However, for the United States as a space leader, that is, one who has to be the major investor and exploiter, the situation would make it worse-off which could prompt a backout by the United States.¹⁶¹ The overall situation, in that case, would be that of a negative-sum.

Perhaps to deal with what is an impending negative-sum situation, the United States shifted its focus from commercial exploitation of lunar resources (markets) to scientific investigation (research) on the Moon—a strategic move of lowering expectations and changing the level of stakes to overcome negative-sum situations.¹⁶² The focus on the scientific investigation thus helped the United

¹⁵⁶ See US Working Paper, U.N. Doc. A/AC.105/C.2(XI)/WP.12/ Rev.1, Art. VIII, April 14, 1972, in Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on its Eleventh Session, U.N. Doc. A/AC.105/101 (1972), Annex I, Proposals and other Documents relating to Agenda Item 3 (Questions Relating to the Moon). See also POP, *supra* note 154, at 147.

¹⁵⁷ See Nicholas D. Welly, *Enlightened State-Interest: A Legal Framework for Protecting the ‘Common Interest of All Mankind’ from Hardinian Tragedy*, 36 J. SPACE L. 273, 280 (2010).

¹⁵⁸ *Id.* at 280, 281.

¹⁵⁹ SENATE REPORT ON THE MOON AGREEMENT, *supra* note 59, at 323 (discussing the potential effect of a moratorium and comparing with experience of the seabed mining programs).

¹⁶⁰ *Id.*

¹⁶¹ *Id.*

¹⁶² For a discussion on the game situations and the strategies to overcome them, see MALCOLM McDONALD KENNETH WARD & BRIAN DAVID SMITH, *MARKETING DUE DILIGENCE: RECONNECTING STRATEGY TO SHARE PRICE* 131-33. (2007). See also Brad Spangler, *Positive-Sum, Zero-Sum, and Negative-Sum Situations, Beyond Intractability*, available at <http://www.beyondintractability.org/essay/sum>.

States avoid a negative-sum situation of a complete moratorium on all lunar activities. Moreover, the United States likely understood that as long as commercial exploitation of lunar resources does not begin, it would not fall into the positive-sum situation (in which the United States would be worse off) posed by the resource allocation system of CHM. Then again, active scientific investigations on the Moon would help the United States prevent the situation from lapsing into negative-sum.

The aforementioned shift was not simply a shift from a high-stake situation (market) to a low-stake situation (research) to reduce the reputational stakes and prevent the negative-sum outcome. It was also meant to create an agreement with “efficient terms,” providing for an incremental shift to a positive-sum situation whereby the United States has Pareto superiority.

To elaborate, as preferred by the United States, the scope of scientific investigation in the Moon Agreement was drafted in such a manner that by “scientific investigation” the Treaty meant a “basis” for the commercial exploitation of lunar resources.¹⁶³ As such, in the Moon Agreement, the term “freedom of scientific investigation” means a State has the right to: “collect on and remove from the Moon samples of its mineral and other substances,”¹⁶⁴ retain such samples of minerals for further scientific purposes,¹⁶⁵ use appropriate quantities of minerals for supporting the purposes of missions,¹⁶⁶ and establish crewed and uncrewed stations on the Moon.¹⁶⁷ Once, the Treaty terms were laid down, the United States’ representative Ambassador Richard W. Petree pushed the scope of scientific investigation even further. He stated that “by setting

¹⁶³ See Petree Statement, *supra* note 10, at 162.

[T]he draft Moon Treaty also is, in its own right a meaningful advance in the codification of international law dealing with outer space, containing obligations which are of both immediate and long-term application in regard to such matters as the safeguarding of human life on celestial bodies, the promotion of scientific investigation and the exchange of information, relative to and derived from activities on celestial bodies, and the enhancement of opportunities.

Id.

¹⁶⁴ Moon Agreement, *supra* note 1, art. 6(2).

¹⁶⁵ *Id.*

¹⁶⁶ *Id.*

¹⁶⁷ *Id.*, art. 9(1).

forth now the purposes governing exploitation of natural resources, uncertainty is decreased and both States and private entities may now find it possible to engage in the arduous and expensive efforts necessary if exploitation of the natural resources of the celestial bodies is ever to become reality.”¹⁶⁸

As such, the United States set the ground for a non-zero-sum (positive-sum) situation. Further, to transcend to Pareto superiority, the United States asserted that paragraph 7 of Article 11 of the Moon Agreement, which provides for an international regime for the orderly and safe exploitation and the rational management of the resources of the Moon, “recognizes that an equitable sharing of the benefits ... necessitates giving special consideration to those who have contributed directly to the exploration of the moon as well as to the needs of developing countries and those who have indirectly contributed to the moon's exploration.”¹⁶⁹ Thus, from the threat of a zero-sum situation, which demanded a trade-off for recovery or improvement, the United States created an agreement with efficient terms. N. Jasentuliyana underlines this rationalist position and the diplomatic success it had from that position:

The Moon Agreement, as it stands, [...] represents a solid basis upon which further space legislation can continue. Independent of its origins the Agreement now represents the expression of the common collective wisdom of all member States of the United Nations and it responds, in particular, to the needs and possibilities of those that have already advanced their technologies into outer space.¹⁷⁰

However, the United States claimed success not simply because it avoided a moratorium, but because a moratorium on all exploitation of lunar resources, which was found not consistent with the State-interest of the United States, was avoided.¹⁷¹ That is, the United States was aware that Article 11 of the Moon Agreement leaves sufficient room for a CHM-based regime, which, if

¹⁶⁸ Petree Statement, *supra* note 10, at 163.

¹⁶⁹ *Id.*

¹⁷⁰ SENATE REPORT ON THE MOON AGREEMENT, *supra* note 59, at 324.

¹⁷¹ See generally Stanley B. Rosenfield & Delbert D. Smith, *The Moon Treaty: The United States Should Not Become a Party*, PROC. ANNUAL MEETING OF THE ASIL, April 1980, pp.162-70.

effectuated, will have the United States worse-off.¹⁷² Hence, a moratorium on the commercial exploitation of lunar resources was an optimal strategy for the United States up until negotiations are started anew in the conference of parties. But a complete moratorium on all lunar activities would have reputational costs, which could sink the United States into a negative-sum situation. By pitching on the minimalism of scientific investigation on the Moon—a trade-off between market gains and reputational costs—the United States reinstated the situation to non-zero-sum, and therefrom transcended to Pareto superiority by creating an agreement in efficient terms.¹⁷³

In response to the United States' position that there be no moratorium, the Third World bloc argued that the language of the Moon Agreement is sufficient enough to impose a moratorium on all commercial activities on the Moon.¹⁷⁴ For example, provisions such as paragraph 5 of Article 11, which relays that a regime for the exploitation of lunar resources is yet to be established, and paragraph h2 of Article 6, which restricts the use of lunar resources to "scientific purposes only" have the effect of a moratorium on commercial lunar activities.¹⁷⁵ The argument of the Third World States was that if there is no pre-regime moratorium, technologically advanced countries would have sufficient leeway for exploiting the resources before the regime is established.¹⁷⁶ According to them, "the exploitation of lunar resources shall be carried out only in accordance with procedures and rules established by an international regime."¹⁷⁷ Only a functional international regime can break the moratorium.

The situation was ironic as far the Third World States were concerned, that is, even after gaining a CHM clause in the Moon Agreement, they had to ask for a moratorium – for what was hard-earned was too vague to be fairly determined or enforced, which

¹⁷² See Moon Agreement, *supra* note 1, art.11 (7) (d).

¹⁷³ *Id.*

¹⁷⁴ This was obvious from the Indonesian position on CHM. As quoted in the Remarks by John B. Breaux before the Centre for Strategic and International Studies, Feb. 19, 1980. See SENATE REPORT ON THE MOON AGREEMENT, *supra* note 59, at 321. See also RICKY J. LEE, LAW AND REGULATION OF COMMERCIAL MINING OF MINERALS IN OUTER SPACE 274 (2012).

¹⁷⁵ See Lotta Viikari, *Natural Resources of the Moon and Legal Regulation*, in MOON: PROSPECTIVE ENERGY AND MATERIAL RESOURCES 519, 542 (Viorel Badescu, ed., 2012).

¹⁷⁶ See TRONCHETTI, *supra* note 22, at 55.

¹⁷⁷ *Id.*

aggravated the fear of a unilateral regime.¹⁷⁸ Hence, the Third World States wanted, as if as an assurance, that technologically advanced countries become parties to the Moon Agreement and participate in building a regime that is beneficial for all members of the United Nations.¹⁷⁹ In other words, they sought an official moratorium until the proposed international regime is established.¹⁸⁰

There were also other provisions in the Moon Agreement that evoked anxiety among many Third World States. For example, in paragraph 3 of Article 11, which deals with the prohibition on ownership of natural resources, only natural resources which are “in place” are prohibited from private ownership, leaving undefined the status of the samples of natural resources collected and removed from the Moon for scientific purposes or other purposes.¹⁸¹ This clause, according to many Third World States, opens scope for the inference that such samples “once removed, becomes the property of the collecting state.”¹⁸²

Moreover, there was a troubling sense of nostalgia for many Third World States which was evoked by the diplomatic experiences they had during the negotiation for the United Nations Convention on the Law of the Sea (UNCLOS).¹⁸³ Therein also, negotiators had to grapple with a CHM-regime and questions regarding the existence of a moratorium.¹⁸⁴ The situation, opines Virgiliu Pop, might have been sparked by the UNCLOS-related General Assembly Resolution 2574 (XXIV), which declared that pending the establishment of the international regime, States and other pertinent actors shall refrain from “all activities of exploitation of the resources of the area of the sea-bed and ocean floor, and the sub-soil thereof.”¹⁸⁵ In sum, a moratorium which was declared in circumstances parallel to that of the Moon Agreement prompted many Third World States

¹⁷⁸ See PETERSON, *supra* note 52, at 161.

¹⁷⁹ *Id.*

¹⁸⁰ *Id.*

¹⁸¹ See POP, *supra* note 154, at 144.

¹⁸² *Id.*

¹⁸³ *Id.* at 147.

¹⁸⁴ See Helmut Tuerk, *The Idea of the Common Heritage of Mankind*, in *SERVING THE RULE OF INTERNATIONAL MARITIME LAW* 156, 170-71 (Norman A. Martinez Gutierrez, ed., 2010).

¹⁸⁵ POP, *supra* note 154, at 147; See also GA Res. 2574 D (XXIV)(Dec. 15, 1969).

to believe that there is a moratorium on commercial lunar mining as well.

Revisiting the Third World bloc position, three characteristics attributable to normative systems (which make the Third World bloc's approach normative) are apparent. First, the type of legal reasoning employed by the Third World States is what may be called "simple normative," that is, their reasoning proceeded in a "humdrum," unchanging and unidirectional manner.¹⁸⁶ They deemed social reality as having been embodied in the rule in all its fine simplicity as if the description of a certain situation in a rule is conclusive and free from the need for any extra-legal evaluation.¹⁸⁷ This was particularly obvious in the Third World position on the moratorium, whereby all doubts regarding the existence of a moratorium was based on the language of the treaty.¹⁸⁸ The Third World approach resembles the normative faith that a rule, in whatever form it is, is a "consensual linguistic domain."¹⁸⁹

Second, while relying on the language of the Moon Agreement to assert that there is a moratorium, that is, even when following the semantic plainness of the Moon Agreement—the simple normative—the Third World States wanted an interim moratorium declared in the best interest of humankind.¹⁹⁰ In other words, their self-subjection to the rules went beyond the pull of the semantic objectivity of the simple normative but had an interest-base to it.¹⁹¹ At this juncture, the Third World States departed from the simple

¹⁸⁶ See PAUL F. DIEHL & CHARLOTTE KU, *THE DYNAMICS OF INTERNATIONAL LAW* 49 (2010).

¹⁸⁷ See J. Aguilo-Regla, *Introduction: Legal Informatics and the Conceptions of Law*, in *LAW AND THE SEMANTIC WEB: LEGAL ONTOLOGIES, METHODOLOGIES, LEGAL INFORMATION RETRIEVAL AND APPLICATIONS* 18, 20 (V. Richard Benjamins et al., eds., 2005). See also SEBASTIAN URBINA, *LEGAL METHOD AND THE RULE OF LAW* 130 (2002) (drawing on Carlos S. Nino).

¹⁸⁸ See e.g., POP, *supra* note 154, at 146 ("The language of Art. 11.5 has been subject to [...] scrutiny as to its prohibiting or not the exploitation of the lunar resources prior to the establishment of a regime."); Finch Edward R Jr. & Amanda Le Moore, *The 1979 Moon Treaty Encourages Space Development*, *Proceedings of the 23rd Colloquium on the Law of Outer Space*, 1999, pp. 9-11 ("[L]anguage specifically calling for moratorium was, at least in two instances, rejected during the negotiations of the Moon Treaty").

¹⁸⁹ See Martin Neumann, *Cognitive Architectures of Agent Systems and Social Mechanisms of Emergence and Immersion*, *Proceedings of the AISB Convention*, 2008 (on file with the author).

¹⁹⁰ See JULIAN HERMIDA, *LEGAL BASIS FOR A NATIONAL SPACE LEGISLATION* 37-38, fn.254. (2004).

¹⁹¹ *Id.*

normative approach to a “substantivized” approach (not any less normative, though) by which pertinent substantive values and interests inject meaning and purpose into law.¹⁹² The substantivized approach, as a qualitative improvement from the simple normative approach, comes with a greater sense of legalism, that is the “ethical attitude” (an optimism regarding the constitutive potential of law) and an enhanced faith in rule of law.¹⁹³

The interest-driven claims of the Third World States for a moratorium are not, however, comparable to the policy-driven pursuit of preferences in idealist approaches to international law. While both remain choices, the choice-category of the latter is the rational choice favoring self-interest and the former is analogous to what Perry Dane identifies, as a “normative choice for its normative sake.”¹⁹⁴ Regardless, the Third World States combined both the approaches; first, they dutifully followed the semantic imperatives of the Moon Agreement and then they added their value choices—expectations, so to say—to those imperatives, to generate a “normative vista” (as part of the substantification): a real-world of rights, duties and relations.¹⁹⁵

Third, the reliance on the experiences in lawmaking for the UNCLOS produced a nostalgic recurrence of a particular context. Though nostalgia as such has hardly been considered as a cause of norm-formation, the presence of a legal memory to contain the normativity was never disputed by the supporters of normative reasoning.¹⁹⁶ In the case of the negotiator’s reversion to the UNCLOS-experiences in the LSC, it was a resort to the practice of a “transhistorical” search in the legal memory for the coherence of legal doctrine and legal texts—nothing but a “nostalgic lapse”—a practice characteristic of normative legal reasoning.¹⁹⁷

Against the United States’ denial of a moratorium, the Third World States felt a loss of coherence of the doctrinal ensemble of Article 11 – for according to them, the text of Article 11 imposes a

¹⁹² See Aguilo-Regla, *supra* note 187, at 21.

¹⁹³ *Id.*

¹⁹⁴ Perry Dane, *The Natural Law Challenge to Choice of Law*, in *THE ROLE OF ETHICS IN INTERNATIONAL LAW* 142, 162 (Donald Earl Childress, ed., 2012).

¹⁹⁵ See *id.*

¹⁹⁶ CHRISTOPHER HUTTON, *LANGUAGE, MEANING AND THE LAW* 181 (2009).

¹⁹⁷ See *id.*

moratorium.¹⁹⁸ And then came the nostalgic lapse, finely captured by an Assessment Study: “The Moon Treaty ... *like* the [...] Law of the Sea would delay or prevent commercial investments in space activities ... The eventual outcome of the Law of the Sea [would] have an important bearing on the shape of the future outer space regime.”¹⁹⁹

Again, the lapse to UNCLOS also resulted in an intertextual reading of the CHM in the Moon Agreement. However, what is meant by intertextual here is the legal reasoning by analogy—a type of reasoning common in legal doctrine—employed by the Third World bloc.²⁰⁰ Such a reading is apparent from the statement of Mr. Vallata, a Mexican delegate:

If the sea-bed and the ocean floor beyond limits of national jurisdiction have been recognized as the common heritage of [hu]mankind we can find much logic in the statement that all areas [including the Moon and its natural resources] outside the limits of State jurisdiction by their very nature also constitute the common heritage of [hu]mankind and are subject, therefore, to an equitable and binding distribution of their benefits.²⁰¹

In the present case, intertextuality between the Moon Agreement and UNCLOS must have produced an intertextual ambiguity such that a troubling sense of *déjà vu* fell over many of the Third World States. The circumstances which led to the moratorium on the commercial exploitation of seabed and the resources thereof were felt to be present in the case of Moon also. It was based on such an evaluation that the Third World bloc held that there is a moratorium on the commercial mining of lunar resources.²⁰²

¹⁹⁸ As a support to this observation, see Carl Q. Christol, *The Common Heritage of Mankind Provision in the 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies*, 14 INT’L LAW. 429, 475-77 (1980).

¹⁹⁹ SOLAR POWER SATELLITES 158, 159 (1981) (emphasis added) <https://space.nss.org/wp-content/uploads/1981-OTA-Solar-Power-Satellites.pdf>.

²⁰⁰ Jan M. Broekman, *Analogy in the Law*, in LEGAL KNOWLEDGE AND ANALOGY: FRAGMENTS OF LEGAL EPISTEMOLOGY, HERMENEUTICS AND LINGUISTICS 217, 221 (Patrick Nerhot, ed., 1991).

²⁰¹ Comm. On the Peaceful Uses of Outer Space, Verbatim Record of its One Hundred and First Meeting, U.N. Doc. A/AC.105/PV.101, 113 (Sep. 3, 1971).

²⁰² Support for this conclusion can be found in the United States response that “if it is estimated that there is such uncertainty [the moratorium] ... consideration could be

A review and evaluation of these States' positions show us the assessment problem from a different perspective. However, for the case herein, the outcome is not favorable—State positions simply did not correspond or coincide.²⁰³ The United States stood firm for no-moratorium and the Third World bloc for moratorium. No consensus was reached on this point in the LSC. Nevertheless, what is interesting about the assessment problem in this context is that it is the optimism, which is shared by both groups, about a future international regime for resource exploitation and allocation, that shaped their respective positions.²⁰⁴ That is, the United States wanted the regime to be run along the lines of liberal market, and the Third World bloc wanted it on the CHM lines which “resemble most closely the ‘Natural Law School’ of space law.”²⁰⁵ Whatever followed was an output of this common motive.

The legal nature of the interim period was somewhat baffling. The question was whether it should be of a liberal or egalitarian character. However, it was quite natural for the United States to start building a liberal market regime and for the Third World bloc to build an egalitarian architecture.²⁰⁶ The United States proceeded along those lines only. Hence, leaving no scope for a future trade-off (i.e., at the time when the regime is established), the United States created a deal on efficient terms. What the United States felt as appropriate for the interim period was to ensure that there occurs a fair transition from minimal/optimal market conditions to a business-friendly regulatory regime.²⁰⁷ For such a transition to happen, the United States wanted activities of a certain sort to happen during the interim period.²⁰⁸ Hence, the United States had to declare no-moratorium on lunar activities—very much a strategic decision.

given to handling the situation along lines similar to those being considered by the Congress for the deep seabed minerals.” SENATE REPORT ON THE MOON AGREEMENT, *supra* note 59, at 75.

²⁰³ See Kim Elaine Rathman, *Sharing the Harvest of the Skies: Outer Space Commercialization and Third World Development*, 3 SOC'Y PHILOSOPHY & TECHNOLOGY 4 (1998).

²⁰⁴ *Id.*

²⁰⁵ *Id.*

²⁰⁶ *Id.*

²⁰⁷ *Id.*

²⁰⁸ *Id.*

However, for the Third World bloc, in all their normative faith, the Treaty language was meant to be inviolably respected. When treaty language is uncertain, one can, however, “venture out” to construct meanings.²⁰⁹ But in the case of the Moon Agreement, the uncertainty existed because the so-called “provisional application” clause was cast in a soft language of “not to be legally bound to provisionally apply the Treaty.”²¹⁰ Hence the Third World bloc had little scope for venturing out to stop others from carrying out activities on the Moon.²¹¹ Caught in this dilemma, they likely saw the United States declaring no-moratorium as if commercial activities were soon to commence on the Moon at the violation of CHM. Thus, the rationally thought-out strategic decision-making of the United States appeared to the Third World bloc as the former taking advantage of the uncertainty in the language of the Moon Agreement—amounting to a normative breach by the United States. As a response, the most pertinent option before them was to demand an official moratorium.

Even though the assessments by each party about the behavior of the other can somehow meet somewhere, no consensus was reached on the moratorium issue then. Not only was there no consensus, but the non-consensus was also poorly informed. In other words, clearly, no breach of norms, as the Third World bloc anticipated, was intended by the United States, although they wanted a regime of a certain kind for the future. In the same vein, the United States proceeded with a one-sided—preference-based—assessment of the situation, ignoring the normative conceptions of international law.

At this juncture, it is worthwhile to think that had the States informed about the understanding of the type of international law which the other State had internalized, the outcome may have been different. To be specific, had the Third World States known that the United States’ no-moratorium position is a strategic move driven by reputational and prestige factors and a cost-based preference-pursuit, perhaps they would not have resisted the no-moratorium position in the fashion that they did. Otherwise, perhaps the Third

²⁰⁹ See Anneliese Quast, PROVISIONALLY APPLIED TREATIES: THEIR BINDING FORCE AND LEGAL NATURE 221-22 (2012).

²¹⁰ *Id.*

²¹¹ *Id.*

World bloc would have yielded to a more or similar cost-efficient alternative arrangement for the interim period without transgressing normative foundations. Then again, had the United States been aware of the possible normative consequences of their cost-based action, they could have modified their preference, without much (or with less) trade-off between material cost and reputational cost. The collective suboptimal outcome, as it was in the case of the Moon Agreement, due to the rational actions of the United States, could have been avoided.²¹²

2. The Final Moments and the Death of the Moon Agreement

It is the height of paradox that the much ambitious concept of the CHM caused the death of the Moon Agreement. The paradox is particularly surprising given that the entire negotiations of the Moon Agreement were centered on the CHM. Not only that, a treaty instrument was also drafted with a fair dose of CHM in it. However, a few turns of events—happenings and counter-happenings—after the drafting of the Treaty and the post-drafting contemplations prompted big policy swings which rendered the CHM a burden for the State parties. Particularly after the disagreement regarding the presence of a moratorium, the misunderstandings between the State parties widened, worsening the assessment problem.

As far as the Third World bloc was concerned, the uncertainty regarding the legal nature of the interim period was disconcerting.²¹³ There were also widespread concerns about the prospective international regime, which produced, what E.E. Weeks and M.K. Force call, a “knee-jerk prejudice” against the regime.²¹⁴ This was aggravated by the infamous statement by Mr. Hosenball before the LSC.²¹⁵ Speaking on the United States’ approach to the legal nature of the interim period and the proposed regime, he declared that the United States’ plan is, as paraphrase by Christol, to make a “transition from experimental to pilot programs, and from pilot programs to commercial activity ... Through such permissible activity the

²¹² See Sun-Ki Chai, *Rational Choice: Positive, Normative and Interpretative*, available at <http://www2.hawaii.edu/~sunki/paper/ratjust.pdf>.

²¹³ See Edythe E.E. Weeks & M.K. Force, *Tidying up the Moon Treaty Prior to Construction*, 53 PROC. INT’L INST. SPACE 169 (2010).

²¹⁴ *Id.* at 173.

²¹⁵ CHRISTOL, *supra* note 23, at 303.

feasibility of further exploitation would be determined. Once this feasibility has been demonstrated, the negotiation of the proposed regime could be initiated.”²¹⁶

For the Third World bloc, which has its own fine prejudices about the international regime, the United States’ approach, as it was reflected in Mr. Hosenball’s statement, seemed like a unilateral resolution to install liberal market principles for lunar exploitations.²¹⁷ This appeared so ridiculous an intention that it could devastate the “cosmopolitan conceptualization” of CHM—that is of a global-level benefit and burden sharing—which many of the Third World States envisaged for the proposed regime.²¹⁸ The Third World bloc hence asserted that Article 11 of the Moon Agreement provides for “equitable sharing” of resources which means “‘equal’ distribution by all States of the benefits derived from the exploitation of the natural resources of the Moon.”²¹⁹ The United States, however, rejected the Third World interpretation of equitable sharing as being utopian socialism and asked for a “less direct interpretation of the idea of ‘sharing.’”²²⁰ Not only that, the United States interpreted Article 11 as providing a base for free market liberalism.²²¹ As if in support to this position, Ambassador R.W. Petree stated that the Moon Agreement has enhanced the opportunities for “free and equal exploration, use, and exploitation of the Moon and its natural resources ... allowing for scientific and commercial activity respecting the Moon and its natural resources.”²²²

As discussed earlier in this article, it was not simply the equal sharing of resources that many of the Third World States meant by the CHM, but through the concept they advanced “legitimate aspirations to achieve more equitable solutions” under a new, perhaps

²¹⁶ *Id.*

²¹⁷ See BASLAR, *supra* note 35, at 163-64.

²¹⁸ See Ellen Hey, *Interdependencies, Conceptualizations of Humanity and Regulatory Regimes*, in HUMANITY ACROSS INTERNATIONAL LAW AND BIOLAW 244, 263 (Britta van Beers et al., eds., 2014).

²¹⁹ TRONCHETTI, *supra* note 22, at 58.

²²⁰ Bryon C. Brittingham, *Does the World Really Need New Space Law?*, 12 OREGON REV. INT’L L. 31, 39 (2003).

²²¹ *Id.*

²²² CHRISTOL, *supra* note 23, at 310 (citations omitted).

revolutionary, international law of humankind.²²³ The claim for moratorium and thereby the efforts to prevent commercial mining by the developed countries was only part of such a scheme. M. Bedjaoui points out that the Third World claims related to the CHM were not, as widely believed, an effort at realpolitik to obtain a favorable diplomatic quotient.²²⁴ Instead, they were meant to make the high ideal of “human good” part of the normativity of the pursuit of “the legitimate interest of all countries and for the benefit of all States.”²²⁵ Scott J. Shackleford echoes this sentiment: “[d]escriptions of the principle range from proclamation of a social and political ideal to a legal requirement that *must* benefit all humanity. ... In its most positive form the CHM epitomizes the aspiration of friendly and cooperative international relations to manage communal resources for the common good.”²²⁶

This social idealism of the Third World States, which manifested through the claim for equitable allocation of the lunar resources, was likely interpreted by the United States as a strategy for receiving unjust enrichment. Moreover, the fall to collective suboptimal conditions due to the moratorium issue had disturbed the United States, as a commentator noted, the United States analysis demonstrated that the language would:

create a moratorium on commercial exploitation of the resources of the moon and other celestial bodies, until a second, more comprehensive treaty for regulating such activities is concluded, and establish guidelines for this second treaty antithetical to the commercial development of outer space resources by private enterprise²²⁷

To avoid further suboptimal outcomes, the United States’ decision-makers had to modify their policy choices, as Jennifer Sterling-Folker conceptualizes the best strategy after suboptimal conditions: Decisionmakers who are confronted with the problem of

²²³ See BASLAR, *supra* note 35, at 164. See generally M. Bedjaoui, *Classism and Revolution in the Elaboration of the Principles and Rules of Space Law*, in PERSPECTIVES ON INTERNATIONAL LAW 441, 463 (Nandasiri Jasentuliyana, ed., 1995).

²²⁴ *Id.* at 457.

²²⁵ *Id.*

²²⁶ Scott J. Shackleford, *The Tragedy of the Common Heritage of Mankind*, 28 STANFORD ENVIRONMENTAL L. J. 109, 149 (2009)(emphasis in original).

²²⁷ *Id.* at 16.

suboptimal outcomes “have to actively carry through [lessons from past decisions] in their subsequent choices and behavior.”²²⁸ Moreover, a major qualitative change that they should bring in subsequent decision-making is to avoid patterns through which suboptimal outcomes are produced.²²⁹ However, further assessments of the outcomes done by sub-agencies for the United States criticized the pro-Treaty stance of the United States Government as being naïve. As Michael Calabrese of the Space Futures Society, a space enthusiast group, put it:

The federal government of the United States is almost totally ignorant of the value of space, its potential for development as an industrial base or its economic benefits. There is a basic lack of understanding in terms of just what the American ability in space is and what it means to this nation and the free world.²³⁰

Alongside the critics, activist groups like the L-5 Society applied pressure on the United States’ decision-makers to avoid the mistake of entering into coordination games, though coordination strategies were, in theory, the perfect strategy to optimize conditions.²³¹ Yet, to avoid “recidivism,” as Sterling-Folker refers to a lapse to preceding patterns of decision-making, the United States decided to altogether drop the negotiations.²³²

The United States had taken such a decision, for in its assessment, the Third World States wanted an unjust enrichment through the CHM.²³³ The United States observed that the CHM is so unfairly organized that it was set to create an “anticommons,” wherein cost for mining was to be assumed by the United States and the benefit shared with everyone.²³⁴ Since the costs outweigh the benefits, the United States would be worse off in the deal.²³⁵ Any collective action through the proposed regime also did not seem

²²⁸ JENNIFER STERLING-FOLKER, THEORIES OF INTERNATIONAL COOPERATION AND THE PRIMACY OF ANARCHY 122 (2002).

²²⁹ *Id.* at 122-23.

²³⁰ Gangale, *supra* note 51, at 5 (citations omitted).

²³¹ *See id.* at 5-7. *See also* STERLING-FOLKER, *supra* note 228, at 122 (discussing strategies to optimize conditions).

²³² *Id.*

²³³ Benjamin David Landry, *A Tragedy of the Anticommons: The Economic Inefficiencies of Space Law*, 38 BROOKLYN J. INT’L L. 523, 531 (2013).

²³⁴ *Id.* at 527-28.

²³⁵ *Id.* at 528.

to be a viable option then, given the problem of “anticommons” on one side and the high transaction cost the regime could impose on the other side.²³⁶ Finally, the United States Congress decided not to sign or ratify the Moon Agreement.²³⁷

For the Third World bloc, it was a fall from high hopes to disillusionment. Their idealist vision for a universalism of “common human good” in the self-ordering of humanity, which they sought to achieve through the CHM, was lost before the cost-based assessments of the United States.²³⁸ However, were the underlying rationales for the respective positions of each group known to the other, there would have been, perhaps, better outcomes.

It is true that there was uncertainty regarding the proposed regime, which was felt by both groups notwithstanding their varied internalizations—normative, rationalist and idealistic. But it has been the practice in law—normative or rational choice model—that subjects of the law who encounter uncertainty reflexively try to pull through counteractions to extinguish uncertainty.²³⁹ However, uncertainty—vague information and uncertain outcomes—also distorts efficient behavior such that subjects resort to different, often suboptimal, strategies according to their respective assessments.²⁴⁰ Both the United States and the Third World bloc did the same. As far as the United States was concerned, apparent uncertainty about the nature of the regime and the possible payoffs prompted the nation to move towards risk aversion such that some level of optimality is obtained—and hence, the United States abandoned the Moon Agreement.²⁴¹ And the Third World States saw the United States trading in a legal uncertainty, thereby extinguishing their hopes for a common good and to build a normative architecture that suits their convenience, which was not in fact the case—but the Third World States also left the Moon Agreement.²⁴²

²³⁶ See *id.* at 528.

²³⁷ *Id.* at 531 n.34.

²³⁸ *Id.* at 534, n. 58.

²³⁹ See generally Anthony D’Amato, *Legal Uncertainty*, 71 CAL. L. REV. 1 (1983)

²⁴⁰ *Id.* at 4-5, 37.

²⁴¹ D’Amato, *supra* note 239, at 15.

²⁴² See *id.* at 43-45.

IV. FALSE ASSESSMENTS BECOMING AN EPISTEMOLOGICAL PROBLEM: THE INTERNATIONAL LAW OF THE MOON

The false assessments and the resulting outcomes were not the end of the play of perspectives—the politics of perspectives did not simply stop with each State wrongly understanding the other and with the failure of the negotiations. From the end of the negotiations continued the scholarly work of recording of the negotiations to become what has come to be called the international law of the Moon. In other words, after the completion of negotiations, both the negotiations and their outcomes started getting expressed in scholarly works as theories, doctrines, assertions, claims, anxieties, skepticism, dissents and criticism. Here, one must remember that knowledge production in general is not a process free from scholarly biases and their epistemological internalizations—there are inevitable imperative variables which naturally creep into any type of human knowing, virtually influencing and determining the nature of knowledge. Hence, occurrences which happen in their finest objectivity, when getting recorded by the scholars, receive a subjective quality as well as generality. In the case of the Moon Agreement also, various occurrences (the interstate interaction regarding the Moon) have been recorded by the scholars, with their own respective internalizations of international law—normative, rationalist and idealistic—and with a fine generality typical to scholarly products, which have become the international law of the Moon.

Although this article presented the assessment problem with an analytical specificity, for presenting the epistemological problem (caused by the plurality of approaches), it takes a somewhat generalized approach. That is, it does not warrant a revisit to each and every State interaction analyzed as part of the assessment problem. Yet, as the epistemological problem is a natural effect of the assessment problem, this article is not poised to altogether start a new analysis. Hence, it takes the three State positions, rather the broader attitudes of States—the Soviet resistance to the CHM, the United States opposition to the CHM and the Third World support for the CHM (in the respective order)—salient during the Moon Agreement negotiations.

First, this article presents the Soviet Union's opposition to the semantic construction of the CHM doctrine. Second, it discusses the US's opposition to the CHM for it being antithetical to the market

liberalism advocated by the US. And third, it presents the Third World States' support for a CHM-regime, a seemingly normative framework for the exploitation, allocation and redistribution of lunar resources.

A. Epistemology of the Soviet Position on the Moon: Normative Assessment of Idealism

The socialist idealist position of the Soviet Union on the ownership of lunar resources, on the term heritage and on the CHM as a whole was opposed by the Third World States on normative grounds. Notwithstanding the diplomatic differences, coincidentally, the outcome of the interaction—occurrence, so to speak—was favorable. That much is a known story. However, scholarly recording of the many occurrences, call it the oversight of scholars or due to their yielding to the pull of their own epistemological internalizations, failed to appreciate the internalizations of the States, and thus produced opinionated commentaries on the international law of the Moon, which are far off from real State intentions and actual facts. A few examples follow.

The Soviet's first participation in the Moon Agreement negotiation was through the submission of a draft treaty. The draft, which was substantially different from the final Moon Agreement, from a Soviet perspective, was meant to realize the proletarian interest on the Moon.²⁴³ The draft, irrespective of the specific issues it addressed, mainly intended to create a legal relationship of a “dialectical character” for a peaceful coexistence of States, as a step towards the actualization of a certain determination of common interest.²⁴⁴ However, this Soviet position in the draft and the differences it had with other drafts and State positions in the LSC had delayed the conclusion of the Moon Agreement, but for the final coincidental favorable outcome.²⁴⁵

Recoding this particular interstate interaction, Bin Cheng, in a work that the author considers to be an authoritative “first voice” on space law, observes that the Soviet draft can only be viewed as a move to “head off” the other State initiatives.²⁴⁶ Instead of trying

²⁴³ See Allott, *supra* note 113, at 36-37.

²⁴⁴ *Id.*

²⁴⁵ CHENG, *supra* note 45, at 359-60.

²⁴⁶ *Id.* at 359.

to find out the ideological motivation behind the Soviet move, Chen focuses on the semantic differences that the Soviet draft had with other similar drafts:

In contrast to the original Argentine draft, the Soviet proposal (i) applied only to the Moon but not to other celestial bodies, and (ii) did not deal with the problems of resources. These were two of the issues which held up agreement on the Treaty for seven years.²⁴⁷

Another contentious stance taken by the Soviet Union in their draft treaty was the waiver of any claims of ownership of lunar property because the Soviets deemed private ownership of property as a “source of power” for the bourgeoisie and as a means for perpetuating capitalist regimes.²⁴⁸ If private ownership of property is destroyed, the bourgeois will not be able to find its position of power, and society would move to socialist echelons.²⁴⁹ This social idealist position of the Soviet Union and the subsequent objection it had from certain States was given a normative reading by Christol.²⁵⁰ He records:

By supporting the *res communis* principle [which is in fact not true], and by specifically urging that private property or ownership rights might not be acquired in the surface or subsoil of the Moon,” the Soviets were in fact accepting a part of a fundamental element of the more wide-ranging CHM principle.²⁵¹

Christol calls this position of the Soviet Union a “self-denying one”...²⁵² His observation is on the basis of a straightforward reading of the raw outcomes of the interaction of States, considering only the positivistic essentials—such as language, context, etc. — which are too specific for the meta-ideological generalities which were at the base of the Soviet position.²⁵³ Christol’s conclusion on the Soviet position is that, going by the semantics of the Soviet’s draft treaty, the Soviets were “not in total opposition to the CHM principle.”²⁵⁴ In his recording of the law of the Moon, the Soviet

²⁴⁷ *Id.*

²⁴⁸ See Hazard, *supra* note 74, at 466-67.

²⁴⁹ See *id.* at 467.

²⁵⁰ See generally CHRISTOL, *supra* note 23.

²⁵¹ *Id.* at 168.

²⁵² *Id.* at 457.

²⁵³ *Id.*

²⁵⁴ *Id.*

Union's internal incoherence—an absence of normative intelligibility—was to a large extent responsible for the slow pace of negotiations.²⁵⁵

As noted, the Soviets are criticized for excluding any reference to the CHM in their draft treaty.²⁵⁶ The reason for this exclusion and their subsequent resistance to the CHM, according to the Soviet Union, was to prevent the free rider problem from occurring and forestall the “laissez-faire capitalist exploitation of the natural resources of outer space.”²⁵⁷ Hence, they took a “middle ground” — that of the space, including the Moon, becoming an “international arena for common use.”²⁵⁸ The idea was to keep things on hold until the juridical nature of CHM became clear for legal relations to form.²⁵⁹ Once the legal actors (stakeholders) reach the “pattern of potentiality” of the possible legal relations among actors, the legal status of the Moon would become determinable.²⁶⁰ Such was the depth of idealism of the Soviet Union that it not only escaped the normative attention of other States but also that of the commentators who recorded the particular occurrence.

Missing the true intent of the Soviet Union, Cheng records the negotiation as if there is a normative error caused by the Soviets. Cheng noted that “[o]ne of the Soviet objections to the adoption of this concept [CHM], from the purely technical and legal point of view, was probably its lack of legal definition and the consequential danger of alleged rules and obligations being deduced from it in time to come.”²⁶¹ It is true that while questioning the juridical nature of the CHM, the Soviet Union questioned the semantic structure and implication of the CHM concept, however, as became apparent while presenting the assessment problem, that was not due to any normative concerns as Cheng records.²⁶² Against the recordings of Cheng's, a commentator has cautioned:

²⁵⁵ *Id.*

²⁵⁶ Jaksetic, *supra* note 67, at 504.

²⁵⁷ *Id.* at 505.

²⁵⁸ *Id.* See also Dekanozov, *Some Questions of Juridical Nature of Areas (Spaces) Withdrawn from State Sovereignty*, 1 SOVIET Y.B. INT'L L. 203 (1973) (discussing the Space Treaty of 1967 and common use).

²⁵⁹ Dekanozov, *supra* note 258, at 203.

²⁶⁰ See Allott, *supra* note 113, at 36.

²⁶¹ CHENG, *supra* note 45, at 366.

²⁶² *Id.* at 366-67.

[I]t is difficult to determine to what extent Soviet writings on space law are political puffery intended to be expendable in practical diplomatic negotiations and to what extent they are based on ideological premises not subject to compromise. The consistent invocation of Soviet Marxist-Leninist ideology indicates that the writings should be taken at face value. Otherwise, one risks serious error by dismissing the ideological components as superfluous rhetorical devices.²⁶³

But again, taking for a normative value, the Soviet resistance to the CHM, which actually was due to the possibilities for private ownership that the CHM offered, another commentator has concluded that the Soviet position on CHM was driven by concerns about State sovereignty which prompted the Soviet Union to oppose the concept: “the Moon Treaty did not attract Soviet support since the accord was viewed less as a vindication of its legal policies and more as an attack on its sovereignty.”²⁶⁴

The Soviet Union’s was not the only case of an idealist position receiving a normative assessment and epistemological recording.²⁶⁵ The United States’ rational positions were also given a normative interpretation.²⁶⁶

*B. The United States as the Antihero of the Law of the Moon:
Normative Assessment of Rationalism*

It is by now easily argued that the United States got itself mis-assessed on its position regarding the moratorium and on its effort to recover from the suboptimal conditions created by the disagreement on the existence of a moratorium. But it can also be argued that all actions of the United States apropos of the Moon Agreement were due to its desire to maintain cost-equilibrium, which is subject to an over-generalized scholarly recording. Today, concerning the CHM, an epistemology exists in which the United States is a self-interested actor and a killer of the Moon Agreement.²⁶⁷

In a somewhat milder criticism of the United States’ position, Baslar records that the objection that the United States had for

²⁶³ Jaksetic, *supra* note 67, at 505.

²⁶⁴ Shackleford, *supra* note 226, at 148-49.

²⁶⁵ *Id.* at 113, 152-53

²⁶⁶ *Id.*

²⁶⁷ *Id.*

CHM was of an “ideological nature,” which is shaped by the interests of private enterprises.²⁶⁸ Later, Baslar demonstrates that it was deep-rooted national interest, exacerbated by cross-linkages to the UNCLOS negotiations, that prompted the United States to support the private enterprises and oppose the CHM.²⁶⁹ Baslar writes critically of the United States that they preferred a *laissez faire* mode of economy which supported free markets to a Keynesian model economy which offers an opportunity for developing countries because “*laissez faire* doctrine was the perfect philosophy to rationalize American hegemony.”²⁷⁰ Baslar concludes, rather easily, that “therefore they [the United States] did not accept ratifying the Moon Treaty.”²⁷¹

True, the United States’ choices were driven by State interest. However, “State interest” from a rationalist perspective is neither a cause for breach nor a ground for condemnation as in the case of centralized inter-State normative systems.²⁷² Rather, as per the rationalist approach, State interest is a “causal determinant”—a choice motivation—which gets influenced by domestic considerations.²⁷³ Therein, State interest is the “interest of citizens translated by the political process into government policy.”²⁷⁴ Eric Posner clarifies how this position is reflected in international law:

Whatever the case, it seems sensible to assume that trade law reflects state interests in advancing the prosperity of exporters and import-competitors, human rights law reflects people’s altruism, the law of the sea reflects merchant and other commercial interests, and so forth. In general, states seek to maximize the wealth and security of their people . . . , and this general policy manifests itself in particular trade, human rights, security, and other foreign policies.²⁷⁵

²⁶⁸ BASLAR, *supra* note 35, at 128.

²⁶⁹ *Id.* at 124-28.

²⁷⁰ *Id.* at 126.

²⁷¹ *Id.*

²⁷² Eric Posner, *International Law and the Disaggregated State*, 23 FLA STATE U. L. REV. 834-35 (2005).

²⁷³ *Id.*

²⁷⁴ *Id.*

²⁷⁵ *Id.*

In the case of the Moon Agreement also, the United States trailed along the lines of their foreign policy and the precepts of realism. Their adoption of pro-market strategies regarding the CHM was part of the pursuit of State interest only. However, Baslar and many other scholars' criticism of the United States' position miss the rationalist internalization of the United States, indicting them for acting in self-interest which the scholars deemed as normative breach. As Jasentuliyana records with an oversimplification, the CHM and the international regime of resource allocation "were contentious points during the negotiations of the Moon Agreement [which] kept the major space powers from ratifying it, though adopted by consensus in the General Assembly."²⁷⁶ What might have prompted these scholars for such recordings is the normative sensibility that subjective State-interest, and its pursuit thereof, is antithetical to the sense of international community.²⁷⁷

Some scholarly works have recorded that the United States had let external sub-political influences play a vital role in determining their State interest.²⁷⁸ That is to say, they assert that State interest regarding the Moon Agreement was not simply shaped by US foreign policy but also by interest group pressures—to the extent of lobbying—allowing sub-political strategies to determine State interest.²⁷⁹ Chris Dubbs and Emeline Paat-Dahlstrom succinctly present the lobbying done by L5 Society, an interest group, to influence the United States Congress:

The L5 Society hired a Washington lobbyist, who trained key L5 [Society] members to circulate through the halls of Congress explaining opposition to the treaty. The society launched a publicity and letter-writing campaign, and in short order [a society member] threw together a telephone tree to inundate Congress

²⁷⁶ Nandasiri Jasentuliyana, *Future Space Applications, Including the Future Framework within the United Nations*, in *THE USE OF AIR AND OUTER SPACE COOPERATION AND COMPETITION* 369, 378 (Chia-Jui Cheng, ed., 1998).

²⁷⁷ The finest reflection of this normative sensibility is in Art.103 of the United Nations Charter which states: "In the event of a conflict between the obligations of the Members of the United Nations under the present Charter and their obligations under any other international agreement, their obligations under the present Charter shall prevail." U.N. Charter § 103. See Jure Vidmar, *Norm Conflict and Hierarchy in International Law*, in *HIERARCHY IN INTERNATIONAL LAW: THE PLACE OF HUMAN RIGHTS* 13-41 (Erika De Wet & Jure Vidmar, eds., 2012).

²⁷⁸ See generally Gangale, *supra* note 51.

²⁷⁹ *Id.*

with calls ... [T]he United States ultimately refused to sign the treaty.²⁸⁰

Critical of this influence on the United States, Shackleford has recorded that:

The United States did not ratify the Moon Treaty due to intense lobbying by several space industrialization special interest groups, a decision that was made in the face of a US State Department report indicating that the Moon Treaty was “the best possible structure for regulating activities which governments may now or in the future engage in on the Moon or elsewhere in space.”²⁸¹

Thus, going by the epistemology of the law of the Moon, the United States, in rejecting the Moon Agreement, had not only acted in State interests (self-interest) but had also let the State interest yield to sub-political pressures.²⁸² However, State interest being shaped by factors exogenous to foreign policy is not uncommon in liberal democracies (the political version of legal rationalism), for in liberal democracies like the United States, State interest is an “aggregation of individual and group preferences.”²⁸³ Hence, sub-political strategies like interest group pressures in shaping State interest in order to achieve a certain preconceived outcome are custom-measures in rationalist approaches.²⁸⁴ It is this rationalist pragmatism which the United States had followed regarding the CHM and which the commentators have overlooked while holding the United States responsible for the failure of the Moon Agreement.²⁸⁵

Whatsoever was the rationale behind the United States’ position, in the recoded epistemology of the law of the Moon, the United States is the antihero who “kill[ed] the Moon Treaty dead.”²⁸⁶

²⁸⁰ CHRIS DUBBS & EMELINE PAAT-DAHLSTROM, *supra* note 50, at 29.

²⁸¹ Shackleford, *supra* note 226, at 147-48 (citations omitted).

²⁸² *Id.* at 154.

²⁸³ See Annie Marie Slaughter, *International Law in a World of Liberal States*, 5 EUR. J. INT’L L. 503, 516 (1995).

²⁸⁴ See *id.* at 508.

²⁸⁵ *Id.*

²⁸⁶ Gangale, *supra* note 51, at 6 (quoting Leigh Ratiner, a US lobbyist).

*C. The Fair Share Due to the Third World—Normative
Assessment of Idealism*

Mostly during the negotiations in the LSC, the Third World States had taken normative positions. It is also the case that, in some of these instances, due to their rigorous observance of normative prescriptions, they failed to appreciate the ideological internalizations of other States. However, regarding the CHM, the Third World States, albeit followed the normative/positivist style of deontological reasoning, had a rather holistic view of the CHM – a holism of human self-becoming through the potentialities of a legal order. This departure of the Third World States, however, missed the focus of scholars who recorded the interaction between the relevant Third World countries and other States.

One noteworthy example of the abovementioned oversight is the scholarly recording on the subject of the Third World claim for the equitable allocation of resources.²⁸⁷ The Soviet writer Gennady M. Danilenko records that the developing States believed that the developed countries need to share with them the resources of the Moon on an equitable basis.²⁸⁸ The logic behind this claim, according to Ricky J. Lee, is the Third World anxiety that “by exploiting resources in the common property of humankind, the industrialized States are depriving the developing States of the mineral resources of which they are proud part owners.”²⁸⁹

This recording means to say that the Third World States had deemed the CHM doctrine as vesting them with a certain type of ownership, a part-ownership of a domain (which is by virtue of them being members of humankind), managed by humanity or by a trustee-representative, and “any benefit flowing from such management must be shared amongst all humanity.”²⁹⁰ Christol conceptually adds to this material dimension of the Third World claim that CHM “seeks through agreement to achieve the goal of equitable

²⁸⁷ Gennady M. Danilenko, *The Concept of the “Common Heritage of Mankind” in International Law*, 13 ANNALS AIR & SPACE L. 247, 249 (1988).

²⁸⁸ *Id.*

²⁸⁹ LEE, *supra* note 174, at 15.

²⁹⁰ Christopher Garrison, *Beneath the Surface: The Common Heritage of Mankind*, 1 KESTUDIES 1, 18, (2007).

allocation of ... resources and benefits with particular attention to the needs of the less developed countries.”²⁹¹

These positions raise the question: Whether the Third World States were asking for a material distribution of the lunar resources, perhaps using ethical constants to obtain a moral quotient? Gbenga Oduntan records that this was in fact the case.²⁹² He puts that, based on the claim of the Third World States that:

It is better to adopt the [Rawlsian] ‘Theory of Justice’ ... to explain the fact that inequalities of wealth and authority are irrelevant to the imperatives of maintaining compensating benefits for everyone and, in particular, to the least advantaged members of the society ... [This] division of advantages should be such as to draw forth the willing cooperation of everyone taking part, including if not particularly those who are less well situated.²⁹³

However, by endorsing the CHM, the Third World States perhaps did not mean to be the supplicants scholars have made them.²⁹⁴ It is true that they made a claim for equitable sharing of lunar resources but that did not mean a material distribution of resources.²⁹⁵ Christol later modified his previous position that the CHM entails resource allocation and states that the claim for the CHM has a utilitarian oneness to it:

It has been perceived [through the CHM] that all human beings are members of the human race no matter whether they live in the ‘North’ or the ‘South’, whether their loyalties are given to technologically advanced or disadvantaged states, and whether their ideologies support the cause of freedom or statism.²⁹⁶

The CHM is a cause and call for marshalling the humanity to start a post-colonial “fairness revolution.”²⁹⁷ And quite

²⁹¹ CHRISTOL, *supra* note 23, at 286.

²⁹² GBENGA ODUNTAN, SOVEREIGNTY AND JURISDICTION IN AIRSPACE AND OUTER SPACE: LEGAL CRITERIA FOR SPATIAL DELIMITATION 214 (2011).

²⁹³ *Id.*

²⁹⁴ *Id.* at 213-14.

²⁹⁵ *Id.* at 214.

²⁹⁶ CHRISTOL, *supra* note 23, at 287.

²⁹⁷ *Id.* at 453.

appropriately, the CHM is replete with fairness-models, including, among others, *res communis humanitatus*, interest of the human-kind and sustainable maintenances of heritage. Among all these “the sense of sharing has come to be considered as a precursor of a global fairness revolution.”²⁹⁸

In fact, it was because of such a motivation—the sense of fairness—that the Third World States found contentment in the language of paragraph 7 of Article 11 of the Moon Agreement which provided for an equitable allocation of the lunar resources, taking into account the interests and needs of the Third World States.²⁹⁹ There was a reactionary revisionism on the part of the Third World States which, regrettably, was taken literally by the scholars to mean an “abrasively strident” demand for contribution in cash and kind.³⁰⁰

Deeper down this revolutionary zeal of the Third World States was an idealist faith in the transformative power of international law – the power to overcome the tiring authority of an unjust system of control and domination. There was also among them the idealist optimism that the universalizing potential of CHM would help redeem humanity of all colonial parochialism.

The abovementioned idealism of the Third World States regarding the CHM was also recorded by certain insightful scholars. For example, according to Christopher C. Joyner, aside from the active legalism of the Third World States, there was a more “extremist version” which has its base in the ideology of the New International Economic Order (NIEO).³⁰¹ He has further recorded that the NIEO-form of CHM “would substantially alter and significantly modify the legal attributes, as well as institutional character, of a CHM regime.”³⁰² However, when it comes to foreseeing the results of a NIEO-based CHM, Joyner discounted the socio-ontological transformation meant by the Third World States and went on to record that under a radical form of CHM, “if mineral resources were exploited from the region, any profits derived from those activities would accrue to ‘all [hu]mankind’, with preferential

²⁹⁸ *Id.*

²⁹⁹ *Id.*

³⁰⁰ *See id.* at 452.

³⁰¹ Christopher C. Joyner, *The Legal Implications of the Concept of the Common Heritage of Mankind*, 35 INT’L & COMP. L. Q. 190, 192-93 (1986).

³⁰² *Id.* at 193.

treatment in their distribution being given to developing countries.”³⁰³ Though Joyner rose to recognize the idealist justification in the Third World States’ position, ultimately he too yielded to the normative way of thinking to believe that the NIEO-based claim of the Third World States were meant to create super-rights to acquire a fair share in the lunar resources.³⁰⁴

D. Epistemological Problem Restated

The epistemological problem pertains to the knowledge of international law—the formation, authenticity and appropriateness of knowledge. By “knowledge of international law” what we have deemed throughout this article is scholarly recordings of the various routine interactions by States within the scope of a given treaty. It is this knowledge that later on helps States or other relevant actors, as the case may be, design their behavior or modify their previous behavior.

However, a treaty is not the only form of international cooperation. In other words, treaty is not the only medium through which States interact. Yet, most of the contemporary knowledge of international law is laid on international treaties—they are not only the primary source of international law but also the primary knowledge of international law. But no international treaty can be effectively functional unless it has the “working information” necessary for States to act upon the treaty. This working information is the scholarly recordings on the treaty, e.g., previous State interactions, possible future interactions, potential interrelationship with other treaties and scope of the trans-application of the treaty. From such a perspective, scholarly recordings graduate to become the substance of the knowledge of international law, though it is only a secondary source of international law as per the source doctrine.³⁰⁵

This article is also aware that knowledge formation in international law can happen though other sources of international law such as custom, general principles of law and decisions of

³⁰³ *Id.* at 192-193.

³⁰⁴ *Id.*

³⁰⁵ See generally Michael Peil, *Scholarly Writings as a Source of Law: A Survey of the Use of Doctrine by the International Court of Justice*, WASHINGTON UNIVERSITY IN ST. LOUIS LEGAL STUDIES RESEARCH PAPER NO. 12-07-03, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2115529

international courts and tribunals.³⁰⁶ However, there is no more optimum a vantage point than a treaty if one wants to observe interstate interactions in their finest verities, for treaties provide the “system of equilibrium” that best reflect the interplay of law and power.³⁰⁷ Hence, a treaty and the knowledge surrounding it, became the focus of this analysis.

V. CONCLUSION

In the case of negotiations leading to the Moon Agreement and its CHM clause, the assessment problem was found to be quite prominent. States interacted with each other with their own respective internalizations of international law, squarely missing each other’s standpoints, but for certain coincidental favorable outcomes. The mistaken standpoints passed in through the scholarly mill to become the knowledge of international law of the Moon. However, in reporting the occurrences during the negotiations, whatever objectivity scholars could have claimed, was lost because of their internalization dismissing other States’ standpoints; and they recorded occurrences based on their subjective understanding of international law. The scholars also indicted States for dismissing the positions of other States which the scholars deemed—informed by their respective internalization of international law—to be a breach. That much, but for a few historical analyses, the epistemological problem did not aggravate further since the Moon Agreement has become dysfunctional.

However, the epistemological problem will get a new dimension if we assume that the negotiations of the Moon Agreement resume from where they were left. Then, States will turn to the scholarly recordings presented above, for such recordings provide the background information on the Moon Agreement, what we have mentioned above as international law of the Moon. However, the presently recorded international law of the Moon is not a homogeneous epistemic discourse, because law of the Moon is not uniformly understood by the States. For example, for the Soviet Union, the

³⁰⁶ Statute of the International Court of Justice, art. 38(1), June 26, 1945, 59 Stat. 1031.

³⁰⁷ See Amnon Lev, *The Transformation of International Law in the 19th Century*, in RESEARCH HANDBOOK ON THE THEORY AND HISTORY OF INTERNATIONAL LAW 11, 123-28 (Alexander Orakhelashvili, ed., 2011).

international law of the Moon is meant to be expended in the process towards the overcoming of capitalist tendencies to exploit the Moon and the building of a regime based on a cooperative scheme. For the United States, international law of the Moon—a model of failed negotiations—imposes costs high enough to invite suboptimal conditions. And for the Third World States, it is a grand normative architecture, which has the potential to realize some of the highest human ideals, and through them a just society. Regardless, the above review of recordings on State positions in the LSC shows that international law of the Moon is more or less a normative structure/narrative which certainly has left a meta space for the interplay of legal and socio-ethical considerations.

In this analysis it can be predicted that the United States in further negotiations will adopt maximum cost enhancing strategies so that cost equilibrium is maintained, if not for Pareto optimal conditions.³⁰⁸ They might make a UNCLOS-style move to a pro-market regime and a production and sharing mechanism like the International Seabed Authority (ISA).³⁰⁹ There is a probability that more aggressive policies on competition, production and distribution than the UNCLOS are adopted.³¹⁰ On balance, given the suboptimal conditions in which the United States had to exit from the negotiations, in future negotiations, State interest is likely to prevail over consideration for a globally efficient regime.³¹¹ However, considering the United States' position in the international law of the Moon – that of a potential violator – its future strategic moves are less likely to be considerably viewed.³¹² The Third World States may try to bind it with demands for greater commitments and thicker normativity. By such a move, for the Third World States on the one hand, the United States pro-market moves could be controlled, and on the other hand, the CHM could be made normatively even stronger.

³⁰⁸ See Landry, *supra* note 233, at 540-42.

³⁰⁹ *Id.*

³¹⁰ See Eric Posner & Alan O. Sykes, *Economic Foundations of the Law of the Sea*, 104 AM. J. INT'L L. 569 (2010).

³¹¹ See Alan O. Sykes & Eric Posner, *Economic Foundations of the Law of the Sea* 26 (John M. Olin Program in L. & Econ., Working Paper No. 504, Dec., 2009) (on file with the author).

³¹² *Id.*

On a brighter side, the United States might try to relax its previous positions. That is, it can allow for the creation of a competitive regime whereby a State's agency, like the "Enterprise" in the law of the sea, can compete on free market lines with the United States or any potential exploiter within a regulatory framework.³¹³ In this case, perhaps the global efficiency regime (that would come to exist) and the associated cost-cuts (e.g., the reduction in reputational cost) can reduce costs that the agency may impose. However, even if the Third World States – which are normatively informed, unaware of the cost-based approach of the United States, and discreet about the potential violator – respond to the latter's move, they will possibly demand for a stronger regulatory control on the competition, which may include cost-imposing monitoring mechanisms. A response such as this has every chance of missing the rationalist strategy of the United States and can impose costs on it.

If the initiative to resume the negotiations comes from the Third World States, they will count on the socializing possibilities of the CHM because of the scope in the Moon Agreement for socio-ethical consideration of fairness and equality to find discursive routes to enter the normative domain of law. Christol has expressed optimism towards such an approach: "It would be worse than blind to attempt to avoid the impact of such considerations [...] when it comes to a meaningful appraisal of the CHM provisions of the Moon Treaty."³¹⁴ It would be an effort to generate idealist images in the normative memory of international law—it would amount to a cross discursive induction.³¹⁵ Despite being unsure about the success of that move towards idealist legalism, it is certain that the rationally pragmatic realism of the United States will see abysmal cost in what is for the Third World, "positive idealism." Richard Posner outright denies any likelihood of a compromise with idealism: "An idealistic law-and-economics vision is Hell of hedonistic markets governed, along with everything else in life, by private bureaucratic law unmitigated by any more due process than the private bureaucracies find it desirable to allow."³¹⁶

³¹³ See generally *id.* at 19-23.

³¹⁴ CHRISTOL, *supra* note 23, at 287.

³¹⁵ *Id.*

³¹⁶ RICHARD POSNER, OVERCOMING LAW 441 (1995) (quoting "Bureaucracy, Liberalism, and Community—American Style," 79 NW. UNIV. L. REV. 900, 919 (1984)).

Perhaps the United States might not reconsider a return to renegotiate the Moon Agreement, knowing that it is a cause for the death of the Treaty, unless huge reputational gains come in the way of the United States. The Third World States also might not reconsider the Agreement, which, irrespective of its normative aura, was rejected for the inefficiency it may have in liberal markets. Thus, the international law of the Moon is disappointing from both sides: it promotes distrust against the United States while representing the Third World States as supplicants of the proceeds of others' labor. In fact, instead of focusing on the internalizations behind State positions (that of legalism, pragmatism and idealism), knowledge formation in the law of the Moon has been around finding "ideological consistency" and in securing doctrinal consensus.³¹⁷

On balance, the assessment problem and the epistemological problem have emerged because international law exists in a plurality of approaches. Each approach is sustained by a discourse community which remains ignorant about the other. These problems would have not arisen had there been a uniform way of knowing international law or at the very minimum, certain means for States to know the internalizations of other States.

³¹⁷ Weeks & Force, *supra* note 213, at 174-75.

THE ARTEMIS PLAN: A PARADIGM SHIFT IN INTERNATIONAL SPACE LAW?

*Rossana Deplano**

ABSTRACT

The Artemis Plan is the current United States program for human space exploration. This article examines the extent to which the Artemis Plan is compatible with the Outer Space Treaty, especially in relation to space resource utilization. It shows that the normative underpinnings of the Artemis Plan rest on consolidated State practice initiated by the International Space Exploration Coordination Group in 2007. The latter introduced the concept of sustainable exploration, which requires the utilization of space resources in support of the goals of human exploration missions. By embracing the concept of sustainable exploration, the Artemis Plan encourages the development of a novel form of conduct in the application of the Outer Space Treaty without generating any new interpretation of its provisions. Consequently, current State practice supporting space resource utilization as part of sustainable exploration missions constitutes a subsidiary means of interpretation—not an authentic interpretation—of the Outer Space Treaty. By developing the concept of sustainable exploration as a legal construct with unique features, this article makes an original contribution to the international space law literature. It also shows that, by clarifying aspects related to space resource utilization (including property claims on space resources), the Artemis Plan contributes to the development of international space law. However, it does not represent a paradigm shift.

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I. INTRODUCTION

In September 2020, the United States (US) National Aeronautics and Space Administration (NASA) publicly released the *Lunar Exploration Program Overview* (Artemis Plan).¹ Aimed at strengthening American leadership in space exploration, the Artemis Plan's goal is to build a sustainable human presence on the Moon by the end of this decade through a series of long-term, potentially multi-year, missions.² Sustainable exploration missions are human exploration missions that do not require regular life support and logistic supplies from Earth. Space resource utilization is central to this model of exploration. For example, oxygen and hydrogen can be extracted from the Moon's soil to provide drinking water, serve as a radiation shield on the human habitats and produce propellant, which is essential for space travel.³ If successful, the model of space exploration envisioned in the Artemis Plan will be adapted for the sustainable exploration of other destinations in the solar system, such as Mars.⁴

The adoption of the Artemis Plan raises far-reaching questions about the rights and duties of States under international space law by stating that the lawfulness of space resource utilization stems from its instrumental role in performing sustainable exploration missions. The Outer Space Treaty⁵ – a treaty of principles which is widely recognized as the magna carta of outer space⁶ – does not refer to either sustainable exploration or space resources. The Moon

¹ See NAT'L AERONAUTICS & SPACE ADMIN., ARTEMIS PLAN: NASA'S LUNAR EXPLORATION PROGRAM OVERVIEW 9 (Sept. 2020), https://www.nasa.gov/sites/default/files/a_toms/files/artemis_plan-20200921.pdf [hereinafter Artemis Plan].

² *Id.* at 9.

³ *Global Space Exploration Strategy: The Framework for Coordination*, INT'L SPACE EXPL. WORKING GRP. (May 2007), https://www3.nd.edu/~cneal/Lunar-L/Global_Exploration_Strategy.pdf [hereinafter ISECG Strategy].

⁴ Artemis Plan, *supra* note 1, at 8.

⁵ See Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 (entered into force on Oct. 10, 1967) [hereinafter Outer Space Treaty].

⁶ See Gennady M. Danilenko, *Outer Space and the Multilateral Treaty-Making Process*, 4 HIGH TECH. L.J. 217, 219 (1989) (arguing the Outer Space Treaty "provides the basis for all subsequent treaties and other legal instruments relating to outer space"); see also Vladlen S. Vereshchetin & Gennady M. Danilenko, *Custom as a Source of International Law of Outer Space* 13 J. SPACE L. 22 (1985) (arguing the Outer Space Treaty establishes the foundations of the international legal order in outer space).

Agreement,⁷ which requires States to establish an international regime for the exploitation of the Moon's resources "as such exploitation is about to become feasible," has been ratified by only 18 States: none of which are spacefaring.⁸ At the United Nations (UN) Committee on the Peaceful Uses of Outer Space (COPUOS), delegations remain divided as to the lawfulness of space resource utilization in the absence of a bespoke regime.⁹ The literature is also divided into two camps: some scholars maintain that the exploitation of space resources is lawful under the Outer Space Treaty¹⁰ while others reject the argument.¹¹ When fully implemented, the Artemis Plan will set a precedent for future interpretations of the Outer Space Treaty, unavoidably influencing the development of international space law in relation to space resource utilization.

Is the Artemis Plan a reinterpretation of the Outer Space Treaty? Does sustainable exploration represent a paradigm shift in international space law? This article examines the concept of sustainable exploration as formulated in the Artemis Plan and supported by State practice with a view to establishing the extent to which its governing principles conform with both the Outer Space Treaty and established theories of international space law. The article is divided into three sections. Section II provides a brief overview of the Artemis Plan and how its adoption has been received in the scholarly literature. Section III examines the concept of sustainable exploration, which the Artemis Plan endorses. It shows that, as a distinctive form of exploration, it is governed by a unique set of principles originating in State practice rather than treaty law. Taking stock of the analysis, Section IV evaluates the impact of the

⁷ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies art. 11(5), Dec. 5, 1979, 1363 U.N.T.S. 22 [hereinafter Moon Agreement].

⁸ Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcommittee on Its Sixty-First Session, *Status of International Agreements Relating to Activities in Outer Space as at 1 January 2022*, 10 U.N. Doc. A/AC.105/C.2/2022/CRP.10 (2022)[hereinafter Status of UN Agreements].

⁹ See Comm. On the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Fifty-Eighth Session, U.N. Doc. A/AC.105/1203, at 32-36 (2019)[hereinafter LSC 2019 Report].

¹⁰ See Stephen Gorove, *International Space Law in Perspective – Some Major Issues, Trends and Alternatives*, 181(3) *Recueil Des Cours* 374 (1983) (arguing that the non-appropriation principle does not apply to the resources of celestial bodies).

¹¹ See Steven Freeland & Ram Jakhu, *Article II*, in 1 COLOGNE COMMENTARY ON SPACE LAW I 44, 53-54 at ¶ 39 (Stephan Hobe, Bernhard Schmidt-Todd & Kai-Uwe Schrogl eds., 2009).

Artemis Plan on the development of international space law in relation to treaty interpretation and law-making. Section V provides some concluding remarks.

II. OVERVIEW OF THE ARTEMIS PLAN

The document outlining the Artemis Plan is divided into three brief chapters. Chapter 1 describes sustainable exploration missions as “a globally unifying endeavor” requiring a robust participation from industry and international partnerships.¹² It recognizes that services provided by commercial actors, such as payload delivery and surface operations, are essential to meet the goal of sending humans back to the Moon.¹³ Finally, it states that its mission design builds on the work of the International Space Exploration Working Group (ISECG), which is an international mechanism established in 2007 to foster international collaboration and coordination among space agencies in human exploration matters with a view to facilitating the sustainable human exploration of Mars by the 2030s.¹⁴

Chapter 2 details the three phases of the mission exploration architecture.¹⁵ Artemis I, which is currently taking place, consists of a series of uncrewed missions to test the Space Launch System (SLS) rocket and return scientific lunar data.¹⁶ Artemis II, scheduled for 2023, is the first SLS crewed mission; it will send four astronauts on a 10-day journey aboard the Orion capsule to test the trajectory for insertion into lunar orbit and reinsertion into high-Earth orbit.¹⁷ Finally, Artemis III will send the first woman and the first person of color to the surface of the Moon in 2024, thus paving the way for future crewed lunar missions.¹⁸ In order to enable a sustained human presence on the Moon beyond 2024, the operationalization of Artemis III requires the presence of a lunar orbiting space station (the Gateway) and a lunar base to conduct surface operations (the Artemis Base Camp).¹⁹

¹² See Artemis Plan, *supra* note 1, at 11.

¹³ See *id.* at 10.

¹⁴ *Id.* at 12; ISECG Strategy, *supra* note 3, at 5.

¹⁵ See generally Artemis Plan, *supra* note 1, at 15.

¹⁶ *Id.*

¹⁷ *Id.* at 15, 18-20.

¹⁸ *Id.* at 15, 20.

¹⁹ *Id.* at 20.

Chapter 3 states that the Artemis missions are simulations of future sustainable missions to Mars, which will require the exploitation of space resources to reduce the dependence on supplies delivered from Earth.²⁰ To that end, it envisions a robust participation from private commercial actors in the development and operation of the technology required for *in situ* resource utilization as well as the right of NASA to purchase the extracted resources, as needed, “in compliance with Article II and other provisions of the Outer Space Treaty.”²¹ However, it does not elaborate on the details of the transaction, including the conditions for securing compliance with the Outer Space Treaty. Nor does it clarify whether the transaction entails property claims over space resources on the part of NASA or the commercial actors.

The Artemis Plan also includes the Artemis Accords, a set of 13 provisions delineating the framework of legal principles guiding the operations of the actors involved in the implementation of the Artemis missions, including space mining operations. Effectively, States wishing to enter into collaboration with NASA for the purposes of lunar exploration missions, as identified in the Artemis Plan, must commit in advance to abide by the principles set forth in the Artemis Accords. Section 1 thereof states that “[t]he principles set out in these Accords are intended to apply to civil space activities conducted by the civil space agencies of each Signatory.”²²

Scholars have raised concerns about the compatibility of the Artemis Accords with international space law. Mosteshar writes that by creating property rights over space resources, the Artemis Accords extend the jurisdiction of the United States to outer space in violation of the principle of non-appropriation set forth in Article II of the Outer Space Treaty.²³ Therefore, as “a retrograde step undermining the Outer Space Treaty,” the Artemis Accords may create international friction and conflict, eventually endangering the principle of peaceful uses of outer space contained in Article IV of

²⁰ *Id.* at 26.

²¹ *Id.* at 29.

²² The Artemis Accords: Principles for Cooperation in the Civil Exploration and Use of the Moon, Mars, Comets, and Asteroids, § 1, NASA, <https://www.nasa.gov/specials/artemis-accords/img/Artemis-Accords-signed-13Oct2020.pdf> (last visited Sept. 15, 2022) [hereinafter Artemis Accords].

²³ Sa’id Mosteshar, *Artemis: The Distant Accords*, 42 J. SPACE L. 591, 598-99 (2020).

the Outer Space Treaty.²⁴ In addition, Tronchetti and Hao write that States which are simultaneously signatories of the Artemis Accords and parties to the Moon Agreement, such as Australia, are endorsing incompatible approaches to the exploitation of space resources.²⁵ Wright Nelson further argues that the Artemis Accords “mark the end of multilateralism in space lawmaking.”²⁶

The scholarly reaction prompted by the adoption of the Artemis Accords raises far-reaching questions about the rights and duties of States under international space law. Yet, as formulated, such criticism downplays the significance of the Artemis Plan for the future of human space exploration and the development of international space law. By focusing exclusively on the Artemis Accords, it neglects the role they serve in implementing the sustainable exploration vision detailed in the Artemis Plan. At the same time, the absence of any conceptualization about the normative underpinnings of sustainable exploration in the Artemis Plan makes the Artemis Accords appear as the legal basis of the whole exploration project.

The Artemis Accords are an integral part of the Artemis Plan. They indicate “how” to implement the Artemis missions through partnerships. They acknowledge the lawfulness of space resource utilization under the Outer Space Treaty without providing a rationale for that. Conversely, the Artemis Plan clarifies “why” space resource utilization is lawful by presenting it as a necessary component of the concept of sustainable exploration. However, it does not elaborate on the latter other than stating that the Artemis Plan’s mission design reflects a multilateral effort.²⁷

²⁴ *Id.* at 602-603. See also Chris Borgen, *The Artemis Accords: One Small Step for Space Law?*, OPINIO JURIS (May 8, 2020), <http://opiniojuris.org/2020/05/08/the-artemis-accords-one-small-step-for-space-law/>. *Contra see* Rossana Deplano, *The Artemis Accords: Evolution or Revolution in International Space Law?*, 70 INT’L & COMP. L. QUART. 799 (2021) (arguing that the Artemis Accords conform with the Outer Space Treaty).

²⁵ Fabio Tronchetti & Hao Liu, *Australia’s Signing of the Artemis Accords: A Positive Development or a Controversial Choice?*, 75 AUSTRALIAN J. INT’L AFFAIRS 243, 244-46 (2021). See also Jack Wright Nelson, *The Artemis Accords and the Future of Space Law*, AM. SOC’Y INT’L L. INSIGHTS (Dec. 10, 2020), <https://www.asil.org/insights/volume/24/issue/31/artemis-accords-and-future-international-space-law> (arguing that “[i]t is unclear whether the Moon Agreement can coexist with the Accords” especially in relation to the issue of utilization of natural resources).

²⁶ *Id.* (also describing the Artemis Accords as “U.S.-led and privately negotiated”). For similar remarks, see Tronchetti & Hao, *supra* note 25, at 4.

²⁷ See Artemis Plan, *supra* note 1, at 12.

Originating in ISECG practice rather than treaty law,²⁸ the term sustainable exploration expounds the relationship between the legal entitlements and the practical needs of space actors engaging in human exploration missions. Entitlements derive from the provisions of the Outer Space Treaty, especially Article I, which establishes the freedom of all States to explore and use outer space. For example, the Artemis Plan recognizes that the Artemis missions must comply with the Outer Space Treaty.²⁹ Similarly, the Artemis Accords state that they operationalize the provisions of the Outer Space Treaty.³⁰ Needs are elements of the mission architecture essential to achieve the stated mission goal. For example, space resource utilization is a need, since it is essential to conduct long-duration missions without receiving regular supplies from Earth.³¹ As a distinctive form of exploration, sustainable exploration is governed by a defined set of principles and the Artemis Plan should be interpreted in the light of such principles. They are detailed in Section III below.

III. GOVERNING PRINCIPLES OF SUSTAINABLE EXPLORATION

In 2010, the ISECG concluded a study aimed at providing a model for designing multilateral architectures to enhance cooperation and coordination among space agencies.³² Known as the Reference Architecture for Human Lunar Exploration, the document marks “the first time that a group of space agencies has worked closely together to create a conceptual definition of a complex

²⁸ *Global Exploration Roadmap*, INT’L SPACE EXPL. WORKING GRP. (Jan. 2018), https://www.globalpaceexploration.org/wordpress/wp-content/isecg/GER_2018_small_mobile.pdf [hereinafter GER 2018].

²⁹ Artemis Plan, *supra* note 1, at 29.

³⁰ Artemis Accords, *supra* note 22, at preamble.

³¹ Artemis Plan, *supra* note 1, at 10; Artemis Accords, *supra* note 22, § 10(2) (“[T]he extraction and utilization of space resources... should be executed... in support of safe and sustainable space activities”); EUR. SPACE AGENCY, ESA SPACE RESOURCES STRATEGY (May 22, 2019), https://sci.esa.int/documents/34161/35992/1567260390250-ESA_Space_Resources_Strategy.pdf (“in situ resource utilization offers the potential to locally derive what is needed for living and working in space”)[hereinafter ESA SPACE RESOURCES STRATEGY].

³² INT’L SPACE EXPLORATION COORDINATION GROUP, REFERENCE ARCHITECTURE FOR HUMAN LUNAR EXPLORATION, (July 2010), <https://www.globalpaceexploration.org/wordpress/wp-content/uploads/2013/10/ISECG-LunarReferenceArchitecture-July-2010.pdf> [hereinafter ISECG Reference Architecture].

human exploration mission scenario.”³³ Without using the term sustainable exploration, the Reference Architecture refers to core principles aimed at guiding the design of multilateral mission scenarios.³⁴ Such principles have been subsequently developed in the Global Exploration Roadmap,³⁵ where the term sustainable exploration appears for the first time: “The Global Exploration Roadmap reflects the international effort to define feasible and sustainable exploration pathways to the Moon, near-Earth asteroids, and Mars,”³⁶

None of the ISECG documents, including the Global Exploration Roadmap, are binding.³⁷ However, they have been adopted by consensus³⁸ and are intended to influence the practice of the ISECG States by fostering collaboration to achieve shared goals.³⁹ Therefore, they are evidence of State practice.⁴⁰ In addition, following the adoption of the Global Exploration Roadmap, several States have published lunar space exploration programs aimed at enabling long-term, sustainable human exploration missions on the Moon and other celestial bodies.⁴¹ For example, in addition to the US Artemis Plan, on June 16, 2021, China and Russia published their joint lunar exploration program, which includes a set of guidelines for international cooperation in the exploration of the Moon and, in

³³ *Id.* at 3.

³⁴ *Id.*

³⁵ GER 2018, *supra* note 28.

³⁶ INT’L SPACE EXPLORATION COORDINATION GROUP, GLOBAL EXPLORATION ROADMAP, iii (Sept. 2011), https://www.globalspaceexploration.org/wordpress/wp-content/uploads/2013/10/GER_2011.pdf [hereinafter GER 2011].

³⁷ *Terms of Reference*, INT’L SPACE EXPLORATION COORDINATION GROUP, https://www.globalspaceexploration.org/wordpress/?page_id=50 (last visited Sept. 15, 2022) (“The adoption of these Terms of Reference does not create any legal obligations on the part of the ISECG Participating Agencies.”).

³⁸ *Id.* at section III.2.2 (“ISECG operates by consensus”).

³⁹ GER 2018, *supra* note 28, at 30 (“While this document does not create commitments of any kind on behalf of any of the participants, the Global Exploration Roadmap and the coordination that supports its development are important tools for achievement of a global, strategic, coordinated, and comprehensive approach to space exploration.”).

⁴⁰ Frans G. von der Dunk, *Customary International Law and Outer Space*, in RE-EXAMINING CUSTOMARY INTERNATIONAL LAW 346, 348 (Brian D. Lepard ed., 2017) (pointing out that “much ‘state practice’ consists of ‘paper practice’ rather than actual activities in outer space”).

⁴¹ Jeff Foust, *NASA report outlines vision for long-term human lunar exploration*, SPACENEWS, (Apr. 3, 2020), <https://spacenews.com/nasa-report-outlines-vision-for-long-term-human-lunar-exploration/>.

perspective, Mars.⁴² Similarly, the European Space Agency (ESA) has elaborated a Space Resources Strategy to explore celestial bodies in the solar system.⁴³

The following subsections examine the principles governing sustainable exploration as they have emerged from the abovementioned instances of State practice and evaluate them against established theories of international space law.

A. *Exploration in Pursuit of Peaceful Purposes*

The first principle is the pursuit of sustainable exploration for peaceful purposes and through peaceful means. The Artemis Accords assert that all activities falling within its remit “should be for exclusively peaceful purposes.”⁴⁴ Similarly, the Guide for Partnership outlining the goals and structure of the proposed Sino-Russian lunar research station require international partners to conduct activities aimed at “the peaceful exploration and use of the Moon.”⁴⁵ The outcomes of sustainable exploration missions must also be peaceful.⁴⁶ For example, the ISECG Strategy states that sustainable space exploration must contribute to common peaceful goals.⁴⁷

The principle of peaceful exploration strengthens the provision of Article IV(2) of the Outer Space Treaty that outlaws the use of the Moon and other celestial bodies for military purposes.⁴⁸ State practice further shows that this principle of peaceful uses of outer space has never been challenged, even before the adoption of the Outer Space Treaty.⁴⁹ Turning to scholarly literature on this notion, there are two schools of thought. Some argue that the principle of

⁴² *International Lunar Research Station (ILRS) Guide for Partnership*, CHINA NAT’L SPACE ADMIN., (June 6, 2021), <http://www.cnsa.gov.cn/english/n6465652/n6465653/c6812150/content.html> [hereinafter IRLS].

⁴³ ESA Space Resources Strategy, *supra* note 31.

⁴⁴ Artemis Accords, *supra* note 22, § 3.

⁴⁵ IRLS, *supra* note 42, at 2.

⁴⁶ Mohammad Saiful Islam, *The Sustainable Use of Outer Space: Complications and Legal Challenges to the Peaceful Uses and Benefit of Humankind*, 9 BEIJING L. REV. 235, 237 (2018).

⁴⁷ ISECG Strategy, *supra* note 3, at 23.

⁴⁸ See also Moon Agreement, *supra* note 7, art. III(1) (mirroring the provision of Article IV(2) of the Outer Space Treaty).

⁴⁹ WILFRED JENKS, SPACE LAW 45 (1965) 45 (arguing that “[n]o responsible statesman appears to have called into question the general principle of the exclusive dedication of space to peaceful and scientific purposes”).

peaceful uses entails a complete demilitarization of outer space.⁵⁰ Others, such as Ogunbanwo and Lachs, interpret the expression “peaceful uses” as meaning non-aggressive uses of outer space. They argue that the peaceful or non-peaceful nature of space activities depends on the purpose of the activity carried out, whether conducted by civilian or military personnel.⁵¹

Sustainable exploration missions are currently supported by space agencies in collaboration with private actors.⁵² Hence, they do not envision to have any sort of military component embedded within the nature of their activities.⁵³ However, should future mission designs contemplate the involvement of military personnel, the aim of the exploration missions would remain peaceful.⁵⁴ Furthermore, this approach indicates that the exploration aims pursued by the Artemis Plan conform with the principle of peaceful uses of outer space contained in Article IV(2) of the Outer Space Treaty. Additionally, these principles also align with the Tokyo Principles for International Space Exploration, which COPUOS endorsed in 2018.⁵⁵

B. Affordable Exploration

The second principle of sustainable exploration is affordability. This principle stems from the recognition by States that no single space agency has sufficient economic resources to perform long-term human exploration missions beyond low-Earth orbit in their

⁵⁰ Kai-Uwe Schrogl & Julia Neumann, *Article IV*, in COLOGNE COMMENTARY, *supra* note 11, 70, at 82 ¶ 45; BIN CHENG, STUDIES IN INTERNATIONAL SPACE LAW 521 (1997).

⁵¹ Ogunbansola O. Ogunbanwo, INTERNATIONAL LAW AND OUTER SPACE ACTIVITIES 32 (1975); Manfred Lachs, THE LAW OF OUTER SPACE: AN EXPERIENCE IN CONTEMPORARY LAW-MAKING 97 (Tanja Masson-Zwaan & Stephan Hobe eds., 2010).

⁵² Artemis Accords, *supra* note 22, § 2(1).

⁵³ Kanishka Singh, *Military Component in Draft Space Law Faces Opposition*, SUNDAY GUARDIAN LIVE, (Mar. 5, 2016), <https://www.sundayguardianlive.com/news/3578-military-component-draft-space-law-faces-opposition>.

⁵⁴ *Space2030: Space as a Driver for Peace—World Leaders Proclaim Innovative Space Diplomacy as the New Frontier for Peace on Earth*, SPACE.COM, (Sept. 26, 2018), <https://www.space.com/41940-space2030-space-as-a-driver-for-peace.html>.

⁵⁵ UNCOPUOS, Conference Room Paper by Japan, UN Doc. A/AC.105/2018/CRP.15, Annex II, at 4 (June 20, 2018) https://www.unoosa.org/res/oosadoc/data/documents/2018/aac_1052018crp/aac_1052018crp_15_0_html/AC105_2018_CRP15E.pdf (requiring that space exploration is conducted only for peaceful purposes).

entirety.⁵⁶ As a result, there are two aspects to this principle – namely, the collaborative nature of exploration missions (Subsection *i*) and cost considerations related to the feasibility of their implementation (Subsection *ii*).

i. Collaborative Exploration Missions

Current sustainable exploration plans are collaborative in nature.⁵⁷ For example, the Artemis Plan envisions human exploration missions as a collective endeavor.⁵⁸ The entire Artemis Accords are a set of principles of cooperation in human space exploration and so is the Guide for Partnership of the Sino-Russian lunar research station. Similarly, the Global Exploration Roadmap refers to sustainable exploration missions as “partnerships” with both the public and the private sector.⁵⁹

This aspect of the principle of affordability aligns with Articles III and X of the Outer Space Treaty, which require that exploration activities promote international cooperation and understanding.⁶⁰ Kapustin writes that international cooperation is the idea underlying the entire Outer Space Treaty.⁶¹ However, the scope of the required degree of international cooperation under the Outer Space Treaty is debated among scholars.⁶² Some argue that it refers only

⁵⁶ *Id.* (stating that exploration missions should be “implementable, evolvable and affordable”); ISECG Strategy, *supra* note 3, at 12 (“Space is an unforgiving environment and no nation has the resources to take on all of its challenges at once.”); GER 2011, *supra* note 36, at 28 (“No one agency can invest robustly in all the needed technology areas that represent key challenges for executing human missions beyond low-Earth orbit.”); COMM. ON THE PEACEFUL USES OF OUTER SPACE, Note by the Secretariat, U.N. Doc. A/AC.105/1168, at 6 ¶ 45 (“No single space agency can invest heavily in all the areas of technology that are needed.”)[hereinafter Note by the Secretariat].

⁵⁷ *The Possibilities of Sustainable Space Exploration*, OPEN ACCESS NEWS (Oct. 6, 2021), <https://www.openaccessgovernment.org/sustainable-space-exploration/121866/>.

⁵⁸ Artemis Plan, *supra* note 1, at 9.

⁵⁹ GER 2018, *supra* note 28, at 10.

⁶⁰ Outer Space Treaty, *supra* note 5, arts. III & X.

⁶¹ Anatoly Kapustin, *Article X*, in COLOGNE COMMENTARY, *supra* note 11, 183, at 184 ¶ 1.

⁶² Kuan-Wei Chen, *Outer Space is not the “Wild West,” There Are Clear Rules for Peace and War*, MSN, (Sept. 13, 2022), <https://www.msn.com/en-gb/money/technology/outer-space-is-not-the-wild-west-there-are-clear-rules-for-peace-and-war/ar-AA11MCSn>.

to large scale operations in outer space,⁶³ while others maintain that it applies to all aspects of exploration activities—including the dissemination of information about space activities and due regard for the activities of others in outer space.⁶⁴ The Artemis Plan appears to conform with the more extensive interpretation, since the Artemis Accords regulate aspects of international collaboration such as information sharing⁶⁵ and interoperability.⁶⁶

It may also be argued that, by entertaining collaboration with the private sector, the Artemis Plan exceeds the scope of application of the principle of international collaboration under the Outer Space Treaty.⁶⁷ Several statements in the Artemis Plan describe the contribution of private actors as strictly instrumental to facilitating scientific research.⁶⁸ For instance, selected commercial actors will provide logistics supply launches to the Gateway⁶⁹ and payloads to the surface of the Moon.⁷⁰ NASA has also concluded investments through public-private partnerships to commission the manufacture and operation of equipment for *in situ* resource utilization.⁷¹ The underlying assumption is that utilizing lunar resources will lead to “safer, more efficient operations” by reducing the dependence on supplies from Earth.⁷²

⁶³ A.S. Piradov, INTERNATIONAL SPACE LAW: CURRENT PROBLEMS AND PROGRESS 106 (Boris Belitsky ed., 2000) (1976) (specifically referring to human space exploration missions).

⁶⁴ Valen Vereshchetin, SPACE, COOPERATION, LAW 29 (1974), https://archive.org/details/nasa_techdoc_19750005614; CHENG, *supra* note 50, at 252.

⁶⁵ Artemis Accords, *supra* note 22, § 5.

⁶⁶ *Id.* Similarly, the Global Exploration Roadmap acknowledges that pursuing interoperability initiatives, such as agreeing on international standards and common interfaces “will ensure different systems and nations can work together in exploring the solar system.” INT’L SPACE EXPLORATION COORDINATION GROUP, GLOBAL EXPLORATION ROADMAP, (Aug. 2013), https://www.globalspaceexploration.org/wordpress/wp-content/uploads/2013/10/GER_2013.pdf [hereinafter GER 2013].

⁶⁷ Sean Potter & Cheryl Warner, NASA, *International Partners Advance Cooperation with First Signings of Artemis Accords*, NASA (Oct. 13, 2020), <https://www.nasa.gov/press-release/nasa-international-partners-advance-cooperation-with-first-signings-of-artemis-accords>.

⁶⁸ Artemis Plan, *supra* note 1.

⁶⁹ *Id.* at 10.

⁷⁰ *Id.* at 12.

⁷¹ *In-Situ Resource Utilization*, NASA: AMES RESEARCH CENTER, https://www.nasa.gov/centers/ames/research/technology-onepaggers/in-situ_resource_Utiliza14.html (last visited Sept. 15, 2022).

⁷² Artemis Plan, *supra* note 1, at 28; *See also* ISECG Strategy, *supra* note 3, at 11-12. The Guide for Partnership of the Sino-Russian lunar research station similarly states

At the same time, the Artemis Accords acknowledge that, in supporting scientific operations, commercial actors will gain economic profits.⁷³ They will also acquire know-how and develop their own technologies, which they could reuse for further outer space activities beyond the Artemis missions or adapt for use on Earth.⁷⁴ The Artemis Accords refer to such a potential development as an added benefit of space exploration requiring protection.⁷⁵ This may be seen as the Artemis Accords encouraging the development of space resource utilization by private actors outside the framework of public-private partnerships.⁷⁶ The Vancouver Recommendations on Space Mining warn that such activities are not regulated by the Outer Space Treaty and may be unlawful under the current international space law regime.⁷⁷ Similarly, Jakhu argues that appropriating space resources is a violation of the Outer Space Treaty.⁷⁸

A counterargument is that, by recognizing the centrality of international collaboration for the execution of sustainable exploration missions, the Artemis Plan does not add to or detract anything from Article I of the Outer Space Treaty.⁷⁹ The Artemis missions

that the exploration and use of the Moon is most effective when performed in partnership with States, international organization and industry. ILRS, *supra* note 42, at 2.

⁷³ Artemis Accords, *supra* note 22, § 5.

⁷⁴ *Id.* § 11(11) (stating that the signatory States will commit to use safety zones in a manner that encourages “the safe and efficient extraction of space resources in support of sustainable space exploration and other operations.” See also ISECG Strategy, *supra* note 3, at 11 (business will find ‘unexpected ways of exploring this know-how in the wider economy’).

⁷⁵ Artemis Accords, *supra* note 22, at preamble (recognizing the “global benefits of space exploration and commerce”). See also ISECG Strategy, *supra* note 3, at 7; INT’L SPACE EXPLORATION COORDINATION GROUP, Benefits Stemming from Space Exploration (Sept. 2013), <https://www.globalspaceexploration.org/wordpress/wp-content/uploads/2013/10/Benefits-Stemming-from-Space-Exploration-2013.pdf> (referring to enlarging “the sphere of human economic activity”).

⁷⁶ Desmonda Lawrence, *The Artemis Accords: A New Race to Dominate Space*, PRINDLE POST, (July 21, 2021), <https://www.prindleinstitute.org/2021/07/the-artemis-accords-a-new-race-to-dominate-space/>.

⁷⁷ *Vancouver Recommendations on Space Mining*, OUTER SPACE INSTITUTE (Apr. 20, 2020), http://www.outerspaceinstitute.ca/docs/Vancouver_Recommendations_on_Space_Mining.pdf.

⁷⁸ Ram S. Jakhu, *The Legal Regime of the Geostationary Orbit* (1983) (Doctorate of Civil Law thesis, McGill University) (https://escholarship.mcgill.ca/concern/parent/bg257f82k/file_sets/d504rk94w).

⁷⁹ Note by the Secretariat, *supra* note 56, at 6 (stating that peaceful exploration requires “a holistic approach to collaboration between all stakeholders in outer space activities”).

are scientific missions aimed at increasing knowledge of the solar system through human exploration.⁸⁰ While the Outer Space Treaty is silent as to the actors entitled to conduct scientific research, Article VI thereof establishes that both governmental and nongovernmental entities can carry out activities in outer space.⁸¹ It thus recognizes that private actors are entitled to conduct scientific research in outer space.⁸² The Artemis Accords reinforce this provision by stating that private actors taking part in the implementation of exploration missions act on behalf of NASA (or any other signatory of the Artemis Accords that has concluded a bilateral agreement with NASA),⁸³ meaning that States remain responsible for their activities in outer space.⁸⁴

ii. Feasibility of Mission Implementation

A second aspect of the principle of affordability is that designing affordable exploration missions also entails cost-benefit choices

⁸⁰ *The Artemis Accords*, NASA, <https://www.nasa.gov/specials/artemis-accords/index.html> (last visited Sept. 15, 2022).

⁸¹ Outer Space Treaty, *supra* note 5, art. VI.

⁸² Frans G. von der Dunk, *The Origins of Authorisation: Article VI of the Outer Space Treaty and International Space Law*, ResearchGate, (Jan. 2011), https://www.researchgate.net/profile/Frans-Von-Derdunk/publication/280071272_The_Origins_of_Authorisation_Article_VI_of_the_Outer_Space_Treaty_and_International_Space_Law/links/55f2130308aedeb69020e8c/The-Origins-of-Authorisation-Article-VI-of-the-Outer-Space-Treaty-and-International-Space-Law.pdf.

⁸³ Artemis Accords, *supra* note 22, § 2(1)(d) (“Each signatory commits to taking appropriate steps to ensure that *entities acting on its behalf* comply with the principles of these Accords.”) (emphasis added).

⁸⁴ Fabio Tronchetti, *Legal Aspects of Space Resource Utilization*, in HANDBOOK OF SPACE LAW 781 (Frans von der Dunk ed., 2015) (referring to the extraction of space resources by private actors); Kofi Henaku, *Private Enterprises in Space Related Activities: Questions of Responsibility and Liability* 3 LJIL 45, 53-54 (1990). This is also the conclusion reached by the Hague International Space Resources Working Group. Building Block 5(a) states:

States shall bear international responsibility for national space resources activities, whether such activities are carried out by governmental agencies or non-governmental entities, and for ensuring that such activities are carried out in conformity with the international framework.

BUILDING BLOCKS FOR THE DEVELOPMENT OF AN INTERNATIONAL FRAMEWORK FOR THE GOVERNANCE OF SPACE RESOURCE ACTIVITIES 42, <https://www.universiteitleiden.nl/binaries/content/assets/rechtsgeleerdheid/instituut-voor-publiekrecht/lucht--en-ruim-terecht/space-resources/bb-thissrwwg--cover.pdf>.

aimed at maximizing the chances of achieving the mission goals within the budgetary constraints of space agencies. For example, the Global Exploration Roadmap states that “[c]ost must be a consideration when formulating exploration programmes as well as throughout programme execution.”⁸⁵ In this respect, space resource utilization turns out to be a more affordable choice than providing regular supplies from Earth.⁸⁶ For this reason, the Global Exploration Roadmap states that “lunar surface operations include *in situ* resource activities.”⁸⁷ Similarly, the plan for establishing a lunar research station by China and Russia describes *in situ* resource utilization as instrumental for conducting sustained scientific research⁸⁸ while the European Space Agency (ESA) strongly supports the integration of space resource utilization into mission designs.⁸⁹

This aspect of the principle of affordability is not recognized in the Outer Space Treaty. However, such is not unknown in the realm of scholarly literature. For example, in relation to the duty of States to share information about their activities in outer space set forth in Article XI of the Outer Space Treaty, Gorove writes that “feasibility and practicability [of information sharing] may involve questions of cost.”⁹⁰ Mayence and Reuters also argue that States may lawfully refrain from sharing “economically sensitive data,” such as data generated by the remote sensing of the Earth.⁹¹ Since Article XI of the Outer Space Treaty does not require dissemination of information free of charge, considerations aimed at protecting a

⁸⁵ GER 2018, *supra* note 28, at 10. *See also* Note by the Secretariat, *supra* note 56, at 7 ¶ 58.

⁸⁶ GER 2013, *supra* note 66, at 23 (“Use of local resources would limit the cost and complexity of bringing all the needed supply from Earth.”); Note by the Secretariat, *supra* note 56, at 5 ¶ 41 (stating that space exploration “in the long-term will also require *in situ* space resource utilization”).

⁸⁷ GER 2018, *supra* note 28, at 16. *See also*, *Global Exploration Roadmap – August 2020 Supplement*, ISECG, (Aug. 2020), https://www.globalspaceexploration.org/wp-content/uploads/2020/08/GER_2020_supplement.pdf (describing *in situ* resource utilization as “valuable for sustained long-term human presence”)[hereinafter GER 2020 Supplement]; ISECG Strategy, *supra* note 3, at 2 (“Sustainable space exploration is a challenge that no nation can do on its own.”).

⁸⁸ ILRS, *supra* note 42, at 3, 5 & 10.

⁸⁹ ESA Space Resources Strategy, *supra* note 31, at 16.

⁹⁰ Stephen Gorove, *Freedom of Exploration and Use in the Outer Space Treaty: A Textual Analysis and Interpretation*, 1 DENV. J. INT’L L. & POL’Y 93, 103 (1971).

⁹¹ Jean-François Mayence & Thomas Reuters, *Article XI*, in COLOGNE COMMENTARY, *supra* note 11, 189, at 202 ¶ 76.

commercial market for information sharing turn out to be lawful exemptions from the general duty of information sharing.⁹² It thus appears that cost-benefit considerations in mission design do not seemingly exceed the remit of the Outer Space Treaty.⁹³

Cost-benefit considerations permeate the Artemis Plan and they encourage the collaboration with the private sector.⁹⁴ Such a collaboration is deemed so essential for the feasibility of the Artemis missions that their implementation requires a conducive environment for commercial activities in outer space.⁹⁵ As a result, the Artemis Plan states that one of its goals is to pave the way for a lunar economy through the “exploitation and development” of the Moon by NASA in collaboration with US commercial companies and international partners.⁹⁶ Notably, the Outer Space Treaty does not refer to either exploitation or development of outer space. Article I thereof only recognizes the freedom of exploration and use of outer space by all States as well as the freedom of scientific investigation in outer space.⁹⁷ At the same time, it does not forbid the use of outer space for non-scientific purposes. This begs the question of the extent to which, if any, the Artemis Plan is consistent with the concept of exploration and use of outer space mentioned in Article I of the Outer Space Treaty.

On the one hand, the Artemis Plan appears to build on a recent trend in State practice. For instance, the Global Exploration Roadmap states that “sustainable exploration must actively enable the creation of new markets and commerce, *once governments have led the way*.”⁹⁸ Similarly, the European position, as expressed by ESA acting as the implementing body of the European Union (EU)

⁹² *Id.* at 198, ¶ 51.

⁹³ *Space Mission Design Tools*, NASA, <https://www.nasa.gov/smallsat-institute/space-mission-design-tools>, (last visited Sept. 18, 2022).

⁹⁴ See discussion *supra*, Section III.B.1; See also Mike Wall, *NASA Will Spend \$93 Billion on Artemis Moon Program by 2025, Report Estimates*, SPACE.COM, (Nov. 15, 2021), <https://www.space.com/nasa-artemis-moon-program-93-billion-2025>

⁹⁵ Elle Rothermich, *NASA's Artemis Accords Boost Commercial Space Activity*, THE REGULATORY REVIEW (Dec. 23, 2020), <https://www.theregreview.org/2020/12/23/rothermich-nasa-artemis-accords-boost-commercial-space-activity/>.

⁹⁶ Artemis Plan, *supra* note 1, at 9.

⁹⁷ See generally Outer Space Treaty, *supra* note 5.

⁹⁸ GER 2011, *supra* note 36, at 8 (emphasis added).

space policy,⁹⁹ conceives of space operations by commercial actors as instrumental to achieve sustainable human exploration.¹⁰⁰ As part of this vision, the ESA Space Resources Strategy states that “[t]he mastering of space resource utilization transcends domains to advance technologies and transfer expertise across sectors,” including the private sector.¹⁰¹ Such statements provide evidence of a growing consensus among spacefaring States about the importance of commercial actors’ participation in exploration missions.¹⁰²

On the other hand, the Artemis Plan appears to favor the development of the space mining industry without establishing the conditions for the lawful conduct of space resource utilization. On this point, State practice beyond the ISECG is not uniform. At COPUOS, some delegations maintain that the exploitation of space resources, if undertaken for the purpose of exploration, is in the general interest of States because it contributes to technological progress and scientific advancement.¹⁰³ They note that the Outer Space Treaty does not prohibit the utilization of space resources.¹⁰⁴ Other delegations argue that mining space resources for commercial purposes seems to differ from both exploration and use of resources for scientific purposes,¹⁰⁵ while another group of delegations rejects the argument that the exploitation of space resources is lawful under the Outer Space Treaty.¹⁰⁶

The lack of uniformity among States’ positions about the lawfulness of the involvement of private actors in space exploration suggests that the statements in the Artemis Plan describing the

⁹⁹ ESA Agenda 2025, at 4 & 6, March 2021, https://esamultimedia.esa.int/docs/ESA_Agenda_2025_final.pdf.

¹⁰⁰ ESA Space Resources Strategy, *supra* note 31, at 5.

¹⁰¹ *Id.* at 6.

¹⁰² GER 2018, *supra* note 28, at 22 (“An international consensus exists on the value of government/private sector partnerships. [...] Strengthening the space exploration community and promoting the development of new markets in space are keys to a sustainable human exploration effort”).

¹⁰³ Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Fifty-Sixth Session, U.N. Doc. A/AC.105/1122, at 32, ¶ 242 (2017)[hereinafter LSC 2017 Report].

¹⁰⁴ LSC 2019 Report, *supra* note 9, at 33, ¶ 245.

¹⁰⁵ Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Fifty-Seventh Session, U.N. Doc. A/AC.105/1177, at 20, ¶ 237 (2018)[hereinafter LAC 2018 Report].

¹⁰⁶ LSC 2017 Report, *supra* note 103, at 32 ¶ 247 (“the exploitation of space resources goes beyond what is generally understood as exploration and utilization”).

Artemis missions as paving the way for a sustainable lunar economy should be read in the light of the scientific goals pursued by the Artemis Plan. The fact that industry has always been part of NASA's space exploration efforts through public-private partnerships provides further support for this reading.¹⁰⁷ The lawfulness of commercial activities, including space resource utilization under the Artemis Plan, stems from the sustainable character of its exploration missions. Once States "have led the way,"¹⁰⁸ private actors will be entitled to conduct the same type of sustainable exploration missions on their own (while remaining under the continuing supervision of the licensing State).¹⁰⁹ A passage from the Global Exploration Roadmap supports this interpretation: "If the use of lunar volatiles and other space resources is proven to be economically advantageous, it is envisioned that commercial companies will collaborate with ISECG agencies in public-private partnerships to develop a space-based industry of in-situ resource utilization."¹¹⁰

The application of the Outer Space Treaty under the Artemis Plan is limited to scientific missions implemented through public-private partnerships. Most notably, the Outer Space Treaty does not cover space mining operations by private actors outside the framework of human space explorations. This indicates that the narrow scope of application of the principles governing the Artemis Plan does not support generalizations about the lawfulness of commercial activities conducted in outer space by private actors.

¹⁰⁷ The documented history of NASA contains abundant evidence. See e.g., JOAN LISA BROMBERG, *NASA AND THE SPACE INDUSTRY* (2000); W. Henry Lambright, *NASA, Industry, and the Commercial Crew Development Program: the Politics of Partnership*, in *NASA SPACEFLIGHT: A HISTORY OF INNOVATION* 349 (Roger D. Launius & Howard E. McCurdy eds, 2018).

¹⁰⁸ See GER 2011, *supra* note 36 and corresponding text.

¹⁰⁹ Annette Froehlich, *Utilization-Consumption-Appropriation: Asteroid Mining Is in the Pipe* 66 ZLW 268, 272-273 (2017) ("it can be deduced from a logical point of view that if it prohibited for states to appropriate, the same is valid for private persons/entities"); Gbenga Oduntan, *Aspects of the International Legal Regime Concerning Privatization and Commercialization of Space Activities* 17 GEO. J. INT'L AFFAIRS 79, 83 (2016) (arguing that "private corporations cannot do more than their states of origin under treaty law"). See also Tronchetti, *supra* note 84 and corresponding text.

¹¹⁰ GER 2018, *supra* note 28, at 23.

C. Staggered Mission Design

The third principle of sustainable exploration consists of designing staggered exploration missions. It logically derives from the principle of affordability and requires the inclusion of milestones in the mission designs to test and develop the technology needed for individual stages.¹¹¹ Each stage and related milestone is propaedeutic to the execution of the following one, at the same time leaving the mission partners the flexibility to redesign the structure and revise the timeline for individual stages on the basis of the know-how accumulated in the previous stage.¹¹² The principle of staggered mission design underpins the Global Exploration Roadmap.¹¹³ The division of both the Artemis Plan (Artemis I, II and III)¹¹⁴ and the plan for the establishment of the Sino-Russian lunar research station into three stages (site selection or “reconnaissance,” construction and utilization)¹¹⁵ is another example. Seen from this angle, the inclusion of space resource utilization in mission designs requires the mission partners to test technologies that can only function in the outer space environment. For example, the ISECG Reference Architecture states that verifying the reliability of a pilot *in situ* resource utilization plant must precede the construction of any large infrastructure on the Moon.¹¹⁶

This aspect of the principle of affordability is not recognized in either the Outer Space Treaty or the scholarly literature. It may be argued that, by endorsing the principle of staggered mission design, the Artemis Plan aims at encouraging the responsible use of outer space by every actor involved in the execution of the Artemis missions. The operational details for collaboration at each stage of the mission are set out in bilateral agreements between NASA and its international partners. Whether the implementation of such agreements violates the Outer Space Treaty remains a matter of factual assessment.

¹¹¹ GER 2013, *supra* note 66, at 14 (“affordability constraints at global level dictate a stepwise approach”).

¹¹² GER 2020 Supplement, *supra* note 87, at 21 (describing the staggered approach to mission design as “the process of building capabilities on existent capabilities”).

¹¹³ *Id.* (referring to “a phased approach”); GER 2013, *supra* note 66, at 14 (referring to “a stepwise development”).

¹¹⁴ See discussion *supra*, Section II.

¹¹⁵ ILRS, *supra* note 42, at 4-5.

¹¹⁶ ISECG Reference Architecture, *supra* note 32, at 13.

D. Benefit Sharing

The fourth principle of sustainable exploration is benefit sharing. It requires that human exploration missions generate benefits for all, not only the participating actors. The Global Exploration Roadmap states that “[s]ustainable human exploration *must* respond to exploration goals and objectives and *provide value* to the public and other stakeholder communities.”¹¹⁷ Likewise, the Artemis Accords aim to promote the “sustainable and beneficial use of space for all humankind.”¹¹⁸ They also recognize that “the utilization of space resources can benefit humankind by providing critical support for safe and sustainable operations.”¹¹⁹ They do not refer to other forms of benefit sharing. The latter may include promoting the value of space and its applications in developing countries, as proposed by ESA,¹²⁰ or increasing the ability of States to address global challenges, such as environmental sustainability. For example, several ISECG documents mention the possibility of adapting water purification and waste management systems for use on Earth.¹²¹

By requiring space actors to include some form of benefit sharing in their mission designs,¹²² the principle of benefit sharing favors a case-by-case assessment of the benefits generated by human exploration missions and their modalities of sharing without rejecting any alternative option, including the creation of a bespoke international regime. As Paxson notes, “from a practical point of view, spacefaring countries can themselves determine their obligations under Article I [of the Outer Space Treaty], which implies that a spacefaring nation can share whatever – and as much or little as – it likes so long as it shares something.”¹²³

¹¹⁷ GER 2018, *supra* note 28, at 10 (emphasis added).

¹¹⁸ Artemis Accords, *supra* note 22, § 1(1).

¹¹⁹ *Id.* § 10(1).

¹²⁰ ESA Agenda 2025, *supra* note 99, at 14.

¹²¹ GER 2018, *supra* note 28, at 4-5; ISECG, *Advancing the Global Exploration Strategy: Human Exploration of the Moon*, at 1-2, (Dec. 7, 2009).

¹²² See Fengna Xu, Junyuan Su & Miqdad Mehdi, *A Re-examination of Fundamental Principles of International Space Law at the Dawn of Space Mining* 44 J. SPACE L. 1, 31 (2020) (arguing that international cooperation in space activities does not entail a specific list of mandatory benefit sharing).

¹²³ Edwin W. Paxson, *Sharing the Benefits of Outer Space: Space Law and Economic Development* 14 MICH. J. INT'L. L. 487, 493 (1993).

Arguing that the benefit sharing obligation in Article I of the Outer Space Treaty does not impose any qualitative or quantitative obligation on spacefaring States beyond those they wish to assume themselves contrasts with the view that only the principle of common heritage of humankind,¹²⁴ or an international institution modelled after the International Seabed Authority,¹²⁵ can guarantee an equitable sharing of benefits. Article I of the Outer Space Treaty only states that the exploration and use of outer space “shall be carried out for the benefit and in the interests of all countries.”¹²⁶ It does not exclude the case-by-case assessment. Indeed, noting that benefits can be both direct and indirect, Gorove argues that the identification of benefits to be shared “may depend on the facts and circumstances of the particular case.”¹²⁷

A more challenging issue is whether sustainable exploration missions must ensure some form of benefit sharing at each stage of the mission or in relation to the exploration mission as a whole. Gorove writes that “[s]o long as there is some tangible or substantial benefit, it appears that the requirement has been satisfied.”¹²⁸ This suggests that, at a minimum, the international community of States must benefit from the completion of a sustainable exploration mission in its entirety. The sharing of benefits at stage level remains open to a case-by-case assessment involving the balancing of two contending views about the recipient of the benefits.

¹²⁴ RICKY LEE, LAW AND REGULATION OF COMMERCIAL MINING OF MINERALS IN OUTER SPACE 320 (2012).

¹²⁵ *Id.* at 277 (advocating the creation of an International Space Development Authority); See Zachos A. Paliouras, *The Non-Appropriation Principle: the Grundnorm of International Space Law* 27 LJIL 37, 48 (2014); FABIO TRONCHETTI, THE EXPLOITATION OF NATURAL RESOURCES OF THE MOON AND OTHER CELESTIAL BODIES: A PROPOSAL FOR A LEGAL REGIME 246-285 (2009). Compare Devanshu Ganatra & Neil Modi, *Asteroid Mining and Its Legal Implications* 20 J. SPACE L. 81, 98-99 (2015-2016) (proposing the creation of an International Space Body with the status of specialized agency of the United Nations); with Priyank D. Doshi, *Regulating the Final Frontier: Asteroid Mining and the Need for a New Regulatory Framework* 6 NOTRE DAME J. INT'L & COMP. L. 189, 208 (2016) (advocating the creation of an international institution independent from the United Nations); and Zach Meyer, *Private Commercialization of Space in an International Regime: A Proposal for a Space District* 30 NW. J. INT'L L. & BUS. 241, 258-261 (2010) (advocating the creation of an internationally authorized space district).

¹²⁶ Outer Space Treaty, *supra* note 5, art. I(1).

¹²⁷ Gorove, *supra* note 90, at 102.

¹²⁸ *Id.* at 101.

On the one hand, scholars point out that outer space activities must benefit all States at once, including the spacefaring States.¹²⁹ According to this view, what is due to the international community of States is a benefit shared by all. For example, the sharing of scientific data from exploration missions would increase knowledge and understanding of outer space to the benefit of all States. On the other hand, other scholars point out the duty of spacefaring States to “enable the non-space-faring members of the international community to participate more actively in space exploration and use.”¹³⁰ According to this view, benefit sharing is a tool for ensuring equal access to outer space for all States. For example, the sharing of technology, space facilities or monetary benefits with developing countries would increase their ability to actively participate in outer space.

Article I(1) of the Outer Space Treaty refers to the “benefit and interests” of all States, irrespective of their level of economic development. This supports the view describing benefits deriving from space activities as benefits for the entire international community of States. This may include broadening access to outer space for developing countries.¹³¹ However, the Outer Space Treaty does not contain a duty of developmental assistance on the part of the spacefaring States, as acknowledged by COPUOS.¹³² The UN Declaration on Space Benefits (1996) confirms that States are required to promote international cooperation “on an equitable and mutually acceptable basis.”¹³³ This leads to the further conclusion that the

¹²⁹ *Id.* at 105; Stephan Hobe, *The Moon Agreement – Let’s Use the Chance!* 59 ZLW 372, 379 (2010) (stating that the interests of spacefaring countries must be taken into consideration).

¹³⁰ Ramya Sankaran & Nivedita Raju, *A Framework to Address Burgeoning Commercial Complexities in Space Mining* 66 ZLW 71, 88 (2017) (arguing that States have a duty to provide access to the extracted resources to all States).

¹³¹ Note by the Secretariat, *supra* note 56, at 9, ¶ 70 (recognizing “the need for broadening access to space”); STEPHAN HOBE, *Article I*, in 1 COLOGNE COMMENTARY ON SPACE LAW, *supra* note 11, 25, at 38 ¶ 51.

¹³² Note by the Secretariat, *supra* note 56, at 11, ¶ 91 (“it is desirable to fully include in such activities countries with emerging or limited capabilities in space exploration”). *Contra*, Sankaran & Raju, *supra* note 130, at 88.

¹³³ G.A. Res. 55/122, ¶ 3 (Dec. 13, 1996). *See also* V. S. Mani, *Paragraph 3 (Promoting International Cooperation/Developing Countries)*, in 3 COLOGNE COMMENTARY ON SPACE LAW 337, 338, ¶ 82 (Stephan Hobe et al. eds., 2015) (pointing out that spacefaring States are free to structure their cooperation with other States. Decisions to initiate

minimum requirement for the States involved in the Artemis missions is to share benefits for all States deriving from the completion of missions in their entirety. Benefit sharing at stage level remains optional. Since space resource utilization takes place within the framework of a public-private partnership and is confined to mission support, no duty of benefit sharing automatically arises from extraction activities.

IV. IMPACT OF THE ARTEMIS PLAN ON THE DEVELOPMENT OF INTERNATIONAL SPACE LAW

The Artemis Plan makes several creative arguments relating to the role of private actors in space exploration missions and utilization of space resources. This section evaluates whether the provisions of the Artemis Plan withstand scrutiny in the light of well-established theories of international space law. In doing so, it assesses the impact of the Artemis Plan on the development of two areas of international space law – namely, treaty interpretation (Subsection A) and lawmaking (Subsection B).

A. *A Subsidiary Means of Interpretation of the Outer Space Treaty*

The Artemis Plan revolves around the concept of sustainable exploration.¹³⁴ The latter is a principled form of practice complying with the provisions of the Outer Space Treaty.¹³⁵ Yet its governing principles do not replicate the letter of the Outer Space Treaty. For example, the Outer Space Treaty does not refer to staggered mission planning, affordability, or space resource utilization. Therefore, the question arises regarding the extent to which it is possible to generalize the scope of application of the guiding principles of sustainable exploration: does the Outer Space Treaty allow space resource utilization in other contexts? Are the guiding principles of sustainable exploration an authoritative interpretation of the Outer Space Treaty? The emergence of the concept of sustainable exploration through State practice does not amount to a

cooperation programs with developing countries are based on moral and political considerations).

¹³⁴ Artemis Plan, *supra* note 1, at 12.

¹³⁵ As discussed in Section III.

modification of the Outer Space Treaty,¹³⁶ thus suggesting that the theoretical limits of its guiding principles derive from the normative value they have acquired through practice.

Article 31(3) of the Vienna Convention on the Law of Treaties (VCLT 1969)¹³⁷ states that subsequent practice in the application of a treaty which establishes the agreement of the parties constitutes an authentic interpretation of the treaty. Having developed through the practice of the 26 ISECG space agencies over 15 years, sustainable exploration represents the agreement of a minority of States parties to the Outer Space Treaty, which has been ratified by 111 States.¹³⁸ Hence, the principles governing sustainable exploration do not constitute an authentic interpretation of the Outer Space Treaty. They may nonetheless provide a supplementary means of interpretation.

The International Law Commission (ILC) defines subsequent practice as a supplementary means of interpretation under Article 32 of the VCLT as “conduct by one or more parties *in the application* of the treaty.”¹³⁹ Conduct in the application of a treaty is not the same as conduct regarding the interpretation of a treaty. Rather, it is a form of conduct falling within the accepted interpretation of a treaty. As a form of exploration allowed under the current interpretation of Article I of the Outer Space Treaty, sustainable exploration appears to meet the requirement of conduct in the application of a treaty; it does not purport to offer a new interpretation of the Outer Space Treaty nor is it intended to amend the treaty.

Further evidence of sustainable exploration as a subsidiary, as opposed to authentic, means of interpretation of the Outer Space Treaty is the fact that it encompasses the conduct of both States and private actors acting on behalf of the space agencies participating in the exploration missions.¹⁴⁰ As the ILC points out, relevant conduct for the purposes of Article 32 of the VCLT “is not limited to conduct of the organs of a state, but may also cover conduct of

¹³⁶ G.A. Res. 73/202, at Conclusion 7(3) (Jan. 3, 2019) (“The possibility of amending or modifying a treaty by subsequent practice of the parties has not been generally recognized”).

¹³⁷ Vienna Convention on the Law of Treaties, May 23, 1969, 1155 U.N.T.S. 331 (*entered into force* Jan. 27, 1980).

¹³⁸ Status of UN Agreements, *supra* note 8.

¹³⁹ G.A. Res. 73/202, at Conclusion 4(3) (Jan. 3, 2019)(emphasis added).

¹⁴⁰ As discussed in Section III.B.1 above.

private actors acting under delegated public authority.”¹⁴¹ As a general rule, Article VI of the Outer Space Treaty establishes that space operations conducted by nongovernmental actors require the authorization of and continuing supervision by States.¹⁴² This indicates that private actors partaking in sustainable exploration missions, such as the Artemis missions, must be licensed and remain open to scrutiny by the licensing State.¹⁴³ This also satisfies the requirement that practice in the application of a treaty must be sufficiently unequivocal.¹⁴⁴

The consequence of considering sustainable exploration missions as practice in the application of a treaty is two-fold. Firstly, it contributes to the clarification of the meaning of the Outer Space Treaty,¹⁴⁵ thus making a distinctive contribution to treaty interpretation in international space law. For example, it acknowledges the lawfulness of space resource utilization in the absence of a bespoke regulatory framework.¹⁴⁶ Secondly, it clarifies that sustainable exploration is a specific form of conduct – a practical agreement between a limited number of parties¹⁴⁷ – of which space resource utilization constitutes an attribute. By acknowledging that the lawfulness of space resource utilization stems from its being instrumental to the sustainability of human exploration missions, it makes a second distinctive contribution to the development of international space law. Specifically, it shows that generalizations about the

¹⁴¹ Int'l Law Comm'n, Rep. on the Work of its Seventieth Sess., U.N. Doc. A/73/10, at 37, Commentary to Conclusion 5 (2018). This is also a principle recognized by the International Court of Justice (ICJ); *See Case Concerning Rights of Nationals of the United States of America in Morocco (U.S. v. Morocco)*, Judgment, 1952 I.C.J. Rep. 176, at 211 (August 27) (recognizing that interpretations of Article 95 of the General Act of the 1906 Conference of Algeciras must take into consideration the practice of local customs authorities).

¹⁴² Outer Space Treaty, *supra* note 5, art. VI.

¹⁴³ *See Tronchetti, supra* note 84 and corresponding text.

¹⁴⁴ Int'l Law Comm'n Rep., *supra* note 141, at 38.

¹⁴⁵ G.A. Res. 73/202, at Conclusion 5(2) (Jan. 3, 2019).

¹⁴⁶ *See Artemis Accords, supra* note 22, § 10.

¹⁴⁷ Int'l Law Comm'n Rep., *supra* note 141, at 51.

lawfulness¹⁴⁸ or unlawfulness¹⁴⁹ of space resource utilization are difficult to sustain.

The conceptualization of sustainable exploration as conduct in the application of the Outer Space Treaty reframes the scholarly debate on the three main areas of criticism against the Artemis Accords. Firstly, the conformity of the guiding principles of sustainable exploration with the Outer Space Treaty, as embedded in the Artemis Plan, provides a different perspective from the stream of scholarly literature describing the Artemis Accords as an arbitrary interpretation thereof.¹⁵⁰ Secondly, the emergence of the principle of collaborative exploration demonstrates that the Artemis Accords do not represent the end of multilateralism in international space law.¹⁵¹ Although the concept of sustainable exploration originates in the practice of States whose interests are “specially affected,”¹⁵² the Artemis Plan, including the Artemis Accords, is not a unilateral act by the United States in disregard of the views of the international community.

Thirdly, the signing of the Artemis Accords by States which are also parties to the Moon Agreement is not *per se* a source of international friction. While it is widely acknowledged that “the existence of conflicting rules in different instruments on the same issues could create serious legal and practical problems for the interpretation and implementation of space treaties,”¹⁵³ the Artemis Accords do not create a fragmentation of legal regimes on space resource utilization. As a subsidiary means of interpretation, sustainable exploration does not add to or detract any obligation from the provisions of the Outer Space Treaty. To criticize the Artemis Accords for encouraging the exploitation of space resources in support

¹⁴⁸ See e.g., JENKS, *supra* note 49, at 275 and Thomas Gangale, *The Legality of Mining Celestial Bodies* 40 J. SPACE L. 187, 189 and 205 (2015-2016) (both arguing that the non-appropriation principle does not apply to the resources of celestial bodies).

¹⁴⁹ See Freeland & Jakhu, *supra* note 11, at 53-54, ¶ 39; LEE, *supra* note 124, at 13 (“mineral extraction activities on celestial bodies [are] difficult, if not impossible, to justify in law”); PHILIP DE MAN, EXCLUSIVE USE IN AN INCLUSIVE ENVIRONMENT: THE MEANING OF THE NON-APPROPRIATION PRINCIPLE FOR SPACE RESOURCE UTILIZATION 407 (2016) (arguing that the commercialization of space resources is unlawful).

¹⁵⁰ See Mosteshar, *supra* note 23.

¹⁵¹ See Wright Nelson, *supra* note 25.

¹⁵² North Sea Continental Shelf Cases (Ger. v. Den., Ger. v. Neth.), Judgment, 1969 I.C.J. Rep. 3 (Feb. 20), at 42-43.

¹⁵³ Danilenko, *supra* note 6, at 241.

of exploration missions amounts to recognizing the existence of a moratorium on space resource utilization until the international regime envisioned in Article 11(5) of the Moon Agreement¹⁵⁴ is established. This position does not find support in either the *travaux préparatoires* of the Moon Agreement¹⁵⁵ or the scholarly literature.¹⁵⁶ Quite the contrary, Article 6(2) of the Moon Agreement recognizes the lawfulness of using “mineral and other substances of the Moon in quantities appropriate for the support of [scientific] missions.”¹⁵⁷

The emergence of the concept of sustainable exploration is a significant innovation in international space law since it clarifies the scope of application of key provisions of the Outer Space Treaty. However, it does not represent a paradigm shift in international space law. By endorsing the concept of sustainable exploration and its guiding principles, the Artemis Plan aims at encouraging the responsible use of outer space by every actor involved in the execution of the Artemis missions. In this context, space resource utilization turns out to be an application of the principle of affordability of human exploration missions,¹⁵⁸ not an end in itself.

B. *Lawmaking: Property Claims on Space Resources*

The emergence of the concept of sustainable exploration shows that the provisions of the Outer Space Treaty are the necessary and sufficient condition to regulate issues related to space resource extraction and utilization in context of human exploration missions.¹⁵⁹ The stream of scholarly literature arguing that the UN outer space treaties provide a comprehensive regime for activities in outer space supports the finding.¹⁶⁰ This contradicts the view

¹⁵⁴ Moon Agreement, *supra* note 7, art. 11(5).

¹⁵⁵ The documentary history is analyzed in THOMAS GANGALE, *THE DEVELOPMENT OF OUTER SPACE: SOVEREIGNTY AND PROPERTY RIGHTS IN INTERNATIONAL SPACE LAW* 121-125 (2009). See also Paxson, *supra* note 123, at 499-500.

¹⁵⁶ *Id.*, at 117; DE MAN, *supra* note 149, at 174; Paxson, *supra* note 123, at 499; Karl-Heinz Böckstiegel, *Legal Implications of Commercial Activities*, in *PROCEEDINGS OF THE TWENTY-FOURTH COLLOQUIUM ON THE LAW OF OUTER SPACE* 1, 8 (1981).

¹⁵⁷ Moon Agreement, *supra* note 7, art. 6(2).

¹⁵⁸ See discussion *supra* Section III B.

¹⁵⁹ See discussion *supra* Section III.

¹⁶⁰ Gorove, *supra* note 90, at 95-97 (arguing that the principles set forth in the space law conventions cover all activities of exploration and use of outer space); DE MAN, *supra*

that the Outer Space Treaty fails to address space mining effectively.¹⁶¹ However, it is noteworthy that the Artemis Plan contains a statement on property rights over space resources which appears to violate the principle of non-appropriation of outer space.¹⁶² A departure from the Outer Space Treaty would amount to the possible creation of a new rule. The statement reads:

NASA plans to *purchase* from one or more providers a sample of an extracted lunar resource for a nominal dollar value. The sample will be delivered in place on the lunar surface for retrieval by NASA at a later date. This process will establish *a critical precedent* that lunar resources can be extracted and purchased *from the private sector* in compliance with Article II and other provisions of the Outer Space Treaty.¹⁶³

The Artemis Accords refer only indirectly to property rights. For example, Section 2(1) states that the bilateral instruments between the signatories should contain provisions on “the transfer of goods,”¹⁶⁴ which may include extracted resources. At the same time, Section 10(2) states that “the extraction and utilization of space resources does not inherently constitute national appropriation under Article II of the Outer Space Treaty.”¹⁶⁵ This indicates that the Artemis Accords do not recognize property rights over space resources. Nor do their signatories through the conclusion of bilateral agreements with NASA on the implementation of the Artemis missions. Signing the Artemis Accords does not entail an endorsement of the Artemis Plan, including the statement on property rights.

note 149, at 43 (referring to the “self-referential nature of the international space law regime”).

¹⁶¹ Ganatra & Modi, *supra* note 125, at 81 (arguing that “the framework of international space law regimes, such as the Moon Agreement and the Outer Space Treaty, [is] archaic”); Fengna Xu and Jinyuan Su, *New Elements in the Hague Space Resources Governance Working Group’s Building Blocks* 53 SPACE POL’Y 1 (2020); Gershon Hasin, *Developing a Global Order for Space Resources: A Regime Evolution Approach*, 52 GEO. J. INT’L L. 77, 99 (2020) (describing the Outer Space Treaty as “a relic of the Cold War”); Nick Smith, *Space Rocks!: A Perspective on Largely Unregulated Asteroid Mining*, 8(3) GEO. MASON J. INT’L COMP. L. 402, 403 (2017) (the Outer Space Treaty is “a relic of the cold war space race that is intentionally ambiguous, and has far outlived its usefulness on the question of privatization in space”).

¹⁶² Outer Space Treaty, *supra* note 5, Article II.

¹⁶³ Artemis Plan, *supra* note 1, at 28-29 (emphasis added).

¹⁶⁴ Artemis Accords, *supra* note 22, § 2(1)(b).

¹⁶⁵ Artemis Accords, *supra* note 22, § 10(2).

It may be argued that, by including the statement on property rights over space resources in the Artemis Plan, the United States intend to make a legal claim aimed at initiating a new practice. A precedent in US history is the 1945 Truman Proclamation, which started the process of crystallization of a new rule of customary international law on State jurisdiction over the resources of the continental shelf.¹⁶⁶ If supported by a large number of States, the statement on property rights in the Artemis Plan could similarly lead to the creation of a new customary rule.

At COPUOS, delegations unanimously agree that neither the Outer Space Treaty¹⁶⁷ nor the Moon Agreement¹⁶⁸ prohibit the utilization of space resources. This aligns with the scholarly position maintaining that there exists no treaty or customary rule prohibiting the exploitation of space resources *per se*.¹⁶⁹ Delegations also agree that the freedom of exploration and use of outer space is not absolute, but limited by other principles of the Outer Space Treaty, such as non-appropriation and avoiding harmful interference with the activities of other States.¹⁷⁰ In relation to human exploration missions, the Guidelines for Partnership of the proposed Sino-Russian lunar research station do not mention property rights. They only commit the signatories to utilize *in situ* resources as part of their exploration missions.¹⁷¹ Likewise, ESA acknowledges the instrumental role of space resource utilization for achieving the

¹⁶⁶ Proclamation No. 2667, 59 Stat. 884 (Jan 3, 1945). For an analysis of the Proclamation, see James Crawford, *International Law on a Given Day, in* INTERNATIONAL LAW AS AN OPEN SYSTEM: SELECTED ESSAYS 43 (James Crawford ed., 2002).

¹⁶⁷ LSC 2018 Report, *supra* note 105, at 30 ¶ 238; Comm. On the Peaceful Uses of Outer Space, LSC 2019 Report, *supra* note 9, at 33 ¶ 245. See also Vancouver Recommendations on Space Mining, *supra* note 77, at 1.

¹⁶⁸ LSC 2018 Report, *supra* note 105, at 33 ¶ 260 (the fact that the Moon Agreement attempts to regulate the utilization of space resources shows that space resource activities are permitted under the Outer Space Treaty).

¹⁶⁹ Jinyuan Su, *Legality of Unilateral Exploitation of Space Resources under International Law*, 66(4) INT'L & COMPARATIVE L. QUARTERLY 991 (2017).

¹⁷⁰ Tronchetti, *supra* note 90, at 781. See also LSC 2017 Report, *supra* note 103, at 32-33 ¶ 24 (stating that the principle of non-appropriation applies only to resources “in place”).

¹⁷¹ ILRS, *supra* note 42, at 2 (describing the research station as designed to conduct “scientific research activities, including exploration and use of the Moon”).

exploration missions' goals while excluding that this amounts to a legal claim over space resources.¹⁷²

The lack of references to property rights over space resources in current State practice does not appear to be coincidental. Therefore, it cannot be considered a form of acquiescence to the US claim in the Artemis Plan, at least in context of human exploration missions. This begs the question of what the consequence of NASA's purchase of a sample of extracted resources from a private actor would be. Since outer space is not subject to national appropriation by any means,¹⁷³ the transaction would not be able to create or transfer any property rights.¹⁷⁴ Arguably, it would amount to an exchange of money for the service of space resource extraction and delivery – that is to say, it would be a purchase of service, as such lawful under international space law.

The purchase of service interpretation is not without objections. For instance, De Man argues that any exchange of space resources is unlawful. He writes:

the extraction of tangible resources from celestial bodies can only be legitimate if the excavating state subsequently uses the removed substance *itself* instead of transferring it to another state. [...] the act of sale would imply the existence of property rights.¹⁷⁵

A counterargument is that this position provides an interpretation of the principle of non-appropriation that is not supported by

¹⁷² *ESA Space Resources Strategy*, *supra* note 31, at 16 (“ESA cannot assume leadership in interpreting and further developing the legal and regulatory framework applicable to space resources, as this is beyond the Agency’s competences”).

¹⁷³ Outer Space Treaty, *supra* note 5, Article II (“Outer space... is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by *any other means*.” Emphasis added). See also Paul B. Larsen, *Asteroid Legal Regime: Time for a Change?* 39(2) J. SPACE L. 275, 282 (2014) (arguing that “Art. II is all-inclusive”).

¹⁷⁴ CHENG, *supra* note 50, at 233 (“outer space and celestial bodies are not only not subject to national also appropriation, but also not subject to appropriation under private law”). See also INT’L INST. SPACE L., Statement of the Board of Directors, at 2 (2004), https://iislweb.space/wp-content/uploads/2020/01/IISL_Outer_Space_Treaty_Statement.pdf (maintaining that private ownership by governmental or non-governmental entities is not legally possible).

¹⁷⁵ DE MAN, *supra* note 149, at 407 (emphasis original). See also Philip de Man, *The Exploitation of Asteroids and the Non-Appropriation Principle: Reflections on the Nature of Property Rights in Light of the US Space Resource Act of 2015*, 40 J. SPACE L. 1, 49 (2015-2016).

the textual analysis of Article II of the Outer Space Treaty, which does not refer to any modality of use of outer space, including limits *ratione personae* to the uses of space resources. Quite the contrary, State practice appears to encourage the conclusion of public-private transactions in space as part of sustainable exploration missions.¹⁷⁶ Transactions over space resources do not, and cannot, imply the existence of property rights in outer space.

Another objection is that, if brought back to Earth, space resources would become property of the State carrying them. Some scholars argue that, in the absence of any specific provision in the UN outer space treaties, such action would be lawful.¹⁷⁷ According to this interpretation, the physical act of moving the extracted resource from outer space to Earth would be constitutive of property rights. However, the argument does not find support in any theory of property rights.¹⁷⁸ Conversely, De Man writes that the space law regime “remains applicable to materials brought back to Earth.”¹⁷⁹ Hence no property rights arise over the space resources. This position is equally problematic, since it reduces outer space into a *res* capable of appropriation. As Lachs writes, outer space is an environment, not a *res*.¹⁸⁰ As such, it cannot be brought back to Earth. A middle position is that States could claim property rights over the space resources returned to Earth under national law. The US Commercial Space Launch Competitiveness Act¹⁸¹ lends support to this interpretation, since it recognizes the right of US citizens to “own, transport, use, and sell” space resources. Yet, as Cheney writes, absent mutual recognition of property rights at the domestic level, such claims cannot be enforced against other States.¹⁸² A

¹⁷⁶ See discussion *supra* Section III. B above.

¹⁷⁷ Henry R. Hertzfeld & Frans von der Dunk, *Bringing Space Law into the Commercial World: Property Rights without Sovereignty* 6(1) CHICAGO J. INT’L L. 81, 83 (2005). See also Megan A. MacKay, *Property Rights in Celestial Bodies: A Question of Pressing Concern to All Mankind* 104(2) MARQUETTE L. REV. 575, 593 (2020) (arguing that moving an asteroid “transforms the asteroid into possessable property”).

¹⁷⁸ For a comprehensive analysis, see JOHN G. SPRANKLING, *THE INTERNATIONAL LAW OF PROPERTY* (2014).

¹⁷⁹ DE MAN, *supra* note 149, at 407.

¹⁸⁰ LACHS, *supra* note 51, at 46 (describing outer space as “a sphere of states’ activities”).

¹⁸¹ U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114–90, § 51303, 129 Stat. 704, 721 (2015).

¹⁸² Thomas Cheney, *There’s No Rush: Developing a Legal Framework for Space Resource Activities*, 43(1) J. SPACE L. 106, 139 (2019). Cf. Tronchetti, *supra* note 90, at 781

more radical view maintains that space resources are not subject to national jurisdiction, hence national legislation conferring property rights over space resources “may be enacted but [does] not have a legally binding character.”¹⁸³

None of the objections above makes a cogent argument against the lawfulness of the purchase of service in outer space interpretation. This suggests that the statement on property rights contained in the Artemis Plan should be interpreted in its context – that is to say, as part of the US civilian program for human space exploration. The latter embraces the principle of sustainable exploration, which includes space resource utilization as part of the mission design.¹⁸⁴ The statement is not intended to modify the Outer Space Treaty and applies only to activities taking place in outer space¹⁸⁵ within the framework of public-private partnerships. It has a narrow meaning and generalizations beyond sustainable exploration missions are difficult to sustain. By discriminating between transactions in support of human exploration missions and transactions concluded for other purposes, the statement shows that the lawfulness of the proposed transaction derives from the application of the bundle of guiding principles of sustainable exploration. Conversely, it is not constitutive of any new rule under international space law.

V. CONCLUSION

The Artemis Plan ushered in a new era of human space exploration. Adopted by the United States in 2020, its content and structure are informed by 15 years of State practice developed within the

(arguing that legislation granting property rights over space resources violates the principle of non-appropriation “by other means” set forth in Article II of the Outer Space Treaty).

¹⁸³ Stephan Hobe & Philip de Man, *National Appropriation of Outer Space and State Jurisdiction to Regulate the Exploitation, Exploration and Utilization of Space Resources*, 66 GER. J. AIR & SPACE L. 460, 475 (2017).

¹⁸⁴ See discussion *supra* Section III.

¹⁸⁵ See also Exec. Order No. 13914, 85 Fed. Reg. 20,381, Sec. 1 (Apr. 6, 2020) (“It shall be the policy of the United States to encourage international support for the public and private recovery and use of resources *in outer space*, consistent with applicable law.” Emphasis added); But see Fabio Tronchetti & Hao Liu, *The White House Executive Order on the Recovery and Use of Space Resources: Pushing the Boundaries of International Space Law?* 57 SPACE POL’Y (2021) (describing the Executive Order as instrumental to the implementation of the Artemis Plan, effectively creating a self-contained regime of international space law).

framework of the ISECG – a consortium of 26 space agencies created for the purpose of elaborating a shared vision for human space exploration. Central to both the ISECG work and the Artemis Plan is the concept of sustainable exploration mission, which envisions space resource utilization as part of the mission design.

The Artemis Plan has been severely criticized as circumventing the provisions of the Outer Space Treaty by asserting the lawfulness of space resource utilization in the Artemis Accords, a memorandum of understanding shared with the exploration missions' international partners. This article critically examined the content of the Artemis Plan in the light of both State practice and theories of international space law.

The findings show that, by embedding the concept of sustainable exploration, the Artemis Plan clarifies the meaning of exploration and use of outer space, as set forth in the Outer Space Treaty. At the same time, the Artemis Plan has a narrow scope and generalizations about the lawfulness of space resource utilization beyond its remit should be avoided. While the findings indicate that State practice is gradually consolidating around the lawfulness of space resource utilization in support of human exploration missions, this new trend in practice does not amount to an authentic interpretation of the Outer Space Treaty, especially in relation to property claims on space resources.

The adoption of the Artemis Plan is a significant development in international space law. However, it does not represent a paradigm shift.

THE ODYSSEY OF EUROPEAN SPACE POLICY

*Maria Castillo**

I. INTRODUCTION

Throughout history, space has nourished the dreams of human beings and attracted the attention of States. In 2021, the European Union (EU or Union) adopted its first comprehensive space program that was intended to enable it to remain “a leading international player.”¹ This program, included in Regulation (EU) 2021/696 of April 28, 2021 (Regulation 2021/696),² simplifies and rationalizes the Union’s achievements in this area. The Union is determined to forge its way to the stars, and thus promotes the visibility of its space policy.

In many ways, Europe’s awakening may seem to have appeared late,³ but space is a symbol of power which is closely related to the defense sector.⁴ Space is an area of important strategic dimension, both in its civilian and military applications. It is not subject to any claims of sovereignty, its exploration and use must be for the benefit and in the interest of all countries, and it shall be

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¹ Commission Regulation 2021/696 of Apr. 28, 2021 Establishing the Union Space Programme and the European Union Agency for the Space Programme and repealing Regulations (EU) No 912/2010, (EU) No 1285/2013 and (EU) No 377/2014 and Decision No 541/2014/EU, 2021 O.J. (L 170/69) 69 [hereinafter Regulation 2021/696].

² *Id.* Regulation 2021/696 has been applicable since Jan. 1, 2021.

³ Juhna-Matti Liukkonen et al., *Espace : le Réveil de l’Europe ?*, INSTITUT MONTAIGNE (Feb. 2020), <https://www.institutmontaigne.org/publications/espace-le-reveil-de-leurope>.

⁴ Philippe Varnoteaux, *La naissance de la politique spatiale française* [The Birth of French Space Policy], 77 VINGTIEME SIECLE. REVUE D’HISTOIRE 59, 59-68 (2003) <https://www.cairn.info/revue-vingtieme-siecle-revue-d-histoire-2003-1-page-59.htm>.

considered the province of all humankind.⁵ In 1957, while the USSR launched Sputnik-1 and positioned itself at the front of the race to the stars, six European States signed the Treaty of Rome, thus creating the European Economic Community (EEC).⁶ While this treaty sought the integration of national economies at the cost of ignoring the space sector, the space race between the USA and the USSR contributed to the emergence of a spatial Europe.⁷

To make up the ground separating them from other countries, the European States chose to develop cooperatively. This cooperation gave rise to a complex spatial Europe, combining national, multilateral, intergovernmental and community dimensions.⁸ Two international cooperation organizations were first created: the European Launcher Development Organization (ELDO)⁹ and the European Space Research Organization (ESRO).¹⁰ The former is responsible for developing launching services,¹¹ while the latter takes charge of developing scientific satellites.¹² The merging of these two entities gave rise to the European Space Agency (ESA), which was created in 1975,¹³ and enables the countries of the European continent¹⁴ to pool their “human, technical and financial resources required for activities in the space field.”¹⁵ Under the impetus of the

⁵ 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, Oct. 10, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty].

⁶ Treaty establishing the European Economic Community, Mar. 25, 1957, 298 U.N.T.S. 3 [hereinafter Treaty of Rome] (Belgium, France, Germany, Italy, Luxembourg and the Netherlands as signatories) (volume 298 as cited contains the English translation by the Interim Committee for the Common Market and EURATOM).

⁷ PIERRE-MARIE MARTIN, *LE DRIOT DE L'ESPACE* 8 (Presses Universitaires de France ed., 1992); René-Jean Dupuy, *Les Espaces hors Souveraineté*, 67 Pouvoirs 99 (1993); MIREILLE COUSTON, *DROIT SPATIAL* 224 (2014).

⁸ Géraldine Naja, *Politiques spatiales Intergouvernementales Européennes*, 2 ANNALES DES MINES - REALITES INDUSTRIELLES 6 (2019).

⁹ Convention for the Establishment of a European Organization for the Development and Construction of Space Vehicle Launchers, Mar. 29, 1962, 507 U.N.T.S. 177.

¹⁰ Convention for the establishment of a European Space Research Organization, June 14, 1962, 528 U.N.T.S. 33.

¹¹ Comprising six Member States: Belgium, France, Germany, Italy, the Netherlands and the United Kingdom

¹² Comprising ten Member States: the six ELDO member states plus Denmark, Spain, Sweden and Switzerland

¹³ Convention establishing a European Space Agency, May 30, 1975, 1297 U.N.T.S. 161 [hereinafter ESA Convention].

¹⁴ The ESA Convention would go on to be signed by the 10 ESRO Member States.

¹⁵ See ESA Convention, *supra* note 13, preamble ¶ 1.

ESA, two intergovernmental entities were also created: EUTELSAT, in 1977, to build, launch, and operate European telecommunications satellites and EUMETSAT, in 1986, to operate European meteorological satellites.¹⁶

In parallel with this intergovernmental cooperation, the EEC recognized the importance of space related issues within its focus to create a common market to ensure “economic and social progress”¹⁷ and improve the “living and working conditions of [the European] peoples.”¹⁸ As an economic and then political integration organization, the EEC has developed along with various foundational treaties¹⁹ to finally place the Union ahead. During this period, the European Parliament had the opportunity to stress “the importance of the benefits that the [European Economic Community] can derive... from space activities... [and the fact] that Europe cannot depend on the outside world to meet its own needs”²⁰ After the launch of the US space shuttle Columbia, the European Parliament stated that “a new era has started in space... [and that] the time has come... for the effort of the nations and the Community in the field of space exploration to be pursued with renewed vigor”²¹ Thus, in 1987 the Single European Act²² introduced Title VI, which is devoted to research and technological development, into European Economic Community law. The objective is for the Union to “strengthen the scientific and technological bases of European

¹⁶ EUTELSAT was provisionally established in 1977 and has been governed since 1982 by the Convention Establishing the European Telecommunications Satellite Organization “EUTELSAT”, July 15, 1982, 1519 U.N.T.S. 149; EUMETSAT was created and has been governed by the Convention for the establishment of a European organization for the exploitation of meteorological satellites “EUMETSAT”, May 24, 1983, 1434 U.N.T.S. 3.

¹⁷ Treaty of Rome, *supra* note 6, preamble ¶ 2.

¹⁸ *Id.* at preamble, ¶ 3.

¹⁹ Single European Act, Feb. 17-Feb. 28, 1986, 1754 U.N.T.S. 3; Treaty on European Union, Feb. 7, 1992, 1757 U.N.T.S. 3; Treaty of Amsterdam Amending the Treaty on European Union, the Treaties Establishing the European Communities and Certain Related Acts, Oct. 2, 1997, 1997 O.J. (C 340) 1; Treaty of Nice amending the Treaty on European Union, the Treaties establishing the European Communities and certain related acts, Feb. 26, 2001, 2701 U.N.T.S. 3; Treaty of Lisbon Amending the Treaty on European Union, the Treaties Establishing the European Community, Dec. 13, 2007, 2007 O.J. (C 306) 1 [hereinafter Treaty of Lisbon].

²⁰ European Parliament Resolution on Community Participation in Space Research, 1979 O.J. (C 127) 42.

²¹ European Parliament Resolution on European Space Policy, 1981 O.J. (C 260) 102.

²² 1987 O.J. (L 169) 10.

industry and develop international competitiveness.”²³ The following year, in a statement on space, the European Commission (Commission) established the principle of the EU’s participation in space activities in Europe, while stressing that its role should be complementary to that of the ESA.²⁴ Acknowledging that “whole sections of European society depend... critically on the use of satellites and space technologies,” it stated that “...the Union cannot remain indifferent to the development of space exploration, which contributes both to Europe’s industrial competitiveness and to improving the life quality of its citizens.”²⁵ In 2003, in its white paper entitled “Space: A New European Frontier for an Expanding Union,” the Commission stated what seems to be a matter of course: space is “not only a tool for exploring the universe and taking [hu]mankind to new frontiers...[it] also has a strategic and economic dimension.”²⁶ The Commission’s space strategy will therefore focus on four major objectives: 1) maximizing the benefits that space represents for the European society and economy; 2) fostering a globally competitive and innovative European space sector; 3) strengthening Europe’s autonomy in accessing and using space in a safe and secure manner; and 4) reinforcing Europe’s role as a global player while promoting international cooperation.²⁷ Finally, the Treaty of Lisbon explicitly confers competence in the space field on the Union following its entry into force on December 1, 2009.²⁸ The new Article 189(1) of the Consolidated Version of the Treaty on the Functioning of the European Union (TFEU) stipulates that “to foster scientific and technical progress, industrial competitiveness and the implementation of its policies, the Union shall develop a European space policy. To this end, it may promote joint initiatives, support research and technological development and coordinate the efforts

²³ *Id.* at art. 130f.

²⁴ *Community and Space: A Coherent Approach. Communication from the Commission*, COM (1988) 417 final (July 26, 1988).

²⁵ *Europe and Space: Turning to a New Chapter*, COM (2000) 597 final (Sept. 27, 2000).

²⁶ *The European Union and Space: Fostering Applications, Markets and Industrial Competitiveness*, COM (1996) 617 final (Dec. 4, 1996).

²⁷ *Space Strategy for Europe*, COM (2016) 705 final (Oct. 26, 2016).

²⁸ Treaty of Lisbon, *supra* note 19. It may be useful to stress that, in addition to this new space competence, the Lisbon Treaty recognizes the legal personality of the European Union, *id.* at art. 47, and strengthens the means and coherence of its defense policy, *Id.* at art. 42 & 46.

needed for the exploration and use of space.”²⁹ This inclusion of space in the European Union’s sphere of competence enhances its political visibility and cannot be disconnected from the Union’s increased and recognized role in security and defense. As underlined in Regulation 2021/696, space exploration opportunities must be exploited for the safety of the Union and its Member States while maintaining the civilian character of the Union’s space program as well as any neutrality or non-alignment provisions laid down in the constitutional law of the Member States.³⁰ Notably, this aligns with the global strategy for the European Union’s foreign and security policy, dated June 2016.³¹

At a time when the new space development overturns the international space landscape,³² when China, the United States, and Russia measure their power based on their control of space,³³ and when States such as Japan and India are trying to develop their own presence in space,³⁴ the Union is showing off its ambitions for space.³⁵ Despite the challenge this poses for the European economy, space is nonetheless a key that could enable it to assert its sovereignty through participation in global governance, as discussed in Part III. Regardless, the development of the Union’s interest in space raises the question of space governance in Europe, discussed below in Part II.

II. EUROPEAN SPACE GOVERNANCE

Pythagoras is said to have understood the harmony of sounds when, as he passed by a forge, he noticed that pleasant sounds were occasionally produced when hammers of different weights would

²⁹ Consolidated Version of the Treaty on the Functioning of the European Union art. 189, June 7, 2016, 2016 O.J. (C 202) 47 [hereinafter TFEU].

³⁰ Regulation 2021/696, *supra* note 1.

³¹ FEDERICA MOGHERINI, SHARED VISION, COMMON ACTION: A STRONGER EUROPE; A GLOBAL STRATEGY FOR THE EUROPEAN UNION’S FOREIGN AND SECURITY POLICY (2016).

³² Lukas Rass-Masson, *Stratégies étatiques et lois nationales dans le droit international de l’espace*, at *L’espace Extra-Atmosphérique et le Droit International*, Colloque SFDI, 2021, Pedone, Paris (May 6, 2021).

³³ Isabelle Sourbes-Verger, *La place de l’Europe au sein des puissances spatiales*, at *L’espace Extra-Atmosphérique et le Droit International*, Colloque SFDI, 2021, Pedone, Paris (May 6, 2021).

³⁴ *Id.*

³⁵ *Id.*

strike metal bells.³⁶ Just as musical harmony arises from the consonance of sounds, the harmony of European space governance arises from the coordination of the various actors involved. European space policy emerges from the combined efforts of the ESA, the Union, and the Member States. To put all the puzzle pieces together and avoid unnecessary overlap, Regulation 2021/696 proposes a new governance model based on a clear division of the tasks and responsibilities between these entities.³⁷

A. The Union and its Member States

Europe must learn to speak the “language of power.”³⁸ In this sense, it must “guarantee autonomous European access to space.”³⁹ “[A] robust European space sector is essential for a robust Europe.”⁴⁰ The Union’s clearly stated political ambitions must, however, be harmonized with any national space ambitions. Space policy is traditionally reflected in national policy. Therefore, in addition to their decision-making power within the EU and ESA bodies, the Member States exert their own political will in the space sector in varying ways. Some, such as France, Germany, and Italy hold national capacity rights in the field of space including contracting, industry, and research capacities. Yet France and Germany still differ in their consideration of space policy. France views it as intrinsically linked to the defense sector while Germany takes a

³⁶ Maria Popova, *How Pythagoras and Sappho Radicalized Music and Revolutionized the World*, THE MARGINALIAN (2021), <https://www.themarginalian.org/2021/03/02/pythagoras-sappho-music/>.

³⁷ Resolution 2021/696, *supra* note 1.

³⁸ Alexandre Robinet-Borgomano, *Les leaders politiques révélés par le Covid-19: Ursula von der Leyen ou l’affirmation d’une ambition européenne* [Political Leaders Revealed by Covid-19: Ursula von der Leyen on the Affirmation of a European Ambition], INSTITUT MONTAIGNE (Aug. 18, 2020) (quoting Ursula van der Leyen speech on the occasion of the thirtieth anniversary of the fall of the Berlin Wall (Nov. 1, 2019)), <https://www.institutmontaigne.org/blog/les-leaders-politiques-reveles-par-le-covid-19-ursula-von-der-leyen-ou-laffirmation-dune-ambition>.

³⁹ Baptiste Roman, *A Bruxelles, la Commission européenne marque son soutien à l’industrie spatiale*, TOUTE L’EUROPE (Jan. 22, 2020) (quoting Thierry Breton, European Commissioner for the Internal Market), <https://www.touteurope.eu/economieet-social/revue-de-presse-a-bruxelles-la-commission-europeenne-marque-son-soutien-a-l-industrie-spatiale/>.

⁴⁰ Charles Michel, President of the European Council, opening speech at the 13th European Space Policy conference in Brussels (Jan. 12, 2021).

civilian approach.⁴¹ Others, such as Spain, are initiating the development of an industry linked to the new space savings systems.⁴² It is worth recalling that the Union's space competence is subject to a *sui generis* legal regime, enshrined in Article 4(3) of the TFEU.⁴³ This regime is intended to be exercised in parallel with that of the Member States, in accordance with the principle of loyal cooperation.⁴⁴ Indeed, while the Union's space competence falls within the category of the competences shared between the Union and its Member States and should, as such, be subject to the principle of subsidiarity, Article 4(3) of the TFEU specifies that, when it comes to matters of space, the Union may only "take action, in particular to define and implement programs, [but] the exercise of this competence shall not have the effect of preventing the Member States from exercising their competence in this area."⁴⁵ It is true that the space policies of certain Member States sometimes result in successful achievements of international scope. For example, France, via the CNES,⁴⁶ is contributing to the success of the Mars Sample Return (MSR) program led by the NASA with the SuperCam instrument on board the Perseverance rover.⁴⁷ Therefore, Regulation 2021/696 specifies that the EU Member States may participate in the EU space program by providing technical competence, know-how, and assistance, particularly in the field of safety and security,

⁴¹ Massimiliano Salini, *La Politique spatiale de l'Union: un Succès sous-estimé* (Robert Schuman Foundation Policy Paper No. 611, 2021).

⁴² Juan Manuel de Faramiñán Gilbert, *Los desafíos de España en el ámbito aeroespacial: hacia la creación de una Agencia Espacial Española y la adopción de una Ley global sobre el Espacio*, REAL INSTITUTO ELCANO (Feb. 10, 2021), <https://www.realinstitutoelcano.org/documento-de-trabajo/los-desafios-de-espana-en-el-ambito-aeroespacial-hacia-la-creacion-de-una-agencia-espacial-espanola-y-la-adopcion-de-una-ley-global-sobre-el-espacio/>.

⁴³ TFEU art. 4(3).

⁴⁴ Dimitris Liakopoulos, *The Future of the European Space Agency-EU relationship: Critical Aspects and Perspectives*, 25.2 EUR. J. OF CURRENT LEGAL ISSUES (2019), <http://webjcli.org/index.php/webjcli/article/view/649/919>.

⁴⁵ TFEU art. 4(3).

⁴⁶ National Centre for Space Studies. The CNES is a public establishment created on December 19, 1961. It is the successor to the Space Research Committee, founded two years earlier. It is responsible for developing and proposing the French space program to the French government and for implementing it. It is placed under the joint supervision of the Ministry of Research and the Ministry of the Armed Forces. It is the most important national space agency in the European Union. *See generally* CNES, <https://cnes.fr/en/> (last visited Apr. 25, 2022).

⁴⁷ *Organization*, CNES (June 25, 2020), <https://supercam.cnes.fr/en/organization-2>.

or by making available to the Union, where appropriate and feasible, data, information, services, and infrastructure in their possession or located on their territory.⁴⁸ The Commission may also, by means of contribution agreements, entrust specific tasks to bodies in the Member States which have been designated by them.⁴⁹

Within the Union, the main actors of the space program are the Commission, which is the institution responsible for promoting the general interest, and the new European Union Space Program Agency (EUSPA).⁵⁰ The Commission is responsible for the implementation of the program.⁵¹ It has overall responsibility for the program and must promote its use.⁵² It determines the priorities and long-term development of the program.⁵³ It is also responsible for managing all components or sub-components of the program that are not assigned to another entity, in particular the GOVSATCOM,⁵⁴ the NEO⁵⁵ and SWE⁵⁶ sub-components.⁵⁷ The Commission must also ensure an adequate division of the tasks and responsibilities between the different entities involved in the program and coordinate their activities.⁵⁸ Since January 1, 2020,⁵⁹ it can rely on a new Directorate-General specifically responsible for

⁴⁸ Regulation 2021/696, *supra* note 1, art. 27.

⁴⁹ *Id.*

⁵⁰ EUSPA, <https://www.euspa.europa.eu/> (last visited May 12, 2022).

⁵¹ Regulation 2021/696, *supra* note 1, art. 28.

⁵² *Id.*

⁵³ *Id.*

⁵⁴ GOVSATCOM is the European Union's Governmental Satellite Communications. Regulation 2021/696, *supra* note 1, art. 62.

⁵⁵ Near-Earth Objects (NEO): detecting natural objects such as asteroids that can potentially impact the Earth and cause damage. Regulation 2021/696, *supra* note 1, art. 61.

⁵⁶ Space Weather (SWE): monitoring and predicting the state of the Sun and the interplanetary and planetary environments, including the Earth's magnetosphere, ionosphere and thermosphere, which can affect spaceborne and ground-based infrastructure thereby endangering human health and safety. Regulation 2021/696, *supra* note 1, art. 60.

⁵⁷ Regulation 2021/696, *supra* note 1, art. 28.

⁵⁸ *Id.*

⁵⁹ The same Commissioner (currently Frenchman Thierry Breton), heads the DG DEFIS and DG GROW. The DG GROW (Internal Market, Industry, Entrepreneurship and SMEs) is responsible for developing and implementing the Commission's policies in the fields of the Single Market, Enterprise and Industry. *About this DG*, EUR. COMM'N (last visited June 16, 2022), https://ec.europa.eu/growth/about-us_en; *Industrie de la défense et espace [Defense Industry and Space]*, EUR. COMM'N (last visited June 16, 2022), https://ec.europa.eu/info/departments/defence-industry-and-space_fr.

directing the activities in the industry, defense, and space sectors (DG DEFIS). The creation *ex nihilo* of a new Directorate-General within the EU executive is rare enough to be worth noting. The DG DEFIS is under the responsibility of the Commissioner for the Internal Market.⁶⁰ In the field of industry and defense, the DG DEFIS supports the competitiveness and innovation of the European defense industry by ensuring the evolution of a strong European defense industrial and technological foundation.⁶¹ In the space field, it is responsible for implementing the EU's space program.⁶² The creation of the DG DEFIS illustrates the Union's political will not to depend on the United States or China in a sensitive sector and to avoid downgrading in terms of technological and industrial standards. By bringing together the defense and space industries within the same Directorate General, the European Union has finally recognized the strategic dimension of the space sector.⁶³

Regulation 2021/696 also created the EUSPA, a new decentralized EU agency which succeeds and replaces the European GNSS Agency.⁶⁴ The EUSPA has its own legal personality and a broad mandate to manage all the components of the space program and to exploit their synergies.⁶⁵ Through its Safety Certification Board, it ensures the safety certification of all program components, provides expertise to the Commission and contributes to the development of the market and downstream applications.⁶⁶ Launched on May 12, 2021, the EUSPA acts in close cooperation with the Member States, the relevant EU agencies, the European External Action

⁶⁰ Currently the Frenchman Thierry Breton. In a speech delivered on 22 January 2020, the Commissioner reiterated his desire to make space a priority: "Space is at the intersection of technological leadership, industrial strategy and geostrategic considerations. This is why I always had a strong interest in space. And this is why, as your new European Commissioner in charge of space, you will be able to count on me to push an ambitious European Space Agenda. And deliver on it." Thierry Breton, Commissioner, Eur. Comm'n Internal Market, 12th Annual Space Conference Closing Speech (Jan. 22, 2020).

⁶¹ *Industrie de la défense et espace [Defense Industry and Space]*, EUR. COMM'N (last visited June 16, 2022), https://ec.europa.eu/info/departments/defence-industry-and-space_fr.

⁶² *Id.*

⁶³ "Espace, le Réveil de l'Europe?", Juha-Matti Liukkonen, Arthur Sauzay and Sebastian Straube... aforementioned.

⁶⁴ Regulation 2021/696, *supra* note 1, art. 1.

⁶⁵ *Id.* at const. 62.

⁶⁶ *Id.* at art. 29.1.

Service (EEAS),⁶⁷ and other entities for crisis management missions and operations.⁶⁸ It would also manage future initiatives that might be launched by Brussels, such as the quantum constellation awaited by the European Commissioner, Thierry Breton.⁶⁹ By placing the management of these programs under the aegis of a single agency, the European Union should guarantee the continuity of service and the security of infrastructures and systems.

The implementation of the European Space Program is also the responsibility of the ESA.⁷⁰ Although the ESA is not an EU body, and is not subject to EU law, it is an international organization with recognized expertise in the field of space and has concluded a framework agreement with the European Community in 2004.⁷¹

B. Cooperation with the ESA

The ESA is first and foremost the organization that has given Europeans independent access to space.⁷² Through its cooperation with NASA and the Russian,⁷³ Canadian⁷⁴ and Japanese⁷⁵ space agencies within the ISS,⁷⁶ it contributes to the mediatization of space in European society, fostering the development of a European identity in space.⁷⁷ Since 1975, the organization has held a

⁶⁷ The European External Action Service (EEAS) is the diplomatic service of the EU. EUROPEAN EXTERNAL ACTION SERVICE, <https://www.eeas.europa.eu/en> (last visited Apr. 11, 2022).

⁶⁸ Regulation 2021/696, *supra* note 1, art. 29.2.

⁶⁹ TL with AFP, *Thierry Breton veut une Constellation de Satellites Européenne pour l'Internet haut Débit*, BMF BUSINESS (July 2, 2020, 6:44 AM), https://www.bfmtv.com/economie/entreprises/services/thierry-breton-veut-une-constellation-de-satellites-europeenne-pour-l-internet-haut-debit_AN-202007020311.html.

⁷⁰ Regulation 2021/696, *supra* note 1, art. 30.

⁷¹ Framework Agreement between the European Community and the European Space Agency, 2004 O.J. (L 261) 64.

⁷² Marco Ferrazzani, Legal Dir. of the European Space Agency, L'Agence Spatiale Européenne, Acteur de la Politique Spatiale Européenne at the SFDI Annual Colloquium: L'Espace Extra-Atmosphérique et le Droit International (May 6, 2021).

⁷³ ROSCOSMOS, roscosmos.ru.

⁷⁴ CANADIAN SPACE AGENCY (CSA), <https://www.asc-csa.gc.ca/eng/default.asp> (last visited Apr. 25, 2022).

⁷⁵ JAXA, <https://global.jaxa.jp/> (last visited Apr. 25, 2022).

⁷⁶ See *Mission Pages – International Space Station*, NASA (last visited Aug. 10, 2022), https://www.nasa.gov/mission_pages/station/cooperation/index.html.

⁷⁷ AUDE BONO-VANDROME & BERNARD DEFLESSELLES, FRENCH NATIONAL ASSEMBLY, COMMITTEE ON EUROPEAN AFFAIRS, INFORMATION REPORT N°1438 (2018).

coordinating role at the political and economic levels in the field of space.⁷⁸ It must

... ensure and ... develop, for exclusively peaceful purposes, the cooperation between European States in the fields of space research and technology and their space applications, with a view to their use for scientific purposes and for operational space application systems ... by developing and implementing a long-term European space policy ... by developing and implementing space activities and programs; ... by coordinating the European Space Program and national programs ... by developing and implementing the appropriate industrial policy for its program and recommending to the Member States a coherent industrial policy.⁷⁹

The success of the cooperation is undoubtedly linked to the application of the principle of fair return⁸⁰ and the national preference clause.⁸¹ Similarly, the existence of different types of programs, whether compulsory for all Member States or simply optional,⁸² leads to variable-geometry funding by the States depending on their interests. With a total budget of €4.55 billion in 2021, to which €1.94 billion must be added for programs that are implemented for other institutions, such as the European Union or Eumetsat, the ESA might seem quite modest; particularly in comparison with the \$23.3 billion that make up the budget allocated to the NASA for the same period.⁸³ However, it has achieved major successes: the Rosetta, Huygens, BepiColombo, and Mars Express space probes reflect the scale of its ambitions. The same applies to the Solar Orbiter mission conducted in collaboration with NASA and the Mars 2020 mission, the first segment of the Mars Sample Return (MSR)

⁷⁸ The coordination of the space program is carried out by the ESA Council, which meets either at the level of delegates from the Member States or at ministerial level. ESA Convention, *supra* note 13, art. XI.

⁷⁹ *Id.* at art. II.

⁸⁰ *Id.* at art. VII.10.c.

⁸¹ *Id.* at art. VII.1.c.

⁸² *Id.* at art. V.1.b. Where appropriate, the Agency may also carry out activities on behalf of third parties; *Id.* at art. V.2.

⁸³ See *Funding*, EUROPEAN SPACE AGENCY, https://www.esa.int/About_Us/Welcome_to_ESA/Funding (last visited Apr. 16, 2022). See also, 2021 NASA ANN. FINANCIAL REP. 11.

program led by NASA, which benefits from the major contribution of the Earth Return Orbiter (ERO) provided by the ESA.⁸⁴

While the ESA takes center stage on the European space scene, the EU's growing commitment to space quickly raised the issue of the relations between the two organizations. In order to move from competitive to complementarity, an institutional cooperation was developed with the adoption of a framework agreement between the EC and ESA on November 25, 2003 (Framework Agreement).⁸⁵ This agreement, which entered into force on May 28, 2004, lays the foundation for cooperation and specifies the rules applicable to joint initiatives.⁸⁶ It established the Space Council, a joint secretariat, and a High Level Space Policy Group.⁸⁷ The Space Council facilitates regular meetings at the ministerial level of the EU Council and the ESA Council to guide cooperation activities.⁸⁸ The Framework Agreement is concluded for a period of four years and is automatically renewed for subsequent four-year periods.⁸⁹ According to Regulation 2021/696, the development of the European Space Program must be "without prejudice" to the ESA's activities in regards to access to space.⁹⁰ The ESA is responsible for upstream research and development activities in its areas of expertise.⁹¹ Additionally, the Commission and the EUSPA may request technical expertise from it.⁹² In accordance with Regulation 2021/696, the Commission signed a Framework Financial Partnership Agreement (FFPA) with the ESA in June 2021, which governs all financial relations between the Commission, the EUSPA and the

⁸⁴ *Earth Return Orbiter*, EUROPEAN SPACE AGENCY (May 27, 2019), https://www.esa.int/ESA_Multimedia/Images/2019/05/Earth_Return_Orbiter.

⁸⁵ Council Decision 2004/578/EC Apr. 29, 2004, Conclusion of the Framework Agreement Between the European Community and the European Space Agency, 2004 O.J. (L 261) 63.

⁸⁶ Council Decision 2004/578/EC Apr. 29, 2004, Framework Agreement Between the European Community and the European Space Agency, 2004 O.J. (L 261) 64.

⁸⁷ *Id.* at art. 8.

⁸⁸ *Id.*

⁸⁹ Regulation 2021/696, *supra* note 1, art. 12.

⁹⁰ *Id.* at art. 5.

⁹¹ *Id.* at art. 30 & 31

⁹² *Id.*

ESA.⁹³ From 2021-2027, the FFPA guarantees the ESA an investment of almost 9 billion euros.⁹⁴

III. THE AMBITIONS OF THE EUROPEAN SPACE POLICY

Even before the Treaty of Lisbon came into force and established the basis for the Union's action in the space field, the Union had successfully developed satellite radio navigation⁹⁵ and earth observation programs.⁹⁶ Its achievements were gradually complemented before coagulating in Regulation 2021/696, which reveals the ambitions of the European space policy.⁹⁷

The various components of the European Space Program have been brought together in Regulation 2021/696, which repeals all regulations previously governing the subject matter.⁹⁸ Given the coverage of the space program, its activities have taken on a pronounced international dimension. This raises the question of the possible participation of third-party countries in the European space program, but also that of the Union's participation in international bodies competent in space matters and, more generally, its contribution to the development of international space law.

A. *The Components of the European Space Program*

"Without satellites, the whole planet comes to a halt."⁹⁹ The European Space Program has embraced this reality and utilizes

⁹³ Regulation 2021/696, *supra* note 1, art. 31.

⁹⁴ *N° 20-2021: ESA and EU celebrate a fresh start for space in Europe*, EUROPEAN SPACE AGENCY (June 22, 2021), https://www.esa.int/Newsroom/Press_Releases/ESA_and_EU_celebrate_a_fresh_start_for_space_in_Europe.

⁹⁵ The competence used is that of trans-European networks. This development was funded from the appropriations assigned to the trans-European transport networks. Decision No 1692/96/EC of the European Parliament and of the Council of 23 July 1996 on Community Guidelines for the Development of the Trans-European Transport Network, art. 4(g), 1996 O.J. (L 228) 1; Council Regulation (EC) No 2236/95 of 18 September 1995 Laying Down General Rules for the Granting of Community Financial Aid in the Field of Trans-European Networks, art. 17, 1995 O.J. (L 228) 1.

⁹⁶ *See Global Monitoring for Environment and Security (GMES): From Concept to Reality*, COM (2005) 565 final (Nov. 10, 2005)

⁹⁷ *See generally* Resolution 2021/696, *supra* note 1.

⁹⁸ *Id.*

⁹⁹ Michel Cabirol, « Sans Satellites, la Planète Entière s'Arrête! » Jean-Yves Le Gall (CNES), LA TRIBUNE (Jan. 20, 2014, 12:20 PM), (quoting Jean-Yves LeGall President of the Centre national d'études spatiales (CNES))

satellite infrastructure to maintain European economic competitiveness and technological capabilities. The program currently comprises the following systems: Galileo, European Geostationary Navigation Overlay Service (EGNOS), Copernicus, Space Situational Awareness (SSA), and GOVSATCOM.¹⁰⁰ Regulation 2021/696 stresses the importance of ensuring the continuous operation of these services, which must not only be of high quality¹⁰¹ but also “on the leading edge” in the case of Galileo and EGNOS, “accurate and reliable” for Copernicus, and “enhanced” and “improved” for SSA.¹⁰²

Galileo has been in operation since 2016.¹⁰³ With this project, the EU aims to build and operate the world’s first satellite navigation and positioning infrastructure.¹⁰⁴ Initiated by the European Commission in 1999¹⁰⁵ as part of its transport policy, the system, which had a difficult start,¹⁰⁶ was developed in collaboration with the ESA.¹⁰⁷ The Commission provides its funding and direction, while the ESA is responsible for its overall architecture, from design to integration and validation.¹⁰⁸ Unlike the American GPS and Russian GLONASS, with which it is compatible, Galileo was designed for civilian purposes. With a real-time positioning accuracy

<https://www.la Tribune.fr/entreprises-finance/industrie/aeronautique-de-fense/20140120trib000810506/-sanssatellites-la-planete-entiere-s-arrete-jean-yves-le-gall-cnes.html>.

¹⁰⁰ Regulation 2021/696, *supra* note 1, art. 3.

¹⁰¹ *Id.* at art. 4(1).

¹⁰² *Id.* at art. 4(2).

¹⁰³ Gemma Ryles, *What is Galileo?*, TRUSTED REVIEWS (Apr. 20, 2022), <https://www.trustedreviews.com/explainer/what-is-galileo-4226777>.

¹⁰⁴ *Qu'est-ce que Galileo?*, EUROPEAN SPACE AGENCY, https://www.esa.int/Space_in_Member_States/France/Qu'est-ce_que_Galileo.

¹⁰⁵ *Galileo – Involving Europe in a New Generation of Satellite Navigation Services*, COM (1999) 54 final (Feb. 10, 1999).

¹⁰⁶ BERNARD DEFLESSELLES & MICHEL DELEBARRE, INFORMATION REPORT NO. 440 ON BEHALF OF THE NATIONAL ASSEMBLY’S DELEGATION FOR THE EUROPEAN UNION (2007) (on the implementation of the European satellite radionavigation program - Galileo and Egnos (E 3657 and E 3691)) (translation by author); BERNARD DEFLESSELLES, INFORMATION REPORT NO. 2142 ON BEHALF OF THE COMMITTEE ON EUROPEAN AFFAIRS (2009) (on the state of the Galileo program) (translation by author).

¹⁰⁷ *Galileo – Involving Europe in a New Generation of Satellite Navigation Services*, COM (1999) 54 final (Feb. 10, 1999).

¹⁰⁸ EUSPA Press Release EUSPA/PR/21/05, Galileo Constellation Expands After Successful Launch 11 (Dec. 5, 2021).

of one meter,¹⁰⁹ it is the most accurate navigation system in the world.¹¹⁰ The Galileo constellation, which has 28 satellites as of December 4, 2021,¹¹¹ will be fully operational when it has 30.¹¹² The second generation of Galileo is expected to be phased in before 2030.¹¹³ Galileo operates independently of other existing or future systems and contributes to the strategic autonomy of the Union.¹¹⁴

EGNOS is a system that aims to improve the quality and reliability of the open signals emitted by existing global satellite navigation systems, in particular those emitted by Galileo.¹¹⁵ Developed in collaboration by the ESA, the European Commission, and Eurocontrol,¹¹⁶ it became operational on 1 October 2009.¹¹⁷ By approving the signals for accuracy and quality, EGNOS can be used for cargo tracking and precision agriculture, but also for safety-critical applications such as aviation, transport, automated toll collection systems, or pay-per-use insurance schemes.¹¹⁸

In July 2019, “a technical incident related to its ground infrastructure”¹¹⁹ paralyzed Galileo. As Regulation 2021/696 points out, “Galileo and EGNOS are complex systems which require intensive coordination.”¹²⁰ Accordingly, their coordination is entrusted to the EUSPA, which “in view of the expertise it has acquired in recent

¹⁰⁹ *Qu'est-ce que Galileo?*, *supra* note 104.

¹¹⁰ *Deux nouveaux satellites rejoignent la constellation Galileo* [Two New Satellites Join the Galileo Constellation], EUROPEAN SPACE AGENCY (Dec. 5, 2021), https://www.esa.int/Space_in_Member_States/France/Deux_nouveaux_satellites_rejoignent_la_constellation_Galileo2.

¹¹¹ EUSPA Press Release EUSPA/PR/21/05, *supra* note 108.

¹¹² *Id.*

¹¹³ Regulation 2021/696, *supra* note 1, const. 63.

¹¹⁴ *Id.*

¹¹⁵ Regulation 2021/696, *supra* note 1, const. 47.

¹¹⁶ The European Organization for the Safety of Air Navigation

¹¹⁷ *Le système de navigation EGNOS est disponible dès aujourd'hui pour la navigation aérienne en Europe* [The EGNOS Navigation System is Available Today for Air Navigation in Europe], EUROPEAN SPACE AGENCY (Mar. 2, 2011), https://www.esa.int/Space_in_Member_States/Belgium_-_Francais/Le_système_de_navigation_EGNOS_est_disponible_des_aujourd'hui_pour_la_navigation_aerienne_en_Europe.

¹¹⁸ Regulation 2021/696, *supra* note 1, const. 62.

¹¹⁹ *Update on the Availability of Some Galileo Initial Services*, EUSPA (July 14, 2019), <https://www.euspa.europa.eu/newsroom/news/update-availability-some-galileo-initial-services>.

¹²⁰ Regulation 2021/696, *supra* note 1, const. 47.

years, is the most appropriate body to coordinate all the operational tasks related to the operation of these systems.”¹²¹ Therefore, the EUSPA is responsible for managing the operation of EGNOS and Galileo. EUSPA draws on the expertise of the ESA, which is also responsible for activities relating to the evolution of the systems and the design and development of elements of the ground segment and satellites.¹²²

In addition to navigation, the European Space Program includes earth observation activities.¹²³ In October 1998, a number of institutions involved in the development of space activities in Europe¹²⁴ adopted the “Baveno Manifesto,” a document that recalls the strategic importance for Europe to supply itself with the means of globally monitoring the environment.¹²⁵ The Baveno Manifesto will give rise to a European initiative for the global monitoring of the environment and security, known as GMES.¹²⁶ GMES, referred to as Copernicus, became operational in 2014.¹²⁷ Copernicus aims to observe and monitor the planet and its ecosystems.¹²⁸ The program offers six types of services: atmospheric, marine, and terrestrial monitoring; climate change monitoring; emergency response service; and security service.¹²⁹ Copernicus services are based on data from a constellation of satellites,¹³⁰ supplemented by *in situ* (on site) measurements.¹³¹ The program transforms the data into value-added information by processing and analyzing them,

¹²¹ *Id.*

¹²² *Id.*

¹²³ *See id.* at const. 62.

¹²⁴ Those being the BNSC, CNES, DLR, European Commission, EARSC, ESA, and EUMETSAT. Later joined by the ASI. Gérard Bégni et al., *L’initiative européenne “Suivi global pour l’environnement et la sécurité” et le protocole de Kyoto* [*The European Initiative “Global Monitoring for Environment and Security” and the Kyoto Protocol*], 157 *Revue Française de Photogrammétrie et de Télédétection* [French J. of Photogrammetry and Remote Sensing] 18, 18-35 (2000).

¹²⁵ *Id.*

¹²⁶ *Id.*

¹²⁷ Regulation (EU) No 377/2014 of the European Parliament and of the Council of 3 April 2014 establishing the Copernicus Programme and repealing Regulation (EU) No 911/2010, 2014 O.J. (L 122) 44.

¹²⁸ *Id.*

¹²⁹ Regulation 2021/696, *supra* note 1, const. 71.

¹³⁰ In particular, the “Sentinel” satellites. *Satellites d’observation de la Terre* [*Earth Observation Satellites*], COPERNICUS, <https://www.copernicus.eu/fr/propos-de-copernicus/infrastructures>.

¹³¹ Regulation 2021/696, *supra* note 1 const. 72.

integrating them to other sources and finally by validating the results.¹³² The dataset, which spans over years and even decades, allows the monitoring of trends.¹³³ Coordinated and managed by the European Commission, in cooperation with the ESA, the European Environment Agency, and the Member States, the Copernicus program provides the EU with independent information on how its policies and decisions interact with and affect countries and regions across the world.¹³⁴ In doing so, the European Union strengthens its role as a global player on the world stage. Furthermore, the free and open data policy of the Copernicus program is also likely to strengthen its position in international negotiations, particularly on climate, the environment and biodiversity, thus reinforcing its role as a “soft power” on the international scene.¹³⁵

There is only one step from observation to surveillance: this step has been taken with the Space Situational Awareness system (SSA).¹³⁶ SSA is an indispensable tool for spatial Europe. Not only to protect its strategic infrastructures, in particular the Galileo and Copernicus systems, but also to guarantee the sustainability of space activities and access to space for the Union.¹³⁷

In its resolution of November 25, 2010, entitled “Global challenges: Making the Most of European Space Systems,” the Space Council recognized the need for SSA capability.¹³⁸ Four years later, the EU established a framework to support Space Surveillance and Tracking (SST).¹³⁹ According to Regulation 2021/696, the SST must be based on “a holistic approach, including detailed knowledge and understanding, of the main space hazards, which include collisions between space objects, fragmentation and re-entry of space objects

¹³² *Id.*

¹³³ *Id.* at const. 75-77.

¹³⁴ *Id.* at const. 85-87.

¹³⁵ *À propos de Copernicus*, COPERNICUS, <https://www.copernicus.eu/fr/propos-de-copernicus> (last visited Apr. 18, 2022).

¹³⁶ Space Situational Awareness (SSA). Regulation 2021/696, *supra* note 1, art 3.1(d) & 4.2.(c).

¹³⁷ *See id.* at art. 2.6.

¹³⁸ EUROPEAN SPACE AGENCY, 7TH SPACE COUNCIL RESOLUTION: GLOBAL CHALLENGES: TAKING FULL BENEFIT OF EUROPEAN SPACE SYSTEMS (2010).

¹³⁹ Decision No 541/2014/EU of the European Parliament and of the Council of 16 April 2014 Establishing a Framework for Space Surveillance and Tracking Support, 2014 O.J. (L 158) 227.

into the atmosphere, space weather and near-Earth objects.”¹⁴⁰ Hence, the SSA of the European Space Program includes: a Space Surveillance and Orbiting Object Tracking System to improve, exploit and provide data, information, and services related to space surveillance and to the location of space objects in orbit around the Earth (SST sub-component); observational parameters related to space weather events (SWE sub-component); and monitoring of the risk represented by near-Earth objects approaching the Earth (NEO subcomponent).¹⁴¹

The SST involves the establishment, development and operation of a network of both terrestrial and space-based sensors developed by Member States, the ESA, the EU, or the EU's private sector.¹⁴² This SST sensor network will monitor and establish a European inventory of space objects¹⁴³ in order to assess the risk of collision between space vehicles or between space vehicles and space debris.¹⁴⁴

As for SWE services,¹⁴⁵ they can contribute to civil protection actions and to the protection in a wide range of sectors, such as space, transport, electricity networks, or communications.¹⁴⁶ Extreme and severe space weather events can threaten the safety of citizens and disrupt the functioning of space and ground infrastructures. The SWE subcomponent of the European Space Program assesses the risks associated with space weather and the needs of users.

The European Space Program is finally complemented by a protection clause.¹⁴⁷ In the context of a thematic debate on defense, the European Council of December 19 and 20, 2013 pointed out Europe's capability deficits in terms of secure satellite communications.¹⁴⁸ The answer to this policy challenge is GOVSATCOM. GOVSATCOM is a civilian and government-controlled satellite

¹⁴⁰ Regulation 2021/696, *supra* note 1, art. 2.

¹⁴¹ *Id.* at art. 3(d).

¹⁴² *Id.* at art. 54.

¹⁴³ *Id.*

¹⁴⁴ *Id.* at art. 55. The public and private entities responsible for providing SWE services are selected through a tender process.

¹⁴⁵ Regulation 2021/696, *supra* note 1, art. 60.

¹⁴⁶ *Id.*

¹⁴⁷ *Id.* at title VIII chapter II.

¹⁴⁸ EUCO 217/13, Cover Note from the General Secretariat of the Council to Delegations (Dec. 20, 2013).

communication system for the provision of reliable and secure satellite communications capabilities and services to the EU and Member State authorities managing security-critical missions and infrastructure.¹⁴⁹ It is a user-driven program with a strong security dimension. The cases of GOVSATCOM's use should be analyzable by stakeholders in three main areas: crisis management (which may include civil and military missions and operations under the Common Security and Defense Policy, natural and man-made disasters, humanitarian crises, and maritime emergencies); surveillance (which may include border and illegal trafficking surveillance); and key infrastructures (which may include the diplomatic network, police communications, digital infrastructure such as data centers and servers, critical infrastructures such as energy, transport, and water retention devices such as dams and space infrastructure).¹⁵⁰

The European Space Program shares similar objectives with other EU programs. The exploitation of space systems such as EGNOS, Galileo or Copernicus directly complements the actions carried out under many other EU policies, in particular the research and innovation policy, the security and migration policy, the industrial policy, the common agricultural policy, the fisheries policy, trans-European networks, the environmental policy, the energy policy, and development assistance.¹⁵¹ The ESS and the new GOVSATCOM initiative will also contribute to the objectives of the European Defense Action Plan and the EU's Global Strategy.¹⁵²

From 2021-2027, the budget for the Commission's space program amounts to €14.88 billion.¹⁵³ Of this amount, €9.017 billion will be used for the further development of the Galileo and Egnos programs.¹⁵⁴ €5.421 billion will be devoted to the Copernicus observation program and its expansion.¹⁵⁵ The remaining €0.442bn will be used mainly for the SSA program and the GOVSATCOM

¹⁴⁹ Regulation 2021/696, *supra* note 1, const. 100 & 101.

¹⁵⁰ *Id.*

¹⁵¹ *Id.* at const. 15.

¹⁵² *Id.*

¹⁵³ Regulation 2021/696, *supra* note 1, art. 11.

¹⁵⁴ *Id.*

¹⁵⁵ *Id.*

program for secure government networks.¹⁵⁶ This is the highest amount ever allocated by Europe for space programs.¹⁵⁷

B. The Space Program: The Key to European Power?

The emergence of private actors in space has become a matter of course, as illustrated by companies such as SpaceX or Amazon and their Starlink¹⁵⁸ and Kuiper¹⁵⁹ projects respectively.

Focused on the development of commercial space activities, these private actors have fostered the emergence of an “economic space.” For the European Union, whose genetic heritage is to enable the economic integration of its members in order to promote economic progress,¹⁶⁰ space offers new opportunities to strengthen competitiveness, innovation, entrepreneurship and the development of skills and capacities building across Member States. The development of the European Space Program certainly pushes the boundaries of science and research and facilitates the security and defense of the Union. However, the European Space Program also contributes to creating jobs, stimulating growth and investment, thus helping the economic recovery from the COVID-19 crisis.

Therefore, the European Space Program provides a platform for the European private sector that will enable it to innovate and grow. Thus, in achieving the objectives of the program, the Union is able to draw upon the capabilities offered by private entities.¹⁶¹ The provision of SWE services, in particular, may rely on the capacities of the private sector.¹⁶² In the framework of GOVSATCOM services, public-private partnerships, with EU satellite operators for example, may make it possible to develop additional space infrastructures or capacities.¹⁶³ Similarly, in the ESS sub-component,

¹⁵⁶ *Id.*

¹⁵⁷ Council Regulation No 1311/2013 of 2 December 2013 Laying Down the Multiannual Financial Framework for the Years 2014-2020, art. 16, 2013 O.J. (L 347) 884.

¹⁵⁸ STARLINK, <https://www.starlink.com/> (last visited Apr. 18, 2022).

¹⁵⁹ *Project Kuiper*, AMAZON, <https://www.aboutamazon.com/news/tag/project-kuiper> (last visited June 19, 2022).

¹⁶⁰ Consolidated Version of the Treaty on the European Union, preamble, O.J. (C 202) 7-6-2016 pp1-388

¹⁶¹ Regulation 2021/696, *supra* note 1, const. 75.

¹⁶² *Id.* at const. 97 & art 60.

¹⁶³ *Id.* at const. 104.

ground and space-based sensors could be developed by the EU private sector.¹⁶⁴

Intended to “guarantee autonomous European access to space,”¹⁶⁵ the European Space Program nevertheless provides for the participation of third countries within its various components. Under strictly controlled conditions, and according to modalities that vary depending on the component, the European Free Trade Association (EFTA) and European Economic Area (EEA) Member States, acceding countries, declared or potential candidate countries, countries covered by the European Neighborhood Policy, or other third countries may participate in the program.¹⁶⁶

Furthermore, given the coverage of the European Space Program, its activities raise the question of the Union’s participation in international space governance. In this context, Regulation 2021/696 proposes that, in close coordination with the Member States and with their agreement, the competent bodies of the program may participate in program-related initiatives in the framework of international cooperation and collaborate with the relevant sectoral bodies of the United Nations.¹⁶⁷ In particular, the Commission may coordinate international activities on behalf of the Union and within its area of competence, in particular to defend the interests of the Union and of its Member States in international forums, without prejudice to the competences of the Member States in this field.¹⁶⁸ More specifically, Regulation 2021/696 stresses that it is particularly important for the Union, represented by the Commission, to cooperate with the bodies of the international Cospas-Sarsat program.¹⁶⁹ Regulation 2021/696 further stresses that international cooperation is essential to promote the Union’s role as a global player in the space sector.¹⁷⁰ The Commission should therefore use the Union Space Program to contribute to international efforts through initiatives and build on these efforts to promote European technologies and industry on the international scene.¹⁷¹ The

¹⁶⁴ *Id.* at art. 54.

¹⁶⁵ *See* Roman, *supra* note 59.

¹⁶⁶ Regulation 2021/696, *supra* note 1, art. 7.

¹⁶⁷ *Id.* at const. 12.

¹⁶⁸ *Id.*

¹⁶⁹ *Id.*

¹⁷⁰ *Id.* at const. 13.

¹⁷¹ *Id.*

Union's participation in space governance must, however, be without prejudice to the competences of the Member States.¹⁷² In particular, Regulation 2021/696 notes that the Commission, together with the High Representative of the Union for Foreign Affairs and Security Policy and in close coordination with the Member States, should promote responsible conduct in space in the context of the implementation of the Union Space Program.¹⁷³ The Commission should also examine the possibility that the Union may accept the rights and obligations provided for in the relevant UN treaties and conventions and make appropriate proposals, if necessary.¹⁷⁴

The prospects for EU participation in international space governance are no illusion. It is true that the various instruments of the Union constituting international space law are *pacta tertiis* for not being open to international organizations.¹⁷⁵ Nevertheless, in accordance with Article 4(3) of the TFEU, "by virtue of the principle of sincere cooperation, the Union and the Member States shall respect and assist each other in carrying out the tasks arising out of the Treaties."¹⁷⁶ Additionally, according to the established case law of the Court of Justice of the European Union, the fact that the Union is "not a member of an international organization does not prevent it from exercising its external competence effectively, in particular through the intermediary of the Member States acting jointly in the interest of the Union."¹⁷⁷ Specifically, "the TFEU does not preclude the Union from adopting a decision establishing a position to be taken on its behalf in a body set up by an international agreement to which it is not a party."¹⁷⁸ It should also be noted that

¹⁷² Regulation 2021/696, *supra* note 1, const. 14.

¹⁷³ *Id.*

¹⁷⁴ *Id.*

¹⁷⁵ These treaties include: Outer Space Treaty, *supra* note 5; Agreement on the Rescue of Astronauts and the Return of Objects Launched in Outer Space, Dec. 19, 1967, 19 U.S.T. 7570, 672 U.N.T.S. 119; Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187 [hereinafter Liability Convention]; Convention on Registration of Objects Launched into Outer Space, Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15 [hereinafter Registration Convention]; Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 18, 1979, 1363 U.N.T.S. 3 [hereinafter Moon Agreement].

¹⁷⁶ TFEU, art. 4(3).

¹⁷⁷ Case C-45/07, *Comm'n v. Hellenic Republic*, ECLI:EU:C:2009:81, ¶ 31 (Feb. 12, 2009); *See generally* Opinion 2/91 of the Court 19 March 1993, ECLI:EU:C:1993:106.

¹⁷⁸ Case C-399/12, *Rep of Ger. v. Council of the European Union*, ECLI:EU:C:2014:2258, ¶ 50 (Oct. 7, 2014).

the role of international organizations in space matters is addressed by the Convention on International Liability for Damage Caused by Space Objects¹⁷⁹ and the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies.¹⁸⁰ Similarly, the Convention on Registration of Objects Launched into Outer Space allows international organizations engaged in space activities to make a declaration of acceptance of the rights and obligations provided for in the Convention if a majority of the member States of the organization are State Parties to the Convention and to the Outer Space Treaty.¹⁸¹ This declaration of acceptance, made by the ESA as early as 1979,¹⁸² could also be made by the Union.

IV. CONCLUSION

Although further development is necessary, Regulation 2021/696 provides European space policy with an essential boost. Similar to national space policies, the European Union space policy is designed to meet the interests of Europeans through strategic priorities that emphasize economic, diplomatic, and security aspects. The establishment of an atypical governance model makes it possible to combine the various existing competences. While the ESA will focus on research and development activities, the Union will take charge of the economic dimension and potentially the security dimension as well. The security aspect nevertheless remains the prerogative of national policies, even if the establishment of a European Defense Fund includes support for programs such as space surveillance, which is an essential element of European information and decision-making autonomy.

If space is a sovereignty issue, it is also a driving force for the revival of the European economy. In this respect, it must be seen in

¹⁷⁹ Liability Convention, *supra* note 175, preamble para. 4, art. I(a).

¹⁸⁰ Moon Agreement, *supra* note 175.

¹⁸¹ Registration Convention, *supra* note 189, art. VII(1). 21 of the 27 Member States are parties to the Convention: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Lithuania, Luxembourg, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden.

¹⁸² The organizations which have made a declaration accepting the rights and obligations under the Convention are: ESA (2/01/1979), the European Telecommunications Satellite Organization (10/6/2014), the European Organization for the Exploitation of Meteorological Satellites (10/7/1997) and the International Organization of Space Communications Intersputnik (10/7/2018) (make sure to find these)

the light of the European Commission's latest digital ambitions.¹⁸³ The Digital Single Market has been prioritized by the Commission in its Digital Single Market Strategy¹⁸⁴ and recently in the agenda of the Commission President's for Europe 2019-2024.¹⁸⁵ The coming decade will be Europe's "digital decade." With space and digital being interrelated, Europe will be able to get off the ground.¹⁸⁶

¹⁸³ On 15 December 2020, the European Commission made two proposals for regulations on the digital single market: Proposal for a Regulation of the European Parliament and of the Council on a Single Market for Digital Services (Digital Services Act) and Amending Directive 2000/31/EC, COM (2020) 825 final (Dec. 15, 2020); Proposal for a Regulation of the European Parliament and of the Council on Contestable and Fair Markets in the Digital Sector (Digital Markets Act), COM (2020) 842 final (Dec. 15, 2020).

¹⁸⁴ *Id.*

¹⁸⁵ URSULA VON DER LEYEN, POLITICAL GUIDELINES FOR THE NEXT EUROPEAN COMMISSION 2019-2024 (2019) (This document was originally presented by Ursula von der Leyen in her capacity as candidate for President of the European Commission, laying out her agenda for Europe).

¹⁸⁶ *Une Europe Adaptée à l'ère Numérique*, EUROPEAN COMMISSION, https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age_fr.

LUNAR MISSIONS BY NEWER SPACE ACTORS IN THE NEXT FIVE YEARS: AN EVALUATION OF LEGAL ISSUES

*Upasana Dasgupta**

ABSTRACT

At present, we are witnessing a renewed interest in probing the Moon by the space powers and private entities. With this renewed interest, it is relevant to evaluate the legality of carrying out space activities in and around the Moon, including human settlement and mining, the legality of which are debatable. These operations will, in any case, require huge financial commitments, resources and technological expertise which only a few governments and even fewer private entities possess. However, there are several other lunar activities possible which may be exercised by governments of non-space power States and small to medium sized private space actors in near future, possibly within the next five years. This article examines the legal issues surrounding these possible smaller scale lunar activities including: (a) deploying satellites in lunar orbit; (b) providing cargo supplies to stations and installations on the Moon. Examination of the legal issues will involve learning lessons from space activities around the Earth's orbit and understanding the physical differences between the Moon and the Earth.

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I. INTRODUCTION

Human interest and endeavor in exploring the Moon are as old as the beginning of the space age. Whereas the first satellite around the Earth's orbit, the Sputnik, was launched in 1957, the first successful spacecraft to flyby the vicinity of the Moon was Luna 1 in 1959.¹ Soon thereafter, we witnessed humans landing on Moon with the Apollo 11 mission on July 20, 1969.² During the 1960s and 1970s, we saw a hiatus, especially with the end of the Cold War and a shift of budgetary preference from space exploration to other arenas in the United States (US). Now more 50 years since humans last walked on the Moon, there has been renewed interest in the exploration of the Moon. In December 2017, the President of the US called on the National Aeronautics and Space Administration (NASA) to lead a human return to the Moon and beyond with commercial and international partners.³ The US Artemis Program plans to send humans again to the Moon by 2024.⁴ The Artemis Accords, an agreement on principles for cooperation in space activities, has been signed by the US and more than 20 other countries.⁵ China and Russia are working on an International Lunar Research Station mission and invite international partners to return to Moon via uncrewed and crewed missions.⁶ United Arab Emirates (UAE), a new entrant in the space arena, which is rapidly expanding its space exploration potential, successfully deployed spacecraft around Mars orbit in 2021 and plans to transport a rover to the

¹ NASA Space Science Data Coordinated Archive, NASA, <https://nssdc.gsfc.nasa.gov/nmc/spacecraft/display.action?id=1959-012A>.

² *Apollo 11, Mission Overview*, NASA https://www.nasa.gov/mision_pages/apollo/apollo-11.html.

³ US Space Policy Directive-1, Reinvigorating America's Human Space Exploration Program, 82 Fed. Reg. 59501 (Dec. 11, 2017).

⁴ NASA, Artemis Plan - NASA's Lunar Exploration Program Overview, NASA (Sept. 2020), https://www.nasa.gov/sites/default/files/atoms/files/artemis_plan-20200921.pdf [hereinafter Artemis Plan].

⁵ The Artemis Accords: Principles for Cooperation in the Civil Exploration and Use of the Moon, Mars, Comets, and Asteroids, NASA, <https://www.nasa.gov/specials/artemis-accords/img/Artemis-Accords-signed-13Oct2020.pdf> (last visited Oct. 15, 2022) [hereinafter Artemis Accords].

⁶ Andrew Jones, *China, Russia Reveal Roadmap for International Moon Base*, SPACENEWS (June 16, 2021), <https://spacenews.com/china-russia-reveal-roadmap-for-international-moon-base/>.

Moon in 2023 as payload on Japanese company, iSpace, mission.⁷ The renewed interest of States to send crewed and uncrewed missions to explore the Moon, opens up avenues for the space industry in general.

With renewed interest in Moon exploration and exploitation, it is pertinent to examine the legality of and legal issues surrounding lunar space activities. This renewed interest in lunar activities is mostly motivated by ambitious plans of long-term exploration of the solar system beginning with the return of humans to the Moon, human settlement on the Moon and Mars,⁸ mining the Moon's resources⁹ and building a lunar economy.¹⁰ However, whereas the permissibility of some of these large-scale operations under international law is in question,¹¹ renewed interest in Moon will also involve less controversial operations which will be lucrative to the private space industry and the scientific community. These operations include the deployment of satellites in lunar orbit and

⁷ Lisa Barrington and Alexander Cornwell, *UAE Partners With Japan's iSpace to Send Rover to the Moon in 2022*, REUTERS (Apr. 14, 2021) [https://www.reuters.com/world/middle-east/uae-partners-with-japans-ispac-send-rover-moon-2022-2021-04-14/#:~:text=DUBAI%2C%20April%2014%20\(Reuters\),business%20to%20diversify%20its%20economy](https://www.reuters.com/world/middle-east/uae-partners-with-japans-ispac-send-rover-moon-2022-2021-04-14/#:~:text=DUBAI%2C%20April%2014%20(Reuters),business%20to%20diversify%20its%20economy).

⁸ NASA, *NASA's Plan for Sustained Lunar Exploration and Development*, NASA https://www.nasa.gov/sites/default/files/atoms/files/a_sustained_lunar_presence_nspc_report4220final.pdf. See Michael Sheetz, *Elon Musk Wants SpaceX to Reach Mars so Humanity is not a "Single-planet Species"*, CNBC (Apr. 23, 2021), <https://www.cnbc.com/2021/04/23/elon-musk-aiming-for-mars-so-humanity-is-not-a-single-planet-species.html>.

⁹ NASA, *supra* note 8. See Christian Davenport, *A Dollar Can't Buy You a Cup of Coffee but That's What NASA Intends to Pay for Some Moon Rocks*, THE SEATTLE TIMES (Dec. 3, 2020), <https://www.seattletimes.com/nation-world/a-dollar-cant-buy-you-a-cup-of-coffee-but-thats-what-nasa-intends-to-pay-for-some-moon-rocks/#:~:text=A%20dollar%20may%20not%20buy,agency%20for%20a%20small%20fee>.

¹⁰ Brian Dunbar, *Moon to Mars*, NASA (July 8, 2021), <https://www.nasa.gov/topics/moon-to-mars/overview>.

¹¹ The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty], which has been ratified by 110 State parties, clearly stipulates that the outer space "is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means." *Id.* at art. II. As under the Outer Space the State assumes responsibility for space activities by its non-governmental entities, appropriation by private entity would also amount to national appropriation and thereby, prohibited by the Outer Space Treaty. *Id.* at art. VI.

providing cargo supplies to stations and installations on the Moon.¹² This article examines the legal issues surrounding the operations which are less capital intensive and can be carried out by governments of non-space power States and small to medium sized private space actors. While examining these issues, one must remember the lessons learned from space exploration to date, particularly space activities in Earth's orbit while understanding that the physical characteristics of the Moon and the lunar orbit are different from that of the Earth.

II. DEPLOYING SATELLITES IN LUNAR ORBIT

Deploying satellites in the outer space void has been the State practice since 1957 with the launch of Sputnik 1. As Judge Manfred Lachs stated:

[t]he first instruments that men sent into outer space traversed the air space of States and circled above them in outer space, yet the launching States sought no permission, nor did the other States protest. This is how the freedom of movement into outer space, and in it, came to be established and recognized as law within a remarkably short period of time.¹³

The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies provides as follows: "Outer space, including the Moon and other celestial bodies, shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies."¹⁴ This principle was also earlier articulated in General Assembly Resolution 1721

¹² NASA, *Lunar Reconnaissance Orbiter*, NASA <https://lunar.gsfc.nasa.gov/>; See also, NASA, *About Gateway Deep Space Logistics*, NASA <https://www.nasa.gov/content/about-gateway-deep-space-logistics>.

¹³ *North Sea Continental Shelf Cases (Federal Republic of Germany v. Denmark and Federal Republic of Germany v. The Netherlands)*, Dissenting Opinion of Judge Lachs [1969] ICJ Rep 3 at 230, <https://www.icj-cij.org/public/files/case-related/52/052-19690220-JUD-01-10-EN.pdf>; See also, Bin Cheng, *United Nations Resolutions on Outer Space: "Instant" International Customary Law?* (1965) 5 INDIAN J. INT'L L 23.

¹⁴ Outer Space Treaty, *supra* note 11, art. I (2).

(XVI), 1961¹⁵ and the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, 1963.¹⁶ Thus, the concept of the freedom of exploration and use of outer space is both treaty law as well as customary law since the beginning of the space age.¹⁷ This suggests that the deployment of satellites in the lunar orbit is permitted under international space law. There are already a few active satellites around the Moon at this moment – such as the US's Lunar Reconnaissance Orbiter.¹⁸ However, deploying satellites in lunar orbit brings up a number of unexplored legal issues. Such issues include sustainability of lunar orbits, allotment and assignment of radiofrequency for satellites around Moon, the legality of deploying military satellites around the Moon, the requirement for registration of satellites around the Moon and liability for damage caused by satellites around the Moon.

A. Sustainability of Lunar Orbits

The Outer Space Treaty provides that

[i]n the exploration and use of outer space, including the Moon and other celestial bodies, States Parties to the Treaty shall be guided by the principle of co-operation and mutual assistance and shall conduct all their activities in outer space, including the Moon and other celestial bodies, with due regard to the corresponding interests of all other States Parties to the Treaty.¹⁹

The Outer Space Treaty further states that State Parties shall ensure while carrying out outer space exploration that harmful

¹⁵ International Co-Operation in the Peaceful Uses of Outer Space, G.A. Res 1721B (XVI) (Dec. 20, 1961).

¹⁶ Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, G.A. Res 1962 (XVIII) (Dec. 13, 1963).

¹⁷ Ram S Jakhu & Steven Freeland, *The Relationship between the Outer Space Treaty and Customary International Law* (2016) 59 PROC INT'L INST SPACE L 183 at 189-190; Eugene Pepint, *Legal Problems Created by the Sputnik* (1957) 4 MCGILL L. J. 66 at 66-67.

¹⁸ *In Depth: Lunar Reconnaissance Orbiter*, NASA (July 11, 2019) [https://solarsystem.nasa.gov/missions/lro/in-depth/#:~:text=NASA's%20Lunar%20Reconnaissance%20Orbiter%20\(LRO,continues%20to%20orbit%20the%20Moon](https://solarsystem.nasa.gov/missions/lro/in-depth/#:~:text=NASA's%20Lunar%20Reconnaissance%20Orbiter%20(LRO,continues%20to%20orbit%20the%20Moon).

¹⁹ Outer Space Treaty, *supra* note 11, art. IX.

contamination of outer space is avoided.²⁰ Hence, while deploying satellites in lunar orbit, the operator has the responsibility to protect both the Moon and the lunar orbit.

Unlike the Earth's orbit which is at the risk of being over-populated due to space debris and an increasing number of satellites, lunar orbit remains relatively unexplored. To deal with long-term sustainability of the Earth's orbit, several guidelines have been adopted including Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space²¹ and Guidelines for the Long-term Sustainability of Outer Space Activities of the Committee on the Peaceful Uses of Outer Space.²² The primary lesson of space sustainability that humans have learned from the experience of artificial satellites around the Earth is that the historical disregard for the space environment that has been witnessed in Earth's orbits should be avoided as we gradually deploy more and more satellites in lunar orbit. Moreover, it must be understood that lunar orbits are not as stable as that of the Earth's and there are always chances of satellites crashing on the Moon.²³ Whereas some orbits, known as frozen orbits, are relatively stable, there remains a likelihood of instability,²⁴ and without an atmosphere similar to Earth's, the chances of a satellite burning on reentry and thereby never reaching the surface are nil.

Currently, frozen orbits are a scarce resource, as only the frozen orbits are useful for satellites around Moon due to their stability. This is similar to the situation wherein Geosynchronous orbit (GEO) is the most desirable for communication satellites. Even

²⁰ *Id.*

²¹ *See generally*, Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space, G.A. Res 62/217 (Dec. 22, 2007) [hereinafter COPOUS Debris Mitigation Guidelines].

²² *See generally*, Comm. on the Peaceful Uses of Outer Space, Rep. of the Comm. on Its Sixty-Second Session, Annex II, U.N. Doc A/74/20 (2019)[hereinafter LTS Guidelines].

²³ Robert W. Buchheim, *USA Air Force - Project Rand- Research Memorandum*, July 14, 1956, 11-13, https://www.rand.org/content/dam/rand/pubs/research_memoranda/2008/RM1941.pdf; For example, on Mar. 4, 2022, a leftover piece of SpaceX's Falcon 9 rocket has been circling the Earth on a very wide orbit and is predicted to accidentally slam into the far side of the Moon. Loren Grush, *A SpaceX Rocket Slamming into the Moon is Reminder to Clean up our Deep Space Junk*, THE VERGE (Jan. 27, 2022), <https://www.theverge.com/2022/1/27/22904427/spacex-falcon-9-rocket-second-stage-moon-collision-deep-space-junk>.

²⁴ *See generally*, Buchheim, *supra* note 23.

now, GEO is regarded as a scarce resource.²⁵ The character of GEO means that a satellite is orbiting at the same speed as the Earth's rotation, making it essentially stationary over one spot on Earth. This means that ground station receivers do not have to rotate, but can be pointed permanently at the position in GEO where the satellite is located.²⁶

Like GEO, frozen orbits are scarce resources. Treaty obligations require that in deploying satellites in lunar orbit, one should take into account the "due regard to the corresponding interests" of others.²⁷ Measures should be taken to reduce the instances of first comers gaining access to limited spots in frozen orbits, leaving only a few or none for newcomers. One way to achieve this objective of not cluttering the frozen orbits is to use a shared telecommunications and navigations service which will make each individual mission lighter, freeing up space for future missions.²⁸ Further, some spots in frozen orbits should be reserved for newcomers, so that they can be allotted on an equitable basis.²⁹

The Moon's Hill sphere is at 66,000 km, which means at this point gravity of other celestial bodies are more dominant than the Moon, so a satellite cannot orbit the Moon beyond 66,000 km with

²⁵ Constitution of the International Telecommunication Union (ITU), art. 44, (hereinafter ITU Constitution) <https://www.itu.int/en/council/Documents/basic-texts/Constitution-E.pdf>.

²⁶ Louis de Gouyon Matignon, *Is the Orbital Environment a Natural Resource?*, SPACE LEGAL NEWS (Oct. 9, 2019), <https://www.spacelegalissues.com/is-the-orbital-environment-a-natural-resource/>.

²⁷ Outer Space Treaty, *supra* note 11, art. IX.

²⁸ European Space Agency, *ESA advances its plan for satellites around the Moon*, ESA (May 20, 2021), https://www.esa.int/About_Us/Corporate_news/ESA_advances_its_plan_for_satellites_around_the_Moon.

²⁹ By analogy, ITU Constitution, art. 44 and Radio Regulations, Appendices 30/30A/30B provides that there should be equitable access to radio frequencies, in addition to a first come first serve basis. Constitution of the Int'l Telecomm. Union [ITU] art. 44, available at <https://www.itu.int/council/pd/constitution.html> [hereinafter ITU Constitution], Int'l Telecomm. Union [ITU] Radio Regulations 2016, available at <https://www.itu.int/publR-REG-RR> [hereinafter Radio Regulations]. Equitable access means each ITU Member State gets a pre-determined allocation of part of the spectrum/orbit resources protected from harmful interference for current and future use. Jian Wang, *Introduction to BSS & FSS Plans*, ITU World Radiocommunication Seminar 2018, (Dec. 3, 2018) https://www.itu.int/en/ITU-R/space/plans/Documents/Seminar/WRS18_Space_Workshop/0_BSS-FSS%20Plans%20_Introduction.pdf.

stability.³⁰ Hence, orbital space for placing satellites in lunar orbit is tighter and constrained. Limited resources call for careful calculations and regulation of the use of the resources.

Whereas most existing long-term sustainability and debris mitigation guidelines are Earth-centric, they should apply to operators of satellites in lunar orbit *mutatis mutandis*.³¹ However, despite best efforts, some of these guidelines may not be suitable for the satellites in lunar orbit. This is because due to the complex gravitational field of the Moon, satellites may not stay stable for long periods.³² This may mean that the satellites around the Moon can be in orbit for limited periods only. This increases the chances of creating more space junk, typically on the Moon's surface.³³ Also, repositioning of satellites will require more fuel (which is expensive) and in some cases, another space mission. Soft laws such as Long-Term Sustainability Guidelines³⁴ and COPUOS Space Debris Guidelines³⁵ may not be as relevant for governing satellites around the Moon, since maximum junk will be collected on the Moon's surface and not in the lunar orbit. Hence, to the extent the existing soft laws on space sustainability are not sufficient to deal with missions to Moon and lunar orbit, new guidelines should be framed.³⁶

B. Allotment and Assignment of Radio Frequency

The Constitution of the International Telecommunication Union provides that that International Telecommunication Union (ITU) shall

³⁰ David A. Rothery, *Moons: A Very Short Introduction*, 15 (OXFORD UNI. PRESS, 2015) <https://planet4589.org/space/gcat/web/worlds/index.html>

³¹ See Artemis Accords, *supra* note 5, §12 (indicating that signatories commit to plan for the mitigation of orbital debris, though it does not specify lunar orbit, the document itself contemplates lunar activities in general).

³² See NASA, *Bizarre Lunar Orbits*, (Nov.6, 2006), https://science.nasa.gov/science-news/science-at-nasa/2006/06nov_loworbit.

³³ Already, we have seen unintentional crashes which have left items on the Moon. Kameron Virk, *Tardigrades: "Water Bears" Stuck on the Moon After Crash*, BBC (Aug. 7, 2019), <https://www.bbc.com/news/newsbeat-49265125>; See also, Karl Hille, *Vikram Lander Found*, NASA (Dec. 2, 2019), <https://www.nasa.gov/image-feature/goddard/2019/vikram-lander-found>.

³⁴ LTS Guidelines, *supra* note 22.

³⁵ COPUOS Debris Mitigation Guidelines, *supra* note 21.

³⁶ Moon Dialogs which is a partnership between various stakeholders for governance and coordination mechanisms for the lunar surface is a commendable effort. MOON DIALOGS, <https://www.moondialogs.org/> (last visited October 15, 2022).

effect allocation of bands of the radio-frequency spectrum, the allotment of radio frequencies and the registration of radio-frequency assignments and, for space services, of any associated orbital position in the geostationary-satellite orbit or of any associated characteristics of satellites in other orbits, in order to avoid harmful interference between radio stations of different countries.³⁷

There is no restriction that ITU shall have jurisdiction only over Earth's orbit. The Radio Regulations expressly allocate radio-frequency for communication from Earth to deep space and space research in deep space in general.³⁸ It may be noted that "[s]pace research systems intended to operate in deep space may also use the space research service (deep space) allocations, with the same status as those allocations, when the spacecraft is near the Earth, such as during launch, early orbit, flying by the Earth and returning to the Earth."³⁹

The electromagnetic spectrum is heavily used on Earth, and much of its potential value for passive scientific research has already been seriously affected. However, the far side of the Moon remains an accessible place where radio observations of the Universe are possible without interference over the whole radio spectrum from the Earth.⁴⁰ It is necessary to allocate frequencies for active use by deep-space probes, lunar satellites, scientific instrument packages and research stations on the lunar surface in such a way that interference with such passive observations is avoided. This area, called the Shielded Zone of the Moon (SZM), is the part of the Moon's surface that is always protected from interfering signals generated on and near the Earth because the Moon always presents nearly the same side towards the Earth. As noted, the SZM can be very useful for scientific missions.⁴¹

C. Military Satellites Around the Moon

The Outer Space Treaty provides that

³⁷ ITU Constitution, *supra* note 29, art. 1(2)(a).

³⁸ See generally, Radio Regulations, *supra* note 29.

³⁹ Radio Regulations, *supra* note 29, art. 4.24.

⁴⁰ Protection of Frequencies for Radio Astronomical Measurements in the Shielded Zone of the Moon, Recommendation ITU-R RA.479-5.

⁴¹ *Id.*

[t]he Moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes. The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military maneuvers on celestial bodies shall be forbidden. The use of military personnel for scientific research or any other peaceful purposes shall not be prohibited. The use of any equipment or facility necessary for peaceful exploration of the Moon and other celestial bodies shall also not be prohibited.⁴²

Though Outer Space Treaty uses the word “peaceful” at various places, it does not define the term. This has led to long debates on whether the term “peaceful” means either: non-military uses, thus prohibiting any military use altogether; or “non-aggressive” which would mean that only aggressive military behavior is prohibited, thereby permitting non-aggressive military uses.⁴³ It may be noted that the Artemis Accords also do not define peaceful purposes but do provide that exploration of the Moon shall be exclusively for peaceful purposes.⁴⁴

Even if we accept the meaning of non-military use for the term “exclusively for peaceful purposes,” it must be remembered that the Outer Space Treaty itself carves out certain exceptions and allows certain military uses.⁴⁵ For example, it has come to be accepted that remote sensing satellites which have dual use as reconnaissance satellites will be allowed if such space objects are “necessary for peaceful exploration of the Moon and other celestial bodies.”⁴⁶

D. Registration and Cataloging Satellites in Lunar Orbit

The Registration Convention provides that launching States should register space objects launched into Earth’s orbit “or beyond.”⁴⁷ Therefore, the Registration Convention also deals with space objects launched in lunar orbit, and all State parties to Registration Convention are legally bound to register such space

⁴² Outer Space Treaty, *supra* note 11, art. IV.

⁴³ Kai-Uwe Schrogl & Julia Neumann, *Article IV*, in STEPHAN HOBE ET AL., COLOGNE COMMENTARY ON SPACE LAW 70, 82 (2009).

⁴⁴ Artemis Accords, *supra* note 5.

⁴⁵ Outer Space Treaty, *supra* note 11, art. IV.

⁴⁶ *Id.*

⁴⁷ Convention on Registration of Objects Launched into Outer Space art. II, Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15 [hereinafter Registration Convention].

objects. In addition, non-State parties to the Registration Convention should furnish information on the registration of their space objects to the United Nations in accordance with General Assembly resolution 1721B (XVI).⁴⁸ International intergovernmental organizations conducting space activities that have not yet declared their acceptance of the rights and obligations under the Registration Convention should do so in accordance with Article VII of the Registration Convention.⁴⁹

Article XI of the Outer Space Treaty is also relevant in this aspect. It provides as follows:

In order to promote international co-operation in the peaceful exploration and use of outer space, States Parties to the Treaty conducting activities in outer space, including the Moon and other celestial bodies, agree to inform the Secretary-General of the United Nations as well as the public and the international scientific community, to the greatest extent feasible and practicable, of the nature, conduct, locations and results of such activities....⁵⁰

However, historically State practice does not generally provide information on space objects located beyond Earth orbit.⁵¹ There is a need to “ensure a minimum degree of coordination among upcoming lunar activities.”⁵² Registration Convention requirements of a national registry and furnishing registration information to the United Nations should be followed by State parties to the Registration Convention.⁵³ For non-State Parties, registration information should still be furnished under General Assembly resolution 1721B (XVI) and Article XI of the Outer Space Treaty.⁵⁴

In addition to the registration of space objects in lunar orbit or on the Moon, a catalog of space objects on the Moon should be

⁴⁸ *Supra* note 15. See Recommendations on Enhancing the Practice of States and International Intergovernmental Organizations in Registering Space Objects, G.A. Res 62/101, (Dec. 17, 2007).

⁴⁹ *Id.*

⁵⁰ Outer Space Treaty, *supra* note 11, art. XI

⁵¹ Registration Mechanisms for the Moon, A Moon Dialogs Salon Report, <https://static1.squarespace.com/static/5d36544d1438f10001b32ebd/t/5fd407cdf-fab5d3c56c1e9ba/1607731150768/MD+Registration+Report.pdf>.

⁵² *Id.* at 6.

⁵³ See generally, Registration Convention, *supra* note 47.

⁵⁴ Outer Space Treaty, *supra* note 11, art. XI

maintained. As Jonathan McDowell, an astrophysicist at the Harvard-Smithsonian Center for Astrophysics noted during a webinar on the topic:

the difference between a registry and a catalog is that a registry is something where an object's owner provides information under some regulations, whereas a catalog looks at what people truly know about that object. The Registration Convention aims to deliver complete, accurate, and timely information. Still, he argued, these goals are not currently achieved because registering States often provide data with gaps and even incorrect information. Catalogs like McDowell's offer external validation, and are critical for assessing what is in the registration documents, as well as being useful for other applications.⁵⁵

A USA-based non-profit organization, For All Moonkind, also voluntarily maintains a catalog for missions to Moon and attempts to include all missions on the Moon and in lunar orbit.⁵⁶

Another way of cataloging space objects on the Moon and in lunar orbit is through Space Situational Awareness⁵⁷ (SSA). SSA is broadly defined as characterizing the space environment and its impact on activities in space.⁵⁸ It is the key factor behind protecting the space environment from possible collisions. Though SSA around the Moon is not as well developed as SSA of Earth's orbits, efforts are being made to improve the ability to track Moon's orbits.⁵⁹ The US Air Force Research Laboratory (AFRL) is designing a pathfinder satellite to find and track objects in the vast area of cislunar space, as well as those in lunar orbit.⁶⁰ Ground based sensors and

⁵⁵ Registration Mechanisms for the Moon, *supra* note 51, at 3.

⁵⁶ FOR ALL MOONKIND, <https://moonregistry.forallmoonkind.org/about-us/> (last visited Oct. 15, 2022).

⁵⁷ C. Frueh, K. et al., *Cislunar Space Traffic Management: Surveillance through Earth-Moon Resonance Orbits*, Proc. 8th ESA/ESOC European Conference on Space Debris (virtual) (Apr. 20, 2021), https://engineering.purdue.edu/people/kathleen.howell.1/Publications/Conferences/2021_ESA_FruHowDeMBhaGup.pdf.

⁵⁸ Brian Weeden, *Space Situational Awareness: Examining Key Issues and the Changing Landscape*, Testimony before the House Subcommittee on Space and Aeronautics (Feb. 11, 2020) 12.

⁵⁹ Theresa Hitchens, *AFRL Satellite To Track Up To The Moon; Space Force-NASA Tout Cooperation*, *BreakingDefense* (Sept. 21, 2020), <https://breakingdefense.com/2020/09/afrl-satellite-to-track-up-to-the-moon-space-force-nasa-tout-cooperation/>.

⁶⁰ *Id.*

telescopes are useful in observing lunar orbits. Before deploying satellites in lunar orbit, one should subscribe to an SSA service provider, which is at the moment mostly provided by the governments of certain countries only. Subscribing to such SSA service would be acting in “due regard to corresponding interests” of others.⁶¹

E. Liability for Satellites Crashing on Re-entry

The Liability Convention provides that,

[i]n the event of damage caused elsewhere than on the surface of the earth to a space object of one launching State or to persons or property on board such a space object by a space object of another launching State, the latter shall be liable only if said damage is due to its fault or the fault of persons for whom it is responsible.⁶²

Therefore, as per Liability Convention, liability will be according to fault in case of crashes of satellites on or around the Moon.⁶³ This provision is important in Moon context as due to the instability of lunar orbits there are higher chances of a crash on the lunar surface than on Earth.⁶⁴

In addition to specific provisions in the Liability Convention, there is a more general provision dealing with liability for damage in outer space in the Outer Space Treaty. Article VI of the Outer Space Treaty provides as follows:

Each State Party to the Treaty that launches or procures the launching of an object into outer space, including the Moon and other celestial bodies, and each State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts

⁶¹ Outer Space Treaty, *supra* note 11, art. IX.

⁶² Convention on International Liability for Damage Caused by Space Objects, art III, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187 [hereinafter Liability Convention]

⁶³ *Id.*

⁶⁴ Kenneth Chang, *Study of Moon's Atmosphere Ends with Planned Crash*, N.Y. TIMES (Apr. 18, 2014), <https://www.nytimes.com/2014/04/19/science/space/nasa-lunar-explorer.html> (“The lunar atmosphere [is] just one-quadrillionth the density of Earth’s”); *Bizarre Lunar Orbits*, *supra* note 32.

on the Earth, in air or in outer space, including the Moon and other celestial bodies.⁶⁵

It may be noted however, the Liability Convention provides for absolute liability for damage caused on Earth's surface or aircraft in flight.⁶⁶ The question that arises is whether a similar regime is necessary on the Moon. Such a regime may better protect scientific and industrial installations, as well as historic sites on the Moon. However, one must remember that the crashing of satellites on the Moon's surface is more likely than crashes on Earth due to the absence of lunar atmosphere and limited amounts of stable orbits. In any case, the complex gravitational field of the Moon and eccentric orbit of the Moon needs detailed gravitational calculations to find stable orbital positions.⁶⁷ These calculations can be created by experts and corroboration of the results of experts by other experts to eliminate chances of mistakes. Liability should arise for miscalculation, especially for private entities. Capacity-building for such calculations should be done by United Nations Office for Outer Space Affairs (UNOOSA) or through other international organizations as many States may not have the necessary knowledge and infrastructure to make these calculations. One way of dealing with the problem in the immediate future, and perhaps even later, is through insurance. At the moment, not all national laws of States require the space operators to buy third party insurance policies.⁶⁸ If every entity which deploys satellites on Moon is obligated to obtain insurance, the regime of liability will be easier to manage.

Recently, in 2020, the US passed the law "One Small Step to Protect Human Heritage in Space Act."⁶⁹ Pursuant to the act,

"[i]t is the sense of the Congress that . . . as commercial enterprises and more countries acquire the ability to land on the Moon, it is necessary to encourage the development of best

⁶⁵ Outer Space Treaty, *supra* note 11, art. VI

⁶⁶ Liability Convention, *supra* note 62, art. II.

⁶⁷ NASA, *A New Paradigm for Lunar Orbits*, (Nov. 30, 2006), https://science.nasa.gov/science-news/science-at-nasa/2006/30nov_highorbit.

⁶⁸ For more details on third party insurance, see Philippe Montpert, *Considerations on Space Liability Insurance*, Willis Inspace (Vienna, Mar. 22, 2010), <https://www.unoosa.org/pdf/pres/lsc2010/symp04.pdf>.

⁶⁹ One Small Step to Protect Human Heritage in Space Act., Pub. L. No. 116-275 Dec. 31, 2020.

practices to respect the principle of due regard and to limit harmful interference to the Apollo landing site artifacts in acknowledgment of the human effort and innovation they represent, as well as their archaeological, anthropological, historical, scientific, and engineering significance and value.⁷⁰

The question is if such heritage sites are damaged by a satellite due to no fault of the satellite operator, how will the heritage sites be protected?

A related issue is that such crash may cause distress, in which case the Rescue and Return Agreement will be applicable.⁷¹ The Artemis Accords too provides that the signatories commit to taking all reasonable efforts to render necessary assistance to personnel in outer space who are in distress, and acknowledge their obligations under the Rescue and Return Agreement.⁷²

II. PROVIDING CARGO SUPPLIES TO THE MOON

Another activity that will support larger missions to Moon is providing cargo transport of supplies to the Moon. We have examples of cargo being supplied to the International Space Station by SpaceX on a commercial basis.⁷³ In fact, SpaceX's Dragon was devised to send humans and cargo to outer space and has sent 28 visits to the International Space Station.⁷⁴ The example of Dragon spacecraft demonstrates that when there is a base in outer space including celestial bodies, there is a market for resupply.⁷⁵ Where crewed spacecrafts, such as the new Dragon, will need advanced technology, it will be easier for small to mid-sized space actors to engage in uncrewed missions to send supplies to Moon.

A. *What Can Be Carried to the Moon?*

The first question that arises is what kind of supplies can be carried to Moon as resupply. The Outer Space Treaty provides that

⁷⁰ *Id.* § 2(b)(1)

⁷¹ Agreement on the Rescue of Astronauts, the Return of Astronauts and Return of Objects Launched into Outer Space, Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119.

⁷² Artemis Accords, *supra* note 5, § 6.

⁷³ SpaceX Dragon, <https://www.spacex.com/vehicles/dragon/>.

⁷⁴ *Id.*

⁷⁵ *Id.*

the Moon shall be used exclusively for peaceful purposes.⁷⁶ Hence, unless the States agree to a different interpretation, private industry should err on the side of caution. As stated above, a military facility or equipment necessary for peaceful exploration of the Moon and other celestial bodies is not prohibited.⁷⁷ Hence, resupply of such dual-use equipment or even military equipment, that are planned to be used for peaceful purposes, are allowed to be transported to Moon. However, if weapons are planned to be transported to the Moon, it is not allowed under Outer Space Treaty.⁷⁸

One question that arises is if supplies transported to Moon are subsequently used for creating weapons, what will be the consequences for the transporter? Presumably, so long the original purpose of the supplies was not for military purposes, the transporter will have no liability. The issue becomes more difficult to ascertain if the transporter is grossly negligent while assessing the supplies transported.

The Outer Space Treaty provides that “all stations, installations, equipment and space vehicles on the Moon and other celestial bodies shall be open to representatives of other States Parties to the Treaty on a basis of reciprocity.”⁷⁹ Travaux préparatoires indicates that open access stations is intended to be the general rule and exceptions to this rule may be made based on reciprocity.⁸⁰ Thus, all facilities “shall be open” to all unless there is an exception made by State parties.⁸¹ The right of a State to refuse another State to access its facilities arises only towards a State that does not comply with its obligations to allow visits to its facilities.⁸² It may be noted the facilities that have open access includes space vehicles.⁸³ Therefore, a transporter has the right to obtain details of the supplies transported. In fact, the transporter should request such information to avoid liability.

⁷⁶ Outer Space Treaty, *supra* note 11, prmb.

⁷⁷ Outer Space Treaty, *supra* note 11, art. IV

⁷⁸ *Id.*

⁷⁹ Outer Space Treaty, *supra* note 11, art. XII

⁸⁰ Lesley Jane Smith, *Article XII* in STEPHAN HOBE ET AL., COLOGNE COMMENTARY ON SPACE LAW 207, 210 (2009).

⁸¹ *See generally, id.*

⁸² *Id.* at 211.

⁸³ *See generally id.*

B. Can Transported Supplies Include Radioactive Material?

The Outer Space Treaty clearly prohibits installing nuclear weapons or any other weapons of mass destruction in celestial bodies.⁸⁴ Therefore, the transportation of nuclear weapons is clearly prohibited. It may be kept in mind that under Nuclear Proliferation Treaty, States are obligated to prevent the spread of nuclear weapons from activities related to nuclear energy.⁸⁵

When nuclear power sources and related materials are transported to the Moon, the transporter should carry out a thorough safety assessment, including probabilistic risk analysis, with particular emphasis on reducing accidental exposure of the public to harmful radiation or radioactive material.⁸⁶ The design and use of space objects with nuclear power sources on board a spacecraft shall ensure with a high degree of confidence that the hazards in foreseeable operational or accidental circumstances are kept below acceptable levels.⁸⁷ The State of the transporter, as a launching State, shall be internationally liable for damage caused by the radioactive material on board a spacecraft.⁸⁸ The compensation that the transporter State shall be liable to pay for damage caused shall be according to the Liability Convention.⁸⁹ This compensation shall include reimbursement of the duly substantiated expenses for search, recovery and clean-up operations, including expenses for assistance received from third parties.⁹⁰

C. Export Control Laws and Supplies Transported to the Moon

Even though the Artemis Accords are not accepted by all States, they provide an interesting perspective on interoperability.⁹¹ It provides that the signatories shall develop

⁸⁴ Outer Space Treaty, *supra* note 11, art. IV

⁸⁵ The Treaty on the Non-Proliferation of Nuclear Weapons, July 1, 1968, 729 U.N.T.S. 161.

⁸⁶ Principles Relevant to the Use of Nuclear Power Sources in Outer Space, G.A. Res. 47/68 (Dec. 14, 1992), pmbl. ¶ 4 and princ. 4.

⁸⁷ *Id.* at princ. 3(1)(a)

⁸⁸ *Id.* at princ. 9(1)

⁸⁹ *See generally*, Liability Convention, *supra* note 62.

⁹⁰ Principles Relevant to the Use of Nuclear Power Sources in Outer Space, *supra* note 86, at princ. 9(3).

⁹¹ *See generally*, Artemis Accords, *supra* note 5.

interoperable and common exploration infrastructure and standards, including but not limited to fuel storage and delivery systems, landing structures, communications systems, and power systems, will enhance space-based exploration, scientific discovery, and commercial utilization. The Signatories commit to use reasonable efforts to utilize current interoperability standards for space-based infrastructure, to establish such standards when current standards do not exist or are inadequate, and to follow such standards.”⁹²

If common facilities and standards are developed, then supplies can be shared between various entities carrying out activities on the Moon. This sharing of facilities and infrastructure is in consonance with the Outer Space Treaty which provides that “[t]he exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development.”⁹³

In case of interoperability, the export control laws of States involved will be applicable. Export control laws of States pose restrictions on transfer of technology and knowledge related to space sector. In the US, for example, export is defined as including not only physically sending or taking an article beyond the borders of the US but also transferring control or ownership (including, presumably, on-orbit transfer) and, notably, disclosing technical data to foreign persons (in the United States or elsewhere, including oral or visual disclosure).⁹⁴ In Europe, national and international regulations that are in force now include the Missile Technology Control Regime and the Wassenaar Agreement, both intended to provide higher transparency in the transfer of arms and dual-use technology.⁹⁵ Space technology is, in most cases, considered a dual-use technology with information about space products considered core

⁹² Artemis Accords, *supra* note 5, § 5.

⁹³ Outer Space Treaty, *supra* note 11, art. I.

⁹⁴ USA International Traffic in Arms Regulations, 22 CFR § 120.50.

⁹⁵ See Cristian Bank, *Consequences of the French Space Law on Space Operations (FSOA) on CNES's Mission as a Contracting Space Agency in*, CONTRACTING FOR SPACE: CONTRACT PRACTICE IN THE EUROPEAN SPACE SECTOR 133, 137 (Ingo Baumann & Lesley Jane Smith, eds., 2011).

technology knowhow, and hence, export control laws apply.⁹⁶ As a general matter, States are not comfortable allowing unrestricted transfer of space technology and goods.⁹⁷ For interoperability to work, a waiver under export control laws of relevant States will be required. This waiver may be limited and for the particular purpose of using certain facilities in Moon.

D. Product Liability May Arise Due to Harsh Temperature on the Moon

Long days and long nights with no atmosphere lead to extremely hot days and extremely cold nights on the Moon. For example, the Chinese Lunar Rover of Chang'e 4 mission hibernates at night but found the temperatures on the lunar far side, where it is operating, to be colder than expected.⁹⁸ In the Chang'e 3 mission, the lander and rover hibernated during the harsh cold nights in Moon, but the lander's main color camera didn't survive the first night.⁹⁹ While delivering cargo supplies to the Moon, manufacturers have to ensure that goods are not destroyed due to extreme weather on the Moon. If the goods are destroyed, the manufacturer of the cargo may incur liability. The customer has the right to require repair and/or rework, or at least an investigation followed by a correction, if similar equipment have been ordered by the customer/operator. The result of such a defect is that all similar equipment that might still be on-ground must be reworked and repaired or replaced as well, usually at no cost to the customer. This obligation is usually for the defined lifetime of the spacecraft.¹⁰⁰ Further, the operator receiving the cargo may consider property insurance to protect the cargo. However, this may not be a viable option since premiums for property insurance are high in the space industry.

⁹⁶ See Patrick Goergen, *Space Technologies' Compliance with Export Control Regimes*, (Aug. 2019), <https://crossborders.lu/wp-content/uploads/2019/08/20190818-working-paper-space-vfin.pdf>.

⁹⁷ *Id.*

⁹⁸ Roland Jackson, *Chinese Rover Finds Lunar Nights "Colder Than Expected"*, PHYS ORG (Jan. 31, 2019), <https://phys.org/news/2019-01-chinese-rover-lunar-nights-colder.html>.

⁹⁹ Emily Poore, *Sleep of Death For China's Lunar Rover?*, SKY TELESCOPE, (Jan. 29, 2014), <https://skyandtelescope.org/astronomy-news/sleep-of-death-for-chinas-lunar-rover/>.

¹⁰⁰ Ines Scharlach, *Performance and Warranty Articles in Space Industry Contracts*, in BAUMANN & SMITH *supra* note 95, at 260.

E. Lunar Dust Ejecta Caused by Moon Missions and Sustainability of Lunar Activities

Phil Metzger, a planetary physicist at the University of Central Florida and dust dynamics expert, states that the dust ejecta caused “by rocket exhaust can interfere with actors’ activities and should be mitigated.”¹⁰¹

The vacuum environment [on the Moon] allows rocket exhaust to spread out faster and very widely . . . This exhaust picks up dust particles, ejecting them in a thin sheet several degrees above the local horizon at a high velocity. The best data available on this phenomenon comes from studying video footage from lunar module landings, which depict objects ejected at high velocities from the lunar landers.¹⁰²

Simulations of lunar modules have led Dr. Metzger to predict that “a 200 ton lunar lander will blow 1,000 tons of ejecta.”¹⁰³ The larger the vehicle, the faster and farther the ejecta will go.

In 2011, the US NASA issued Recommendations to Space-Faring Entities: How to Protect and Preserve the Historic and Scientific Value of U.S. Government Lunar Artifacts¹⁰⁴ This document suggests that safety requires that a 2.0 km exclusion radius be applied to the descent/approach path of a lunar landing vehicle.¹⁰⁵ While these are only recommendations and guidelines, recent US law makes them “a condition or requirement to contracts, grants, agreements, partnerships or other arrangements pertaining to lunar activities carried out by, for, or in partnership with [NASA].”¹⁰⁶ However, the 2 km limit is arbitrary and not based on science and 2 km distance reduces but does not eliminate chances of damage

¹⁰¹ The Implications of Dust for Resource Contention and Lunar Policy, A Moon Dialogs Salon Report, 1 (May 7, 2020), https://drive.google.com/file/d/1IwEotyYTDMR3wEF3g3BTR94_n1sS5oUO/view.

¹⁰² *Id.* at 2.

¹⁰³ *Id.* This prediction may not be entirely correct according to Phil Metzger himself.

¹⁰⁴ *NASA’s Recommendations to Space-Faring Entities: How to Protect and Preserve the Historic and Scientific Value of U.S. Government Lunar Artifacts*, NASA (July 20, 2011), https://www.nasa.gov/sites/default/files/617743main_NASA-USG_LUNAR_HISTORIC_SITES_RevA-508.pdf.

¹⁰⁵ *Id.* at § A2-1

¹⁰⁶ One Small Step to Protect Human Heritage in Space Act, *supra* note 69, §3(b)(1).

due to the dust.¹⁰⁷ Whereas NASA's Guidelines act as a model, science and engineering are not yet able to define a safe landing distance.¹⁰⁸ Multilaterally agreed guidelines need to be formulated to address ejecta issues; while doing so, one must remember that some areas of the Moon are more important based on science and economy and some missions may be more sensitive than others.

IV. CONCLUSION

In this article, the near future missions to Moon by mid-size and small space entities has been discussed. I have identified and focused on two such probable future missions: (a) deploying of satellites in lunar orbit and (b) transporting goods and supplies to Moon to assist bigger missions.

Whereas the author finds that existing space treaties, principles and guidelines assure that lunar activities do not take place in a legal vacuum, existing laws need to be amended or updated. While considering these laws, one must keep in mind the special physical characteristics of the Moon which is largely different from the Earth. However, humanity should keep in mind the lessons we have learnt from our space activities so far and should not continue to make historical mistakes such as disregarding the outer space environment, carrying out space activities without insurance and not registering all space objects. Hence, the Moon and lunar orbits should be utilized in a more planned manner and collaboration and cooperation should be encouraged wherever possible. The Outer Space Treaty, Liability Convention, Registration Convention and Rescue and Return Agreement which provides basic principles of operating in outer space including the Moon should be respected, especially by the State parties.

Liability for deploying and operating satellites in lunar orbit is heightened and complicated due to the complex gravitational field and eccentric orbit of the Moon. Such space missions require complex calculations which not all space actors will have. Hence, UNOOSA should take initiative for capacity building in this respect. However, third party liability insurance provides a short-

¹⁰⁷ Moon Dialogs, *Research Salon #2: The Implications of Dust for Resource Contention and Lunar Policy* (May 7, 2020), recording can be found on this website: <https://www.moondialogs.org/researchsalons> (last visited Oct. 15, 2022).

¹⁰⁸ *Id.*

term solution and maybe even a longer-term solution. Hence, all missions to Moon should ideally be insured. In case of private operators, the national laws may cap the liability and, if the cap is exceeded, it would be paid by the government. Such approach will make the insurance premiums more affordable and encourage more space actors to participate.

With regards, supplying cargo to the Moon, one must remember that the Outer Space Treaty and other documents indicate that Moon should be used exclusively for peaceful use. This means that one cannot transport weapons to the Moon. However, if goods transported are later assembled to create weapon in Moon, the transporter's liability does not arise unless the transporter was grossly negligent in assessing the contents of the cargo. Transporting supplies to lunar installations may also attract export control laws of countries and such transportation may require waiver under export control laws.

In short, whereas the existing space laws serve a basis for human activities on Moon and the lunar orbit, there is much that is left unsaid. The international community should engage in international law making, perhaps beginning with soft laws, for the governance of the Moon.¹⁰⁹ What is necessary is a governance mechanism for sustainable and peaceful exploration and use of Moon and lunar orbit. This governance mechanism should include details about debris mitigation, lunar dust mitigation, benefits sharing, information sharing, registration of activities in and around Moon and define exclusively peaceful use of Moon.

¹⁰⁹ There have been some attempts by organizations such as: *Best Practices for Lunar Activities*, 1 MOON VILL. ASS'N 4 (Oct. 19, 2020), <https://moonvillageassociation.org/wp-content/uploads/2020/10/MVA-Best-Practices-Issue-1-19.10.2020-FINAL.pdf>.

TRACKING THE EVOLUTION OF CUSTOMARY RULES IN INTERNATIONAL SPACE LAW

*Berfin Bediz Yildiz Keskin**

ABSTRACT

The established United Nations space treaties have become insufficient to tackle existing space-related problems. Moreover, there is minimal political will to create a new treaty. As a result, there is a shift from binding treaties to non-binding legal instruments in space law. This trend may also change the role of custom in space law. With the evidence of State practice and of *opinio juris*, these non-binding legal instruments may have attained the status of custom. As a consequence, space law instruments that are not binding initially may eventually become binding. Custom currently plays a marginal role in space law. Some provisions of the Outer Space Treaty, with the participation of sufficient evidence of State practice and of *opinio juris*, have eventually attained the status of customary international law (CIL).¹ Non-binding space law instruments may be strong candidates to become CIL. With the absence of binding modern legal instruments, the CIL potential of non-binding instruments will likely have important effects on the future of space law.

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¹ See generally Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty]; Ram Jakhu & Steven Freeland, *The Relationship Between the Outer Space Treaty and Customary International Law*, 59 PROC. INT'L INST. SPACE L. 183 (2016).

I. INTRODUCTION

Customary rules play an important role in public international law as a source of law. International custom is one of the law sources listed in Article 38 of the Statute of the International Court of Justice² (ICJ). International custom is also listed in international conventions, the general principles of law recognized by civilized nations, judicial decisions and the teaching of the most highly qualified publicist of the various nations, as subsidiary means for the determination of rules of law.³

Space activities are conducted within a framework of international law that includes multilateral, regional and bilateral treaties, as well as customary international law (CIL). United Nations General Assembly (UNGA) principles, resolutions and guidelines have also played an important role in international space law since the beginning of the space era, despite their non-binding nature.⁴ Apart from the international law framework, many States have national legislation governing space-related activities.⁵ The role of custom has always been limited and controversial in space law.⁶ Provisions of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space⁷ (OST) non-binding legal documents such as UNGA principles, resolutions, guidelines and codes of conduct have been subject to CIL analysis.⁸ National legislation, along with *travaux préparatoires*, claims, statements, correspondence and domestic judicial decisions may become relevant to international space law due to their potential to constitute elements of customary international space law.

² Statute of the International Court of Justice art. 38, Jan. 26, 1945, 59 Stat. 1055, 33 U.N.T.S. 933 [hereinafter Statute of the ICJ].

³ *Id.*

⁴ *Id.*

⁵ UNITED NATIONS OFFICE OF OUTER SPACE AFFAIRS, National Space Law, <https://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/index.html> (last visited Oct. 15, 2022).

⁶ Sergio Marchisio, *Space Law and Governance*, Keynote speech at the 10th U.N. Workshop on Space L., at 10 (Sept. 2016).

⁷ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter OST].

⁸ See e.g. Marko Divac Öberg, *The Legal Effects of Resolutions of the UN Security Council and General Assembly in the Jurisprudence of the ICJ*, 16 EUR. J. INT'L L. 879 (2006).

This paper consists of three main sections. Part II introduces custom as a source of public international law. Before delving into customary international space law, the reader will be familiarized with the concept of custom and the formation of CIL within the light of ICJ decisions. In addition, the features of CIL, such as its universal applications, and the relation between customary rules, treaty provisions and UNGA resolutions are examined. Part III deals with custom in space law. In this section, the role of custom in space law and the CIL status of selected elements of the OST, such as space freedoms, the non-appropriation principle and peaceful purposes will be discussed. Lastly, in the Part IV, the prospective role of custom in space law, with specific focus on the CIL potential of non-binding legal instruments in and outside of the UN system is examined.

II. CUSTOM AS A SOURCE OF PUBLIC INTERNATIONAL LAW

A. *The Concept of Custom*

States conduct their activities in the international community in accordance with certain rules, which gradually, or sometimes quickly, become accepted as practice.⁹ As States tacitly agree upon these rules, such practices become legally binding customary rules in the international community.¹⁰

Since the adoption of the Statute of the ICJ, the definition of international custom has been the subject of debate.¹¹ The definition provided by Article 38(1)(b) of the Statute of the ICJ is “international custom, as evidence of a general practice accepted as law.”¹² Based on this description, international custom is comprised of two elements: State practice and *opinio juris sive necessitates* (*opinio juris*).¹³ The ICJ has frequently affirmed these two elements. In the *North Sea Continental Shelf* cases, the Court stated that:

⁹ HUGH THIRLWAY, *THE SOURCES OF INTERNATIONAL LAW* 17 (2d ed. 2019).

¹⁰ *Id.*

¹¹ *Id.* at 11.

¹² Statute of the ICJ, *supra* note 2, art. 38(1)(b).

¹³ Frederic L. Kirgis Jr., *Custom on a Sliding Scale*, 81 AM. J. INT'L L. 146, 149 (1987).

Not only must the acts concerned amount to a settled practice, but they must also be such or be carried out in such a way as to be evidence of a belief that this practice is rendered obligatory by the existence of a rule of law requiring it. The need for such a belief, i.e., existence of a subjective element, is implicit in the very notion of the *opinio juris sive necessitates*. The States concerned must therefore feel that they are conforming to what amounts to a legal obligation.¹⁴

The Court reaffirmed this statement in later decisions by referring to *North Sea Continental Shelf*.¹⁵

There is a relatively new adopted approach to the formation of CIL, which is instant customary international law.¹⁶ According to this approach, long-established State practice is not a requirement for the development of CIL and a rule of CIL can be established in a short period of time, even overnight.¹⁷ However, in both *North Sea Continental Shelf* and, the subsequent case, *Military and Paramilitary Activities In and Against Nicaragua*, the notion of instant custom was rejected.¹⁸ In *North Sea Continental Shelf*, although the ICJ recognized a very short period of time to establish CIL, it still referred to the passage of time as an indispensable requirement.¹⁹ In the *Nicaragua Case*, the importance of State practice in the development of CIL is highlighted and the mere *opinion juris* was not regarded as satisfactory to develop CIL.²⁰ Moreover, the International Law Commission (ILC) rejected the notion of instant custom and declared that a lapse of some time, even short, is necessary for the development of a rule of CIL.²¹ However, as shown in the above cases, a rule of CIL can be established in a considerably shorter

¹⁴ *North Sea Continental Shelf*, (Ger. v. Den.; Ger. v. Neth.), Judgement, 1969 I.C.J. 3, 44, ¶ 77 (Feb. 20).

¹⁵ *Military and Paramilitary Activities in and Against Nicaragua* (Nicar. v. U.S.), Judgement, 1986 I.C.J. 14, 108, ¶ 207 (June 27). See *Jurisdictional Immunities of the State* (Ger. v. It.: Greece Intervening), Judgement, 2012 I.C.J. 99, 122-23, ¶ 55 (Feb. 3).

¹⁶ E.g., Roozbeh Baker, *Customary International Law in the 21st Century: Old Challenges and New Debates*, 21 EUR. J. INT'L L. 173 (2010).

¹⁷ *Id.* at 181.

¹⁸ *North Sea Continental Shelf*, 1969 I.C.J. at 43, ¶ 74; *Nicaragua Case*, 1986 I.C.J. at 97, ¶ 184.

¹⁹ *North Sea Continental Shelf*, 1969 I.C.J. at 43, ¶ 74.

²⁰ *Nicaragua Case*, 1986 I.C.J. at 97, ¶ 184.

²¹ Draft Conclusions on Identification of Customary International Law, with Commentaries, at Concl. 8, Comment. 9 (Dec. 20, 2018), https://legal.un.org/ilc/texts/instruments/english/commentaries/1_13_2018.pdf [hereinafter Draft Conclusions].

period of time than the past to adapt to the fast pace of current development and meet the need for legal framework.²²

B. The Formation of Customary International Law: Two Element Theory

i. State Practice

As previously introduced, the two elements theory states that CIL is formed by the presence of State practice and *opinion juris*.²³ In this section, the material element of custom, State practice, will be discussed first.

What forms of behavior constitute State practice is a controversial issue.²⁴ It is widely accepted that the actual practice of States, such as actively seizing foreign vessels or sending satellites into orbit, qualify as State practice.²⁵ It is also widely accepted that the legislative acts of States and their legal practices generally may constitute State practice.²⁶ However, whether statements or claims alone may qualify as State practice is more controversial.²⁷ D'Amato and Wolfke are of the view that only acts, not statements or claims, are considered as State practice for the support or opposition of the development, maintenance or change of an existing customary rule.²⁸ Furthermore, the ICJ has highlighted the importance of actual practice.²⁹ Contrarily, Thirlway considers claims and other statements as State practice as long as they are made in the context of some concrete situation and not solely *in abstracto*.³⁰ A more broadly held view is that national laws, domestic judicial decisions, claims, correspondence and statements in general may

²² Tullio Treves, *Customary International Law*, in MAX PLANCK ENCYC. OF PUB. INT'L L. ¶ 25 (2006).

²³ Kirgis, *supra* note 13, at 149.

²⁴ MARK E. VILLIGER, COMMENTARY ON THE 1969 VIENNA CONVENTION ON THE LAW OF TREATIES 4-5 (2009).

²⁵ JAN KLABBERS, INTERNATIONAL LAW 28 (2013).

²⁶ *Id.*

²⁷ *Id.*

²⁸ MICHAEL BYERS, CUSTOM, POWER AND THE POWER OF RULES: INTERNATIONAL RELATIONS AND CUSTOMARY INTERNATIONAL LAW 134 (1999); ANTHONY A. D'AMATO, THE CONCEPT OF CUSTOM IN INTERNATIONAL LAW 88 (1971).

²⁹ Continental Shelf (Libyan Arab Jamahiriya v. Malta), Judgement, 1985, I.C.J. 13, 29, ¶ 27 (June 3).

³⁰ HUGH THIRLWAY, INTERNATIONAL CUSTOMARY LAW AND CODIFICATION 58 (1972).

constitute State practice as an element of CIL.³¹ Moreover, the ICJ has taken statements, diplomatic correspondence, objections and similar manifestations into account as State practice in its other decisions.³² For instance, in *Gabcikovo-Nagymaros Project*, the ICJ confirmed that State practice also includes official pronouncements, statements and other similar verbal or written acts.³³ In another case, the ICJ has attached equal importance to the exercise of diplomatic asylum and the official views on various occasions.³⁴ Therefore, along with actual practice, written or verbal acts may constitute the material element of CIL.

Besides forms of State practice, the duration, consistency, repetition and generality of State practice are some points to be considered in regarding the nature of State practice.³⁵ So much uncertainty, contradiction, fluctuation and discrepancy in the exercise and official views expressed on various occasions prevent actions from becoming State practice within the meaning of the material element of CIL.³⁶ The ICJ further decided that State practice must be constant and uniform to evolve as a rule of CIL.³⁷ Despite that, perfect consistency is not required.³⁸ In the *Nicaragua Case*, the ICJ concluded that, in order to decide whether a particular rule is established as CIL, “the conduct of States should, in general, be consistent with such rule and that instances of State conduct inconsistent with a given rule should generally have been treated as breaches of that rule, not as indications of the recognition of a new rule.”³⁹

³¹ James R. Crawford, *The Sources of International Law*, in BROWNIE'S PRINCIPLES OF PUBLIC INTERNATIONAL LAW 24 (8th ed. 2012); MARTIN DIXON, TEXTBOOK ON INTERNATIONAL LAW 26 (1996).

³² *Gabcikovo-Nagymaros Project* (Hung. v. Slov.), Judgement, 1997 I.C.J. 7, 33 & 49, ¶¶ 37, 64 (Sept. 25); *Colombian-Peruvian Asylum* (Colom. v. Peru), Judgement, 1950 I.C.J. 266, 273 (Nov. 20); *North Sea Continental Shelf*, 1969 I.C.J. at 25, ¶ 27; *Rights of Nationals of the United States in Morocco* (Fr. v. U.S.), Judgement, 1952 I.C.J. 176, 200 (Aug. 27).

³³ *Gabcikovo-Nagymaros Project*, 1997 I.C.J. at 33, 49, ¶¶ 37, 64.

³⁴ *Colombian-Peruvian Asylum*, 1950 I.C.J. at 277; Michael Akehurst, *Custom as a Source of International Law*, 1975 BRIT. Y.B. INT'L L. 1, 2.

³⁵ MALCOLM N. SHAW, INTERNATIONAL LAW 56 (8th ed. 2017).

³⁶ *Colombian-Peruvian Asylum*, 1950 I.C.J. at 277.

³⁷ *Id.* at 276.

³⁸ *Id.* at 277.

³⁹ *Nicaragua Case*, 1986 I.C.J. at 98, ¶ 186.

Although the passage of time supports the generality and consistency of the State practice, there is no time limit for the usage to constitute the material element of CIL.⁴⁰ The existence of a customary rule is not only a game of numbers, the practice of States whose interests are specially affected can have a disproportionate effect on the formation of a particular CIL rule.⁴¹ Examples of these impacts are the United States' (US) and United Kingdom's (UK) role in the development of a regime for the continental shelf or the US' and Soviet Union's (USSR) effect on early space law.⁴² Moreover, in the *Continental Shelf* case, the ICJ ruled that the exclusive economic zone turned into a rule of CIL due to claims of significant maritime States.⁴³

Understandably, States which were pioneers or actively participate in an area have more tendency to devote resources to thinking about and developing the applicable law in that area. However, the development of CIL in a field should not be left only to such States, since rules of CIL have universal application on all States, except for persistent objectors. Persistent objectors are not bound by a specific CIL rule due to their clear demonstration that they persistently object to that rule from the early stages of its formation.⁴⁴ Thus, it is the author's opinion that statements, claims, objections and official pronouncements of States that are not pioneers or do not actively participate in a particular area have become more relevant to CIL due to the possibility that such States may become persistent objectors.

ii. *Opinio Juris*

The second element that comprises CIL is the subjective element of *opinio juris*, which is the legal sense of obligation that States should act in accordance with the substance of the alleged customary rule.⁴⁵ If States believe they are legally obliged to act in accordance with a specific practice, such practice can be regarded

⁴⁰ See *North Sea Continental Shelf*, 1969 I.C.J. at 43, ¶ 74.

⁴¹ *Id.* See Michael P. Scharf, *Accelerated Formation of Customary International Law*, 20(2) ILSA J. INT'L & COMPAR. L. 305, 315 (2014).

⁴² Scharf, *supra* note 41, at 316.

⁴³ *Continental Shelf*, 1985 I.C.J. at 32,33, ¶¶ 31, 34.

⁴⁴ Draft Conclusions, *supra* note 21, Concl. 15; See discussion *infra* Section III.C.

⁴⁵ VAUGHAN LOWE, INTERNATIONAL LAW 38 (2007).

as “accepted as law.” For example, when heads of States are on official visits abroad, there is a well-established State practice that they enjoy immunity from prosecution and arrest.⁴⁶ This immunity stems from the conviction that there is a legal obligation to uphold this immunity.⁴⁷ Therefore, such practices can be regarded as State practice which stems from the *opinio juris* that States are conforming with an international obligation. However, State practice also encompasses a large set of behavioral patterns, such as actions stemming from principles of morality, which are not legally binding.⁴⁸ For example, there are many international acts, which are motivated only by considerations of courtesy, convenience or tradition and not by any sense of legal duty.⁴⁹ Therefore, as these actions are not undertaken from the position that States are legally bound to do so (i.e. *opinio juris* is absent), they do not constitute CIL. It is necessary to distinguish State practice constituting customary rules from these patterns of behavior. At that point, the psychological element of custom, which is *opinio juris*, takes its place to make that distinction.

Within the meaning of Article 38(1)(b) of the Statute of the ICJ, the State practice must be “accepted as law” in order to constitute international custom.⁵⁰ The ICJ has held that State practice must “[b]e carried out in such a way, as to be evidence of a belief that this practice is rendered obligatory by the existence of a rule of law requiring it.”⁵¹

The ICJ has also held that the frequency or habitual characteristics of activities are not sufficient alone for being considered as customary rules. In the *S. S. “Lotus”* and the *Right of Passage over Indian Territory* cases,⁵² even though there had been uniform and widespread State practices, such practices were not considered

⁴⁶ *Id.*

⁴⁷ *Id.*

⁴⁸ *See id.*

⁴⁹ North Sea Continental Shelf, 1969 I.C.J. at 44, ¶ 77.

⁵⁰ Statute of the ICJ, *supra* note 2, art. 38(1)(b).

⁵¹ North Sea Continental Shelf, 1969 I.C.J. at 44, ¶ 77.

⁵² *S. S. “Lotus”* (Fr. v. Turk.), Judgement, 1927 I.C.J. (ser. A) No. 9, at 28 (Sept. 7); *Right of Passage Over Indian Territory* (Port. v. India), Judgement, 1960 I.C.J. 6, 42-42 (April 12).

legally binding to States because of the absence of *opinio juris* in the view of the ICJ.⁵³

C. Universal Application of Custom

One of the main distinguishing features of CIL is its universal application. Principally, CIL applies to all States, while a treaty is only applicable to its party States.⁵⁴ Professor Kelly states that the UN provides a forum that makes universal codification of international law possible and therefore, custom seems to have become a less important source of law.⁵⁵ However, despite the existence of a global forum, a universally accepted treaty is still rare. Although the universal application does not establish a priority for custom over treaty law, it is still an important distinguishing characteristic of CIL.

However, the non-binding effect of CIL on persistent objectors constitutes an exception to the universal application of custom. If a State or a group of States do not consent to the establishment of a specific customary rule, they may be exempted from the application of this new customary rule.⁵⁶ In other words, a State or a group of States may manifest their opposition to a practice before it has become a rule of CIL.⁵⁷ Consequently, that objecting State opts out from the application of the new rule of CIL.⁵⁸ The ICJ has recognized and applied the persistent objector rule in several cases.⁵⁹ In the *Fisheries Case*, the ICJ stated that “[i]n any event the ten-mile rule would appear to be inapplicable to Norway, inasmuch as she always opposed any attempt to apply it to the Norwegian coast.”⁶⁰

⁵³ Rein Müllerson, *On the Nature and Scope of Customary International Law*, 2 AUSTRIAN REV. INT'L & EUR. L. 341, 345 (1997).

⁵⁴ J. Patrick Kelly, *The Twilight of Customary International Law*, 40, VA. J. INT'L L. 449, 451-52 (2000).

⁵⁵ *Id.* at 452.

⁵⁶ See THIRLWAY, *supra* note 30, at 17.

⁵⁷ Scharf, *supra* note 41, at 317.

⁵⁸ *Id.*

⁵⁹ *Id.*; *Fisheries Case* (U.K. v. Nor.), Judgement, 1951 I.C.J. 116, 131 (Dec. 18).

⁶⁰ *Fisheries Case*, 1951 I.C.J. at 131.

D. Interrelation Between Treaties and Customary International Law

International custom and treaties have been primary sources of international law which interact with each other. There are three types of interaction between treaties and CIL in doctrine: (1) a treaty can be the codification of existing rules of CIL, (2) a treaty can create new rules of CIL and (3) a treaty can shape the process of CIL rules.⁶¹

As a further explanation for the first type of interaction, if the drafters of a treaty provide a rule which has already existed as a custom, the treaty provision is an articulation of the existing custom and may have a declaratory effect on the CIL rules.⁶² Article 1 of the Paris Convention on Aerial Navigation, major portions of the Vienna Convention on the Law of Treaties (VCLT) as well as of the United Nations Law of the Sea Convention are examples of this case.⁶³

Turning to the second type of interaction, treaty provisions can be a prelude to the creation of new CIL rules.⁶⁴ In this way, treaty provisions have passed into CIL.⁶⁵ Therefore, even if party States withdraw from a treaty, they cannot withdraw from its application of the rule of CIL. As a logical consequence, third States which have not ratified the treaties will also be bound by these customary treaty provisions.⁶⁶ Some provisions of the OST, including Articles I, II, III, VI and VII will be evaluated under this kind of interaction in the next Part III.

Lastly, treaty provisions may have a crystallizing effect on the development of the CIL rule.⁶⁷ In this case, a rule had almost been developed as custom; however, there are still some doubts about its

⁶¹ Draft Conclusions, *supra* note 21, Concl. 11; ROBERT KOLB, *THE LAW OF TREATIES* 260 (2016).

⁶² Draft Conclusions, *supra* note 21, Concl. 11, Comment. 5.

⁶³ Convention Relating to the Regulation of Aerial Navigation, Oct. 13, 1919, 11 L.N.T.S. 173, at art. 1. *See generally* Vienna Convention on the Law of Treaties, May 23, 1969, 1155 U.N.T.S. 331 [hereinafter VCLT]; U.N. Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 397.

⁶⁴ Draft Conclusions, *supra* note 21, Concl. 11, Comment. 6.

⁶⁵ *Id.*

⁶⁶ *See* VCLT, *supra* note 63, art. 38.

⁶⁷ Draft Conclusions, *supra* note 21, Concl. 11, Comment. 7.

existence and extension.⁶⁸ A provision of a new treaty can also eliminate the development of custom by formalizing a rule which is contrary to the alleged custom. For instance, during the Hague Codification Conference of 1930, it was clarified that the three-mile limit of the territorial sea was not sufficiently accepted as a rule of CIL.⁶⁹ Alternatively, a provision of the new treaty may articulate this doubted rule, which indicates States' consensus on that rule and eliminates doubts.

E. Interrelation Between UNGA Resolutions and Customary International Law

The UNGA may make recommendations to the UN member States.⁷⁰ In the same vein, Article 14 of the UN Charter states that UNGA may recommend measures for the peaceful adjustment of any situations.⁷¹ Thus, UNGA resolutions generally are considered to be non-binding. UNGA resolutions which are related to the budget and allocation of expenses of the organization have binding force, which constitute an exception to this recommendatory nature.⁷²

When it comes to the effects of the UNGA resolutions as law-making, ICJ Judge Rosalyn Higgins stated that "[t]he Assembly certainly has no right to legislate in the commonly understood sense of the term. Resolutions of the Assembly are not *per se* binding: though those rules of general international law which they may embody are binding on member States, with or without the help of the resolution."⁷³

She assessed that the legal status of the UNGA resolutions is associated with the general law-creating process of CIL.⁷⁴ Professor Falk echoed the quasi-legal effect of UNGA resolutions, which entails that they do not have true legislative status but, instead, serve

⁶⁸ See KOLB, *supra* note 61, at 260.

⁶⁹ Jesse S. Reeves, *The Codification of the Law of Territorial Waters*, 24 AM. J. INT'L L. 486, 491 (1930).

⁷⁰ U.N. Charter art. 10.

⁷¹ *Id.* at art. 14.

⁷² *Id.* at art. 17, ¶ 2.

⁷³ ROSALYN HIGGINS, *THE DEVELOPMENT OF INTERNATIONAL LAW BY THE POLITICAL ORGANS OF THE UNITED NATIONS* 9 (1963).

⁷⁴ *Id.*; Richard A. Falk, *On the Quasi-legislative Competence of the General Assembly*, 60 AM. J. INT'L L. 782, 785 (1966).

a law-creating role.⁷⁵ UNGA resolutions cannot, of themselves, create rules of CIL.⁷⁶ However, conduct in connection with resolutions adopted by an international organization or at an intergovernmental conference can be considered as a form of State practice,⁷⁷ as well as evidence of acceptance as law (*opinio juris*).⁷⁸ Thus, the provisions of these documents are strong candidates for becoming a form of international custom. As a result, they may be considered as having normative value. For example, in the *Nicaragua Case*, the ICJ considered UNGA Resolution 2625, the Declaration of Principles of International Law concerning Friendly Relations and Co-operation among States,⁷⁹ as a resolution that developed CIL.⁸⁰ The Court also stated that:

The effect of consent to the text of such resolutions cannot be understood as merely that of a “reiteration or elucidation” of the treaty commitment undertaken in the Charter. On the contrary, it may be understood as an acceptance of the validity of the rule or set of rules declared by the resolution by themselves.⁸¹

Moreover, the ICJ, in the Advisory Opinion on the Legality of the Threat or Use of Nuclear Weapons, recognized that UNGA resolutions may sometimes have normative value.⁸²

On the other hand, Professor Cheng stated that the *opinio juris* requirement may be fulfilled among all or some members of the UN, by referring to the *Asylum* case and the *Right of Passage over Indian Territory* cases.⁸³ He considered UNGA resolutions “as the law that is generally accepted in the United Nations,” if they proclaim principles and are adopted unanimously.⁸⁴ Regarding instant custom potential of UNGA resolutions, he stated that *opinio juris* may grow in a very short time period among all or some members

⁷⁵ Falk, *supra* note 74, at 782.

⁷⁶ Draft Conclusions, *supra* note 21, Concl. 12.

⁷⁷ *Id.* at Concl. 6.

⁷⁸ *Id.* at Concl. 10.

⁷⁹ G.A. Res. 2625 (XXV) (Oct. 24, 1970).

⁸⁰ *Nicaragua Case*, 1986 I.C.J. at 99-100, ¶ 188, and at 106-107, ¶ 202.

⁸¹ *Nicaragua Case*, 1986 I.C.J. at 99-100, ¶ 188.

⁸² *Legality of the Threat or Use of Nuclear Weapons*, Advisory Opinion, 1996 I.C.J., 226, 254, ¶ 70 (July 8).

⁸³ BIN CHENG, *STUDIES IN INTERNATIONAL SPACE LAW* 139 (1997).

⁸⁴ *Id.*

of the UN.⁸⁵ UN States may also “use UNGA resolutions to positivize their new common *opinio juris*.”⁸⁶ However, as discussed in subsection A above, the ILC rejected the notion of instant custom. In the author’s opinion, UNGA resolutions may only have normative value or declarative effect in terms of CIL.

III. CUSTOM AS A SOURCE OF INTERNATIONAL SPACE LAW: GENERAL REMARKS

A. *The Current Role of Custom in Space Law*

The role of custom has been always limited in space law.⁸⁷ At the beginning of the space era, only two countries, the US and the USSR, conducted space activities. As previously discussed, State practice must be widespread and consistent to constitute the material element of CIL.⁸⁸ Therefore, the practice of only two States was insufficient to establish CIL. One can doubt that the lack of protest by States, whose territories were being overpassed by satellites, would constitute State practice.⁸⁹ Although the identification of early space flights was rather apparent; as Professor Koplow stated, the lack of protest might have derived from unawareness of the potential rights of States and insufficient focus on the nature of a new legal realm.⁹⁰ Therefore, the combined fact that launching States did not seek permission to overfly other States’ territory and that the overflown States did not protest might be considered sufficient to create the principle of free use of outer space. However, there was insufficient evidence to consider these practices as CIL at that time.

There was a minor view that fundamental principles laid down in the OST had already been developed as rules of CIL before adoption of the OST.⁹¹ According to this view, these rules of CIL are

⁸⁵ *Id.*

⁸⁶ *See id.*

⁸⁷ *See* Marchisio, *supra* note 6.

⁸⁸ Colombian-Peruvian Asylum, 1950 I.C.J. at 276.

⁸⁹ MICHAEL P. SCHARF, CUSTOMARY INTERNATIONAL LAW IN TIMES OF FUNDAMENTAL CHANGE: RECOGNIZING GROTIAN MOMENTS 128 (2013).

⁹⁰ David A. Koplow, *Asat-isfaction: Customary International Law and the Regulation of Anti-Satellite Weapons*, 30 MICH. J. INT’L L. 1187, 1232 (2009).

⁹¹ Vladlen S. Vereshchetin & Gennady M. Danilenko, *Custom as a Source of International Law of Outer Space*, 13 J. SPACE L. 22, 25-32 (1985); Joanne I. Gabrynowicz,

codified by means of the OST. However, this view fails to meet both State practice and *opinio juris* elements. Moreover, the first significant step in the development of space law, namely the Declaration of Principles, is considered by ICJ Judge Lachs when he stated, “[i]t is difficult to regard the 1963 Declaration as a mere recommendation: it was an instrument which has been *accepted as law*.”⁹²

It is not possible to accept that, at the beginning of the space era, customary international space law had already developed because there was an absence of State practice and *opinio juris* elements. Early space activities were conducted through actual practice of only two States.⁹³ Therefore, there was not widespread and consistent State practice. Although the Declaration of Principles and the OST were adopted by consensus, the UN Committee on the Peaceful Uses of Outer Space (UNCOPUOS) had less than 30 member States at the time of adoption a number too small to qualify as evidence of *opinio juris*.⁹⁴

In *North Sea Continental Shelf*, the ICJ ruled that legal principles that are incorporated in treaties can become CIL.⁹⁵ Pursuant to Article 38 of the VCLT, a treaty rule becomes binding upon a third State as a rule of CIL, when recognized as such.⁹⁶ In *North Sea Continental Shelf*, the ICJ stated that there are some necessary factors “before a conventional rule can be considered to have become CIL.”⁹⁷ Such factors are (1) widespread and representative participation of States, including whose interests were specially affected, in the convention, (2) the lapse of time between the treaty’s entry into force and the time when CIL is alleged to have entered into existence and (3) extensive and virtually uniform State practice.⁹⁸

The Outer Space Treaty and Enhancing Space Security, in BUILDING THE ARCHITECTURE FOR SUSTAINABLE SPACE SECURITY, 113 (UN Conference Report, 2006); See Koplow, *supra* note 90, at 1233; Steven Freeland, *Peaceful Purposes? Governing the Military Uses of Outer Space*, 18 EUR. J. L. REFORM 35, 39 (2016).

⁹² MANFRED LACHS, *THE LAW OF OUTER SPACE: AN EXPERIENCE IN CONTEMPORARY LAW-MAKING* 128 (Tanja Masson-Zwaan & Stephan Hobe eds., 2010) (emphasis added).

⁹³ *But see* Müllerson, *supra* note 53, at 342.

⁹⁴ See UNITED NATIONS OFFICE OF OUTER SPACE AFFAIRS, Committee on the Peaceful Uses of Outer Space: Membership Evolution, <https://www.unoosa.org/oosa/en/our-work/copuos/members/evolution.html> (last visited Oct. 15, 2022) [hereinafter UNCOPUOS Membership Evolution].

⁹⁵ *North Sea Continental Shelf*, 1969 I.C.J. at 28, ¶ 37.

⁹⁶ VCLT, *supra* note 63, art. 38.

⁹⁷ *North Sea Continental Shelf*, 1969 I.C.J. at 43, ¶ 73.

⁹⁸ *Id.* at 44, ¶¶ 73-74.

State practice should occur in a way as to reflect a general recognition that a legal obligation is involved.⁹⁹

As of January 2022, there are 112 States that are parties to the OST.¹⁰⁰ Twenty-three more States have signed the OST but have not ratified it yet.¹⁰¹ This means that there is wide participation in the OST and all major spacefaring countries are parties to the OST. State practice of State Parties to the OST shows a high degree of consistency. The *travaux préparatoires* of space treaties, official statements, national legislations, national Court's decisions are qualified to constitute State practice.¹⁰² Moreover, the accounts of UN debates, proceedings of the UNCOPUOS and its sub-committees are also found as evidence of State practice and *opinio juris*.¹⁰³ Thus, it can be accepted that some principles laid down in the OST have passed into CIL. These are that outer space is free for exploration and use by all States, but such exploration and use is to be carried out for benefit of all;¹⁰⁴ that outer space, including the Moon and other celestial bodies, is not subject to national appropriation by any means;¹⁰⁵ that space activities are carried in accordance with international law;¹⁰⁶ that States are responsible for national activities in outer space whether such activities are carried on by governmental agencies or by non-governmental entities;¹⁰⁷ and that States are liable for damage caused to other States or their nationals by such activities.¹⁰⁸

The CIL status of the principles laid down in the OST has consequences for both State Parties and non-party States. First, those States that are parties to the OST cannot divest themselves of the provisions that have turned into the CIL. As stated in Article 43 of the VCLT, the cases of the invalidity, termination or denunciation

⁹⁹ *Id.*

¹⁰⁰ Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcommittee on its Sixty-First Session, *Status of International Agreements Relating to Activities in Outer Space as at 1 January 2022*, U.N. Doc. A/AC.105/C.2/2022/CRP.10 (2022)[hereinafter *Status of International Space Agreements*].

¹⁰¹ *Id.*

¹⁰² FRANCIS LYALL & PAUL B. LARSEN, *SPACE LAW: A TREATISE* 38 (2018).

¹⁰³ *Id.*

¹⁰⁴ OST, *supra* note 7, art. I.

¹⁰⁵ *Id.* at art. II.

¹⁰⁶ *Id.* at art. III.

¹⁰⁷ *Id.* at art. VI.

¹⁰⁸ *Id.* at art. VII. See LYALL & LARSEN, *supra* note 102, at 64.

of a treaty or withdrawal of a party from the treaty do “not in any way impair the duty of any State to fulfil any obligation contained in the treaty to which it would be subject under international law independently of the treaty.”¹⁰⁹ Second, non-party States may be bound by provisions of the OST as they have passed into CIL and have universal application. Although there is wide participation in the OST, 58 States out of 193 UN member States have not signed the OST. Thus, the consequences of the CIL status of provisions of the OST also have real relevance, apart from academic one.

B. Determination of Rules as Customary International Space Law

The determination of a rule as CIL requires a careful analysis on available evidence for the presence of the two elements in any given case. In space law, *travaux préparatoires*, accounts of UN debates, proceedings of UNCOPUOS and its subcommittees and several national space legislations have been considered as evidence of State practice and *opinio juris*.¹¹⁰ However, one might hesitate to rely on accounts of UN debates as evidence of *opinion juris* since the reportage is vague and may not be considered true advocacy.¹¹¹

To determine whether provisions of a treaty have attained the status of CIL, the factors expressed in *North Sea Continental Shelf* should be taken into consideration. For provisions of the OST there is, first, widespread and representative participation, there are 112 State Parties to the treaty, and 23 more States are signatories. Second, all spacefaring countries are parties to the treaty, which covers States whose interests are specially affected. Third, State practice has been highly consistent with provisions of the OST. Fourth, there has been a passage of time, however short or long necessary. And fifth, States’ practice is occurring in a legally obligatory way.¹¹² Other evidence to prove that principles laid down in the OST evolve into CIL can be found in UNGA space-related resolutions and measures, which were adopted after the conclusion of the OST.¹¹³ For instance, the Principles Relating to Remote Sensing of the

¹⁰⁹ VCLT, *supra* note 6, art. 43.

¹¹⁰ LYALL & LARSEN, *supra* note 102, at 38.

¹¹¹ *See id.*

¹¹² *Id.* at 70.

¹¹³ *Id.*

Earth from Outer Space concluded in accordance with Article I of the OST.¹¹⁴ Space freedoms laid down in Article I permit passage of satellites over other countries without permission.¹¹⁵ Moreover, Principle II quotes Article I, ¶1 of the OST and states that “remote sensing activities shall be carried for the benefit and interests of all countries.”¹¹⁶ By providing general benefits to all States, such as meteorology and disaster management, remote sensing activities are clear examples of the use of space for the benefit of all States.

Moreover, the OST constitutes a basis for various organizations, cooperation agreements, such as the International Telecommunications Satellite Organization Agreement and the International Mobile Satellite Organization Agreement, and memorandum of understanding.¹¹⁷ State practice under these agreements occurs in accordance with the principles laid down in the OST. To act according to the OST and consider it as a basis for other legal instruments can be regarded as evidence for *opinio juris*.

Turning to the potential of UNGA resolutions to attain the status of CIL, one might see their non-binding nature as an obstacle to constitute *opinio juris*.¹¹⁸ However, the ICJ has stated that UNGA resolutions may have normative value, despite their non-binding nature.¹¹⁹ Moreover, when States implement these resolutions as a requirement or part of their national legislations regarding space activities, it may qualify as evidence of *opinio juris*. Such implementation reflects that several national legislations arouse a legal sense of obligation for these non-binding legal instruments.

Notably, there has not been a judgment from the ICJ or any other competent tribunal dealing with the uncertainty in customary international space law. Indeed, there has not been any space law related international case. Moreover, there has not been any

¹¹⁴ G.A. Res. 41/65, (Dec. 3, 1986) [hereinafter Remote Sensing Principles].

¹¹⁵ OST, *supra* note 7, art. I.

¹¹⁶ Remote Sensing Principles, *supra* note 114, princ. II.

¹¹⁷ Agreement Relating to the International Telecommunications Satellite Organization “INTELSAT”, Aug. 20, 1971, 23 U.S.T. 3813, 1220 U.N.T.S. 19677; Convention of the International Mobile Satellite Organization, Sept. 3, 1976, T.I.A.S. 9605; See LYALL & LARSEN, *supra* note 102, at 71.

¹¹⁸ See Brian Wessel, *The Rule of Law in Outer Space: The Effects of Treaties and Non-Binding Agreements on International Space Law*, 35 HASTINGS INT’L & COMPAR. L. REV. 289, 298 (2012).

¹¹⁹ Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion 1996 I.C.J. at 254, ¶ 70.

request to the ICJ to give an advisory opinion on that matter by the UNGA, other organs of the UN or special agencies, which have been authorized by the UNGA.

When considering the uncertainty on customary international space law and the difficulty to determine which rules have attained the status of CIL, clarification by the ICJ would be welcome. This would also provide a guidance on how one can find evidence for State practice and *opinio juris* in space law instruments.

C. An Examination of Customary International Law Status of Selected Elements of the Outer Space Treaty

i. Customary International Law Status of Space Freedoms

One of the very first legal questions related to space law is whether a State has the right of passage through outer space.¹²⁰ In practice, the USSR did not seek for consent before launching Sputnik I into outer space. Moreover, other States did not protest the launching of Sputnik I.¹²¹ If one State had protested the launching of Sputnik I, that State likely would have encountered protest for its own space activities. The launch of Sputnik I and the lack of the protest established the principle of freedom to access and pass through outer space.¹²² Article II of the Declaration of Principles announced the freedom of exploration and use of outer space and celestial bodies.¹²³ Subsequently, Article I of the OST provides freedom for exploration, use and access to all areas of celestial bodies as well as scientific investigation.¹²⁴ These freedoms are granted to all States without discrimination on a basis of equality. These freedoms are limited by norms of public international law, such as Article 2 of the UN Charter, and space law norms, such as the peaceful use, the principle of cooperation, the avoidance of harmful

¹²⁰ See LACHS, *supra* note 92, at 125.

¹²¹ *Id.*

¹²² Comm. on the Peaceful Uses of Outer Space, Submission by the Space Safety L. & Reg. Comm. of the Int'l Ass'n for the Advancement of Space Safety to the Legal Subcomm. on its Fifty-Seventh Session, U.N. Doc. A/AC.105/C.2/2018/CRP.9, at 20 (2018) [hereinafter UNCOPUOS Delimitation Report].

¹²³ G.A. Res. 2625 (XXV), art. II (Oct. 24, 1970).

¹²⁴ OST, *supra* note 7, art. I.

contamination and the carrying out of activities for the benefit and in the interests of all countries.¹²⁵

After the adoption of the OST, the space freedoms gradually became rules of CIL due to widespread and consistent State practice and *opinio juris*. Since the launching of Sputnik I, all space activities have been conducted in accordance with space freedoms. Space freedoms have subsequently constituted the basis of legal instruments governing outer space activities, such as resolutions, guidelines and national legislations.

When it comes to discussing airspace, however, States have complete and exclusive sovereignty over their own airspace.¹²⁶ Hence, without the permission or other authorization of the State, it is not possible to use or even innocently pass through the State's airspace for scheduled civil flights.¹²⁷ While there are freedoms for use and exploration of outer space, there is a prohibition of passage on territorial airspace with an exception for unscheduled flights.¹²⁸ During the launch and descent phases, space objects must pass through airspace. Since the difference causes contrasting results in terms of the right of passage, the delimitation of the boundary between airspace and outer space becomes relevant. However, there is no agreed definition of where airspace ends and outer space begins.¹²⁹

The problem of delimitation has been discussed in and outside the UN for many years.¹³⁰ After years of discussion, the approaches can be categorized into two prevailing schools of thought on the

¹²⁵ ALEXANDER SOUCEK, *SPACE LAW ESSENTIALS* 21 (2015).

¹²⁶ Convention on International Civil Aviation, art. 1, Dec. 7, 1944, T.I.A.S. 159, 15 U.N.T.S. 295 [hereinafter Chicago Convention].

¹²⁷ *Id.* at art. 6.

¹²⁸ *Id.* at art. 5.

¹²⁹ S. Neil Hosenball & Jefferson S. Hofgard, *Delimitation of Air Space and Outer Space: Is a Boundary Needed Now?*, 57 U. COLO. L. REV. 885, 885 (1986).

¹³⁰ Comm. on the Peaceful Uses of Outer Space, Background Paper Prepared by the Secretariat, for the Legal Subcomm. in 1970 and updated in 1977, U.N. Doc. A/AC.105/C.2/7 (May 7, 1970); Comm. on the Peaceful Uses of Outer Space, Background Paper Prepared by the Secretariat, for the Legal Subcomm. in 1970 and updated in 1977, U.N. Doc. A/AC.105/C.2/7/Add. 1 (Jan. 21, 1977); Comm. on the Peaceful Uses of Outer Space, Working Paper Prepared by the Chair of the Working Group on the Definition and Delimitation of Outer Space, for the Legal Subcomm. on its Fifty-Seventh Session, U.N. Doc. A/AC.105/C.2/L.302 (May 17, 2017).

delimitation of outer space: functionalist and spatialist.¹³¹ While functionalists claim that a characterization of the activity should be a determinant factor, spatialists assert that a physical boundary should be established.¹³² Functionalists would argue that a State's sovereignty is not applicable to space flights even during launch and descent phases when passing through national airspace.¹³³ This means that when it comes to space activities, other States' airspace sovereignty begins and ends at mean sea level.¹³⁴ However, spatialists would disagree with this opinion, claiming that, until a specific physical boundary, airspace sovereignty remains applicable to space flights.¹³⁵ If the Von Karman line is used as the physical boundary, it means that airspace sovereignty is applicable to space flights up to 100 km above mean sea level.¹³⁶ Although there are a lot of aspects to discuss about both approaches, a detailed analysis of the differences between these views is beyond the scope of this article.

At the beginning of the space era, the US Space Shuttle usually launched and descended over its own airspace or over the oceans.¹³⁷ In the same vein, the USSR rockets usually passed through the USSR's own territorial airspace.¹³⁸ There were few cases in which a space object overflowed air space of a State other than the launching State.¹³⁹ Generally, in those occasions the State of registry had furnished the information to the overflowed States or there was a bilateral agreement between the State of registry and underlying States providing the consent.¹⁴⁰ When there was no

¹³¹ See Hosenball & Hofgard, *supra* note 129, at 887; TANJA MASSON-ZWAAN & MAHULENA HOFMANN, INTRODUCTION TO SPACE LAW 13 (4th ed., 2019).

¹³² *Id.*

¹³³ Ricky J. Lee, *Reconciling International Space Law with the Commercial Realities of the Twenty-first Century*, 4 SING. J. INT'L & COMPAR. L. 194, 208 (2000).

¹³⁴ Bin Cheng, *The Legal Status of Outer Space and Relevant Issues: Delimitation of Outer Space and Definition of Peaceful Use*, 11 J. SPACE L. 89, 97 (1983).

¹³⁵ *Id.* at 95.

¹³⁶ *Id.*

¹³⁷ UNCOPUOS Delimitation Report, *supra* note 122, at 22.

¹³⁸ *Id.*

¹³⁹ Comm. on the Peaceful Uses of Outer Space, Note by the Secretariat, U.N. Doc. A/AC.105/635/Add.1, at 6 (Mar. 15, 1996).

¹⁴⁰ *Id.*; UNCOPUOS Delimitation Report, *supra* note 122 at 22. As an example of that occasion, in 1990, the US requested permission and provided information on the final stage of Atlantis Space-Shuttle. The USSR granted the US permission to overfly Russian territory. See also Agreement between the Russian Federation and Republic of

notification, the reason why the overflowed States have not protested could simply be their unawareness.¹⁴¹

The right of innocent passage for space objects through national airspace of other countries has a particular importance for terrestrially smaller States.¹⁴² Without this right, it may not be possible to reach into or return from outer space for such States.¹⁴³

Whether the customary rule on the right of passage for ascending and descending space objects has emerged in space law has been a controversial issue. Some scholars claim that the right of passage through foreign airspace has not been developed as a customary rule.¹⁴⁴ For instance, Vereshchetin and Danilenko claimed the existing practice has not become a general rule of CIL regulating the passage of space objects through foreign airspace.¹⁴⁵ However, they made a reservation on this statement by referring to the possibility of creating a local or particular custom ruling the relations of neighboring countries.¹⁴⁶ According to Gorove, the freedom of exploration and use of outer space covers the freedom to go into outer space and the freedom to return to the Earth.¹⁴⁷ Despite this statement, he did not think that a customary rule on the passage for space objects through airspace had been created.¹⁴⁸ Professor Cheng, Professor Haanappel and Professor Masson-Zwaan also expressed their views that no customary rule of passage for ascending or descending space objects exists.¹⁴⁹ In contrast, other scholars assert that there is a customary rule on passage of space objects through foreign national

Kazakhstan on the Basic Principles and Conditions of Use of the Baikonur Spaceport, Kaz.-Russ., (Mar. 28, 1994).

¹⁴¹ UNCOPUOS Delimitation Report, *supra* note 122, at 22.

¹⁴² See Vereshchetin & Danilenko, *supra* note 91, at 28.

¹⁴³ *Id.*

¹⁴⁴ *Id.* at 29.

¹⁴⁵ *Id.*

¹⁴⁶ *Id.*

¹⁴⁷ Stephen Gorove, *Aerospace Plane: New Policy Issues for Space Law*, 31 PROC. ON L. OUTER SPACE 282, 283 (1989).

¹⁴⁸ *Id.*

¹⁴⁹ CHENG, *supra* note 83, at 425-428; P.P.C. Haanappel, *The Aerospace Plane: Analogies with Other Modes of Transportation*, 32 PROC. ON L. OUTER SPACE 341, 342 (1990); Tanja L. Masson-Zwaan, *The Aerospace Plane: an Object at the Cross-roads between Air and Space Law*, in AIR AND SPACE L.: DE LEGE FERENDA ESSAYS IN HONOUR OF HENRI A. WASSENBERGH 247, 253 (1992).

airspace,¹⁵⁰ or at least that it is developing.¹⁵¹ Therefore, while space freedoms have attained the status of CIL, a customary rule on the passage for space objects through foreign airspace has not been solidified.

The prevailing approach is that there is no existing customary rule on innocent passage for an ascending or descending space objects.¹⁵² The main arguments of this prevailing approach revolve around the lack of the State practice and unawareness of overflown States.

ii. Customary International Law Status of the Non-Appropriation Principle

a) *The Non-Appropriation Principle*

From the beginning of the space era, it was obvious that the traditional rules of public international law on sovereignty, territory and delimitation cannot be applicable to outer space including the Moon and celestial bodies.¹⁵³ States agreed to consider outer space, including the Moon and other celestial bodies as a *res communis omnium*.¹⁵⁴ The *res communis* principle holds that international commons belong to all nations and are not able to be appropriated.¹⁵⁵

The Cold War origins of space law play an important role in the establishment of the non-appropriation principle.¹⁵⁶ Countries had concerns on the results of space activities conducted by the US and the USSR.¹⁵⁷ The importance of the non-appropriation principle derives from its contribution to the fundamental principles of

¹⁵⁰ V. D. Bordunov, *Space Shuttle Flights and Correlation of Legal Regimes of Air Space and Outer Space*, 25 PROC. ON L. OUTER SPACE 211, 212 (1982).

¹⁵¹ Mr. Chowdrury's Response to Questionnaire, Space Law, 59 INT'L L. ASS'N. CONF. REP. 168, 183 (1980).

¹⁵² CHENG, *supra* note 83, at 428.

¹⁵³ R. J. Lee, *Article II of the Outer Space Treaty: Prohibition of State Sovereignty, Private Property Rights, or Both?*, 11 AUSTRALIAN J. OF INT'L L. 128, 128 (2004).

¹⁵⁴ Fabio Tronchetti, *The Non-Appropriation Principle Under Attack: Using Article II of the Outer Space Treaty in its Defence*, 50 PROC. ON L. OUTER SPACE 526, 526 (2007).

¹⁵⁵ A. Kiss, *The Common Heritage of Mankind: Utopia or Reality?*, 40(3) INT'L J. (TORONTO), 423-24 (1985).

¹⁵⁶ Joanne Irene Gabrynowicz, *Space Law: Its Cold War Origins and Challenges in the Era of Globalization*, 37 SUFFOLK U. L. REV. 1041, 1043 (2004).

¹⁵⁷ *Id.* at 1043-44.

space law.¹⁵⁸ Not only has this principle prevented outer space from becoming an area of conflict between States, but it is also the best guarantee for the principle that the exploration and use of outer space will be carried out for the benefit and in the interest of all States, irrespective of their stage of development.¹⁵⁹

Article II of the OST declares that: "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."¹⁶⁰

At the beginning of the space era, States renounced any potential claims over outer space, which is in accordance with the non-appropriation principle.¹⁶¹ Starting with Neil Armstrong and Buzz Aldrin, US astronauts planted several US flags on the surface of the Moon. The act of "planting the flag" has been associated with a declaration of sovereignty and ownership rights over newly settled land based on colonial history.¹⁶² However, these acts did not signify US' intention to claim sovereignty in the same way as Captain Cook claimed Australia for Great Britain back in 1770,¹⁶³ but similar to the planting of a flag on Mount Everest or at the South and North Poles to reflect pride.¹⁶⁴ Prior to the Apollo 11 Moon landing, the US signed and ratified the OST. As a result, the US was bound by Article II of the OST. This was also affirmed by Section 8 of the National Aeronautics and Space Administration Authorization Act of 1970, which states:

The flag of the United States, and no other flag, shall be implanted or otherwise placed on the surface of the moon, or on the surface of any planet, by the members of the crew of any spacecraft making a lunar or planetary landing as a part of a mission under the Apollo program or as a part of a mission

¹⁵⁸ See Tronchetti, *supra* note 154, at 526.

¹⁵⁹ *Id.* at 527.

¹⁶⁰ OST, *supra* note 7, art. II.

¹⁶¹ *Id.*

¹⁶² See Merete Borch, *Rethinking the Origins of Terra Nullius*, 32 AUSTL. HIST. STUD. 222, 222 (2001).

¹⁶³ Austl. Gov't Dep't of the Prime Minister and Cabinet, Australian Flags: Part 4: History of the Australian National Flag: Evolution of a National Flag, <https://www.pmc.gov.au/resource-centre/government/australian-flags-booklet/part-4>.

¹⁶⁴ Anne Platoff, *Where No Flag Has Gone Before: Political and Technical Aspects of Placing a Flag on the Moon*, NASA Contractor Report 188251, <https://www.hq.nasa.gov/alsj/alsj-usflag.html>.

under any subsequent program, the funds for which are provided entirely by the Government of the United States. This act is intended *as a symbolic gesture of national pride in achievement and is not to be construed as a declaration of national appropriation by claim of sovereignty* (own emphasis).¹⁶⁵

The question whether the private appropriation of outer space, including the Moon and other celestial bodies, or private ownership over space resources is also prohibited by Article II of the OST has been controversial among legal scholars. Article II of the OST must be interpreted in accordance with Article 31 of the VCLT.¹⁶⁶ Although the VCLT entered into force after the OST, Article 31 of the VCLT codified the pre-existing CIL on the interpretation of treaties.¹⁶⁷ The rules of interpretation in Article 31 of the VCLT exist as a rule of CIL at the time when States express their will to be bound by the OST; therefore, the rule of interpretation laid down in Article 31(3) of the VCLT governs the interpretation of the OST. The term “national appropriation” must be interpreted “in accordance with the ordinary meaning,” “in its context” and “in the light of its object and purpose” of the OST.¹⁶⁸

While the national appropriation of outer space, including the Moon and other celestial bodies, is explicitly forbidden by Article II of the OST, there is no explicit mention of its private appropriation in this provision. Based on this consideration, some legal scholars have claimed that Article II of the OST, in its present form, does not prohibit the private appropriation of outer space, including the Moon and other celestial bodies.¹⁶⁹ Therefore, in line with that argument, private individuals or international organizations could lawfully appropriate any parts of outer space.¹⁷⁰ Moreover, some enterprises rely on this legal argument and claim that there is a

¹⁶⁵ National Aeronautics and Space Administration Authorization Act of 1970, Pub. L. No. 91-119, 83 Stat. 196, § 8.

¹⁶⁶ VCLT, *supra* note 63, art. 31.

¹⁶⁷ See OLIVER DÖRR & KIRSTEN SCHMALENBACH, VIENNA CONVENTION ON THE LAW OF TREATIES 6 (2012).

¹⁶⁸ VCLT, *supra* note 63, art. 31(1).

¹⁶⁹ Stephen Gorove, *Interpreting Article II of the Outer Space Treaty*, 37 FORDHAM L. REV. 349, 351 (1969).

¹⁷⁰ *Id.*

loophole in Article II of the OST.¹⁷¹ There are few cases that citizens “shouldered the quixotic mission to test this idea, but their property claims over the celestial bodies ended up with Courts’ rejections.”¹⁷² Despite these thoughts, claims and attempts there is a present tendency to believe that both national appropriation and private property rights over outer space, including the Moon and other celestial bodies, fall under the prohibition of national appropriation as laid down in Article II of the OST.¹⁷³

Recent technological developments and “initiatives to harvest, mine, process and subsequently sell resources stemming from celestial bodies” raise the question whether the non-appropriation principle is also applicable to space resources.¹⁷⁴ Since the drafting of the OST, the non-appropriation principle has been reinterpreted as narrower in scope than the original intent of its drafters.¹⁷⁵ This interpretation excludes space resources from the scope of the non-appropriation principle.¹⁷⁶ Consequently, this reinterpretation has had a changing effect on CIL relating to the non-appropriation principle.¹⁷⁷

As part of the Apollo 11 mission, astronauts collected material, including Moonrocks to bring back to Earth.¹⁷⁸ From 1969 to 1972, 842 pounds of lunar material were brought back during Apollo

¹⁷¹ Lunar Embassy is a company that claims to sell land on the Moon. However, the Beijing Administration of Industry and Commerce had revoked the business license of the company and fined the company 50,000 yuan. Following this, the company sued the Beijing Administration of Industry and Commerce in 2005. The rules of The Haidian District People’s Court and the Beijing First Intermediate People’s Court (Appeal Court) were against the company. The Appeal Court ruled against the company’s appeal by referring to the Article II of the OST, <http://www.china.org.cn/english/China/203329.htm>; See Tronchetti, *supra* note 1549, at 533.

¹⁷² John G. Wrench, *Non-Appropriation - No Problem: The Outer Space is Ready for Asteroid Mining*, 51 CASE W. RESERVE J. INT’L L. 437, 446 (2019); *Nemitz v. NASA*, 126 Fed. Appx. 343 (9th Cir. 2005).

¹⁷³ See Tronchetti, *supra* note 154, at 533.

¹⁷⁴ See MASSON-ZWAAN & HOFMANN, *supra* note 131, at 18.

¹⁷⁵ 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, 157-158 (2019).

¹⁷⁶ *Id.*

¹⁷⁷ *Id.*

¹⁷⁸ LUNAR AND PLANETARY INST., *Apollo 11 Lunar Samples*, Lunar & Planetary Inst., https://www.lpi.usra.edu/lunar/missions/apollo/apollo_11/samples/ (last visited Oct. 15, 2022).

missions.¹⁷⁹ NASA clearly stated that “[l]unar material retrieved from the Moon during the Apollo program is U.S. government property.”¹⁸⁰ In the same vein, Japanese and Russian governments consider rocks and soil they have removed from the Moon or asteroids as their properties.¹⁸¹ In *US v. One Lucite Ball*, the Court considered a lunar rock as a material that can be a subject of stolen property.¹⁸² Moreover, the Court upheld “the right of Honduras to assert national property ownership over a Moon rock.”¹⁸³

Turning to the national appropriation and ownership rights of *in situ* resources, the language of the OST is not clear as to whether the non-appropriation principle laid down in Article II extends to resources extracted *in situ* from the Moon and other celestial bodies.¹⁸⁴ According to ICJ Judge Lachs, *in situ* resources fall under the scope of the non-appropriation principle.¹⁸⁵ Some States are interpreting the scope of this principle narrowly, exemplified by recent legislation in the US, Luxembourg and United Arab Emirates, as discussed further below.¹⁸⁶

The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Moon Agreement) has significant relevance to space resources.¹⁸⁷ Article 6 of the Moon Agreement provides the right to collect on and remove from the Moon samples of its minerals and other substances for scientific investigation.¹⁸⁸

¹⁷⁹ NAT'L AERONAUTICS AND SPACE ADMIN., *Lunar Rocks and Soils from Apollo Missions*, <https://curator.jsc.nasa.gov/lunar/> (last visited Oct. 15, 2022).

¹⁸⁰ Paul K. Martin, *NASA's Management of Moon Rocks and Other Astromaterials Loaned for Research, Education and Public Display*, NASA Office of the Inspector Gen., Report No. IG-12-007 at V, note 8 (Dec. 8, 2011).

¹⁸¹ H.R. REP. NO. 114-153, at 8 (2015).

¹⁸² *U.S v. One Lucite Ball Containing Lunar Material*, 252 F. Supp. 2d 1367, 1369 (2003).

¹⁸³ H.R. REP. NO. 114-153, at 8.

¹⁸⁴ Andrew Lintner, *Extraterrestrial Extraction: The International Implications of the Space Resource Exploration Utilization Act of 2015*, 40 FLETCHER F. WORLD AFF. 139, 140 (2016).

¹⁸⁵ See Lachs, *supra* note 92, at 42-43.

¹⁸⁶ Space Act of 2015, Pub. L. No. 114-90, 129 Stat. 704 [hereinafter Space Act]; Grand Duchy of Luxembourg, Law on the Exploration and Use of Space Resources (July 20, 2017)[hereinafter Luxembourg Law]; United Arab Emirates, Federal Law No. 12 On the Regulation of the Space Sector, 669 Official Gazette 111 (Dec. 19, 2019)[hereinafter UAE Law],

¹⁸⁷ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 5, 1979, 1363 U.N.T.S. 3 [hereinafter Moon Agreement].

¹⁸⁸ *Id.* at art. 6.

Although it limits space resource extraction to scientific purposes, it shows that the OST does not preclude space resource extraction. Article 11(1) of the Moon Agreement proclaims that the Moon and its resources are common heritage of [hu]mankind.¹⁸⁹ Article 11(3) of the Moon Agreement explicitly bans property rights of States, international organizations, national organizations, non-governmental entities or any natural person over natural resources.¹⁹⁰ However, it has been ratified by only 18 countries and signed by 4 countries, including France and India, and it has no effect on third States.¹⁹¹

Space resource extraction recently became a subject in national legislatures. First, the US passed the Space Act of 2015, which grants US citizens right to exploit, including “possess, own, transport, use, and sell,” space resources and asteroid resources “in accordance with applicable law, including the international obligation of the United States.”¹⁹² On the other hand, it includes a disclaimer that the US does not assert the sovereignty over or ownership of any celestial bodies by the enactment of the Space Act.¹⁹³ Moreover, the US position on space resources can also be examined by using another legal document. The White House issued the Executive Order on Encouraging International Support for the Recovery and Use of Space Resources on 6 April 2020.¹⁹⁴ The Executive Order states that the “US does not view outer space as a global commons.”¹⁹⁵ Moreover, in the Executive Order, the importance of fostering “international support for the public and private recovery and use of resources in outer space, consistent with applicable law” is highlighted.¹⁹⁶ The most recent US approach is reflected in the Artemis Accords, which will be discussed below.

Following the US act, Luxembourg adopted and entered into force the Law on the Exploration and Use of Space Resources.¹⁹⁷

¹⁸⁹ *Id.* at art. 11(1).

¹⁹⁰ *Id.* at art. 11(3).

¹⁹¹ Status of International Space Agreements, *supra* note 100.

¹⁹² Space Act, *supra* note 187, § 402.

¹⁹³ *Id.* § 403.

¹⁹⁴ Executive Order No. 13914, Encouraging International Support for the Recovery and Use of Outer Space Resources, 85 Fed. Reg. 20381 (April 6, 2020) [hereinafter Executive Order].

¹⁹⁵ *Id.*

¹⁹⁶ *Id.*

¹⁹⁷ Luxembourg Law, *supra* note 186.

Pursuant to Article 1 of the Law, “space resources are capable of being owned.”¹⁹⁸ Contrary to the US act, it does not exclude legal entities owned in full or fully controlled by foreigners from the scope of application.¹⁹⁹ Moreover, it does not make a distinction between space and asteroid resources. Most recently the United Arab Emirates introduced its national space law in 2020 which has provisions on space resource extraction, exploitation and utilization.²⁰⁰

Other States also expressed their interests in space resource exploitation. For example, Poland,²⁰¹ Portugal,²⁰² Japan,²⁰³ China,²⁰⁴ the Czech Republic,²⁰⁵ the United Arab Emirates,²⁰⁶ Belgium²⁰⁷ and US²⁰⁸ signed Memorandums of Understanding with Luxembourg for cooperation in space activities, including space resource exploitation. Russia expressed its will to join Luxembourg in

¹⁹⁸ *Id.* at art. 1.

¹⁹⁹ *Id.* at art. 4.; See MASSON-ZWANN & HOFMANN, *supra* note 131, at 103.

²⁰⁰ UAE Law, *supra* note 186.

²⁰¹ Press Release, Lux. Space Agency, *Luxembourg and the Republic of Poland Agree to Cooperate on Space Activities* (Oct. 12, 2018), https://space-agency.public.lu/en/news-media/news/2018/Lux_Poland.html.

²⁰² *Id.*

²⁰³ Press Release, Lux. Ministry of the Econ., *Luxembourg and Japan Agree to Cooperate on Exploration and Commercial Utilization of Space Resources*, (Nov. 29, 2017), <https://space-agency.public.lu/dam-assets/press-release/2017/2017-11-29-press-release-mou-japan-space.pdf>.

²⁰⁴ Press Release, Lux. Ministry of the Econ., *Luxembourg Cooperates with China in the Exploration and Use of Outer Space for Peaceful Purpose*, (Jan. 16, 2018), <https://space-agency.public.lu/dam-assets/press-release/2018/2018-01-17-press-release-cooperation-china-luxembourg.pdf>.

²⁰⁵ Press Release, Lux. Ministry of the Econ., *Luxembourg and the Czech Republic Cooperate in the Frame of Space Resources Exploration and Utilization*, (Oct. 10, 2018), <https://space-agency.public.lu/dam-assets/press-release/2018/2018-10-10-Press-release-MoU-Czech-Lux-FINAL.pdf>.

²⁰⁶ Press Release, Lux. Ministry of the Econ., *Luxembourg and the United Arab Emirates to Cooperate on Space Activities with Particular Focus on the Exploration and Utilization of Space Resources*, (Dec. 5, 2018), <https://space-agency.public.lu/dam-assets/press-release/2017/2017-10-10-press-release-mou-space.pdf>.

²⁰⁷ Press Release, Lux. Ministry of the Econ., *The Grand Duchy of Luxembourg and Belgium Join Forces to Develop the Exploration and Utilisation of Space Resources*, (Jan. 23, 2019), <https://space-agency.public.lu/dam-assets/press-release/2019/2019-01-23-ENG-joint-press-release-BE-LU.pdf>.

²⁰⁸ Memorandum of Understanding on Space Cooperation, U.S.-Lux., Dept. Com. May 10, 2018, <https://lu.usembassy.gov/complete-text-of-the-mou-on-space-cooperation-between-the-u-s-and-luxembourg/>.

space resource exploitation.²⁰⁹ India is also interested in space mining.²¹⁰

From this follows that the aforementioned countries take the stance that the prohibition laid down in Article II of the OST does not extend to space resources. UNCOPUOS discussions are ongoing regarding the legitimacy of national legislation on space resource exploitation and whether the OST permits the ownership of space resources.²¹¹ Some delegations are of the view that general terms laid down in national legislation on space resources are “not sufficient to ensure compliance with the spirit of the Outer Space Treaty.”²¹²

It is widely accepted that the non-appropriation principle laid down in Article II of the OST has attained the status of CIL.²¹³ This is because it consistently established State practice and *opinio juris* not to claim sovereignty over outer space, including the Moon and other celestial bodies. However, there is a shift from the traditional approach towards the non-appropriation principle, referenced by the above-mentioned State interests in space resource utilization. With the advance of technology and the involvement of private entities in outer space activities, this change is understandable. Moreover, at this period of time there is no sufficient State practice and *opinio juris* to develop a rule of CIL in ownership of *in situ* space resources. The existing practices are premature to constitute elements of CIL.

Recently, the National Aeronautics and Space Administration (NASA) announced the Artemis Accords, which provide principles that NASA has identified as important for regulating the use and

²⁰⁹ Vladimir Soldatkin, *Russia Wants to Join Luxembourg in Space Mining*, REUTERS, March 6, 2019, <https://www.reuters.com/article/us-luxembourg-russia-space/russia-wants-to-join-luxembourg-in-space-mining-idUSKCN1QN1OQ>.

²¹⁰ See Anurag Kotoky, *India Prepares Quest to Find a Trillion-Dollar Nuclear Fuel on the Moon*, ECON. TIMES, June 27, 2018, <https://economictimes.indiatimes.com/news/science/india-prepares-quest-to-find-a-trillion-dollar-nuclear-fuel-on-the-moon/articleshow/64760124.cms?from=mdr>.

²¹¹ Comm. on the Peaceful Uses of Outer Space, Draft Rep. of the Legal Subcomm. on Its Fifty-Eighth Session, U.N. Doc. A/AC.105/C.2/L.309/Add.3, at 4-5, ¶¶ 23, 24 & 27 (April 9, 2019).

²¹² *Id.* at 4, ¶ 24.

²¹³ See Vereshchetin & Danilenko, *supra* note 91, at 25; Zachos A. Paliouras, *The Non-Appropriation Principle: The Grundnorm of International Space Law*, 27 LEIDEN J. INT'L L. 37, 44 (2014).

exploration of the Moon and eventually Mars.²¹⁴ The Artemis Accords can be understood as a framework for bilateral agreements to be negotiated with space agencies of other countries.²¹⁵ What makes the Artemis Accords relevant to the non-appropriation principle is that it reinforces that space resource extraction and utilization can and will be conducted in accordance with the OST.²¹⁶ Reactions and participation of other States may be worth examining as State practice for a new international legal regime on space resource activity.

There is a need to develop an international regime governing space resource exploitation and harmonize existing national legislations thereon. A prospective international framework might be of an obligatory or recommendary nature. However, in both cases they may eventually constitute evidence for State practice and *opinio juris*. State practice, national legislation, actual practice and prospective legal frameworks would have potential to develop evidence for CIL.

To provide a basis for negotiations on space resource activities, The Hague International Space Resources Governance Working Group was created.²¹⁷ The Hague Working Group has published the Building Blocks for the Development of an International Framework on Space Resource Activities.²¹⁸ Reactions of States to the Building Blocks may also have a contribution to the development of new CIL on space resource activities.

²¹⁴ The Artemis Accords: Principles for Cooperation in the Civil Exploration and Use of the Moon, Mars, Comets, and Asteroids, NASA, <https://www.nasa.gov/specials/artemis-accords/img/Artemis-Accords-signed-13Oct2020.pdf> [hereinafter Artemis Accords].

²¹⁵ David P. Fidler, *The Artemis Accords and the Next Generation of Outer Space Governance*, COUNCIL ON FOREIGN REL. BLOG (June, 2, 2020), <https://www.cfr.org/blog/artemis-accords-and-next-generation-outer-space-governance>.

²¹⁶ Artemis Accords, *supra* note 214, § 10, ¶ 2.

²¹⁷ LEIDEN UNIV., *The Hague International Space Resources Governance Working Group*, <https://www.universiteitleiden.nl/en/law/institute-of-public-law/institute-of-air-space-law/the-hague-space-resources-governance-working-group> (last visited Oct. 15, 2022) [hereinafter The Hague Working Group].

²¹⁸ BUILDING BLOCKS FOR THE DEVELOPMENT OF AN INTERNATIONAL FRAMEWORK FOR THE GOVERNANCE OF SPACE RESOURCE ACTIVITIES, <https://www.universiteitleiden.nl/binaries/content/assets/rechtsgeleerdheid/instituut-voor-publiekrecht/lucht-en-ruimterecht/space-resources/bb-thissrwwg-cover.pdf>. [hereinafter BUILDING BLOCKS].

b) Persistent Objectors to the Non-Appropriation Principles

On December 3, 1976 eight equatorial States, including Brazil, Colombia, Congo, Ecuador, Indonesia, Kenya, Uganda and Zaire (now the Democratic Republic of Congo) concluded an international agreement titled The Declaration of the First Meeting of Equatorial Countries.²¹⁹ The starting points for the Declaration were that Geostationary Earth Orbit (GEO) slots were increasingly used by developed countries and the failure of equatorial States' attempts to be recognized as States with special interests in GEO.²²⁰

In the Declaration, there are some key points such as a definition of GEO and a declaration that GEO is a limited natural resource.²²¹ And, most relevant to this article, a proclamation that equatorial States have sovereignty over their corresponding segments of GEO.²²² As a consequence of a States' sovereignty claim, Section 3 (e) of the Bogotá Declaration declares that:

Equatorial States do not condone the existing satellites or the position they occupy on their segments of the Geostationary Orbit nor does the existence of said satellites confer any rights of placement of satellites or use of the segment unless expressly authorized by the State exercising sovereignty over this segment.²²³

The sovereignty claims of the equatorial States over the segments of GEO need further elaboration under the relationship between treaty provisions and CIL due to the customary status of the space freedoms and the non-appropriation principle. However, before delving into the CIL evaluation, it is necessary to discuss this principle as a treaty provision, as some of the State Parties to the Bogotá Declaration were already parties or signatories to the OST.

To be persistent objectors, States manifest their opposition to a practice before it has become CIL.²²⁴ Nine years before the

²¹⁹ The Declaration of the First Meeting of Equatorial Countries (Dec. 3, 1976), Japan Aerospace Exploration Agency (2007) [hereinafter Bogotá Declaration], https://www.jaxa.jp/library/space_law/chapter_2/2-2-1-2_e.html.

²²⁰ See LYALL & LARSEN, *supra* note 102, at 160; CARL Q. CHRISTOL, THE MODERN INTERNATIONAL LAW OF OUTER SPACE 465-468 (1982).

²²¹ Bogotá Declaration, *supra* note 219, § 1.

²²² *Id.* § 2.

²²³ *Id.* § 3(e).

²²⁴ Scharf, *supra* note 41, at 317.

acceptance of the Bogotá Declaration, the OST entered into force. Moreover, three parties to the Declaration, namely Brazil, Ecuador and Uganda, had ratified or accessed to the OST.²²⁵ Three other parties, namely Indonesia, Zaire and Colombia had signed the OST by 1976.²²⁶ The remaining parties, Congo and Kenya were not signatories of the OST at that time.²²⁷

The consequences of being party to the Bogotá Declaration depend on the party or signatory status to the OST at the time. First, those States which were parties to the OST at the time when the Bogotá Declaration was concluded (Brazil, Ecuador and Uganda) risked breaching the international obligations stemming from Article II of the OST. Secondly, those States which were not parties but signatories to the OST at the time when the Bogotá Declaration was concluded (Indonesia, Zaire and Colombia) violated the international obligations stemming from the CIL and, particularly, Article 18 of the VCLT. This provision imposes interim obligations on States “to refrain from acts which would defeat the object and purpose of a treaty” between the time of signature and that of ratification.²²⁸ Although the VCLT was adopted on May 23, 1969 and entered into force on January 27, 1980, Article 18 of the VCLT is a codification of rule of CIL.²²⁹ Therefore, these States were obliged to refrain from acts which would defeat the object and purpose of treaty. However, they breached CIL by concluding the Bogotá Declaration.

Section 4(4) of the Bogotá Declaration provides that, due to a lack of definitive definition for outer space, Article II of the OST should not be applicable to GEO and, therefore, does not affect the equatorial States that party to the OST.²³⁰ In other words, the Bogotá Declaration excluded GEO from the any definition of outer

²²⁵ See Status of International Space Agreements, *supra* note 100; UN Treaties, OST Participants’ Statuses/Actions, <https://treaties.un.org/Pages/showDetails.aspx?objid=0800000280128cbd>.

²²⁶ See *id.*

²²⁷ See *id.*

²²⁸ VCLT, *supra* note 63, art. 18.

²²⁹ Martin A. Rogoff, *The International Legal Obligations of Signatories to an Unratified Treaty*, 32 ME. L. REV. 263, 284 (1980); Dyllan Moreno Taxman, *Unratified Treaties and Signatory Obligations: A Conceptual Solution*, 50 U. MEMPHIS L. REV. 137, 145 (2020); Restatement (Fourth) of Foreign Relations Law § 304, Reporters’ Note 8 (A.L.I. 2018).

²³⁰ Bogotá Declaration, *supra* note 219, § 4(4).

space through obscure arguments. This might be seen as an argument to avoid the discussion regarding the persistent objector status of party States to the Bogotá Declaration at all. However, the author is of the view that there is no agreed definition regarding where outer space starts and ends, thus GEO cannot be excluded from outer space by using the argument laid down in the Bogotá Declaration.

The representative of Colombia expressed the opinion that the provisions of the OST do not bind Colombia as treaty provisions or norms of CIL.²³¹ Regarding treaty provisions, the argument of Colombia is that it has not been a party to the OST.²³² Regarding norms of CIL, Colombia did not consider provisions of the OST binding on it because, it claimed, the Colombian government and its international actions had been very clear and emphatic in rejecting the argument.²³³ However, after this statement, Colombia accessed to the OST in 1984.²³⁴

Lastly, those States which are neither parties nor signatories to the OST at the time when the Bogotá Declaration was concluded (Congo and Kenya) might be persistent objectors to the non-appropriation principle since Article II of the OST has attained the status of CIL. Although there is no exact time when Article II of the OST attained the status of CIL, the status of Congo and Kenya may be evaluated as persistent objectors to the non-appropriation principle during its formation as CIL.

As categorized above, at the time when the Bogotá Declaration was concluded, Brazil, Ecuador and Uganda were bound by Article II of the OST due to their status as State Parties to the OST. Indonesia, Zaire and Colombia were imposed interim obligations due to their status of signatories to the OST; Congo and Kenya were neither parties nor signatories to the OST. As a result, only Congo's and Kenya's claims do not constitute a violation of the international law. Moreover, they may attain the persistent objector status to the

²³¹ U.N. Comm. On the Peaceful Uses of Outer Space, 32nd Sess., 173d mtg. at 56, U.N. Doc. A/AC.105/PV.173 (July 21, 1977).

²³² *Id.*

²³³ *Id.* at 57.

²³⁴ Status of International Space Agreements, *supra* note100; UN Treaties, OST Participants' Statuses/Actions, <https://treaties.un.org/Pages/showDetails.aspx?objid=0800000280128cbd>.

non-appropriation principle. However, Kenya lost its status as a persistent objector by accessing the OST in 1984.²³⁵

iii. Peaceful Purposes

The Cold War origins of space law may raise questions on the purposes of space activities. At the beginning of the space race, both the US and the USSR explored the possibilities of rocket technologies.²³⁶ They both had obtained nuclear weapon capabilities and saw the other's technology as a threat to their own existence.

There is a long-standing emphasis on the idea that space activities are conducted for peaceful purposes at the UN level. The term *peaceful purpose* frequently appears throughout space law instruments including the five UN space treaties, UNGA resolutions and national legislation.²³⁷

Article IV of the OST prohibits the placement of nuclear weapons or any other kinds of weapons of mass destruction in orbit around the Earth, on celestial bodies or in outer space and states these entities shall be used "exclusively for peaceful purposes."²³⁸ There is a debate on the definition of peaceful purposes. While some States and scholars define it as non-military, others consider it as only non-aggressive.²³⁹ The prevailing opinion is that the norm of peaceful purposes is violated by aggressive conduct.²⁴⁰ According to this view, if a military activity pursues non-aggressive purposes, such an activity does not violate the obligation to conduct space activities for peaceful purposes.²⁴¹ However, advocates of opposing opinions argue that all military activities carry non-peaceful

²³⁵ *Id.*

²³⁶ *Space Race: Military Origins of the Space Race*, SMITHSONIAN NAT'L AIR & SPACE MUSEUM (2002), <https://airandspace.si.edu/exhibitions/space-race/online/sec200/sec200.htm>.

²³⁷ *E.g.* All preambles of the five UN Space Law Treaties except the Moon Agreement; OST, *supra* note 7, arts. IV, IX, & XI; Moon Agreement, *supra* note 187, art. 3; G.A. Res. 1721 (XVI), at 6 (Dec. 20, 1961); G.A. Res. 51/122, at 2 (Feb. 4, 1997); 42 U.S.C. § 2451; U.K. *Outer Space Act of 1986* (c. 38) § 5(2)(e)(ii).

²³⁸ OST, *supra* note 7, art. IV.

²³⁹ See P.J. Blount, *Space Security Law*, in OXFORD ENCYL. OF PLANETARY SCIENCES (2018).

²⁴⁰ CARL Q. CHRISTOL, SPACE LAW: PAST, PRESENT AND FUTURE 17 (1991); See Stephan Hobe, The Meaning of Peaceful Purposes in Article IV of the Outer Space Treaty, 40 ANNALS AIR & SPACE L. 9, 17 (2015).

²⁴¹ See Hobe, *supra* note 240, at 12.

purposes in their nature and thus they are aggressive.²⁴² From a practical point of view, space has been used for military activities since the beginning of the space era.²⁴³

Pursuant to Article III of the OST, international law, including the UN Charter, applies to space activities. Article 2(4) of the UN Charter has relevance to peaceful purposes because it provides that States are obliged to “refrain in their international relations from the threat or use of force against the territorial integrity or political independence of any State, or in any other manner inconsistent with the Purposes of the United Nations.”²⁴⁴ The term *peaceful purposes*, within the meaning of customary international space law, covers Article 2(4) of the UN Charter and specific space law norms that aim to reduce the risk of international conflict.²⁴⁵ Non-aggressive use, the prohibition of weaponization and the non-appropriation principle may be examples of such space law norms.

One of the greatest threats to peaceful purposes is anti-satellite (ASAT) tests. Although a *communis opinio* support the legality of ASAT tests, they pose a threat to the space environment and the safety and security of space objects by creating an enormous amount of space debris.²⁴⁶ The author is of the view that, despite a *communis opinio* on the legality of ASAT tests, the consequences of such tests may lead to international conflict. Therefore, ASAT tests should constitute a violation of customary international space law on peaceful purposes.

IV. PROSPECTIVE EVOLUTION OF CUSTOM’S ROLE IN INTERNATIONAL SPACE LAW

A. *Prospective Role of Custom in Space Law*

The most recent space law treaty, the Moon Agreement, was only ratified by a small number of countries, most of which are not major spacefaring nations.²⁴⁷ Even though existing treaties have established the fundamental principles and guidelines, new

²⁴² See *id.* at 10.

²⁴³ See Freeland, *supra* note 91, at 37; See also Hobe, *supra* note 240, at 12.

²⁴⁴ UN Charter art. 2, ¶ 4.

²⁴⁵ See MASSON-ZWAAN & HOFMANN, *supra* note 131, at 67; Blount, *supra* note 239.

²⁴⁶ See Hobe, *supra* note 240, at 17-18.

²⁴⁷ See Status of International Space Agreements, *supra* note 100.

circumstances such as advances in technology and the increasing involvement of private commercial entities in space activities bring along new legal problems. Existing treaties may become insufficient to meet these new needs. In addition, there is no guarantee that the adoption of new treaties is feasible in the first place. Even if there was an attempt to conclude a space law treaty, there would be a possibility that, similar to the Moon Agreement, the participation rate would be low. Thus, it is unlikely that there will be a new space law treaty concluded between a large number of States in the near future. Nonetheless, the law-making process in space law does not halt.

The nature of space law instruments seems to be shifting from binding treaties to non-binding principles, guidelines and codes of conduct. These non-binding instruments are not new in space law. However, taking this trend in space law into account, non-binding legal instruments may take a central role in space law. Moreover, with evidence of State practice and of *opinio juris*, these non-binding legal instruments may have attained the status of CIL. As a consequence, legal instruments that are non-binding initially may eventually gain a binding nature.

Between the 1980s and 1990s, the UNGA adopted non-binding principles in specific areas of space law: Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting,²⁴⁸ Principles Relating to Remote Sensing of the Earth from Outer Space²⁴⁹ and Principles Relevant to the Use of Nuclear Power Sources in Outer Space.²⁵⁰ Moreover, the Declaration of International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries can be included in these principles.²⁵¹

Starting from early 2000, the UNCOPUOS concluded non-binding guidelines on more technical aspects of space law, such as on the launching State,²⁵² registration and national space legislation.²⁵³ Except for the Direct Broadcasting Resolution, all

²⁴⁸ G.A. Res. 37/92 (Dec. 10, 1982).

²⁴⁹ G.A. Res. 41/65 (Dec. 3, 1986).

²⁵⁰ G.A. Res. 47/68 (Dec. 14, 1992).

²⁵¹ G.A. Res. 51/122 (Dec. 13, 1996).

²⁵² G.A. Res. 59/115 (Dec. 10, 2004).

²⁵³ G.A. Res. 62/101 (Dec. 17, 2007); G.A. Res. 68/74 (Dec. 11, 2013).

Resolutions have been adopted by consensus.²⁵⁴ Moreover, the UNGA has approved technical guidelines on orbital debris,²⁵⁵ nuclear power sources²⁵⁶ and long-term sustainability of outer space activities.²⁵⁷

The tendency to develop non-binding legal instruments is also occurring outside of the UN. Such examples are codes of conduct, which are the result of efforts external to the UN,²⁵⁸ aiming to create rules of the road for space activities.²⁵⁹ A code of conduct can be considered as “an ultimate goal in itself, or as a stepping stone toward a legally binding treaty.”²⁶⁰ Some issues for which codes of conduct for space activities provide voluntary guidelines include preventing outer space from becoming an area of conflict, mitigating orbital space debris, minimizing harmful interference of peaceful exploration of other States, streamlining notification of space activities and bolstering space situational awareness.²⁶¹

Non-binding legal instruments, within the UN system and externally, may lead to State practice and *opinio juris*. These instruments may also be considered evidence of State practice and *opinio juris*. With sufficient evidence of State practice and of *opinio juris*, these non-binding space law instruments may eventually evolve into CIL, thus becoming binding.²⁶²

In draft reports of the UNCOPUOS, it was expressed that non-binding UNGA instruments may become more valuable through use and practice and that they can be evidence of a rule of CIL.²⁶³

²⁵⁴ See G.A. Res. 37/92 (Dec. 10, 1982).

²⁵⁵ *Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space* (2010), https://www.unoosa.org/documents/pdf/psa/bsti/COPUOS_SPACE_DEBRIS_MITIGATION_GUIDELINES.pdf [hereinafter *Space Debris Mitigation Guidelines*].

²⁵⁶ Comm. on the Peaceful Uses of Outer Space, Safety Framework for Nuclear Power Source Applications in Outer Space, U.N. Doc. A/AC.105/934 (May 19, 2009).

²⁵⁷ Comm. on the Peaceful Uses of Outer Space, Rep. of the Comm. on Its Sixty-Second Session, Annex II, U.N. Doc A/74/20 (2019) [hereinafter *LTS Guidelines*].

²⁵⁸ See LYALL & LARSEN, *supra* note 102, at 479.

²⁵⁹ See *id.*

²⁶⁰ Wolfgang Rathgeber, Nina-Louisa Remuss & Kai-Uwe Schrogl, *Space security and the European Code of Conduct for Outer Space Activities*, Disarmament Forum (No. 4, 2009), 33, 34.

²⁶¹ See LYALL & LARSEN, *supra* note 102, at 479; See Wessel, *supra* note 118, at 296.

²⁶² See MASSON-ZWAAN & HOFMANN, *supra* note 129, at 42, 50, 51 and 115.

²⁶³ Comm. on the Peaceful Uses of Outer Space, Draft Rep. on Its Fifty-Seventh Session, ¶¶ 16, 18, U.N. Doc. A/AC.105/C.2/L.304/Add.5 (Apr. 19, 2018).

Moreover, Professor Lyall and Professor Larsen claim that certain elements laid down in and repeated in UNGA resolutions about outer space related matters and followed by States constitute elements of CIL.²⁶⁴ The latter even made a specific reference to compliance of spacefaring States with these instruments.²⁶⁵

There are many issues guided by legally non-binding UN Documents in space law.²⁶⁶ For those which are concluded outside of the UN system, proponents claim that provisions of codes of conduct may also eventually become CIL, depending on how many States agree to abide by such codes of conduct.²⁶⁷ However, there is another view that nonbinding instruments are unlikely to become CIL.²⁶⁸

B. An Examination on CIL Potential to Selected Non-Binding Space Law Instruments

i. State Practice

The widespread and consistent State practice in compliance with non-binding space law instruments is an important element to evaluate those instruments CIL potential. Many States implement these non-binding legal instruments into their national space law, which constitutes State practice.²⁶⁹ For example, a national space law may require private entities to comply with the Debris Mitigation Guidelines as a qualification for gaining a license.²⁷⁰ Therefore, State practice that complies with the recent non-binding instruments, such as the Debris Mitigation Guidelines and the LTS Guidelines, may eventually constitute the material element of CIL.

The Remote Sensing Principles were implemented over 30 years ago.²⁷¹ As discussed above, time may not be a determinant factor, but it may be used as evidence of consistent State practice. The number of States that have capability of remote sensing

²⁶⁴ See LYALL & LARSEN, *supra* note 102, at 45.

²⁶⁵ *Id.*; See also North Sea Continental Shelf, 1969 I.C.J. at 42, ¶ 73.

²⁶⁶ E.g. Remote Sensing Principles, *supra* note 114; Space Debris Mitigation Guidelines, *supra* note 255; LTS Guidelines, *supra* note 257.

²⁶⁷ See Rathgeber, Remuss & Schrogl, *supra* note 260, at 35-37.

²⁶⁸ See Wessel, *supra* note 118, at 298; see also discussion *infra* Section IV. B.ii.

²⁶⁹ See Wessel, *supra* note 118 at 297.

²⁷⁰ See MASSON-ZWAAN & HOFMANN, *supra* note 131, at 115.

²⁷¹ See Remote Sensing Principles, *supra* note 114.

activities has inevitably increased over time. Some of the Remote Sensing Principles have been incorporated in various domestic laws and policy, such as the US, Canada and Japan as well as in programs, such as Radarsat, ERS 1 and 2.²⁷² However, there is a debate on its CIL status. There is a view that some of Remote Sensing Principles reflect CIL.²⁷³ Professor Lyall and Larsen do not consider the Remote Sensing Principles, *in toto*, as CIL.²⁷⁴ Further, some States' laws, including the US, France and India, indicate their own *opinio juris* by deviating from some principles laid down in Remote Sensing Principles.²⁷⁵

ii. *Opinio Juris*

The OST attempted to provide a legal ground for new legal issues in the absence of binding rules and practice.²⁷⁶ It was formulated by consensus of UNCOPUOS member States. UNCOPUOS, as a *permanent* committee, initially comprised of 24 member States but has substantially expanded.²⁷⁷ By the time the OST was adopted UNCOPUOS had grown to 28 member States.²⁷⁸ The consensus reached for this adoption was, therefore, only the consensus of that rather small number of States, viewed from a global perspective. Therefore, some scholars claim that rules agreed upon by international conferences, except for articulation of pre-existing rules of CIL, are based on negotiations, their terms being formed to not reflect true *opinio juris*, but merely existing interests of party States.²⁷⁹

However, the consensus at UNCOPUOS level has gained the ability to be qualified as evidence of *opinio juris* with a significant increase in the number of member States. The non-binding legal instruments are products of a long negotiation process and every dissenting opinion during their development required a review of the drafts until unanimity was reached. It means that at the end of

²⁷² Joanne Irene Gabrynowicz, PROC. U.N/INT'L INST. AIR & SPACE L. WORKSHOP ON CAPACITY BUILDING IN SPACE LAW, at 310 (2003).

²⁷³ See Int'l L. Ass'n Space L. Comm., 2012 Conf. Rep. at 3-4.

²⁷⁴ See LYALL & LARSEN, *supra* note 102, at 370.

²⁷⁵ See MASSON-ZWAAN & HOFMANN, *supra* note 131, at 175.

²⁷⁶ *Id.* at 69-70.

²⁷⁷ UNCOPUOS Membership Evolution, *supra* note 94.

²⁷⁸ See *id.*

²⁷⁹ See LYALL & LARSEN, *supra* note 102, at 69.

this negotiation all member States were convinced of the final version of the legal document. Consensus can thus be seen as evidence of *opinio juris*.

Another view is that non-binding legal instruments failed to meet the *opinio juris* requirement.²⁸⁰ The arguments of this view are that there would not be a belief that they would be legally obligatory.²⁸¹ The Space Debris Mitigation Guidelines and the Safety Framework for Nuclear Power Source Applications in Outer Space become more relevant to this discussion, considering that they contain clear statements that they are not binding in their texts.²⁸² The author is of the view that these statements do not preclude the emergence of the legal sense of obligation in the future. Moreover, many States apply these instruments to their space activities by means of national legislations. Implemented instruments should be considered State practice and a clear indication that States consider them legal obligations that must be followed.

V. CONCLUSION

From the brief analysis of this paper, it can be concluded that the role and importance of custom in space law is changing. It appears evident that the established UN space treaties have either become insufficient to tackle existing space-related problems or have become totally incoherent. To address these issues, attempts should be made at establishing a new international regime to overhaul the existing treaties, which have become invalidated. However, following the lack of political will to implement, on an international level, binding treaties for space; the usage and acceptance of soft law and national legislations seems to be the best option. With the participation of State practice and *opinio juris*, soft law may eventually become legally binding through its development as custom.

As of today, the role of custom has been limited and controversial in space law. Fundamental principles laid down in the OST, with the specific focus on space freedoms, the non-appropriation principle and peaceful purposes, have attained the status of CIL.

²⁸⁰ See Wessel, *supra* note 118, at 298.

²⁸¹ *Id.*

²⁸² *Id.*

There is widespread and representative participation, including from all spacefaring countries, in the treaty. State practice has been extensive and virtually uniform in the sense of the provisions invoked. The treaty has been taken as a basis for almost all space law instruments.

The CIL status of these fundamental principles laid down in the OST has consequences for both party and non-party States. For party States, even if they withdraw from the treaty, they will still be bound by these provisions of the OST as they remain customary rules. For non-party States, even if they do not have treaty obligations, they are bound by these provisions by means of CIL.

For the prospective role of custom in space law, UN principles, resolutions and guidelines on space activities are strong candidates for becoming customary international space law. During the negotiation period, States express their opinion on the matter and these documents are generally adopted by consensus. They are evidence of both State practice and *opinio juris*. Many States, including spacefaring ones, implement these non-binding legal instruments into their national legislations which relate to their space activities. Furthermore, legal instruments which are concluded outside of the UN system, such as codes of conduct, may also gradually become customary international space law, if they meet certain requirements. Even if their non-binding nature is explicitly highlighted in their texts, the sense of obligation may eventually emerge. Therefore, relying on the *non-binding expression* in the texts is not a sufficient argument to claim that non-binding space law instruments will never become CIL.

As a last point, States' reactions to the Artemis Accords and the Building Blocks are worth following for their prospective contribution in custom. They may cause a change in an existing customary rule and contribute to the emergence of a new customary rule.

COMMERCIAL SPACE COMPANIES: LAWMAKERS OF 21ST CENTURY NEW SPACE

*Hongxi Wang**

ABSTRACT

In July 2021, not one, but two of the world's richest people, Richard Branson and Jeff Bezos, successfully reached space via commercial spaceflight.¹ SpaceX, on the other hand, made history by launching an all-civilian crew of four into space and safely landing them back on Earth after a three-day mission orbiting the planet.² What was once the sole province of the world's political behemoths, spacefare has advanced to a point where full commercialization is no longer a question of how, but when.

Unfortunately, leaps and bounds in the technological world were not accompanied by similar advancements in the legal world. International treaty law that governs outer space activities chiefly comprises four treaties, the last of which was negotiated and became effective in 1976—almost half a century ago. It should generate scant surprise that the governance scheme outlined by these treaties is pitifully dated and unsuited for the reality of outer space

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¹ Kenneth Chang, *Highlights From Richard Branson's Virgin Galactic Flight*, N.Y. TIMES (Sept. 15, 2021), <https://www.nytimes.com/live/2021/07/11/science/virgin-galactic-launch-richard-branson>; Paul Rincon, *Jeff Bezos Launches to Space Aboard New Shepard Rocket Ship*, B.B.C. NEWS (July 20, 2021), <https://www.bbc.com/news/science-environment-57849364>.

² Denise Chow, *SpaceX Makes History with First All-Civilian Spaceflight*, NBC NEWS (Sept. 16, 2021), <https://www.nbcnews.com/science/space/spacex-makes-history-first-civilian-spaceflight-rcna2027>; Kenneth Chang, *Inspiration4 Astronauts Beam After Return From 3-Day Journey to Orbit*, N.Y. TIMES (Sept. 18, 2021), <https://www.nytimes.com/2021/09/18/science/spacex-inspiration4.html>.

activities today. The problems that arise from this mismatch between technological reality and formal international law are legion.

Since it seems unlikely that the major spacefaring powers will be able to agree upon another treaty any time soon (given world politics today),³ the burden of resolving contemporary governance problems in outer space falls upon customary international law (CIL). In fact, many articles in the space treaties were developed from CIL at the time or had since been accepted as CIL. However, while CIL's broad applicability to States is well-accepted, its applicability to non-State participants (most importantly commercial space companies) remains a contentious issue. This article argues for a direct application of CIL to commercial space companies and a recognition of the direct role commercial space companies will play in the creation of CIL in outer space.

Part I of the article gives a brief overview of treaty law that governs outer space activities, chief among them the four seminal treaties that came into force between 1967 and 1975. It also briefly examines efforts to update treaty law in the years following the negotiation of the original four. Part II explores the different sectors of the contemporary space industry, their market characteristics and associated legal problems. Part III analyzes the relationship between CIL and the governance of outer space activities, as well as recent developments in major spacefaring States that hint at potential changes in CIL. Part IV discusses the increasing prominence of large corporations' role in the formation of CIL and compares the commercial space industry (New Space) with the cybertechnology

³ As of this writing, the global geopolitical landscape is tense, to say the least. Just to name a few examples: US-China relations are at their lowest point in decades; US-Russia relations are at an all-time low; the war in Ukraine has led to a further deterioration of already-strained EU-Russia relations. (See generally Iain Marlow & Ana Monteiro, *China Ties at 'Lowest Moment' Since 1972, US Ambassador Says*, BLOOMBERG (Jun. 9, 2022), <https://www.bloomberg.com/news/articles/2022-06-09/china-ties-at-lowest-moment-since-1972-us-ambassador-says#xj4y7vzkg?leadSource=uverify%20wall>; James T. Areddy & Charles Hutzler, *U.S., China Plunge Further Into a Spiral of Hostility*, THE WALL ST. J. (Mar. 7, 2023), <https://www.wsj.com/articles/u-s-china-plunge-further-into-a-spiral-of-hostilities-b9e539c0>; Caleb Davis & Kevin Liffey, *Russia says relations with U.S. at an all-time low*, REUTERS (Jan. 20, 2023), <https://www.reuters.com/world/europe/russia-says-relations-with-us-an-all-time-low-2023-01-20/>; Stefan Meister, *A Paradigm Shift: EU-Russia Relations After the War in Ukraine*, CARNEGIE EUROPE (Nov. 29, 2022), <https://carnegieeurope.eu/2022/11/29/paradigm-shift-eu-russia-relations-after-war-in-ukraine-pub-88476>.)

industry to portend a future where space companies not only influence, but directly create CIL.

I. FOUR SEMINAL TREATIES, HALF A CENTURY OLD

In the dawn of humankind's space age, only States, and the most powerful States at that, had a realistic chance of reaching outer space successfully. The resultant international legal regime was therefore, perhaps unsurprisingly so, State-centric. While many treaties addressing the governance of space have been proposed and signed, four tower over the rest (because they have been ratified by the "Big Three" – the United States (US), the Soviet Union (now Russia) and the People's Republic of China (China))⁴ and they are known colloquially as the Outer Space Treaty (OST),⁵ the Rescue Agreement,⁶ the Liability Convention,⁷ and the Registration Convention.⁸

The OST is the foundational document of international space regulations.⁹ It provides the main legal framework for space activities and centers around international cooperation, with an eye towards ensuring that space activities would benefit all countries and avoiding harmful interference of other States' legal space activities.¹⁰ With 112 ratifiers and 23 signatories as of January 2022,¹¹ it is highly recognized by States and considered by many to constitute

⁴ Katherine Latimer Martinez, *Lost in Space: An Exploration of the Current Gaps in Space Law*, 11 SEATTLE J. TECH. ENV'T & INNOVATION L. 322, 328 (2021).

⁵ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter the Outer Space Treaty].

⁶ 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, 672 U.N.T.S. 119 [hereinafter Rescue Agreement].

⁷ Convention on the International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187 [hereinafter Liability Convention].

⁸ Convention on Registration of Objects Launched into Outer Space, Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15 [hereinafter Registration Convention].

⁹ Martinez, *supra* note 4, at 326.

¹⁰ Frans G. von der Dunk, *Billion-dollar Questions? Legal Aspects of Commercial Space Activities*, 23 UNIF. L. REV. 418, 420 (2018).

¹¹ Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcommittee on its Sixty-First Session, *Status of International Agreements Relating to Activities in Outer Space as at 1 January 2022*, 10 U.N. Doc. A/AC.105/C.2/2022/CRP.10 (2022) [hereinafter Status of International Space Agreements].

Customary International Law (CIL).¹² The OST declares that, *inter alia*, international law applies in outer space,¹³ there is freedom in the exploration and use of space,¹⁴ no nation may claim territory in outer space,¹⁵ astronauts are to be given assistance in emergencies and returned to their State of registry,¹⁶ State parties and launching States are liable for damage caused to another State through its own space activities or through the activities of those subject to its jurisdiction,¹⁷ States must license and supervise the activities of their nationals,¹⁸ and State parties retain jurisdiction and control over launched objects and personnel on the national registries created for that purpose.¹⁹ Notably, the OST imposes upon State parties both an international responsibility for national outer space activity, including activity engaged in by a non-governmental entity, and a requirement to authorize and supervise those non-governmental space activities, making it impossible for a State to escape liability from outer space activity, even if it abandons the space object.²⁰

The three treaties that followed functioned to clarify and further expand the OST, with the Rescue Agreement²¹ coming into force one year after the OST was signed.²²

The Rescue Agreement deals mainly with the rescue and return of astronauts, as well as space objects.²³ State parties have a duty to notify launching authorities and the Secretary-General of the United Nations about accidents, distress, or emergencies of spacecraft personnel if they have *knowledge* of such, regardless of

¹² Mahulena Hofmann & P.J. Blount, *Emerging Commercial Uses of Space: Regulation Reducing Risks*, 19 J. OF WORLD INV. & TRADE 1001, 1007 (2018).

¹³ See Outer Space Treaty, *supra* note 5, art III.

¹⁴ *Id.* at art. I.

¹⁵ *Id.* at art. II.

¹⁶ *Id.* at art. V.

¹⁷ *Id.* at art. VII.

¹⁸ *Id.* at art. VI.

¹⁹ *Id.* at art. VIII.

²⁰ *Id.* at art. VI; See FRANCIS LYALL & PAUL B. LARSEN, *SPACE LAW: A TREATISE* 78 (2nd ed. 2018) (“There is no suggestion that a state or other entity can divest itself of obligations in relation to space objects by their abandonment. In short, we believe that a state cannot cease to be ‘responsible for’ or avoid any correlative duties by abandoning a space object”).

²¹ Rescue Agreement, *supra* note 6.

²² Status of International Space Agreements, *supra* note 11, at 1-2.

²³ Rescue Agreement, *supra* note 4. See LYALL & LARSEN, *supra* note 20, at 91.

where the incident occurs.²⁴ State parties have similar notification duties if a space object has returned to Earth, whether or not such object is within its territory.²⁵ Other than notification duties, State parties also owe limited duties to rescue personnel of a spacecraft.²⁶

The Liability Convention²⁷ mainly clarifies the nature of liability mentioned in the OST. Under this convention, a launching State whose space object causes damage *on the surface of the Earth* or to an aircraft in flight is “absolutely liable” to pay compensation.²⁸ However, if a space object causes damage to *another space object*, a launching State is only liable if the damage was due to its fault.²⁹ The differentiation of absolute and fault-based liability applies even in the situation when a third State is harmed by the collision of space objects of two other launching States (in this situation, the two launching States would be jointly and severally liable).³⁰ When two or more States jointly launch a space object, they are also jointly and severally liable for any damage caused.³¹ Notably, a State from whose territory or facility a space object is launched is automatically regarded as a participant in a joint launching.³² Another point to note is that the Liability Convention does not apply to damage caused by a launching State to *its own nationals* or foreign nationals taking part in the operation of the space object.³³

The Liability Convention allows the State of nationality of an individual to present a claim, if such State does not do so, it then allows the State in whose territory damage was sustained to present a claim, if such State does not do so, it then allows the State of permanent residence of the individual to present a claim.³⁴ If no resolution is achieved, the Convention contemplates the formation of a dispute resolution mechanism – a Claims Commission.³⁵

²⁴ Rescue Agreement, *supra* note 6, art. 2.

²⁵ *Id.* at art. 5.

²⁶ *Id.* at art. 3.

²⁷ Liability Convention, *supra* note 7.

²⁸ *Id.* at art. II (emphasis added).

²⁹ *Id.* at art. III (emphasis added).

³⁰ *Id.* at art. IV.

³¹ *Id.* at art. V.

³² *Id.* at art. I.

³³ *Id.* at art. VII.

³⁴ *Id.* at art. VIII.

³⁵ *Id.* at art. XIV.

The Registration Convention provides for the registration of objects launched into space in relevant States' registries and a central world register with open public access (maintained by the United Nations Secretary-General).³⁶ This is particularly important regarding articles in the OST and the Rescue Agreement that link jurisdiction, control and the return of space objects and astronauts with States of registry.³⁷ The Registration Convention also reiterates a number of important definitions. "Launching State" is defined as 1) a State that *launches* or 2) *procures* the launching of a space object or 3) a State from whose *territory* or 4) from whose *facility* a space object is launched while "State of registry" is defined as a launching State on whose registry a space object is carried in accordance with the convention.³⁸ When two or more launching States are involved with a space object, they are to determine amongst themselves who will enter the object onto its register.³⁹

Following the convention, the United Nations Register was established and maintained by the United Nations Office of Outer Space Affairs (UNOOSA), containing notifications under the convention and unofficial data on unnotified objects.⁴⁰ It bears significance to note, however, that the UNOOSA register is not the first of its kind. In a 1961 resolution, the United Nations General Assembly called on States to "furnish information" to COPUOS "for the registration of launchings" and requested the Secretary-General to "maintain a public register of the information furnished".⁴¹ That procedure remains available even after the convention was adopted and UNOOSA now maintains the Online Index of Objects Launched into Outer Space containing information provided to the United Nations in accordance with the convention and the resolution.⁴²

³⁶ See Registration Convention, *supra* note 8, arts. II and III.

³⁷ LYALL & LARSEN, *supra* note 20, at 80.

³⁸ Registration Convention, *supra* note 8, art. I.

³⁹ *Id.*

⁴⁰ LYALL & LARSEN, *supra* note 20, at 83.

⁴¹ G.A. Res. 1721 (XVI) Part B (Dec. 20, 1961).

⁴² LYALL & LARSEN, *supra* note 20, at 83; The Online Index of Objects Launched into Outer Space is available online at https://www.unoosa.org/oosa/osoindex/index.aspx?lf_id=

There have been attempts to update treaty law concerning outer space governance following the Registration Convention, but the same level of international consensus was never reached. First and foremost is another international treaty – colloquially known as the 1979 Moon Agreement⁴³ – which, while valid international law, is only binding on the 18 States that ratified it—none of which included the Big Three.⁴⁴ Nonetheless, I believe the Moon Agreement is valuable as an object lesson of an unappealing agreement. While most sections of the agreement are in line with the OST, some believe that its most controversial provision addresses the issue of non-appropriation.⁴⁵ The agreement explicitly prohibits “the surface [or] the subsurface of the moon, [or] any part thereof or natural resources in place” to become property of any State, organization, entity, or natural person.⁴⁶ It also designated the Moon and its natural resources as part of the “common heritage of [hu]mankind” and proposes the establishment of an international regime to govern the commercial exploitation of natural resources of the Moon.⁴⁷ Perhaps most importantly, the language of the agreement proposes the principle of “equitable sharing by all States Parties in the benefits derived from [lunar activities],”⁴⁸ which suggests that all benefits are to be shared *equally*, seemingly favoring less-developed nations over more-developed ones.⁴⁹

In 2012, there was an attempt to address commercial space law issues via the Space Assets Protocol, proposing to apply the Cape Town Convention to international mobile assets in space, which would have facilitated the private financing of such assets by, among other features, enabling lenders to create an enforceable security interest in the assets.⁵⁰ Unfortunately, it has received little

⁴³ The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 18, 1979, 1363 U.N.T.S. 3 [hereinafter Moon Agreement].

⁴⁴ Martinez, *supra* note 4, at 328.

⁴⁵ Moon Agreement, *supra* note 43, art. 11. See Michael Listner, *The Moon Treaty: Failed International Law or Waiting in the Shadows?*, THE SPACE REVIEW (Oct. 24, 2011) <https://www.thespacereview.com/article/1954/1>.

⁴⁶ Moon Agreement, *supra* note 43, art. 11.

⁴⁷ *Id.* at art. 11.

⁴⁸ *Id.* at art. 11(7)(d).

⁴⁹ Fabio Tronchetti & Hao Liu, *Australia's Signing of the Artemis Accords: A Positive Development or a Controversial Choice?*, 75 AUSTL. J. INT'L AFF. 243, 244 (2021).

⁵⁰ Ignacio Tirado & Bernhard Schmidt-Tedd, *Status of and Way Forward for the UNIDROIT Space Protocol*, Comm. on the Peaceful Uses of Outer Space, Int'l Inst. of

support thus far and more work is required before it can viably enter into force in the future.⁵¹

It is also important to mention that the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) is a “focal point for international cooperation.”⁵² While its impact is dependent solely on the willingness of States members, it plays a crucial role in helping bring about international consensus.⁵³ Most recently in 2021, during the sixtieth session of the Legal Subcommittee of COPUOS, working papers and oral statements seem to indicate widespread support for the establishment of a working group on space resources (albeit with a difference in view on execution).⁵⁴

Thus, it can be said that after 1975, despite efforts by many, space treaty law remained relatively stagnant and largely preserved a State centric nature⁵⁵ (with some exceptions)⁵⁶, presumably assuming (incorrectly) that only States can be major players in outer space.

II. NEW SPACE – A COMPLEX ECOSYSTEM OF COMMERCIAL SPACE COMPANIES WITH MODERN PROBLEMS

Space treaties may have stood still for the past fifty years, but space technology boldly marched forward nonetheless. The ingenuity of the human mind and the grit of the human spirit combined to utterly change the nature of outer space activities in the past half century. Today, the commercialization of space activities is not a

Space L. and Eur. Ctr. for Space L. Space Law Symp. 2021 “Space Law for the Global Space Economy” as part of the Legal Subcomm. on Its Sixtieth Session 2 (June 8, 2021), <https://www.unoosa.org/documents/pdf/copuos/lsc/2021/05.pdf>.

⁵¹ *Id.* at 9-10.

⁵² Eilene Galloway, *United Nations Committee on the Peaceful Uses of Outer Space*, 5 PROC. ON L. OUTER SPACE [ix], 3 (1963).

⁵³ See generally S. Neil Hosenball, *The United Nations Committee on the Peaceful Uses of Outer Space: Past Accomplishments and Future Challenges*, 7 J. SPACE L. 95 (1979).

⁵⁴ Valerie Oosterveld & Anne Campbell, *Space Resource Discussions in the UN Committee on the Peaceful Uses of Outer Space*, OPINIOJURIS (July 11, 2021), <http://opiniojuris.org/2021/07/11/space-resource-discussions-in-the-un-committee-on-the-peaceful-uses-of-outer-space/>. (The proposal to establish the Working Group on Legal Aspects of Space Resource Activities was accepted in 2022.)

⁵⁵ von der Dunk, *supra* note 10, at 420.

⁵⁶ See Outer Space Treaty, *supra* note 5, art VI.

pipe dream; far from it. New Space promises a dazzlingly diverse array of business models coming into fruition as technology continues to develop.

A. *Smaller and Smarter Satellites*

The first human-made object that reached space was Sputnik, an artificial satellite.⁵⁷ It thus stands to reason that the first sector of space that matured sufficiently to be truly commercialized was artificial satellites. Earth is orbited by a constellation of satellites that serve a variety of functions, including Global Positioning Systems, Earth imaging, weather observation, internet access and secure data storage.⁵⁸ Following the tradition of State-sponsored space programs, cost and profit was not the driving concern of satellites in the initial decades of humans in space. Weather, navigation, and telecommunication satellites could cost upwards of hundreds of millions of dollars to build and were designed to be deployed for decades, typically orbiting between Medium Earth Orbit (MEO) and Geosynchronous Orbit (GSO) (1200 to 22236 miles above Earth).⁵⁹ However, with the digital revolution and Moore's Law, the size of electronics has miniaturized substantially.⁶⁰ With that came a radically disruptive idea: build and deploy fleets of smaller and cheaper satellites (SmallSats) that as a collective, rival traditional satellites.⁶¹ The crux of it centers around the ability to maintain shorter development timelines for cheaper satellites that are deployed for less time, enabling developers to constantly update

⁵⁷ *Sputnik and the Dawn of the Space Age*, NASA HISTORY DIV., <https://history.nasa.gov/sputnik-timeline.html> (last visited Sept. 17, 2021).

⁵⁸ Fraser Cain, *Artificial Satellites*, UNIVERSE TODAY (Dec. 2, 2009), <https://www.universetoday.com/46659/artificial-satellites/>.

⁵⁹ Gary Brown & William Harris, *How Much Do Satellites Cost?*, HOWSTUFFWORKS <https://science.howstuffworks.com/satellite10.htm> (last visited Sept. 17, 2021); Dan Elliott, *Next-generation of GPS satellites are headed to space*, PHYSORG (Dec. 17, 2018), <https://phys.org/news/2018-12-next-generation-gps-satellites-space.html>; Elizabeth Howell, *Navstar: GPS Satellite Network*, SPACE.COM (Apr. 26, 2018), <https://www.space.com/19794-navstar.html>; *Types of orbits*, EUR. SPACE AGENCY (Mar. 30, 2020), https://www.esa.int/Enabling_Support/Space_Transportation/Types_of_orbits.

⁶⁰ John Loeffler, *No More Transistors: The End of Moore's Law*, INTERESTING ENGINEERING (Nov. 29, 2018), <https://interestingengineering.com/no-more-transistors-the-end-of-moores-law>.

⁶¹ *What is a Smallsat?*, BLACK SKY, <https://www.blacksky.com/what-is-a-smallsat/> (last visited Sept. 17, 2021).

satellites with better and newer technology.⁶² In fact, Morgan Stanley predicts that satellite production costs could decrease from the current price of \$500 million per satellite down to \$500 thousand.⁶³

Market analysts estimate that the SmallSat market will surpass \$62 billion by 2030.⁶⁴ With such massive potential for profit, unsurprisingly, the commercial SmallSat market is growing at an incredible pace. In 2019, 45% of all launches included SmallSats, 62% of which were for commercial purposes (compared to 6% in 2012).⁶⁵ Notably, of the 133 commercial SmallSat operators between 2012 and 2019, *70% were owned by three companies*: Planet (owning 55% of remote sensing SmallSats), SpaceX (owning nearly half of communications SmallSats) and Spire Global.⁶⁶ Market reports have projected that thousands of SmallSats will be launched over the next five to ten years.⁶⁷

Other than a smaller size, satellites are also becoming much smarter in this era of Big Data.⁶⁸ Built with the most sophisticated technology and uniquely positioned in the most advantageous vantage point (both physically and legally), satellites and the companies controlling them are changing the way data is collected, transmitted and stored.⁶⁹

Cloud Constellation Corporation's SpaceBelt Data Security is revolutionizing cybersecurity by storing data in a space-based cloud infrastructure consisting of ten satellites in LEO.⁷⁰ By storing data beyond the literal clouds, this system operates independently of

⁶² *Smaller Satellites Present New Ways to Leverage Space Resources*, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION, (Mar. 03, 2021), <https://www.saic.com/features/space/smallsats-present-new-ways-to-leverage-space-resources>.

⁶³ *Space: Investing in the Final Frontier*, MORGAN STANLEY (July 24, 2020), <https://www.morganstanley.com/ideas/investing-in-space>.

⁶⁴ Vivek Suresh Prasad, *SmallSat Launch Market to Soar Past \$62 Billion by 2030*, VIA SATELLITE (June 08, 2018), <https://interactive.satellitetoday.com/via/july-2018/smallsat-launch-market-to-soar-past-62-billion-by-2030/>.

⁶⁵ *Smallsats by the Numbers 2020*, BRYCE SPACE AND TECH. 4, 10 (2020), https://brycetek.com/reports/report-documents/Bryce_Smallsats_2020.pdf.

⁶⁶ *Id.* at 9, 21, 23.

⁶⁷ ROBERT C. JACOBSON, *SPACE IS OPEN FOR BUSINESS* 97 (2020).

⁶⁸ *See generally Satellites: A Smarter Design for the Thermal Constraints*, NEURAL CONCEPT, <https://www.neuralconcept.com/post/satellites-a-smarter-design-regarding-the-thermal-constraints> (last visited Apr. 11, 2022).

⁶⁹ *Id.*

⁷⁰ *SpaceBelt Data Security as a Service*, SPACEBELT, <https://spacebelt.com/#about> (last visited Sept. 17, 2021).

terrestrial networks, reducing the risks of data breaches and avoiding the red tape involved in traversing an international network.⁷¹

Several companies are working on providing internet access to locations without a robust terrestrial infrastructure network via satellite constellations. O3b (which stands for “Other three billion” - the population of the world which would have no broadband access without outside help) Network’s satellite constellation has been providing internet access since 2013 from MEO.⁷² Now owned by SES, Europe’s first private satellite operator, the company has plans to launch the next generation of satellites in 2021-2023.⁷³ As of September 2021, OneWeb has launched 322 satellites, nearly half of the envisioned 648 satellite-strong constellation which will beam broadband service down to Earth.⁷⁴ As of June 2021, SpaceX has more than 1,800 satellites in orbit for its Starlink constellation (with Federal Communications Commission approval to launch close to 12,000 total satellites and further approval pending for another additional 30,000 satellites).⁷⁵ Not one to fall behind, in April 2019, Blue Origin announced plans to launch a 3,000 satellite-strong constellation to provide internet to “unserved and underserved communities around the world.”⁷⁶ Apart from the giant astrophrenuers, smaller startups like Fleet Space Technologies, Sky & Space Global and Kepler also have plans to launch constellations of satellites targeting this market segment.⁷⁷

⁷¹ *Id.*

⁷² *O3b Satellite Overview*, SPACECRAFT & SATELLITES, <https://spaceflight101.com/spacecraft/o3b/> (last visited Sept. 17, 2021).

⁷³ Jason Rainbow, *O3b mPOWER Get First Cloud Customer, on Track for Launch Even as COVID-19 Issues Loom*, SPACENEWS (Aug. 17, 2021), <https://spacenews.com/o3b-mpower-get-first-cloud-customer-on-track-for-launch-even-as-covid-19-issues-loom/>.

⁷⁴ Mike Wall, *Arianespace Soyuz Rocket Launches 34 More OneWeb Internet Satellites to orbit*, SPACE.COM (Sept. 14, 2021), <https://www.space.com/arianespace-soyuz-launches-oneweb-10-internet-satellite-mission>.

⁷⁵ Ry Crist, *Starlink Explained: Everything You Should Know About Elon Musk’s Satellite Internet Venture*, CNET (Mar. 24, 2022), <https://www.cnet.com/home/internet/starlink-satellite-internet-explained/>; Adam Mann, *Starlink: SpaceX’s Satellite Internet Project*, SPACE.COM (Jan. 07, 2022), <https://www.space.com/spacex-starlink-satellites.html>.

⁷⁶ Eli Blumenthal, *Amazon’s Project Kuiper Gets FCC Approval For Over 3,200 Internet Satellites*, CNET (July 31, 2020), <https://www.cnet.com/news/amazons-project-kuiper-gets-fcc-approval-for-over-3200-internet-satellites/>.

⁷⁷ *About Us*, FLEET SPACE, <https://fleetSPACE.com/about> (last visited Sept. 17, 2021); *Satellite Communication Services*, SKY AND SPACE CO,

With satellite technology taking leaps and bounds forward, naturally, satellite capabilities, especially data collection, follows. Planet is a private-sector data provider that uses high-resolution imagery from space to collect data for customers in agriculture, government and commercial mapping.⁷⁸ The ICARUS Initiative uses satellite data and tracking of animals to manage outbreaks of diseases and viruses (something with which humankind as a collective have unfortunately gotten far too familiar in the recent months).⁷⁹ Companies are utilizing satellite data sets for weather forecasting, with Spire Global and GeoOptics notably obtaining contracts from the National Oceanic and Atmospheric Administration to become commercial weather data providers.⁸⁰ Even humankind's first revolution – agriculture – is benefitting from these little pieces of equipment orbiting our planet.⁸¹ Companies are using constellations of satellites with remote sensing capabilities to collect a range of data from environmental conditions (such as soil moisture and pasture maps) to forecasts of weather and disasters.⁸² At the pinnacle of innovation are companies like Orbital Sidekick and Hypercubes, which utilize hyperspectral imaging (even more precise than multispectral) on nanosatellites to aid precision agriculture, land surveying and environmental monitoring.⁸³ In fact, Fábio Teixeira, co-founder of Hypercubes, notes that “with [hyperspectral imaging] we will be able to identify phenomenon in the day they happen; not one or two months afterwards, when we can already see with the

<https://skyandspace.co/index.php/satellite-communication-services/> (last visited Sept. 17, 2021); *Our Mission*, KEPLER COMM., <https://kepler.space/about-us/> (last visited Sept. 17, 2021).

⁷⁸ *Customer Stories*, PLANET, <https://www.planet.com/company/customer-stories/> (last visited Sept. 17, 2021).

⁷⁹ *About Icarus*, ICARUS, <https://www.icarus.mpg.de/28056/about-icarus> (last visited Sept. 17, 2021).

⁸⁰ Rachel Jewett, *NOAA Awards Spire 6-Month Contract for Commercial Weather Data*, VIA SATELLITE (Aug. 31, 2021), <https://www.satellitetoday.com/imagery-and-sensing/2021/08/31/noaa-awards-spire-6-month-contract-for-commercial-weather-data/>; Debra Werner, *GeoOptics and Spire Global win NOAA weather data contracts*, SPACENEWS (Nov. 23, 2020), <https://spacenews.com/noaa-awards-first-ro-contracts/>.

⁸¹ Alexander Joe, *Satellite Technology in Agriculture*, MKT. BUS. NEWS (Jan. 19, 2021), <https://marketbusinessnews.com/satellite-technology-in-agriculture/256356>.

⁸² *Id.*

⁸³ *Solutions*, ORBITAL SIDEKICK, <https://orbitalsidekick.com/solutions/> (last visited Sept. 17, 2021); Luís Felipe & Marcelo Carneiro, *Hypercubes: A Brazilian Idea That Reached Space*, 2 FUTURE HOLDING, <https://www.2futureholding.com/en/detalhe-blog.php?cod=3> (last visited Sept. 17, 2021).

naked eye and the damage is too big and risking losing great deals of cultivation.”⁸⁴

However, while the amount and extent of data collected by satellites are vast, its full potential is realized when combined with the advanced data analytical tools of Big Data.⁸⁵ This yields a possibility for the commercial sector to monitor and examine the Earth to an extent hitherto unseen in human history. By adding insights, analytics and intelligence to weather and environmental data, incomprehensibly large volumes of ones and zeroes are translated into useable advice for policymakers, farmers and even Wall Street pencil pushers. For example, BlackRock uses computer analyses of satellite images to monitor the Chinese economic landscape to aid in their investment decisions.⁸⁶

B. Reusable Rockets

It should come as no surprise that one of the most important pieces of the puzzle is the rocket, the very vessel that propels humankind beyond this little blue marble we call home. The holy grail of space exploration surrounds “reusability.”⁸⁷ With reusable rockets (and/or other launch devices), launch cost would be drastically reduced in the way plane tickets would be drastically more expensive if every plane was ditched in the ocean after one flight.⁸⁸ This is a bottom-line cost reduction applicable to any space venture that involves sending an object into space (so, every space venture).⁸⁹ In 2018, Morgan Stanley estimated that with reflying, satellite launch costs have dropped from \$200 million each to \$60 million and

⁸⁴ *Id.*

⁸⁵ Ryan Kh, *Big Data Plays Key Role in Helping Satellites Get Launched into Orbit*, SMART DATA COLLECTIVE, <https://www.smartdatacollective.com/big-data-plays-key-role-in-helping-satellites-get-launched-into-orbit>.

⁸⁶ Samuel Shen & John Ruwitch, *Satellites and Blogs: BlackRock to Raise Game in China Stock Picking*, REUTERS (July 24, 2018), <https://www.reuters.com/article/us-china-blackrock-fund/satellites-and-blogs-blackrock-to-raise-game-in-china-stock-picking-idUSKBN1KE16U>.

⁸⁷ *In Space, This Is the Age of Reusability*, THE CONVERSATION (July 13, 2017) <https://theconversation.com/in-space-this-is-the-age-of-reusability-77964>.

⁸⁸ Rich Smith, *How Much Cheaper Are SpaceX Reuseable Rockets? Now We Know*, THE MOTLEY FOOL (Oct. 05, 2020) <https://www.fool.com/investing/2020/10/05/how-much-cheaper-are-spacex-reusable-rockets-now-w>.

⁸⁹ *Id.*

predicted that they could further drop to a mere \$5 million.⁹⁰ In fact, SpaceX's quote for a launch in 2019 was \$450 million, whereas in 2021, it was \$178 million, a 75% decrease.⁹¹ By partnering with SpaceX, NASA was able to save more than \$500 million.⁹²

Some of the biggest names in New Space today are focused on reusable space vehicles. SpaceX, the poster child of New Space, has been unapologetically loud about their ambitions to send humans to Mars, perhaps as early as 2024 with their Starship.⁹³ Jeff Bezos, owner of Blue Origin (and one of the richest humans alive), did not mince words when he expressed the company's goal of developing reusable rockets and, eventually, building out space infrastructure atop of which other space companies could be built.⁹⁴ As another Jeff (Garzik, a software engineer and bitcoin developer) agreed, with reusable rockets, the cost of launches will plummet exponentially, paving the way for "a generous number of small businesses" finding their place in this space niche.⁹⁵ In fact, in his Masterclass, retired astronaut and former commander of the International Space Station Chris Hadfield said that the reusable rocket "is the way of the future," and that we will look back on the past decades of single-use rockets with the same combination of awe and befuddlement that we give early sailing ships and locomotives.⁹⁶

C. Commercial Space Stations

The International Space Station (ISS) is a laboratory in space maintained by an international collaboration among the National

⁹⁰ *Space: Investing in the Final Frontier*, MORGAN STANLEY (Jul. 24, 2020) <https://www.morganstanley.com/ideas/investing-in-space>.

⁹¹ Tim Fernholz, *SpaceX Just Saved NASA \$500 million With One Rocket*, QUARTZ (July 29, 2021), <https://qz.com/2040243/elon-musks-spacex-saved-nasa-500-million/>.

⁹² *Id.*

⁹³ Elijah Chiland, *These 4 Programs Fuel SpaceX's Ambitions*, L.A. BUS. J. (Mar. 14, 2021), <https://labusinessjournal.com/technology/these-4-programs-fuel-spacex-ambitions/>.

⁹⁴ Hannah Miao & Michael Sheetz, *Jeff Bezos Says First Spaceflight Was 'Tiny Little Step' in Blue Origin's Plan to Build a Road to Space*, CNBC (July 20, 2021), <https://www.cnbc.com/2021/07/20/jeff-bezos-says-this-is-a-tiny-little-step-toward-blue-origins-plan-to-build-a-road-to-space.html>.

⁹⁵ JACOBSON, *supra* note 67, at 116.

⁹⁶ Chris Hadfield, *Rockets: How Rockets Work*, MASTERCLASS, <https://www.masterclass.com/classes/chris-hadfield-teaches-space-exploration/chapters/spaceships-shuttles-and-beyond> (last visited Sept. 17, 2021).

Aeronautics and Space Administration (NASA), Roscosmos, the European Space Agency, the Japanese Space Agency, the Canadian Space Agency and the Italian Space Agency.⁹⁷ Experiments conducted in space have widespread application in improving human life, but one of the most exciting areas is medicine.⁹⁸ The unique environment of microgravity enjoyed in orbit enables scientists to better study protein crystals and develop more effective medicines.⁹⁹ In a development that should surprise no one, many commercial actors are interested in using this platform.¹⁰⁰

Although the ISS is sustained by government funding, such funding will run out in 2024, and the ISS's future remains uncertain.¹⁰¹ Commercialization may be a path moving forward. Space Tango is a company that provides research and manufacturing "CubeLabs" on the ISS for commercial experiments.¹⁰² Each CubeLab is a standardized, scalable platform that can "manage multiple fluids, media exchange, sampling, and fixation" and "maintain temperatures as low as 4°C."¹⁰³ As of September 2021, Space Tango has facilitated 181 experiments on the ISS.¹⁰⁴ In 2016, Bigelow Aerospace attached the Bigelow Expandable Activity Module (BEAM), an inflatable space habitat to the ISS, which surpassed expectations to such an extent that their two year contract was

⁹⁷ *International Space Station*, NASA, https://www.nasa.gov/mission_pages/station/cooperation/index.html (last visited Sept. 17, 2021).

⁹⁸ Matteo Emanuelli, *Space Medicine*, SPACE SAFETY MAG., <https://www.spacesafetymagazine.com/spaceflight/space-medicine> (last visited Apr. 12, 2022).

⁹⁹ Amelia Williamson Smith, *Probing Proteins: Leveraging Microgravity for Medically Important Molecular Crystallization*, ISS360: THE ISS NAT'L LAB. BLOG (Aug. 7, 2019), <https://www.issnationallab.org/iss360/probing-proteins-leveraging-microgravity-for-medically-important-molecular-crystallization/>.

¹⁰⁰ See e.g. *Protein Crystallization*, AXIOM SPACE, <https://www.axiomspace.com/research/protein-crystallization> (last visited Sept. 17, 2021).

¹⁰¹ Christian Davenport, *The International Space Station Can't Stay Up There Forever. Will Privately Run, Commercial Replacements Be Ready in Time?*, WASH. POST (Dec. 23, 2020), <https://www.washingtonpost.com/technology/2020/12/23/space-station-replace-biden/>.

¹⁰² *About*, SPACE TANGO, <https://spacetango.com/about/> (last visited Sept. 17, 2021).

¹⁰³ *CubeLab*, SPACE TANGO, <https://spacetango.com/cubelab/> (last visited Sept. 17, 2021).

¹⁰⁴ SPACE TANGO, <https://spacetango.com/> (last visited Sept. 17, 2021).

extended by five years.¹⁰⁵ In 2020, NASA selected Axiom Space to attach a commercial habitable module it developed to the ISS.¹⁰⁶

Even NASA supports the gradual privatization of the ISS. In 2010, NASA's Commercial Crew Development program began to contract the private sector to bring crew and cargo from Earth to the ISS.¹⁰⁷ In 2019, NASA announced that it would allow a minimum of two private astronauts per year to spend up to thirty days on the ISS to conduct "approved commercial and marketing activities."¹⁰⁸ Furthermore, NASA expressed its intention to award various task orders to private sector companies that can provide valid, long-term capabilities that serve NASA's needs on the ISS while shifting its operations to the commercial sector.¹⁰⁹

Fully commercial space stations are the logical next step. In fact, it had been done before, when a private space company, MirCorp, used the Russian Mir as a commercial platform in 1999.¹¹⁰ In 2016, Bigelow Aerospace partnered with United Launch Alliance to develop fully functioning space stations for research, exploratory missions and tourism.¹¹¹ Like their similarly situated competitor, Axiom intends to create a commercial space station to replace the ISS.¹¹² Curiously, this will be done by detaching Axiom components

¹⁰⁵ Stephen Clark, *Bigelow's Expandable Module Goes Into Overtime on Space Station*, SPACEFLIGHT NOW (Dec. 6, 2017), <https://spaceflightnow.com/2017/12/06/bigelows-expandable-module-goes-into-overtime-on-space-station/>.

¹⁰⁶ Darrell Etherington, *NASA Taps Startup Axiom Space for the First Habitable Commercial Module for the Space Station*, TECHCRUNCH (Jan. 27, 2020), <https://techcrunch.com/2020/01/27/nasa-taps-startup-axiom-space-for-the-first-habitable-commercial-module-for-the-space-station/>.

¹⁰⁷ *Commercial Crew Program - Essentials*, NASA, <https://www.nasa.gov/content/commercial-crew-program-the-essentials> (last visited Sept. 17, 2021).

¹⁰⁸ Press Release, NASA, *NASA Opens International Space Station to New Commercial Opportunities, Private Astronauts* (June 7, 2019), <https://www.nasa.gov/press-release/nasa-opens-international-space-station-to-new-commercial-opportunities-private>

¹⁰⁹ *Id.*

¹¹⁰ Louis de Gouyon Matignon, *MirCorp, The First New Space Company*, SPACE LEGAL ISSUES (Sept. 20, 2020), <https://www.spacelegalissues.com/mircorp-the-first-new-space-company/>.

¹¹¹ Emily Calandrelli, *Bigelow Aerospace Partners With ULA to Launch Private Space Habitats*, TECHCRUNCH (Apr. 13, 2018), <https://techcrunch.com/2016/04/13/bigelow-aerospace-partners-with-ula-to-launch-private-space-habitats/>.

¹¹² Michael Sheetz, *Private Spaceflight Specialist Axiom Space Raises \$130 million to Become the Latest Space Unicorn*, CNBC (Feb. 16, 2021), <https://www.cnbc.com/2021/02/16/axiom-space-raises-130-million-and-becomes-the-latest-space-unicorn.html>.

from the ISS (following its retirement) to form a separate commercial space station.¹¹³ Far from being an outlier, Axiom finds peers in Blue Origin and Lockheed Martin, both of which have also unveiled plans to build their own space stations.¹¹⁴

D. Asteroid Mining

Technologies in the electronics, defense and clean energy sectors all depend on rare Earth elements.¹¹⁵ As our technical capabilities advance, demand for such rare Earth elements will continue to increase. Alas, as the moniker may have implied, such elements are relatively difficult to come by on our planet.¹¹⁶ The dwindling supplies that do exist on Earth are difficult and expensive to find and extract and the process of recycling of such elements is nowhere close to where the world needs it.¹¹⁷ However, what is difficult to find below our feet exists in abundance above the clouds.¹¹⁸

There are more than 20,000 known near-Earth asteroids (increasing at a rate of 2,000 being discovered each year) in our planet's neighborhood; many of these asteroids contain precious metals like platinum, nickel, cobalt and other rare Earth elements.¹¹⁹ The ability to tap into this pool of resources presents itself as a possible solution to humankind's problems with massive potential for profits; therefore, it should not come as a surprise that there are commercial efforts to mine celestial bodies.¹²⁰

¹¹³ *Id.*

¹¹⁴ Joey Roulette, *Jeff Bezos' Rocket Company Wants to Build a Space Station*, N.Y. TIMES (Oct. 25, 2021), <https://www.nytimes.com/2021/10/25/science/space-station-blue-origin-sierra.html>.

¹¹⁵ Ariel Schwartz, *Visualizing the Importance Of Rare Earth Elements To Our Digital Lifestyle*, FAST COMPANY (Nov. 13, 2014), <https://www.fastcompany.com/1680658/visualizing-the-importance-of-rare-earth-elements-to-our-digital-lifestyle>.

¹¹⁶ *Id.*

¹¹⁷ Aylin Woodward, *China Could Restrict its Export of Rare-Earth Metals as a Trade-War Tactic. Here's What They Are and Why They're So Crucial.*, BUS. INSIDER (June 4, 2019), <https://www.businessinsider.com/rare-earth-metals-elements-what-they-are-2019-6>.

¹¹⁸ *Id.*

¹¹⁹ MARTIN ELVIS, ASTEROIDS: HOW LOVE, FEAR, AND GREED WILL DETERMINE OUR FUTURE IN SPACE 25 (2021); Bob Goldstein, *Mining A \$10,000 Quadrillion Asteroid*, AP NEWS (Feb. 1, 2021), <https://apnews.com/press-release/accesswire/technology-business-science-utilities-electric-utilities-7bb32ecaac33bebef6e4b97ade588c57>.

¹²⁰ *See generally* ELVIS, *supra* note 119.

Luxembourg, the second-largest investment fund center in the world, invests in and promotes policies to support the commercial exploration of space resources.¹²¹ In 2016, Luxembourg launched its Space Resources initiative (\$223 million allocated to finance companies focused on space mining), the aim of which, as stated by the Deputy Prime Minister of Luxembourg, is to “open access to a wealth of previously unexplored mineral resources, on lifeless rocks hurtling through space.”¹²² In the same year, Luxembourg invested heavily in commercial mining companies like Planetary Resources and Deep Space Industries.¹²³ While these investments ultimately ended as a loss for Luxembourg, there is no indication that it will deter the country and others to continue expanding celestial mining capabilities.¹²⁴ Most recently in April 2021, Chinese-based start-up Origin Space launched a robot prototype that will be used to test technologies and sequences crucial to asteroid mining.¹²⁵

Even the world of academia refuses to take a backseat. In 2018, the Colorado School of Mines Center for Space Resources launched a multi-disciplinary Space Resources graduate program, focused on “learning the core knowledge in this field and developing design practices in the identification, extraction, processing, and responsible use of available resources in the solar system.”¹²⁶

¹²¹ JACOBSON, *supra* note 67, at 169.

¹²² *Luxembourg Sets Aside 200 Million Euros to Fund Space Mining Ventures*, REUTERS (June 3, 2016), <https://www.reuters.com/article/us-luxembourg-space-mining/luxembourg-sets-aside-200-million-euros-to-fund-space-mining-ventures-idUSKCN0YP22H>; Jason Daley, *Will Luxembourg Lead the Race for Space Mining?*, SMITHSONIAN MAG. (May 9, 2016), <https://www.smithsonianmag.com/smart-news/will-luxembourg-lead-race-space-mining-180959031/>.

¹²³ Louis Brennan, *How Luxembourg is Positioning Itself to be The Centre of Space Business*, THE CONVERSATION (July 16, 2019), <https://theconversation.com/how-luxembourg-is-positioning-itself-to-be-the-centre-of-space-business-120436>.

¹²⁴ *Id.*

¹²⁵ Liangping Gao & Ryan Woo, *China Launches Robot Prototype Capable of Catching Space Debris With Net*, REUTERS (Apr. 27, 2021), <https://www.reuters.com/lifestyle/science/china-launches-robot-prototype-capable-catching-space-debris-with-net-2021-04-27/>; Anthony Cuthbertson, *China to Launch Asteroid-Mining Robot*, INDEPENDENT (Sept. 24, 2020), <https://www.independent.co.uk/life-style/gadgets-and-tech/asteroid-mining-robot-china-origin-space-b572318.html>.

¹²⁶ *Graduate Programs*, COLORADO SCHOOL OF MINES, <https://space.mines.edu/graduate-programs/> (last visited Sept. 18, 2021).

E. Industry in Space

If one buys into Jeff Bezos's vision of the future, then one day all heavy industries are going to be moved off our planet into space orbit, where solar energy is abundant, and Earth will be left safe from pollution.¹²⁷ Remarkably, even for these seemingly far-fetched futures, there are companies developing enabling technology.

Tethers Unlimited, Inc. (TUI) is developing hardware for in-space manufacturing and has already received NASA grants for various projects.¹²⁸ TUI's SpiderFab can manufacture structures after achieving orbit, eliminating the need to comply with the size, shape and weight limitations of rocket launches.¹²⁹ TUI is also designing a robotic arm called the KRAKEN X that will support small satellite servicing and assembly.¹³⁰ TUI's DARPA-funded OrbWeaver project aims to create a satellite that can then convert (and thus reuse) elements of the launching rocket into a satellite antenna.¹³¹ In addition, with funding from a NASA Small Business Innovation Research grant, TUI also developed and installed a Refabricator device on the ISS in 2019, a "highly automated recycling-and-manufacturing system" which can recycle plastic parts into 3-D printer filament, then use the filaments to 3-D print new parts.¹³²

¹²⁷ Natalie Musumeci, *Jeff Bezos Wants to Move 'All Polluting Industry' Into Space to Keep Earth Clean*, BUS. INSIDER (Jul 20, 2021), <https://www.businessinsider.com/jeff-bezos-move-all-polluting-industry-into-space-blue-origins-2021-7>.

¹²⁸ *In-Space Services*, TETHERS UNLIMITED, <https://www.tethers.com/in-space-services/> (last visited Sept. 18, 2021); Alan Boyle, *Tethers Unlimited and Rocket Propulsion Systems Win NASA Grants for Space Tech*, GEEKWIRE (May 5, 2020), <https://www.geekwire.com/2020/tethers-unlimited-rocket-propulsion-systems-win-nasa-grants-space-tech/>.

¹²⁹ Robert Hoyt, *SpiderFab: Process for On-Orbit Construction of Kilometer-Scale Apertures*, NASA (Nov 30, 2016), https://www.nasa.gov/directorates/spacetech/niac/2012_phase_I_fellows_hoyt_spiderfab.html.

¹³⁰ Caleb Henry, *Tethers Unlimited Developing Satellite Servicer for LEO Missions*, SPACE.COM (June 04, 2019), <https://www.space.com/tethers-unlimited-developing-satellite-servicer.html>.

¹³¹ *DARPA Awards Tethers Unlimited Contract to Pursue In-Space Manufacture of Comm Satellite*, NEW SPACE GLOBAL (June 12, 2017), <https://newspaceglobal.com/darpa-awards-tethers-unlimited-contract-pursue-space-manufacture-comm-satellite/>; Debra Werner, *Tethers Unlimited Expands to Fulfill Additive Manufacturing Orders*, SPACE NEWS (Dec. 8, 2017), <https://spacenews.com/tethers-unlimited-expands-to-fulfill-additive-manufacturing-orders/>.

¹³² Alan Boyle, *Tethers Unlimited Delivers 3-D Printer and Recycler Combo to NASA for Space Station*, GEEKWIRE (May 30, 2018), <https://www.geekwire.com/2018/tethers-unlimited-delivers-3-d-printer-recycler-combo-nasa-space-station/>; Joris Peels, *Tethers*

Made in Space is developing an Archinaut spacecraft that has the capability to 3D print, manufacture and assemble unlaunchable structures in orbit.¹³³ SpaceFab is aiming to “build a family of robotic mining and manufacturing satellites that can make, form, weld, and assemble metal parts into larger structures” in space.¹³⁴

If factories are to be in space in the future, then human life must be sustainable on such structures. One of the most important issues concerns food. In 2016, an aerospace engineering graduate student won the “Eat It!” Lemelson-MIT undergraduate prize with two robots she developed.¹³⁵ The first, SPOT, grows several fruits and vegetables in a soil-less environment with automatic watering cycles.¹³⁶ The second, AgQ, measures and tracks the health of plants and astronauts.¹³⁷

On the other side of the globe, Japan is taking another approach to space exploration – sending virtual avatars instead of humans. In 2018, JAXA partnered with All Nippon Airways to begin work on the AVATAR X project, aiming to send humanoid robots (“inhabited” by humans on Earth) into space to experience space travel and eventually assist with space construction and farming.¹³⁸ In 2019, the Japanese Space Agency, RealTech Fund (a venture capital fund) and SigmaXYZ (a management consultancy) founded “Space Food X,” an initiative consisting of thirty technology and food companies, universities, investment firms and researchers

Unlimited Recycler and 3D Printer Refabricator Operational on Board the ISS, 3DPRINT.COM (Feb. 11, 2019), <https://3dprint.com/235975/tethers-unlimited-recycler-and-3d-printer-refabricator-operational-on-board-the-iss/>.

¹³³ *On-Orbit Servicing, Assembly, and Manufacturing 2 (OSAM-2)*, NASA SPACE TECH. MISSION DIRECTORATE: TECH. DEMONSTRATION MISSIONS, https://www.nasa.gov/mission_pages/tdm/osam-2.html (last visited Sept. 18, 2021).

¹³⁴ *Our Mission*, SPACEFAB, <https://www.spacefab.us/> (last visited Sept. 18, 2021).

¹³⁵ Leanna Garfield, *An PhD Student Invented a Robot That Can Grow Fruits and Vegetables on Mars*, BUS. INSIDER (Apr. 19, 2016), <https://www.businessinsider.com/mit-student-invented-robot-for-food-in-space-2016-4>.

¹³⁶ *Id.*

¹³⁷ *Id.*

¹³⁸ Rowan Hooper, *2018 in Science in Japan: Climate Change, Space Exploration and Water Bears*, THE JAPAN TIMES (Dec. 24, 2018) <https://www.japan-times.co.jp/news/2018/12/24/national/science-health/2018-climate-change-space-exploration-water-bears/>.

focused on developing technologies to create in-space food-production solutions.¹³⁹

In the short run, some argue that the ISS could be a site in which to test and perfect large-scale space manufacturing, which would then be followed by widespread implementation in the commercial carriers that are emerging.¹⁴⁰ It is hard to tell how the space industry will continue to evolve, but Rich Glover, an expert with more than twenty years of experience in advanced space technologies, believes that commercialization will require moving into the realm of in-space manufacturing and import-export between Earth and space.¹⁴¹ He believes that profits from the delivery of raw space materials will sustain the space transportation industry.¹⁴² Perhaps in-space manufacturing will come sooner or later, but that timing will depend on funding and policy.

F. Communities on the Moon and Beyond

The idea of settling humans on worlds beyond the blue marble we call Earth is one abundantly covered by science fiction. Finally, humankind is on the precipice of realizing that dream. Or at least, of taking the first steps towards realizing that dream. The most obvious candidate is Earth's neighbor, the Moon, which has enthralled civilizations across the world throughout history. A mere three days away, by the most direct route, it is almost surprising that humankind has not yet built a base on the Moon. After all, Neil Armstrong first set foot on it more than half a century ago. Consider this, the iPhone 6 (practically an antique in 2021) is 120 million times faster than the Apollo 11 computer that landed humankind on the moon.¹⁴³ Yet, due to reasons beyond the scope of this paper,

¹³⁹ Michael Wolf, *Meet Space Food X, Japan's New Initiative to Feed People in Space*, THE SPOON (Mar. 28, 2019), <https://thespoon.tech/meet-space-food-x-japans-new-initiative-to-feed-people-in-space/>.

¹⁴⁰ JACOBSON, *supra* note 67, at 177.

¹⁴¹ *Id.* at 177-178.

¹⁴² *Id.* at 178.

¹⁴³ David Pierini, *Your iPhone Could Handle 120 Million Moon Missions at Once*, CULT OF MAC (July 16, 2019), <https://www.cultofmac.com/639048/apollo-computer-iphone/>.

global superpowers collectively relegated Moon exploration to the backburner.¹⁴⁴

Nevertheless, the time has finally come again for humankind to reach for the Moon, and this time, it is the private sector's turn. While superpowers such as the US and China have national plans to return to the Moon, private companies now have a much larger role to play.¹⁴⁵ In February 2019, Israeli SpaceIL launched its Beresheet lunar lander to the Moon (via a SpaceX Falcon 9 rocket), marking the first private lunar mission.¹⁴⁶ Granted, the lunar lander didn't so much land as it did crash.¹⁴⁷ Yet, at about \$100 million, the cost of this attempt was the least by far, exhibiting the cost-saving potential of private space industry yet again.¹⁴⁸ Seeing the important role private industry is and will continue to play, in 2021, NASA awarded a combined \$146 million to five private companies (Blue Origin, Dynetics, Lockheed Martin, Northrop Grumman and SpaceX).¹⁴⁹ According to a NASA press release, these companies will "develop lander design concepts, evaluating their performance, design, construction standards, mission assurance requirements, interfaces, safety, crew health accommodations, and medical capabilities" and "mitigate lunar lander risks by conducting critical component tests and advancing the maturity of key technologies."¹⁵⁰ These companies are among many suitors of the Moon.

¹⁴⁴ See generally Dave Mosher & Hilary Brueck, *Astronauts Explain Why Nobody Has Visited the Moon in More Than 45 Years — and the Reasons Are Depressing*, BUS. INSIDER (July 19, 2019), <https://www.businessinsider.com/moon-missions-why-astronauts-have-not-returned-2018-7>.

¹⁴⁵ *Apollo's Legacy Is NASA's Future*, NASA, <https://www.nasa.gov/specials/apollo50th/back.html> (last visited Sept. 18, 2021); Steven Lee Myers, *The Moon, Mars and Beyond: China's Ambitious Plans in Space*, N.Y. TIMES (Oct. 15, 2021), <https://www.nytimes.com/article/china-mars-space.html>.

¹⁴⁶ Charlie Wood, *SpaceIL's Beresheet Lunar Lander: Israel's 1st Trip to the Moon*, SPACE.COM (Apr. 15, 2019), <https://www.space.com/spaceil-beresheet.html>.

¹⁴⁷ *Id.*

¹⁴⁸ Kenneth Chang, *Moon Landing by Israel's Beresheet Spacecraft Ends in Crash*, N.Y. TIMES (Apr. 11, 2019), <https://www.nytimes.com/2019/04/11/science/israel-moon-landing-beresheet.html>.

¹⁴⁹ Aria Alamalhodaie, *SpaceX, Blue Origin Awarded NASA Contracts to Develop Moon Lander Concepts for Future Artemis missions*, TECH CRUNCH (Sept. 14, 2021), <https://techcrunch.com/2021/09/14/spacex-blue-origin-awarded-nasa-contracts-to-develop-moon-lander-concepts-for-future-artemis-missions/>.

¹⁵⁰ Press Release, NASA, *NASA Selects Five U.S. Companies to Mature Artemis Lander Concepts* (Sept. 14, 2021), <https://www.nasa.gov/press-release/nasa-selects-five-us-companies-to-mature-artemis-lander-concepts>.

There are now many startups seeking commercial opportunities on the Moon, such as ispace, Astrobotic and Moon Express.¹⁵¹ Far from an exclusive niche for entrepreneurs, commercial space ventures have been seeing increased support from the traditional business world. For example, the century-old trading company Sumitomo Corporation announced that it will serve as a corporate partner for ispace's HAKUTO-R (with the lofty goal of extracting resources to eventually developing the infrastructure necessary for humans to live and work on the Moon).¹⁵²

Beyond technology companies, the private investment sector is also exploring lunar development projects. In 2014, a weekend retreat (known as "Moon Base Alpha") consisting of experts from NASA, commercial space companies, technology executives, academics, space societies and Apollo astronauts concluded that an economically self-sustaining lunar base could be established for less than \$5 billion.¹⁵³ In 2019, a nonprofit organization, Open Lunar Foundation appeared on the scene.¹⁵⁴ Boasting a team including former astronaut and ISS commander Chris Hadfield, planetary scientist Lindy Elkins-Tanton, and Planet cofounder Will Marshall, the non-profit has the ultimate goal of creating a settlement on the Moon costing less than \$5 billion.¹⁵⁵

Of course, I believe the golden apple is not the Moon, but Mars. Alas, the mere fact that Mars is much farther away from Earth than the Moon means building a human community on the Red Planet will be a challenge of an entirely different magnitude.¹⁵⁶ However, that does not mean this lofty goal is out of the minds of

¹⁵¹ ISPACE, <https://ispace-inc.com/> (last visited Sept. 18, 2021); ASTROBOTIC, <https://www.astrobotic.com/> (last visited Sept. 18, 2021); MOON EXPRESS, <https://moon-express.com/> (last visited Sept. 18, 2021).

¹⁵² Press Release, Sumitomo Corp., Sumitomo Corporation Becomes Corporate Partner of ispace's HAKUTO-R Program (Aug. 22, 2019), <https://www.sumitomocorp.com/en/jp/news/release/2019/group/12280>.

¹⁵³ Steve Jurvetson, *Moon Base Alpha — Strategies for Low Cost Lunar Settlement Workshop*, FLICKR (Aug. 23, 2014), <https://www.flickr.com/photos/jurvetson/30929394984/>.

¹⁵⁴ Alan Boyle, *Open Lunar Foundation Comes Out in the Open With its Plan to Build a Moon Village*, GEEKWIRE (Sept. 5, 2019), <https://www.geekwire.com/2019/open-lunar-foundation-comes-open-plan-build-moon-village/>.

¹⁵⁵ *Id.*

¹⁵⁶ Aaron Ridley, *Is it Better to Live on the Moon or on Mars? A Scientific Investigation*, QUARTZ (Oct. 18, 2017), <https://qz.com/1105031/should-humans-colonize-mars-or-the-moon-a-scientific-investigation/>.

astropreneurs. In fact, Elon Musk has been quite vocal about his ambition to one day build a human community on Mars.¹⁵⁷

G. Legal issues of New Space

Therein, as they say, lies the rub. On the one hand, treaty law governing space activities is seemingly stuck in the past, its words a snapshot of a bygone era of State-centered spacefare. On the other hand, scientists and businesspeople have come together to promise a future that seems more apt in a science fiction novel than a law journal article. This disconnect has and will continue to give rise to a host of problems in the actual governance of commercial outer space activities.

First, while States are in theory liable for damage caused to another State by the actions of non-governmental entities under its jurisdiction, licensing and supervision, such claims can be initiated only by States against other States, private entities have no formal standing under any of the space treaties.¹⁵⁸ Without *jus standi*, private entities may be left with little recourse for enforcement without help from related States.¹⁵⁹ However, since States have neither sovereignty nor jurisdiction over space and celestial bodies, they may have little incentive to police the treaties.¹⁶⁰ Granted, private enterprises have the option of resolving disputes through institutional or *ad hoc* arbitration rules and procedures such as those of the International Chamber of Commerce (ICC) or the Permanent Court of Arbitration (PCA).¹⁶¹ In fact, the PCA adopted the Rules on Outer Space Disputes in late 2011, which were based on the 2010 UNCITRAL Arbitration Rules and changed to reflect “the

¹⁵⁷ Alejandra O’Connell-Domenech, *Elon Musk Predicts He Will Rocket People to Mars in Less Than 10 Years*, THE HILL (Dec. 29, 2021) <https://thehill.com/changing-america/sustainability/infrastructure/587648-elon-musk-predicts-he-will-rocket-people-to/>.

¹⁵⁸ Liability Convention, *supra* note 7, art. VIII; LYALL & LARSEN, *supra* note 20, at 101-102; von der Dunk, *supra* note 10, at 423. It is worth noting, however, that art. XI of the Liability Convention contemplates the possibility of and does not prevent non-State parties from pursuing a claim in the relevant adjudicative body in the launching State.

¹⁵⁹ Jelena Aparac, *Business, Human Rights and Transitional Justice: Overcoming the Regulatory Dysfunction of International Law* 10 GLOB. BUS. L. REV. 52 (2022).

¹⁶⁰ Martinez, *supra* note 4, at 349.

¹⁶¹ Charles B. Rosenberg & Vivasvat Dadwal, *The 10 Year Anniversary of the PCA Outer Space Rules: A Failed Mission or The Next Generation?*, KLUWER ARBITRATION BLOG (Feb. 16, 2021), <http://arbitrationblog.kluwerarbitration.com/2021/02/16/the-10-year-anniversary-of-the-pca-outer-space-rules-a-failed-mission-or-the-next-generation/>.

particular characteristics of disputes having an outer space component” and “the public international law element” involving the use of outer space by States, international organizations and private entities.¹⁶² Yet, while decisions are binding, the Rules are completely voluntary and require contractual parties to agree beforehand to the arbitration clause(s).¹⁶³ With the exception of public-private joint ventures, commercial entities may still struggle to protect their rights (if any) under space treaties. In any event, it seems that space-specific arbitration rules have not picked up steam yet among the private sector.¹⁶⁴

Setting aside the enforcement issue, many important terms and concepts in the treaties were also left vague. For example, “celestial bodies” is used generally in the space treaties and can be interpreted to encompass any non-human-made object—a definition that is far too general to suffice for the numerous types of space objects with vastly different purposes.¹⁶⁵ With the rise of private commercial spaceflight, there is an open question of whether private space “tourists” should be afforded the same legal privileges as astronauts under the Rescue Agreement.¹⁶⁶ Most critically, however, is that the OST’s non-appropriation and “province of [hu]mankind” principles are undefined and open to interpretation.¹⁶⁷ The opacity in the meanings behind these terms implicates the legality of private property rights over space resources, the rights

¹⁶² Permanent Ct. of Arb., *Optional Rules for Arbitration of Disputes Relating to Outer Space Activities* 4, <https://docs.pca-cpa.org/2016/01/Permanent-Court-of-Arbitration-Optional-Rules-for-Arbitration-of-Disputes-Relating-to-Outter-Space-Activities.pdf>; Fausto Pocar, *An Introduction to the PCA’s Optional Rules for Arbitration of Disputes Relating to Outer Space Activities*, 38 J. OF SPACE L. 171, 190 (2012).

¹⁶³ Rosenberg & Dadwal, *supra* note 161.

¹⁶⁴ *Id.* (While there have been space disputes resolved with arbitration rules and procedures of the International Chamber of Commerce (ICC), the London Court of International Arbitration and the International Center for Dispute Resolution, there has yet to been one publicly recorded arbitration using the PCA Rules as of February 2021.)

¹⁶⁵ See generally *Outer Space Treaty*, *supra* note 5; Martinez, *supra* note 4, at 344.

¹⁶⁶ Steven Wood, *The scope of international obligations to extend rescue assistance to ‘astronauts’ and ‘personnel’ under the Outer Space Treaty and the Return and Rescue Agreement*, in *COMMERCIAL USES OF SPACE AND SPACE TOURISM: LEGAL AND POLICY ASPECTS* (Jan Wouters et al. eds., 2017) 44, 49-51; Pranay Lekhi & Tanishtha Vaid, *A Case for the Protection of Space Tourists - Reimagining the Vacuum in Space*, 68 ZLW 229 (2019).

¹⁶⁷ P.J. Blount & Christian J. Robison, *One Small Step: The Impact of the U.S. Commercial Space Launch Competitiveness Act of 2015 on the Exploitation of Resources in Outer Space*, 18 N. C. J. L. & TECH. 160, 168 (2016).

associated with building bases and communities on off-Earth locales and more, an existential issue for the existence of New Space. The interpretation of these terms remains a major point of contention in the international community today.

On the one hand, there are countries who interpret the OST to mean that nothing, including resources, can be appropriated from space since all should be the “province of [hu]mankind.”¹⁶⁸ This interpretation is supported by the Moon Agreement, which declared that “natural resources in place” shall not become the property of any entity or person.¹⁶⁹

On the other hand, countries like the US and Luxembourg are staunch supporters of the development of a commercial space industry. States in this camp interpret non-appropriation to be a ban on States claiming sovereignty over territory rather than property rights, thus making resource extraction permissible under the OST.¹⁷⁰ They would point out that “province of [hu]mankind” is too vague to create legal obligations on States parties and that the legal regime of the high seas supports the severability of resource extraction from notions of sovereign territory, since States parties to the UN Convention on the Law of the Sea are allowed to freely extract fish from the high seas while prohibited to claim territorial sovereignty.¹⁷¹

As commercial space companies boldly went where none had gone before, it left behind a slew of legal grey areas (at best). However, while entrepreneurs, a class of market participants that is inherently risk-tolerant was not deterred by such opacities, more risk-averse market participants, such as financiers and insurers, have a far lower wherewithal for this type of regulatory unknown. And yet, for New Space to be kicked into full gear and develop into a mature market, participation of these conservative actors is absolutely necessary. Thus, there is an urgent need to find answers to the legal questions that plague New Space.

¹⁶⁸ 9 PHILIP DE MAN, EXCLUSIVE USE IN AN INCLUSIVE ENVIRONMENT 206-211 (Ram S. Jakhu ed., 2016).

¹⁶⁹ Moon Agreement, *supra* note 43, art. 11.

¹⁷⁰ See generally Blount & Robison, *supra* note 167, at 164-170.

¹⁷¹ United Nations Convention on the Law of the Sea arts. 87 & 89, Dec. 10, 1982, 1833 U.N.T.S. 397, 57.

III. CUSTOMARY INTERNATIONAL LAW – THE ANSWER TO SPACE COMPANIES’ PROBLEMS?

Hope, like Pandora’s box, is not yet lost. Since treaty law is no longer up to the task, the burden falls upon CIL. CIL is an accepted source of international law¹⁷² and widely recognized to apply to outer space activities.¹⁷³ Unlike treaty law, CIL rules are understood to create rights and obligations binding upon *all* States, regardless of acceptance.¹⁷⁴ In the *North Sea Continental Shelf* cases, the International Court of Justice (ICJ) held that a treaty can relate to CIL in three ways: 1) as a declaration or codification of existing custom; 2) as a crystallization of custom to which States agreed during negotiations; and 3) as a starting point from which States accept provisions as custom following its adoption.¹⁷⁵

In the *North Sea Continental Shelf* cases, the ICJ outlined the two key elements of CIL: State practice and *opinio juris*.¹⁷⁶ Put another way, CIL is “a clear and continuous habit of doing certain actions which has grown up under the aegis of the conviction that these actions are, according to international law, obligatory or right.”¹⁷⁷ While there is a continued dispute surrounding the relative weight that should be attributed to the objective element (State practice) and the subjective element (*opinion juris*),¹⁷⁸ an objective State practice is nonetheless necessary for the formation of CIL. It is thus in the nature of CIL that it evolves through changing practices.¹⁷⁹ This characteristic of CIL is of especial import in the rapidly changing domain of outer space.

¹⁷² Statute of the International Court of Justice art. 38(1)(b).

¹⁷³ See generally Vladlen S. Vereshchetin & Gennady M. Danilenko, *Custom as a Source of International Law of Outer Space*, 13 J. SPACE L. 22 (1985).

¹⁷⁴ Pierre-Hugues Verdier & Erik Voeten, *Precedent, Compliance, and Change in Customary International Law: An Explanatory Theory*, 108 AM. J. INT’L L. 389, 390 (2014).

¹⁷⁵ Ricky J. Lee & Steven R. Freeland, *Crystallisation of General Assembly Space Declarations into Customary International Law*, 46 PROC. ON L. OUTER SPACE 122, 123-124 (2003).

¹⁷⁶ *North Sea Continental Shelf (Ger. v. Den.; Ger. v. Neth.)*, 1969 I.C.J. Rep 3, para 74 [*North Sea Continental Shelf* cases].

¹⁷⁷ LASSA FRANCIS LAWRENCE OPPENHEIM, OPPENHEIM’S INTERNATIONAL LAW 27 (Robert Jennings & Arthur Watts eds., 9th ed. 1992).

¹⁷⁸ Kirsten Stefanik, *Rise of the Corporation and Corporate Social Responsibility: The Case for Corporate Customary International Law*, 54 CAN. Y.B. INT’L L. 276, 288-293 (2016).

¹⁷⁹ Verdier & Voeten, *supra* note 174, at 410.

Some articles of the OST are arguably considered to be CIL. Articles I and II (outlining the “province of all [hu]mankind,” “free for exploration and use,” and non-appropriation principles in outer space) were codifications of actual practices of the US and the then-Soviet Union at the time of passage.¹⁸⁰ On the other hand, Articles VI and VII (allocating liability from outer space activities to States) arguably became custom after major spacefaring and non-space faring States passed relevant national space legislation and regulations.¹⁸¹ Originally, the non-appropriation principle was construed to prevent *any* appropriation – space “real estate” or resources.¹⁸² As seen below, however, recent developments in major spacefaring States seem to foretell a CIL change in favor of New Space.

The classical view teaches that CIL can only be created (and thus changed) by practices of States and international organizations.¹⁸³ In 2015, with the passage of the Spurring Private Aerospace Competitiveness and Entrepreneurship (SPACE) Act, the US became the first country to recognize *private property rights* over resources obtained from space.¹⁸⁴ The US followed national legislation with the Artemis program, a US-led initiative aiming to herald “a new era for space exploration and utilization,” starting by landing the first woman and person of color on the Moon by 2024.¹⁸⁵ The Artemis Accords are a set of legally non-binding principles under which the cooperation among participating countries is guided and to be implemented through bilateral agreements, most notably outside the usual channels of international law (U.N. committees).¹⁸⁶ As of June 2021, 12 countries have signed the Artemis Accords,

¹⁸⁰ Ram S. Jakhu & Steven Freeland, *The Relationship between the Outer Space Treaty and Customary International Law*, 59 PROC. INT’L INST. SPACE L. 183, 190 (2016).

¹⁸¹ *Id.* at 194-195.

¹⁸² 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).

¹⁸³ Int’l Law Comm’n, Draft conclusions on identification of customary international law, with commentaries, U.N. Doc. A/73/10, at 130 (2018).

¹⁸⁴ *Id.* at 159-160.

¹⁸⁵ The Artemis Accords, *Principles for a Safe, Peaceful, and Prosperous Future*, NASA, <https://www.nasa.gov/specials/artemis-accords/index.html> (last visited Apr. 11, 2022) [hereinafter Artemis Accords].

¹⁸⁶ Tronchetti & Liu, *supra* note 49, at 244; Christopher Newman, *Not Everyone is Buying into US Rules for Exploiting Resources on the Moon*, SCROLL.IN (Oct. 25, 2020), <https://scroll.in/article/976300/not-everyone-is-buying-into-us-rules-for-exploiting-resources-on-the-moon>.

including Australia, Brazil, Canada, Italy, Japan, Luxembourg, New Zealand, the Republic of Korea, Ukraine, the United Arab Emirates, the United Kingdom and the US.¹⁸⁷ While some of the 13 Sections of the Accords are unquestionably in line with existing treaties, others are more problematic. Most relevant to this article is the Accords' further endorsement of the US interpretation of space law which rejects the global commons nature of outer space and creates, under US law, the *private* right to collect, use and sell resources extracted from celestial bodies, a view not shared by all countries.¹⁸⁸ It also creates the right to establish "safety zones" on a celestial body's surface to prevent interferences with nominal operations.¹⁸⁹

Luxembourg took it one step further and focused almost solely on the commercial prospects of outer space. The Grand Duchy is positioning itself to become the European (and possibly global) hub for commercial space activity.¹⁹⁰ In 2016, it launched the Space Resources initiative, aiming to provide the legal, regulatory and business environment for private investors and companies to explore and use space resources.¹⁹¹ In 2017, it followed the US's footsteps and became the second country in the world to create *private* property rights for commercial entities operating in Luxembourg to resources extracted from space.¹⁹² Luxembourg also entered into an agreement with the European Space Agency to set up the European Space Resources Innovation Centre, a research and development hub supported by both public and private funding.¹⁹³ In fact, the Luxembourg Space Agency was established not to undertake

¹⁸⁷ Artemis Accords, *supra* note 185.

¹⁸⁸ Jack Wright Nelson, *The Artemis Accords and the Future of International Space Law*, 24 AM. SOC'Y OF INT'L L. INSIGHTS, Dec. 10, 2020, at 1-2.

¹⁸⁹ NASA, THE ARTEMIS ACCORDS 5-6 (Oct. 13, 2020), <https://www.nasa.gov/specials/artemis-accords/img/Artemis-Accords-signed-13Oct2020.pdf>.

¹⁹⁰ *Luxembourg, a Rising Star in the Space Industry*, DELOITTE: NEWS, <https://www2.deloitte.com/lu/en/pages/technology/articles/luxembourg-space-industry-companies.html> (last visited Sept. 19, 2021).

¹⁹¹ Brennan, *supra* note 123.

¹⁹² *Id.*

¹⁹³ Clive Cookson, *Luxembourg Space Programme to Work with NASA on Moon Mining*, FIN. TIMES (Feb. 15, 2021), <https://www.ft.com/content/3ced3460-abf2-4048-bce4-66f01e16ade4>.

research or conduct missions in space, but rather to develop Luxembourg's space business ecosystem.¹⁹⁴

Other than the US and Luxembourg, the United Arab Emirates also passed domestic laws addressing space resource extraction and utilization.¹⁹⁵ Even China, who doesn't see eye to eye with the US on many issues, seems to at least agree that commercial space has potential worth exploring. The 2016 Chinese Space Activities White Paper, which addressed space activities ranging from launches to satellites, specifically mentioned the actions of "private investors."¹⁹⁶ The White Paper explicitly encourages "non-governmental capital and other social sectors" to participate in space-related activities, "including scientific research and production, space infrastructure, space information products and services, and use of satellites to increase the level of commercialization of the space industry."¹⁹⁷ The Chinese commercial space market has already seen notable development, with private launch companies such as Link-Space, OneSpace, ispace and LandSpace coming onto the scene.¹⁹⁸ As described by Brian Weeden, "Chinese launch companies are reacting to the same market indicators that all the American launch companies see."¹⁹⁹ The country is currently formulating guidelines for commercial launching, with plans to introduce a national space law before China's parliament before 2023.²⁰⁰

While the apparent shifts in State practice is not without controversy, they represent a step away from the original broad construct of the non-appropriation principle in favor of an interpretation that would allow a commercial space industry to exist, especially among major spacefaring States.²⁰¹

¹⁹⁴ Brennan, *supra* note 123.

¹⁹⁵ FEDERAL LAW NO. (12) OF 2019 (U.A.E.).

¹⁹⁶ JOHN J. KLEIN, UNDERSTANDING SPACE STRATEGY: THE ART OF WAR IN SPACE 184 (2019).

¹⁹⁷ *Id.*

¹⁹⁸ *Id.* at 185.

¹⁹⁹ *Id.*

²⁰⁰ Andrew Jones, *Chinese Commercial Launch Sector Regulations Released, New Launch Vehicle Plans Unveiled*, SPACENEWS (July 2, 2019), <https://spacenews.com/chinese-commercial-launch-sector-regulations-released-new-launch-vehicle-plans-unveiled/>.

²⁰¹ See e.g., Almudena Azcárate Ortega, *Artemis Accords: A Step Toward International Cooperation or Further Competition?*, LAWFARE (Dec. 15, 2020), <https://www.lawfareblog.com/artemis-accords-step-toward-international-cooperation-or-further-competition>; Elliot Ji, Michael B. Cerny & Raphael J. Piliero, *What Does China Think About*

However, a glaring problem persists. Since only States and international organizations can create and change CIL, it is unclear whether CIL is directly applicable to non-State actors such as commercial space companies. Considering that many of these space companies have more experience in spacefare than the majority of the world's sovereign nations combined, this view of CIL is too narrow for contemporary purposes.

IV. A MODERN SOLUTION FOR A MODERN PROBLEM – APPLYING CUSTOMARY INTERNATIONAL LAW DIRECTLY TO NON-STATE ACTORS

To truly get a grasp on the complex landscape of international space law, one must consider the role of non-State actors in the process of international lawmaking. There is no doubt that non-State actors, including corporations, can *influence* international space law. For example, the Hague Space Resources Working Group was formed to begin a dialogue on the development of domestic and international frameworks in the area of commercial space governance.²⁰² In 2019, the group adopted a set of “Building Blocks,” on which a more robust legal framework that protect both commercial and public interests.²⁰³ Notably, the suggested framework would enable the unrestricted search for space resources and the “attribution of priority rights to an operator to search for and/or recover space resources for a maximum period of time and a maximum area

NASA's *Artemis Accords?*, THE DIPLOMAT (Sept. 17, 2020), <https://thediplomat.com/2020/09/what-does-china-think-about-nasas-artemis-accords/>; Tanja Masson-Zwaan & Neta Palkovitz, *Regulation of Space Resource Rights: Meeting The Needs of States and Private Parties*, 35 QIL 1, 14 (2017).

²⁰² *The Hague International Space Resources Governance Working Group*, UNIVERSITEIT LEIDEN, <https://www.universiteitleiden.nl/en/law/institute-of-public-law/institute-of-air-space-law/the-hague-space-resources-governance-working-group> (last visited Sept. 16, 2021).

²⁰³ Press Release, The Hague International Space Resources Governance Working Group, Adoption of the Building Blocks for the Development of an International Framework on Space Resource Activities (Nov. 29, 2019), https://www.universiteitleiden.nl/binaries/content/assets/rechtsgeleerdheid/instituut-voor-publiekrecht/lucht—en-ruimterecht/space-resources/press-release_hague-working-group.pdf; *See generally* THE HAGUE INTERNATIONAL SPACE RESOURCES GOVERNANCE WORKING GROUP, BUILDING BLOCKS FOR THE DEVELOPMENT OF AN INTERNATIONAL FRAMEWORK ON SPACE RESOURCE ACTIVITIES (2019), <https://www.universiteitleiden.nl/binaries/content/assets/rechtsgeleerdheid/instituut-voor-publiekrecht/lucht—en-ruimterecht/space-resources/bb-thissrwg—cover.pdf>.

upon registration in an international registry, and provide for the international recognition of such priority rights.”²⁰⁴ Furthermore, it supports the establishment of “a safety zone, or other area-based safety measure, around an area identified for a space resource activity as necessary to assure safety and to avoid any harmful interference with that space resource activity.”²⁰⁵ And yet, the role of non-State actors, especially large space corporations, is not limited to that of an indirect source of influence. Rather, these large corporations can and likely will play the role of lawmaker in international space law.

The inclusion of non-State actors among the ranks of those that create international law is scarcely an innovation, but its significance has not diminished in the time since its inception.²⁰⁶ The crux of what some has dubbed “bottom-up international lawmaking” is that large corporations’ business practices (be they explicitly agreed-upon industry standards or implicitly accepted “customs”), through continued use, can sometimes become viewed as a right or obligation or outright be adopted by more traditional sources of international legal authority the same way State practices can.²⁰⁷

While commentators have observed this phenomenon in the areas of international trade, corporate social responsibility and climate change, most pertinent to this article is its occurrence in the domain of cyberspace.²⁰⁸

Cyberspace is transnational in nature, with no central authority and few points of control.²⁰⁹ It affects a variety of human conduct but is largely facilitated via large corporations that control significant portions of the infrastructure, products and services that

²⁰⁴ THE HAGUE INTERNATIONAL SPACE RESOURCES GOVERNANCE WORKING GROUP, *supra* note 201 at 3.

²⁰⁵ *Id.* at 4.

²⁰⁶ See e.g., Myres S. McDougal, Harold D. Lasswell & W. Michael Reisman, *The World Constitutive Process of Authoritative Decision*, 19 J. LEGAL EDUC. 253, 268-269 (1967); Rosalyn Higgins, *International Law in a Changing International System*, 58 CAMBRIDGE L.J. 78, 84 (1999); Julian Arato, *Corporations as Lawmakers*, 56 HARV. INT’L L.J. 229 (2015).

²⁰⁷ See generally, Janet Koven Levit, *Bottom-up International Lawmaking: Reflections on the New Haven School of International Law*, 32 YALE J. INT’L L. 393, 398-408 (2007).

²⁰⁸ See generally *id.*; Stefanik, *supra* note 178.

²⁰⁹ Pallavi Khanna, *State Sovereignty and Self-Defence in Cyberspace*, 5 BRICS L. J. 139, 140 (2018).

populate it.²¹⁰ The digital market is prone to be and, in fact, is highly concentrated today.²¹¹ Yet, due to disagreements over interpretation of current law and major geopolitical and ideological differences, international law is failing in its regulation of cyberspace.²¹²

In its current form, the digital market is dominated by a handful of private companies. This concentration has led to concerns of anticompetitive actions like gatekeeping, privacy concerns and even democratic concerns.²¹³ Many nations and governing bodies around the world responded domestically in different ways, resulting in a patchwork of governance and regulatory frameworks, the efficacy of which remains to be seen.²¹⁴

There is neither a universal treaty that addresses how cybersecurity relates to civilians nor CIL that is informative of best practices and red lines of States.²¹⁵ While there were many attempts at developing international regulatory frameworks for global cybersecurity, they have largely failed.²¹⁶ Many have conjectured to the reasons behind such failure. On a technical level, there is disagreement over the application of certain legal terms of art, such as

²¹⁰ *Id.*

²¹¹ SUBCOMM. ON ANTITRUST, COM., AND ADMIN. L., COMM. ON THE JUDICIARY, INVESTIGATION OF COMPETITION IN DIGITAL MARKETS 36-46 (2020) [hereinafter HJC REPORT]; JASON FURMAN, HM TREASURY, UNLOCKING DIGITAL COMPETITION, REPORT OF THE DIGITAL COMPETITION EXPERT PANEL 4 (2019) (U.K.); DIGIT. PLATFORMS COMM., GEORGE J. STIGLER CTR. FOR THE STUDY OF THE ECON. AND THE STATE, FINAL REPORT 11 (2019).

²¹² Ido Kilovaty, *Privatized Cybersecurity Law*, 10 UC IRVINE L. REV. 1181, 1204 (2020).

²¹³ HJC REPORT, *supra* note 211, at 6-7; COMPETITION AND MARKETS AUTH., ONLINE PLATFORMS AND DIGITAL ADVERTISING MARKET STUDY 9-21 (2020) (U.K.) [hereinafter UK REPORT].

²¹⁴ Complaint at 1-2, *United States v. Google LLC*, No. 1:20-cv-03010 (D. D.C. Oct. 20, 2020); Complaint at 1, *Federal Trade Commission v. Facebook, Inc.* (D. D.C. Dec. 9, 2020); Complaint at 1-5, *New York v. Facebook, Inc.* (D. D.C. Dec. 9, 2020); Press Release, *Europe Fit for the Digital Age: Commission Proposes New Rules for Digital Platforms*, EUR. COMM'N (Dec. 15, 2020), <https://ec.europa.eu/digital-single-market/en/news/europe-fit-digital-age-commission-proposes-new-rules-digital-platforms>; Raymond Zhong, *With Alibaba Investigation, China Gets Tougher on Tech*, N.Y. TIMES (Dec. 23, 2020), <https://www.nytimes.com/2020/12/23/business/alibaba-antitrust-jack-ma.html>.

²¹⁵ Ido Kilovaty & Itamar Mann, *Towards a Cyber-Security Treaty*, JUSTSECURITY (Aug. 3, 2016), <https://www.justsecurity.org/32268/cyber-security-treaty/>; Dan Efrony & Yuval Shany, *A Rule Book on the Shelf? Tallinn Manual 2.0 on Cyberoperations and Subsequent State Practice*, 112 AM. J. INT'L L. 583, 595 (2018).

²¹⁶ *Id.* at 1204.

“attack” or “use of force,” in cyberspace.²¹⁷ The non-territorial nature of cyberspace generally poses challenges to the chiefly territorial-based international law.²¹⁸ On a practical level, legal uncertainty in the regulation of cyberspace allows States, especially those heavily engaged in it, to operate with relative impunity and it is therefore against their interests to clarify the legal standards and rules in the arena.²¹⁹ Kubo Mačák’s observation that 1) there are no attempts to codify the rules applicable to cybersecurity in a binding treaty, 2) States are reluctant to develop binding CIL and 3) multilateral process that are taking place tends to be on norms is therefore scarcely surprising.²²⁰

In this vacuum of international legal authority, private big tech companies attempted to and have successfully taken on an increasingly legislative role in cyberspace.²²¹ This role is not legislative in the sense of formal treaties and statutes, but the creation of rules, norms and principles for conduct in cyberspace that can become binding upon States in the form of CIL.²²²

Under the leadership of Microsoft, more than one hundred global tech companies signed onto the Cybersecurity Tech Accord and its four principles.²²³ Tech companies pledged to protect users from cyberattacks by providing secure and private products and services; they pledged not to assist governments or other organizations in the launch of cyberattacks; they pledged to educate users on available tools and to support societal, governmental and organizational efforts in advancing global cybersecurity; they pledged to

²¹⁷ Ido Kilovaty, *Virtual Violence – Disruptive Cyberspace Operations as “Attacks” Under International Humanitarian Law*, 23 MICH. TELECOMM. & TECH. L. REV. 113, 117 (2016); see generally Matthew C. Waxman, *Cyber Attacks as “Force” under UN Charter Article 2(4)*, 87 INT’L L. STUD. SER. US NAVAL WAR COL. 43 (2011).

²¹⁸ See generally Jennifer Daskal, *The Un-Territoriality of Data*, 125 YALE L. J. 326 (2015).

²¹⁹ Dan Efrony, *Is it Time to Regulate Cyber Conflicts?*, LAWFARE (May 4, 2018), <https://www.lawfareblog.com/it-time-regulate-cyber-conflicts>.

²²⁰ Kubo Mačák, *Is the International Law of Cyber Security in Crisis?*, 8 INT’L CONFERENCE ON CYBER CONFLICT 127, 129-131 (2016).

²²¹ Kilovaty, *supra* note 215 at 1203.

²²² *Id.* at 1189.

²²³ *Signatories*, CYBERSECURITY TECH ACCORD, <https://cybertechaccord.org/signatories/> (last visited Sept. 16, 2021).

create formal and informal partnerships to enhance cybersecurity.²²⁴

Another example is the CyberPeace Institute, a Cyber Red Cross of sorts, involving both for-profit and non-profit entities.²²⁵ This organization seeks to help vulnerable communities prepare for and recover from cyberattacks, analyze cyberattacks to hold malicious actors accountable and advance the rule of international law and norms governing responsible behavior in cyberspace.²²⁶ In theory, such an organization could be an apolitical cybersecurity expertise institution responsible for humanitarian assistance, the investigation and attribution of cyberattacks and the creation and promotion of cyberspace norms.²²⁷ If tech companies took the lead on a Cyber Red Cross, they will possess unprecedented power in global cybersecurity governance.²²⁸

Tech companies may be pursuing such due to their sense of responsibility and obligation to protect their users (and thus their bottom lines), but it is also possible that tech companies simply desire power.²²⁹ Through market concentration, power was concentrated into the hands of a few tech companies.²³⁰ When the opportunity to take up more power in cyberspace arose, they did not even flinch.²³¹

At first glance, this digression into cyberspace may seem a touch odd (after all, space has existed long before our ancestors crawled out of primordial waters, whereas the advent of computers have yet to reach its hundredth birthday).²³² Yet, upon further

²²⁴ *Our Commitment*, CYBERSECURITY TECH ACCORD, <https://cybertechaccord.org/accord/> (last visited Sept. 16, 2021).

²²⁵ *Our Partners*, CYBER PEACE INSTITUTE, <https://cyberpeaceinstitute.org/our-partners/> (last visited Sept. 16, 2021).

²²⁶ *What We Do*, CYBER PEACE INSTITUTE, <https://cyberpeaceinstitute.org/what-we-do/> (last visited Sept. 16, 2021).

²²⁷ Kilovaty, *supra* note 215 at 1200.

²²⁸ *Id.*

²²⁹ *Id.* at 1193.

²³⁰ Adil Abdela & Marshall Steinbaum, *The United States Has a Market Concentration Problem*, FED. TRADE COMM'N (Sept. 2018) https://www.ftc.gov/system/files/documents/public_comments/2018/09/ftc-2018-0074-d-0042-155544.pdf.

²³¹ Dan Geer et. al., *On Market Concentration and Cybersecurity Risk*, 5 J. CYBER POL. 9 (2020).

²³² Ian Watson, *How Alan Turing Invented the Computer Age*, SCI. AM. (Apr. 26, 2012), <https://blogs.scientificamerican.com/guest-blog/how-alan-turing-invented-the-computer-age/>.

analysis, the comparison is strangely apropos and yields concerning implications.

Like cyberspace, outer space is territorial in nature, lacks a central authority and affects many aspects of human life but is rapidly becoming tangible in the hands of private companies. Most concerning of all, the structure of New Space (as outlined in Part II) lends a hand to immense concentration in the future.

The existing and foreseeable commercial opportunities in outer space seemingly surround infrastructure-building, which share a common market structure – high fixed cost with low marginal cost (economists like to call this economies of scale) – one that tends to lead to concentration. A factor that further exacerbates the situation is that space products and services are generally scarce, if not unique, in nature.

The sectors of commercial space that has undergone significant headway into commercialization are satellites and rockets. Both costs millions, if not hundreds of millions to manufacture and deploy. Yet, once a satellite is in orbit, its continuous operations (be it data gathering or internet provision) yield continuous revenues with comparatively little operating cost. Granted, with the innovation of SmallSats, satellite production costs could decrease from the current \$500 million to a “mere” \$500 thousand. However, the fact that 70% of all commercial SmallSats between 2012 and 2019 were operated by three companies suggest that the SmallSat revolution may contribute to concentration instead of introducing competitors into the fray.

Reusable rockets are similar to satellites in that enormous cost is involved in every construction and launching of rockets. Admittedly, there is a difference in that every additional payload on the rocket may represent increased fuel cost. It may be tempting to suggest that there is little risk of concentration in the field of reusable rockets since any company with the financial wherewithal would be able to enter the space, especially after the patents on the current designs expire. However, one only needs to look to the commercial airline industry in the US to see the counterpoint – when only few oligarchies are involved in a high upfront cost industry, it is possible for them to conspire and achieve monopolistic profits.

The remaining sectors of commercial space are, admittedly, little more than what entrepreneurs hope to commercialize one day.

Therefore, the analyses of such future markets should not be given more weight than conjecture.

There are no current active commercial space stations, but since even NASA supports the gradual privatization of the ISS, it is not unlikely that fully commercial space stations will emerge. In fact, Axiom Space intends to create a fully commercial space station to replace the ISS after 2028. Assuming such a future is upon us, commercial space stations would likely be an extraordinarily expensive endeavor as well. The development, assembly and operation of the ISS cost participating nations and organizations over \$100 billion over the past 10 years.²³³ The first crew of private astronauts were charged \$55 million each for an eight-day mission on the ISS.²³⁴ While the overhead costs of a space station are great, the marginal cost for each additional experiment is comparatively low (subject to the capacity of the space station) in the same way the marginal cost for putting an additional person on a plane is low.

Strictly speaking, whether asteroid mining and manufacturing in space can truly be commercialized, remains to be seen. The two notable asteroid mining companies have since been purchased and pivoted to other pursuits, while the space manufacturing technology is at such a preliminary stage that a fair and accurate evaluation is near impossible. If, however, a booming space mining and manufacturing economy comes to be, it would not be a stretch to imagine high upfront costs of launching and assembling the necessary facilities to make it possible. These facilities, once completed, would be in control of important resources such as rare Earth elements and in-space construction capabilities.

Further stretching our imaginations, if commercial Moon (or even Mars) settlements become reality, absent regulations saying otherwise, they may become the space-age company towns. In fact, hidden within the terms of service of Starlink, one of SpaceX's services, is a Mars clause that requires users to recognize that Mars is a free planet, unbound by any Earth-based governments and will

²³³ *How Much Does it Cost?*, EUR. SPACE AGENCY, https://www.esa.int/Science_Exploration/Human_and_Robotic_Exploration/International_Space_Station/How_much_does_it_cost (last visited Sept. 17, 2021).

²³⁴ Bill Chappell, *1st Private Crew Will Visit Space Station. The Price Tag: \$55 Million Each*, NAT'L PUB. RADIO (Jan. 27, 2021), <https://www.npr.org/2021/01/27/961169001/1st-paying-customers-will-visit-space-station-the-price-tag-55-million>.

be governed by self-governing principles established at the time of settlement.²³⁵

In short, the current sectors of commercial space seem to be focused on infrastructure building – satellites supplementing or substituting land-based infrastructure and reusable spacecraft as the foundational infrastructure for a space-based economy. While it may not be apt to consider the potential future sectors of commercial space as “infrastructure,” the high-cost nature of space-based ventures, by itself, increases the risk of concentration.

As illustrated by developments in cyberspace, in highly concentrated markets that are dependent on cutting-edge technology, the power and authority that comes with concentration can also impart the ability to not only *influence*, but also *create* CIL. With that in mind, it doesn’t require more than a middling imagination to see what may be in store for CIL governing outer space activities.

Considering the current geopolitical climate, it seems unlikely that a new sweeping space treaty will be passed in the near future. Therefore, the current gaps in space treaty law will persist and require answering by CIL. Yet, with the seemingly global (at least among many spacefaring States) transition towards commercializing outer space activities, these answers may increasingly come from commercial space companies rather than States.

While there is still contention surrounding the non-appropriation principle, CIL seems to be shifting towards exempting resource extraction from the non-appropriation principle.²³⁶ In fact, it doesn’t seem entirely out of the question for the appropriation of “real estate” on celestial bodies to become an accepted practice under CIL.²³⁷ Additionally, practical problems in the commercial space industry today may be answered by industry practices, which may become custom. Some examples include the practices surrounding the insurance and financing of spacecraft and the rescue and assistance of astronauts (private or State-sponsored).

Looking further into the future, one can see many aspects of space law that might come from commercial space companies. For example, in the reusable launch sector, standards such as those regarding rocket construction, astronaut safety and environmental

²³⁵ Crist, *supra* note 75.

²³⁶ See generally Pershing, *supra* note 182.

²³⁷ *Id.*

concerns may be gradually established from the repeated launches of companies such as SpaceX and Blue Origin. Without a central authority, practices of commercial companies that operate commercial space stations will naturally become accepted practices. Asteroid mining companies could come together and agree upon a system of differentiating “celestial bodies” (a term used far too generally in the space treaties) into more specified categories based on factors such as composition and locale.

With the major spacefaring States seemingly charging ahead with their support for a commercial space industry, these space companies may soon find themselves in a position of not mere influence, but power to create and uphold the new standards and ground rules of New Space in the 21st Century. Therefore, it may be simpler to do away with the thin veil of statehood and CIL and acknowledge the important and *direct* roles space companies will play in CIL governing outer space activities by directly applying CIL to space companies and their activities. By doing so, not only would space companies enjoy the rights that come with CIL, encouraging the continued development of a promising new industry, but it would also be bound by the many obligations that come with CIL, protecting the interests of the many lives that will doubtlessly be affected as humankind ventures further into the final frontier.

V. CONCLUSION

Outer space enthralls our minds today as much as it did our ancestors centuries ago. Technology enabled us to reach the heavens and, in an all-too-human twist, commercialize it. The space treaties that emerged near fifty years ago understandably failed to contemplate the possibility of a commercialized outer space. One can certainly retain a formal view and essentially recognize only practices of sovereign States as a possible source of CIL, but in a world where private companies launch more rockets than the majority of sovereign States, such a view may prove to be too narrow-minded and out-of-touch. After all, a dozen successful launches speak louder than the voices of a hundred non-spacefaring States.