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Revisiting the Moon Agreement: Analysing 45 Years of Policy and Legal Trends through the Lens of NewSpace Commercialisation

Dominik Adamiak, Natacha Hughes, Josea Tarulli, Dinushka Orrin Dahanaggamaarachchi, Christine Marian

University of Toronto Faculty of Applied Science and Engineering and the University of Toronto Aerospace Team Aerospace Policy Division

Abstract

The rise of space commercialisation and privatisation has provoked much discussion and challenges to existing outer space law, such as the 1979 Moon Agreement, the primary legal instrument that governs man-made development on celestial bodies. Its effectiveness and relevance in the 21st century have been questioned, as demonstrated by its non-ratification by the most active spacefaring nations and the adoption of competing multinational agreements, such as the Artemis Accords.

Various stakeholders have a vested interest in advocating for the commercialisation of outer space. Governments want to solidify legal claims for the deployment of national security assets such as lunar bases, while natural resource companies desire legal clarity for safeguarding profits from extraterrestrial resources such as minerals, water and energy. In both cases, the commercialisation of outer space could present novel prospects and potentially revolutionise the economic and technological landscape. Historically, the main issues of contention that prevent widespread ratification include the prohibition of states, commercial entities or individuals owning extraterrestrial property (the "common heritage" clause), the ambiguity regarding the level of control a private/national entity has in using extraterrestrial resources for commercial gain, and the ambiguous requirements for equitable resource sharing from commercial ventures.

There has been a vast collection of legal, academic and government-funded literature on this topic arguing to either rewrite or support the Moon Agreement, however, no systematic review has been conducted to date. For example, Hertzfeld and Dunk in 2005 argued that property rights and the right to extraterrestrial income appropriation can be achieved without discarding the "common heritage clause", while Gilson in 2011 discussed a potential framework for lunar litigation based on terrestrial analogs, such as the Antarctic Treaty. Various incentivization schemes for nations to sign onto a revised agreement have also been proposed, ranging from game-theoretic to Realpolitik approaches. This paper seeks to collate and review the vast sum of literature on this topic to analyse the underlying trends based on national and commercial stakeholders, with a specific focus on how recent technological advances in the NewSpace era drive policy changes. A qualitative meta-analysis will evaluate the feasibility of alternative frameworks and methodologies from the last 45 years based on recent social, economic, and political realities. Analytical results will then be used to develop a new tentative framework based on common trends and notable anomalies that incorporate concepts within corporate, commercial, property, maritime, and international law.

Keywords: Moon Agreement, Commercialization, Ownership of Resources, Non-appropriation, International Regime

Acronyms/Abbreviations

CHM: Common Heritage of Mankind
COPUOS: Committee of Peaceful Uses of Outer Space
MA: Moon Agreement
OST: Outer Space Treaty
QMA: Qualitative Meta-analysis
UN: United Nations
UNOOSA: United Nations Office for Outer Space Affairs

1. Outline

This paper first discusses the background of international space law, or corpus juris spatialis, with a specific focus on the 1979 Moon Agreement, and how its failure to be ratified by a majority of spacefaring states has left a gap in space law of growing concern in an age of increasing space access and commercialisation. The well-documented reasons for the original agreement's failure are discussed, as are additional challenges with proposing an alternative in the contemporary environment of semi-regulated private actors. Based on two sets of research questions focusing

on the gaps in academic literature and legislation on this topic, a qualitative meta-analysis methodology is outlined to investigate this topic. Specifically, how did various proposals evolve since the 1960s? Information relevant to the development of an agreement to assume the intended functions of the original Moon Agreement is synthesised from the following sources:

- Analyses and proposals developed by qualified individuals in industry and academia related to gaps within the Moon Agreement;
- Analogues (i.e., international legislation, similar to the Moon Agreement in nature, regulating activities that impact the land, sea, atmosphere, and orbital environment);
- International legislation (e.g., treaties), national legislation, and agreements (multilateral and bilateral) that directly aim to redress the gaps in the Moon Agreement.

A discussion on the most probable form and scope of a future framework governing space resource utilisation and various related issues as initially addressed in the MA concludes this work. Are post-2020 NewSpace agreements such as the Artemis Accords sufficient, or is further work needed? Compatibility with existing domestic legislation, reasonable regulation of private actors in the light of commercial interests, and a structure of maximal self-enforcement with respect to the varying benefits and responsibilities of different stakeholders are key aspects considered.

2. Motivation and Background

2.1 Current State of *corpus juris spatialis* and the Continuing Need for a Moon Agreement

In 1959, the United Nations (UN) established the Committee of Peaceful Uses of Outer Space (COPUOS) to "govern the exploration and use of outer space for the benefit of all humanity" [1], attempting to ensure peaceful development and stability of outer space and its resources during a time of great global political tension. In the two decades following, COPUOS, alongside its advisory secretariat body, the United Nations Office for Outer Space Affairs (UNOOSA), introduced five treaties that today form the foundation of the international corpus juris spatialis. The most well-known of these is the 1967 *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Outer Celestial Bodies,* or the Outer Space Treaty (OST) [2]. This treaty establishes outer space as the "province of mankind", affirms the peaceful use of outer space for the benefit of all nations, prohibits the national appropriation of outer space and celestial bodies, and sets the framework for the development of more detailed law [2]. In the years following the OST, using their common names, the Rescue Agreement, Liability Convention and Registration Convention were also, in most cases, unanimously adopted. In 1979, the final treaty, the *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies* or the Moon Agreement (MA), was introduced. The MA is the least accepted of the five UN space treaties; compared to the OST's 114 State Parties, the MA has only 17, none of which are major spacefaring nations [3]. The failures of the MA are numerous and have been documented ad nauseam in the literature. The introduction of the ambiguous term Common Heritage of Mankind (CHM) to describe space by the Argentine delegation coupled with an unfulfilled directive to develop an international regime for the equitable management of space resources led to fears of "socialising the Moon" [4]. Rich, spacefaring nations had no incentive to legitimise a perceived disadvantage onto themselves, relative to the status quo of international space law, and large political voting blocs in the UN followed the rejection of the MA by the US and Soviet Union. Because the commercial market for space exploitation and exploration was nearly non-existent during the drafting of the original UNOOSA treaties relative to today, the interests of commercial stakeholders were unaddressed. Article 14 of the MA states that State Parties "bear international responsibility for national activities on the moon", while Article 11.3 states that "[No] part thereof or natural resources in place [on the moon], shall become property of any [entity]" [6]. Much debate has been proposed on whether traditional terrestrial property rights are a prerequisite to securing the commercial interests (i.e., profits) of private entities. Regardless of the answer, legal certainty is needed to mitigate risk, spur investment, and prevent abuse of the legal vacuum by private actors, with or without the sponsorship of a state. As interest in outer space, particularly the Moon, grows, the need to address points of contention within the Moon Agreement is becoming increasingly urgent. This has been illustrated by near-term manned and unmanned lunar exploration, by entities such as the United States, China, Russia, the European Union, and India as well as private actors such as SpaceX. Though widely accepted, the OST does not cover the full scope of governing activities on the Moon and other celestial bodies. The unacceptance of the Moon Agreement by spacefaring nations has led to the establishment of competing multinational agreements to supplement the Outer Space Treaty, such as the Artemis Accords. However, these multinational agreements are often not accepted by all stakeholders, for various reasons that will be discussed. Domestic legislation regarding relevant issues on this topic has become more common

recently, but is sometimes contradictory and is only applicable to citizens and companies registered in the country of the legislation. The fragmentation of space law must be controlled and mitigated by striking a balance between what can be enforced by an international agreement, and what rights will most likely be reserved to the control of individual state parties.

2.2 Past and Current Challenges in the Ratification of the Moon Agreement

2.2.1 The "Common Heritage of Mankind" Clause and its Application to Lunar Access, Resources and Profits

Article 11.1 of the MA states that "the moon and its natural resources are the common heritage of mankind, which finds its expression in the provisions of this Agreement" [5]. Although there is an implication that the CHM concept abides by the MA's themes of cooperation and mutual assistance, the lack of a concrete definition gives rise to two interpretations, one of which has been a leading contributor to the non-ratification of the MA. Developing countries firmly believe that the CHM invokes the res communis theory of property, which states that the Moon's surface, subsurface and parts thereof are common property. Three elements that define common property include the absence of private ownership rights, the management of property by an international body, and the sharing of benefits between all State Parties [6]. Under this interpretation, developing countries aim to redistribute the wealth generated by commercial lunar activities, thereby securing the necessary financial support to cultivate their own capacity for space exploration. This approach aims to prevent them from being marginalised as a result of their limited technological capabilities [6]. While in line with the intention of the equitable development of space envisioned by the UN, pragmatic considerations make it obvious that the large departure of this statement from the OST meant that spacefaring nations such as the United States had no reason or political will to support it. Before the MA's entry into force, the United States originally supported the CHM concept, first proposed by Argentinian representatives, under the assumption that it invoked the freedom of the seas theory of property. The freedom of the seas echoes the expectation that res communis sets around denying sovereign rights to an area of pristine space. However, it also allows State Parties to exploit the Moon's resources for national use in the industry, assuming that respectful and prudent consideration is taken for the rights and activities of other State Parties [2]. Upon the realisation that the global abundance of developing countries would result in the res communis interpretation of the CHM becoming a reality, the US chose to back out of signing and ratifying the MA. The collective impact of all three elements within the res communis property theory presents a challenge for companies in pertinent sectors to secure funding and initiate technological advancements for conducting private activities on celestial bodies. In isolation, when viewed only within the context of other articles of the Moon Agreement, the CHM principle and its dominant interpretation cannot be adopted by the major relevant space actors. Its inherent ambiguity is detrimental to their immediate self-interests. Any proposed alternatives would have to remove the ambiguity of the CHM by providing a concrete and acceptable definition, via appropriate incentives.

2.2.2 Prohibition on Sovereignty and the Appropriation of Land

In Article 11.2 of the MA, it is stated that "the moon is not subject to national appropriation by any claim of sovereignty […] by any […] means" [5]. While states do retain the use and ownership of their "personnel, space vehicles, facilities, stations and installation on the moon", according to Article 12.1 of the MA, there has been considerable discussion regarding the impact of a blanket prohibition on land and potentially resource ownership on the moon. Discussions with respect to Article 11 can be summarised by two main questions. Firstly, does the MA actually prohibit owning resources that are extracted from the moon and other celestial bodies and exploited commercially? Secondly, is the ownership of land and property on the moon, in its traditional form on Earth, a necessary prerequisite to sustainable, peaceful, and profitable commercial and other operations on the moon? If the second question is answered in the affirmative, a framework of either traditional or novel lunar property rights will have to be developed. If it is answered in the negative, a new system with clearly defined protections, incentives and regulations for state and non-state actors will also have to be developed. In his article *Defending Your Clients Property Rights in Space: A Practical Guide for the Lunar Litigator*, Blake Gibson presents an argument for why "private investors will expect and require some level of protection of their right to the property on which they operate their businesses" through an analysis of traditional common and civil law systems used on Earth [7]. Salter and Leeson say that "without some means of enforcing claims… individuals have little incentive to risk investing in and growing … celestial enterprises" [8]. Erlank proposes that "in certain instances property rights to objects in space should be recognised and that we should develop a legal framework around this, rather than denying the existence of such rights" [9]. Some authors, such as Hertzfeld and Von Dunk, propose that traditional property rights are not needed to secure the investments

of private and state entities [10]. Whatever the eventual resolution of the second question might be, it is important that clarity is provided in any legal instruments that become widely accepted by the international community in the coming years.

2.2.3 Ambiguity Surrounding the Establishment of a Governing International Regime

Article 11.5 states that "State Parties to this Agreement hereby undertake to establish an international regime, including appropriate procedures to govern the exploitation of natural resources of the moon as such exploitation is about to become feasible" [5]. There are two reasons why the establishment of an international regime has deterred major spacefaring nations from signing and ratifying the MA. One reason is that some believe Paragraph 5 imposes a legal moratorium on the exploitation of the Moon and other celestial bodies, pending the inception of an international regime [6]. This limits the scope of activities permissible on the Moon and other celestial bodies solely to scientific investigation for an indeterminate and potentially extended period of time.The second reason can be further explained by Article 11.7: "The main purposes of the international regime to be established shall include: [...] (d) An equitable sharing by all state parties in the benefits derived from those resources, where the interests and needs of the developing countries, as well as the effort of those countries which have contributed either directly or indirectly to the exploration of the moon, shall be given special consideration" [5]. Despite the efforts made by this paragraph to specify the required components of an international regime, there still exists uncertainty surrounding the type of regime that is to be created, particularly with what "equitable sharing" constitutes [5]. The term equitable or equity has various meanings. The international theory of equity aims to cultivate a system of overall fairness by remedying social injustices and economic disparities [6]. Developing countries take this language to reaffirm their belief that the sharing of information, technology, space resources, and profits between developed and developing countries is required to achieve overall fairness and promote equality of opportunity in outer space. However, compulsory sharing of the aforementioned benefits would deter investors from providing substantial investments to develop innovative technology due to concerns regarding a loss in profit and a loss in return on investment (ROI), which, coupled with lengthy payback periods, would doom an investment from the start.

2.2.4 Non-consideration of Private Actors

During the initial drafting of the MA or any of the other main UNOOSA treaties, the political, economic and technological landscape of the space industry precluded the consideration of private entities as major stakeholders with respect to many of the issues described in the aforementioned legal instruments. Today, commercial activities account for around 80% of the global space economy, a figure that is set to only increase with the prevalence of low-cost space access [11]. Companies such as SpaceX, Virgin Galactic, Bigelow and RocketLab are part of only the first industry tranche that is pioneering the space access, telecommunications, tourism and manufacturing industries, and their reach has already grown below low earth orbit. Article 14.1 of the MA provides the only reference with regard to private activities. It delegates ``international responsibility for national activities on the moon … by government agencies or non-government entities" to the respective state parties [5]. Notwithstanding the issue that there are only 17 state parties to the MA, a lack of legal framework codifying an internationally acceptable set of principles regarding the operation of private entities is predicted to serve as a deterrent to private investment of resources. Notably, more universally accepted legal principles such as the Registration Convention, the Liability Convention, and the OST have been adopted to serve the special case of orbital operations where property rights and claims do not compete in the same way as in a terrestrial or lunar environment. This gap has been attempted to be filled by many national (e.g., Luxembourg Space Law of 2017, US Commercial Space Competitiveness Act of 2015) and multilateral (e.g., Artemis Accords) agreements, some of which directly contradict each other, either in the form of political affiliations (e.g., US-led Artemis Accord vs. China/Russia lunar base agreements since 2020) or relevant legal theory and precedent cited. In any case, the fragmentation of law with regard to the rights and limitations of private activities will serve as a deterrent to good-faith space investment due to the risk associated with uncertainty. It will also spur some space actors to find loopholes in the unclear and incomplete legal basis for private lunar operations. These actors can develop trade protection measures by enforcing their nation's space and property regulations exclusively within their domestic judicial systems. As a result, they can exploit the absence of legal safeguards for other non-state entities, thereby encroaching upon their property rights. Lastly, private entities not affiliated with any specific state, such as multinational corporations, are not addressed by any articles in the MA.

3. Methodology

To guide the research direction of the qualitative meta-analysis (QMA), two sets of initial research questions were developed based on a preliminary

literature review. In their most general form, the primary research questions are, (1) what do the various stakeholders need for broad consensus in the adoption of a mutually agreeable framework, and (2) what form will this framework take in the international arena?

The first question addresses stakeholders in three main groups: states, private actors, and non-commercial intergovernmental organisations. The category of states has several intersectional groups. For example, a broad classification can divide states into those that currently have the technological, financial and political ability to access or operate in space with well-established national programs/commercial sectors and have significant influence on international space policy, versus those that do not. Another relevant classification is based on the complex group of global geopolitical blocs, such as US-led, Chinese-led, and unaligned countries. The classification of space actors into these groups is not binary, but generally, these broad categories are sufficient to show the most important policy differences that are relevant to this topic. Based on common trends in the literature, the first primary question can be subdivided further into the following avenues of investigation:

- What are the minimal conditions required to reasonably secure investments from private actors?
- What provisions of equitable benefit sharing and resource redistribution are possible in an agreement, if any?
- What domestic legislations/multinational agreements already exist with relevance to space resource utilisation in the context of MA issues?
- What issues persist beyond the scope of what a solution not involving broader political resolutions can achieve?

The second primary question is influenced by and follows the first insofar as the structures and mechanisms that define a framework are constructed based on the requirements established from the needs of various stakeholders. As a result, the following set of secondary research questions was constructed to supplement the second primary research question:

- In a spectrum ranging from instruments of UN international law, multinational agreements, bilateral agreements, memorandums of understanding and broad guiding principles, what is the most reasonable form for an international framework?
- What will be the scope of any framework? How will it coexist with the aforementioned existing domestic legislations / already existing multinational agreements on space resource utilisation?
- What mechanisms of enforcement will exist, either as self-enforcing principles inherent to the framework, or as direct enforcement by sovereign entities (with regards to other sovereign entities and most importantly, private actors)?

While the selection of literature was in part influenced by topics relevant to the first two questions posed, much of the literature on this topic (such as academic proposals for frameworks) concerns itself with all aspects of the relevant issue on the Moon Agreement, which guided the creation of the secondary questions and provided confidence that all the major issues in contention were covered in further discussions.

The style of QMA adopted for this study was Anselm L. Strauss's Grounded Theory. Through a cyclic process of data collection and analysis, Grounded Theory allows for the formulation of new theories or frameworks associated with a particular field of study [12]. For this paper, Grounded Theory was used to address the primary and secondary research questions. The results of QMA empowered the creation of a regulatory framework that provides the legal certainty and stability required to bolster investment and facilitate the initiation and continued execution of space commercialization endeavours. As a first step, eligibility criteria were constructed to establish a strong and coherent relationship between the selected QMA sources, the Moon Agreement, and the primary and secondary sets of research questions. Thus, if the source fits into one of these categories, it abides by the eligibility criteria and was selected for use in the QMA:

- Analyses and proposals developed by qualified individuals in industry and academia related to gaps within the Moon Agreement;
- Analogues (i.e., international legislation, similar to the Moon Agreement in nature, regulating activities that impact the land, sea, atmosphere, and orbital environment);
- International legislation (e.g., treaties), national legislation, and agreements (multilateral and bilateral) that directly aim to redress the gaps in the Moon Agreement.

Each source that adhered to the eligibility criteria underwent additional assessment for credibility and reliability, which were evaluated based on the source's relevance, authority, and accuracy [13]. Sources that

scored moderately with respect to their relevance to the primary and secondary research questions, the qualifications of the author, and the accuracy of the information presented were used for the QMA. To conduct Grounded Theory, 10 to 30 excerpts that represent a condition, interaction among actors, strategy and tactic, or consequence were extracted for iterations of open coding, axial coding, and selective coding [12]. These four categories represent code contexts and are the foundational pillars of Strauss's coding paradigm. Open coding, a form of data collection, is the "unrestricted coding of the data" and generates the concepts present in all sources [12]. Notably, 25% of the total number of data points (i.e., excerpts) was used as a maximum for the total number of unique codes inductively generated; this strikes a balance between capturing a diverse range of concepts and facilitating the identification of trends and anomalies among codes that may appear repeatedly across different sources. Axial coding, a form of data analysis, involves establishing relationships between the codes generated for each source [12]. Selective coding, a form of data analysis, involves comparing the established relationships across all sources to generate core concepts (i.e., relevant trends and anomalies) that address the primary and secondary sets of research questions [12]. As an extension to selective coding, the relationships established from axial coding were compared across different time periods. The goal of this comparison is to understand how existing analyses, proposals and legislation related to the Moon Agreement have evolved over time and what events triggered these changes.

Table 3.1: Key Legislation and Milestones Relevant to Designated Time Periods

Time Period	Key Events
1960 to 2000	Space Race; Creation of Moon Agreement, UNOOSA, and COPUOS
2001 to 2015	Pre-NewSpace Era; Creation of the U.S. Commercial Space Launch Competitiveness Act
2016 to 2020	Beginning of NewSpace Era; Creation of Artemis Accords
2020 to Present	NewSpace Era; Post-Artemis Accords

A total of 47 sources were selected for this study. From these sources, 575 excerpts were extracted, prompting the generation of 141 unique codes for analysis.

4. Discussion of Results

The results of the QMA are discussed below, between the three main categories of sources examined: academic and industry proposals, analogous legislation, and competing international and national legislation introduced by various states. Common trends and anomalies are discussed as per the QMA methodology.

4.1 Academic and Industry Proposals

Academic proposals have been present in the literature surrounding the issue of the MA since the late 20th century when the continuing non-ratification of the MA became clear. Several early proposals took opposing views on what direction to take after the MA, with some doubling down on its provisions, and others going as far as to reject the OST itself. Proposals supporting the general provisions of the MA often centre on the clarified details of a hypothetical strong international framework, as per Article 11.5 in the MA, which states "State Parties …. hereby undertake to establish an international regime …. to govern the exploitation of the natural resources of the Moon". In this context, strong international regimes refer specifically to those with broad authority enforcing provisions such as the equitable distribution of resources, licensing of resource extraction quotas / operational surface areas, and further restrictions focused on private and state actors. Examples of excerpts from these proposals include:

- "The [governing authority] should consist of a board of legal professionals selected from within the UN, tasked with approving or denying licence applications." [7]
- "Professor Carl Christol … believes that an intergovernmental organisation could take into consideration [public and private views] when deciding equitable distribution of shares from the profits and other benefits derived from the exploitation of outer space resources." [14]
- "The space authority could levy a production royalty on the operations and might be free to impose as it felt necessary. Additionally, it could… reserve a portion of every area approved for mining … to sell or rent to other interested parties to generate profits for itself or to distribute among non-spacefaring nations." [14]
- "The lunar regime should employ a system similar to that used by the Public Utilities Commissions (PUC). A PUC sets a maximum ROI for a privately owned utility company… A commission similar to a PUC should be created and be composed of balanced representation of both developed and developing countries… [and] would be

> responsible for setting an ROI which reflects the risk of investment in the particular lunar project." [15]

Some proposals such as this one from 2005, go as far as to propose an international agency which "must retain ownership of celestial bodies", while "leases [on property] would convey sufficient property rights to make investment safe and predictable…" [16]. It is the view of the authors that many of these proposals are very much not pragmatic, as they only exuberate the well-defined issues that lead to the initial non-ratification of the MA. For example in [16], the international regime would use the leasing mechanism as both a stream of income and as a "permit [for] the agency to inspect industries for adherence to safety and environmental regulations", while adding "the threat of eviction as a strong and final remedy should fines and market forces not curb destructive practices" [16]. There is no situation where countries such as the United States would accept such a limitation and threat upon their companies from any international body potentially composed of its geopolitical adversaries. Private actors themselves would see no reassurance in a lease determined by an exterior body as guaranteeing their investment, as the conditions that determine a "destructive practice" would have no guarantee of remaining static. Lastly, and most importantly, such a framework seems to strongly rely on methods of direct enforcement (i.e. to facilitate an "eviction"), which in the relevant space environment, is only possible by a group of stakeholders who would be the ones facing the eviction in the first place. There is not, and will not be any time in the future, a group of "UN space peacekeepers" that roam around the solar system enforcing the OST or similar instruments. In addition, it is unclear if the clear statement of 'ownership' entitled to an international body would be in violation of Article 2 of the OST.

In contrast, there are several examples of proposals made which go to the alternative extreme. In 2012, a proposed piece of US legislation known as "The Space Settlement Prize Act" was introduced outside of Congress, for which a commentary is found in [17]. In this legislation, legally enforceable property rights, exactly as applied terrestrially, are seen as the cornerstone from which the free exchange of goods and services is derived from. Taking examples from old homesteading practices in the 19th century, this act would allow large entities to claim up to 4% of the lunar land area, with each subsequent claim decreasing 15% in size, on a first-come first-serve basis. As long as the entities owning the land would provide minimum assurances towards its development (such as by the establishment of non-prejudiced transportation routes to Earth), they would be able to sell areas of land (backed on the market through government recognition of claim) to raise funds for the development of their lunar facilities and operations. There are several issues with such a proposal. Firstly, as the author notes, "many of the purchasers have no intention of going to the Moon, but rather see their purchase as an investment" [17]. This, in addition to the very generous land claim allowances and the lax/undefined regulations governing the minimal conditions that determine active use / investment of capital raised from selling land deeds, means that the lunar environment is at high risk of becoming a speculative market dominated by a few large multinationals for which there do not exist effective mechanisms at preventing large scale unused exclusion zones held up by state-sponsored "paper missions". This is against the ethos that has been the policy of every UNOOSA space law instrument to date. Regarding the actual legal question of property rights, the commentary on the act takes the example that the United States recognizing the property rights of a multinational group of investors does not constitute national appropriation by the United States, despite that read together, Article 2 (non-appropriation) and 6 (state party responsibility for national activities, such as those by private actors) of the OST mean that based on a 2004 statement by the International Institute of Space Law (IISL) "[OST] state parties are under a duty to ensure that, in their legal systems, transactions regarding claims to property rights on the moon and other celestial bodies have no legal significance" [17]. While going against Article 11.3 of the MA (no part of the surface/subsurface of the moon or any resources in place shall become property of any state, IGO/NGO, person or any private entity) might not be politically infeasible for the sake of this argument, the legal ambiguity regarding whether terrestrial property right claims by non-national entities violate the OST (as is the view of the IISL, among other entities) means that the OST itself must be reevaluated. This is an absolute political impossible due to the status of the OST as the bedrock of corpus juris spatalis in the international community, and this fact is recognised in all contemporary space resource legislations that will be discussed.

Table 4.1: Classification of Analogues through Mechanisms of Enforcement and Cooperation

		Mechanism									
		Appropriation of Resources	Credit System	International Body	Priority Rights	Licensing System	Registry	Taxation or Fees	Dispute Resolution Framework	Assistance for Developing Nations	Information Sharing and Transparency
Analog	Antartica Treaty	No	No	No	No	No	No	No	No		Yes
	Remote Sensing	Yes	No	No	Yes	No	No	No	No		No
	Montreal Protocol		Yes	Yes				No	Yes	Yes	Yes
	Law of the Sea	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
	ITU	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	No
	ISS			No				Yes	No	No	Yes
	Open Skies			Yes					Yes		Yes

4.2 Analogues

Analogous treaties or agreements from terrestrial (and space) environments can provide insight into different mechanisms that can be implemented in the context of the issues surrounding the MA. Many of the analogous treaties or agreements utilise the mechanisms presented in academic proposals: credit system, international body, priority rights, licensing system, registry, dispute resolution and taxation. The table below identifies what mechanisms are present in each analogues legislation.

4.2.1 Antarctica Treaty

To provide a means of governance regarding resources, research, appropriation, and environmental protection in Antarctica, the Antarctic Treaty was established in 1959, coming into full effect in 1961 [18]. The treaty consists of 14 articles that outline how activities in Antarctica shall be conducted. Because of the similarities between the environment of the Antarctic and Outer Space, principles of Antarctic governance have embedded themselves within the Outer Space Treaty and Moon Agreement. For example, Article 1 of the Antarctic Treaty and Article 3 of the Moon Agreement both call for peaceful uses of their respective domains [18]. Likewise, Article 4 of the Antarctic Treaty and Article 9 of the Moon Agreement both prohibit national appropriation. When considering resource extraction, two Antarctic agreements stand out. The first of these is the Convention on the Regulation of Antarctic Mineral Resource Activities, also known as the Wellington Convention [19]. The Wellington Convention attempted to govern resource extraction in the Antarctic through the creation of a commission, which would grant licensing to resources. The second is The Protocol on Environmental Protection, also known as the Madrid Protocol. Article 7 of this protocol states "any activity relating to mineral resources, other than scientific research, shall be prohibited" [20]. The Wellington Convention's licensing system is of interest as many states adopted such a system in their domestic legislation. This alludes to the fact that although international regime-based licensing is not supported, the need for regulation of space resources and the environment is possible under the control of individual states.

4.2.2 Principles on Remote Sensing

In 1986, the United Nations adopted resolution 45/61, Principles on Remote Sensing were established as a means of clarifying the rights and responsibilities of parties with respect to remote sensing from space [21]. Although these principles do not inherently pertain to resource extraction on the Moon, their implications on state sovereignty and freedom of outer space provide useful insight. Principles 6, 7, and 13 encourage states to cooperate, either through formal agreements or mutually agreed terms, on matters of technical assistance, infrastructure, and opportunity [21]. This is similar to articles in the OST and MA that call for international cooperation and benefit-sharing, with the distinction that no regulations are inherently imposed on the state. This is in agreement with the findings that developed nations will sign onto regulations that do not limit their ability to act as they choose, except for when they would benefit from other states also having this limited ability. Specifically concerning benefit-sharing, mandatory allocation of funds or resources to developing countries is seen as a deterrence to private investment. Thus, benefit-sharing governed by domestic legislation or optionally encouraged by international principles would be conducive to the NewSpace era. Regional agreements would also allow for more flexibility with missions and collaboration between various states, however, care must be taken to ensure compatibility between state legislation. This agrees with common findings that an international agreement is likely to be formed from existing domestic legislation, and the opposite is unlikely.

4.2.3 Montreal Protocol

The Montreal Protocol on Substances That Deplete the Ozone Layer is regarded as one of the most successful instances of international cooperation. Citing President Ronald Reagan, "the Protocol is the result of an extraordinary process of scientific study, negotiations among representatives of the business and environmental communities, and international diplomacy [...] a monumental achievement" [22]. One aspect of the Protocol that is of interest is the concept of 'Common but Different Responsibilities' (CDR), which was formalised in Principle 7 of the 1992 Rio Declaration of Environment and Development [23]. In the context of international law, CDR can be traced back to the CHM principle. It conveys that "while all states are responsible for global environment problems … some states are more responsible than others" [23]. Similar to the Montreal Protocol, it is important to acknowledge the right for all countries to access space (as outlined by the OST), but the inability of most developing countries to do so. The CDR concept can be applied to the Moon Agreement as a means of defining the roles of developed and developing countries pertaining to resource extraction. Clearly outlining the capabilities and expected participation of these two groups can aid in the development of joint missions that further the spacefaring capabilities of developing states, while also helping them gain access to space resources. The Montreal Protocol also had other characteristics that contributed to its success. For example, the Montreal Protocol allowed flexibility and modification [24]. As scientific consensus evolved, critical use cases for ODS emerged, which led to treaty revision. Building this flexibility and adaptability into a space resource framework would allow for compatibility with future domestic legislation.

With respect to CDR, it is important to discuss nuances within its application to the Moon Agreement. One of these nuances is the differing nature of the two treaties. The Montreal Protocol applied CDR as a means of solving an issue for which the international community had reached a consensus. In contrast, the Moon Agreement will be using the principles as a means to highlight the roles and benefits that countries with varying degrees of economic development can expect. Due to the availability of scientific data and the negative impact on every country, the former is much easier to reach an agreement upon than the latter. With respect to the OST, no mention of benefit-sharing or technical assistance is provided, other than the call for 'international cooperation'. Thus, implementation of strict CDR is not compatible with states that only accept the OST, since many of the CHC sentiments derive from the MA. However, the act of outlining the expected responsibilities of states and private actors as done with CDRs is a promising step towards incentivizing investment and collaboration between states.

4.2.4 Law of the Sea

In 1982 the United Nations Law of the Sea Convention (UNCLOS) was adopted. The purpose of this convention was to ensure peaceful usage of the sea for the common benefit of mankind [25]. It is enforced through three international bodies: ISA, ITLOS, and CLCS. Possible analogous bodies for the Moon include a licensing body that approves exploration and exploitation, ISA, and a judicial body to handle disputes, ITLOS [26]. ISA is composed of the Assembly, all state parties, and the council, the executive organ that approves contracts [27][28]. Meanwhile, ITLOS is composed of independent judges voted on by state parties [29]. Key tactics ISA uses in managing contracts include requiring nations to sponsor private actors, only signatories obtain access to licensing contracts [30], and a first-come, first-serve approach [31]. In addition, the original convention had a compulsory fee to fund the Enterprise. The Enterprise was designed to be a supranational company that would act on behalf of developing nations [32]. Developed countries raised concerns surrounding the initial treaty that led to the 1994 Amendment. The amendment delayed the development of the Enterprise and removed the mandatory technology transfer and financing of the Enterprise operation [33]. Even with 157 signatories including China and Russia, the USA is not a party of UNCLOS [34]. Due to the USA not being a member they are unable to access deep-sea mining contracts [30]. To compensate they have passed their law allowing NOAA to issue exploration licences, but companies are hesitant to begin due to lack of international recognition. Not being a party also means that the US can never officially claim that Russia or China is violating the convention [35]. In addition, due to the first-come, first-serve and a hundred percent acceptance of applications China has begun to establish a monopolisation, as they have the most contracts [30]. The implementation of UNCLOS illustrates strengths and weaknesses that can be carried into the proposed framework for the Moon. Developed nations do not want to be required to transfer technology or fund developing nations, especially if it may impact the commercial sector. An international body may be accepted as long as they do not over-restrict nations and the expectation is for applications to be accepted. In addition, benefits only available to signatories can motivate nations to sign but it may also cause monopolisation or fragmented law.

4.2.5 International Telecommunications Union

Established in 1992, the International Telecommunication Union is responsible for coordinating orbits, allocating radio spectrums, and developing technical standards [36]. It is globally recognized and accepted with 193 Member States and over 9000 private actors [37]. ITU works to set a norm for the sharing of space, but not restrict a nation's access. For example, ITU encourages States to limit their number of frequencies to the minimum essential to allow for equitable access [38] but there are no restrictions imposed. This is further illustrated by ITU being responsible for "coordinating" geosynchronous orbits, not "approving". It falls upon ITU Member states to approve licences for satellite systems and ensure satellite operators follow the rules and regulations [39]. All ITU requires is for States or non-governmental actors to submit frequency requirements and ITU examines interferences, assigns frequency, and adds information to the Master Information Frequency Registrar [40]. To prevent paper satellites, ITU's coordination also follows a use it or lose it policy [41]. ITU's approach to not imposing restrictions but offering standards, coordination efforts, and managing the registry is likely a key contributor to its success. This approach can be extremely beneficial for the moon as it is unlikely that any technologically developed nation will agree to an international body with restrictive power. Through this approach, an international body can coordinate lunar activities, provide a platform for international discussion, establish norms and standards, and maintain a registry. At the same time, nations will maintain their ability to approve or disapprove private actors but the nation will be liable for their actions.

4.2.6 International Space Station IGAs and MOUs

Since its first crew in 2000 the ISS established itself as the prime example of international cooperation in the space sector between multiple nations. It includes collaboration between the USA, Russia, Japan, Canada and European countries [42]. The ISS is unique to the analogous treaties discussed in this section because for the ISS participating nations agree to extend existing national terrestrial law to space. Each member nation registers its components and maintains its jurisdiction over the components. If a member nation wants to utilise another nation's component, they are required to obtain approval and must operate following foreign law [14]. This fragment between modules requires clear communication provided through Inter-Government Agreements (IGAs) and Memoranda of Understanding (MOUs). The IGAs, both bilateral and multilateral, have set the general principles and conduct for outer space. Topics of IGAs include liability, exchange of goods and data, liaison personnel, documentation and customs matters. MOUs are bilateral and do not generate rights or obligations but outline the design, development, and operation of the ISS component. To coordinate activities, a multilateral body has been established, the Multilateral Coordination Board (MCB) [43]. But, due to its origin and interaction with the other actors, NASA is still viewed as the "hub" or central actor [14]. This will likely not work for an international lunar implementation and would require an international body or neutral party to act as the "hub". The modular approach will likely be one of the most feasible as each country can independently build its components and restrict the data shared with other nations. In addition, the extension of terrestrial laws would likely be widely accepted by nations. Extending this to a lunar environment, installations would likewise be able to retain the jurisdiction of the host nation (in the case of private actors), under Article 8 of the OST.

4.2.7 Open Skies Treaty

The Open Skies was developed to increase stability, transparency and confidence in military activities. Signatories voluntarily opened their airspace to allow verification of arms control and disarmament agreements. Each State Party has an active quota, their observations of other nations, and a passive quota, observations of their territory. The observation requires flights to use designated aircraft with specific limitations on sensors. It also obligates observing state parties to give notice and supply the observed nation with their flight plans. A copy of all data collected must be supplied to the host country and other states receive a report. The Open Skies Consultative Commission (OSCC) is in charge of questions related to compliance, they resolve ambiguities and differences in interpretation and develop technical and administrative measures. As of 2021, both the United States and Russia have begun withdrawing from the treaty due to concerns about violations by the other parties [44]. This domino of withdrawals indicates that major nations will only sign treaties that require transparency if they gain equal or more information on other nations. This observation approach could be utilised for lunar activities and to ensure the peaceful use of space. The OSSC's limited role focused on resolving discrepancies and assisting in administrative tasks indicates the role an international body would take, if any, in lunar activities.

4.3 Competing Agreements and Legislation and the Perspectives of Spacefaring Powers

At the time of writing, only four countries have enacted legislation that deals directly with space resource extraction [45]:

- 2015 US Commercial Space Competitiveness Act (USA) [46];
- Federal Law No. (12) of 2019 on the Regulation of the Space Sector (U.A.E) [47];
- 2021 Act on Promotion of Business Activities Related to the Exploration and Development of Space Resources (No. 83 of 2021) (Japan) [48];
- Law of July 20th 2017 on the Exploration and Use of Space Resource (Luxembourg) [49].

The states which enacted these legislations are the US, UAE, Japan, and Luxembourg. Although drafted by different states with differing space capabilities, the documents are remarkably similar in scope, content, and implementation details. Each of these has a definite stance that any space resource extracted by a citizen of that state has the right to appropriation, and thus allows commercialization of said resource. The mechanism for which a citizen receives approval also manifests itself in a similar manner: a licensing / registration system which gives control to the host nation over the activities of private actors on the Moon. Each nation grants a licence for various actors to perform space activities, including resource extraction, in accordance with that nation's international obligations and liability conditions - this is a key point that will be returned in section 5. Every space resource legislation thus far explicitly affirms the OST as an obligation required of its private actors, even if debate [50] exists in legal circles on whether the non-commercialisation of extracted resources follows from the OST's non-appropriation principle. In essence, all these states aim to encourage private investment in the space sector by establishing the legal framework required to do so within their own domestic systems and international obligations. As it can be summarised, "it is urgent to consider domestic laws allowing for the exploitation of celestial bodies for economic purposes in light of international space law in order to avoid contradictions or gaps within the legal framework in this area and in order to provide a clear understanding of the legal obligations of States in space exploration" [51]. These are the domestic laws that currently exist which will have to be considered in the creation of a wider internationally accepted regime, but it is certain that more will emerge in the coming years, as has been the trend since the 2015 US Act.

While not being a piece of binding legislation or international law, the US-led 2020 bilateral Artemis Accords are the first large-scale international agreement implemented to govern the utilisation of space resources on the Moon. Expanding on similar principles as present in the Hague Building Blocks, a set of space resource utilisation proposals made by an international working group, the Artemis Accords are notable for several reasons [5]:

- Affirming obligations of parties with respect to supervising private actors under the provisions of the OST and the other non-MA UNOOSA treaties;
- A clear statement recognising that the extraction of space resources does not constitute national appropriation under Article 2 of the OST;
- Clarifying the concept of harmful interference prevention (Article 9 of the OST) through the creation of "safety zones";
- The bilateral nature of the agreement, signifying the use of political commitments between the US and other states as the governing mechanism instead of a "traditional" instrument of international law, and the multiple statements of deferment to various domestic regulations.

Other provisions of the Artemis Accords are less interesting in the context of this discussion because they either reiterate obligations already covered by the main UNOOSA treaties (peaceful purposes, emergency assistance, registration), or are on topics beyond the scope of the space resource issue (orbital debris, interoperability, space heritage protection). The point regarding deferment to the non-MA UNOOSA treaties is important as it reaffirms the legal foundation on which future space law can be based, alleviating fears that this established international law would be discarded like the MA, and establishing basic constraints, such as the prohibition of national appropriation. The second point provides legal clarity to much-debated questions surrounding space resources and property, firmly codifying the de-facto status (such as in pre-AA domestic legislation like that of the US, Luxembourg and the UAE) of the OST interpretation where extracted resources become the full property of the private actor, unbeholden to any mandated regime as could be imagined with the CHM principle. The third point provides a relatively novel approach to the question of securing the interests of private actors engaged in commercial operations while not violating the non-appropriation principle of the OST. The concept of safety zones was mentioned previously in the Hague Building Blocks as well as in other literature from

before 2020 [52] as a method of providing the exclusionary tenant of property rights with scope ("The size and scope…should be determined in a reasonable manner leveraging commonly accepted scientific and engineering principles" [53]) and temporal ("safety zones [are] expected to change over time reflecting the status of the relevant operation…ending when the relevant operation ceases" [53]) restrictions. Officially, a safety zone is defined as "the area in which nominal operations of a relevant activity or an anomalous event could reasonably cause harmful interference" [53]. While more limiting than traditional terrestrial property rights, safety zones are still appealing to private actors since there are no international limits or restrictions on profitable operations provided they are ongoing. In addition, universally accepted principles of space object ownership/jurisdiction retention (i.e. Article 8 of the OST) mean that the operations and equipment can be bought, sold or otherwise transferred without restriction while retaining the exclusionary safety zone (appropriately rescoped to the nature of the new operation). In essence, while the concept of a "safety zone" does seem like a slight exploitation of Article 9 of the OST (of which the spirit was to prevent harmful interference with mainly non-commercial activities of state entities) to the benefit of private commercial actors, the arguments that it does follow the non-appropriation principle while satisfying practical interests of commercial exclusion means that it is a foundation that can be built upon. To fully respect the non-appropriation principle, scholars argue that "their exact extent, configuration, and location would have to be clearly identified in order to respect the non-appropriation principles, and the right to 'free access' to all areas of a celestial body" [54]. It must be noted that the Artemis Accords do not mention free access as a required feature for every safety zone, and delegates overseeing the establishment, maintenance and dissolution of safety zones to individual signatory nations. The main issue arising from this is that a reasonable determination on what an "appropriate safety zone" entails will doubtless differ from nation to nation, and communications regarding the nature of operations that would be needed to justify the creation of a safety zone can easily be suppressed by the private entity by simply having the host state invoke "appropriate protections for proprietary and export-controlled information", as is possible through section 11.9 of the accords. The concept of safety zones has also been described as a form of priority rights, however, the non-practicality of an international regime governing the activities of signatory nations and private companies means alternative solutions all take the form of a priority system to the immediate advantage of the current capable spacefaring entities.

The final unique and established feature of the Artemis Accords is its bilateral nature, as opposed to traditional instruments of international law. While this is not uncommon in the general sense of how countries interact with each other, it does show a trend away from traditional UN treaties that have defined space law as a more pragmatic and less bureaucratic process. This is ironically a reality recognised by the UN itself, which writes in the COPUOS subcommittee on space resources, "we do not think this international coordination must take the form of a treaty… a binding treaty is likely inappropriate before the actual activity begins, and may not even be appropriate thereafter" [55]. Geopolitical rivals of the United States, mainly China and Russia have attacked the bilateral nature of the Artemis Accords as a method to circumvent the process of international law by pushing through a specific interpretation of the OST in order to unilaterally set ground rules in lunar exploration to the benefit of the US [56]. More extreme views stemming from deep-set tensions between the relevant countries see it as the first step in the US and its allies attempting to claim sovereignty on large areas of the Moon. In any case, US domestic legislation (the Wolf Amendment) prevents NASA from cooperating with China, such as in the form of bilateral agreements. This shows a limitation of the Accords as a final form of an appropriate international regime due to its entanglement with US domestic legislation that prevents the participation of certain countries. These issues are further discussed in section 5.

When considering the Artemis Accords, it is also useful to analyze the 'May 2017 Written Testimony of James E. Dunstan & Berin Szoka Senate Committee on Commerce, Science, & Transportation Subcommittee on Space, Science, and Competitiveness' attempted to summarize the U.S. Senate position regarding the OST and the MA [57]. The Accords echo many of the sentiments addressed in this paper. The paper itself details how amending the OST, MA, or creating a new international regime is not in the interests of the U.S. as the current state of space affairs allows the U.S. to have flexibility in how it interprets the OST, how space activities are carried out, and gives it the ability to enact domestic legislation that influences other states. Note that although this is the U.S. perspective (and as such, heavily U.S.-centric), the sentiments can be extrapolated to developed countries, to a logical degree.

Flexibility is enjoyed by the U.S. in the form of self-executing and non-self-executing principles. In ordinary terms, a self-executing principle is a specific, unambiguous statement that immediately becomes the 'law of the land' [57]. This contrasts a non-self-executing statement, which must be

accompanied by domestic legislation detailing its implementation before it becomes the 'law of the land'. For example, the provisions stated in Article 3 of the OST are interpreted as self-executing, whereas state supervision of actors (Article 6) is non-self-executing. This enables the U.S. to take the position that "a lack of supervision is not, in and of itself, a violation of international law; it merely raises the chances that a non-governmental activity [...] will interfere with the activities of another space activity resulting in harm," [57]. This is one of the reasons it is not in the interests of the U.S. to amend the OST. Amending the wording and provisions of the original OST articles would introduce new restrictions that the U.S. would reduce the flexibility that the U.S. currently enjoys. However, it is also not in the best interest of the U.S. to adopt a completely *Laissez-faire* approach to international space law, due to its concerns about other state powers, namely China and Russia. It would be in their best interests to establish *minimum* international standards regarding weapons, military bases, safety zones, and non-appropriation. Minimum enforcement of self-executing OST provisions is required in order to expect reciprocal enforcement from other space powers without limiting the flexibility currently available to the U.S. From a NewSpace perspective, it is also not commercially logical for the U.S. to impose any more restrictions than are required to spur private investment in the sector. The Senate implies that domestic legislation and international guidelines should be the driving force for future space law. This domestic legislation is expected to be in the form of a domestic body with transparent processing requirements and structure, as well as an appeals process [57]. This view, as well as many points in the paper, agree with the generally accepted position of developed states as seen in current literature and legislation.

5. Proposed Framework

Previous analyses in the paper have discerned the general views actors have relating to what a space resource framework should (and should not) constitute. The various views expressed by actors point towards a framework consisting of an international set of guidelines which nations may adopt. The main purpose of these guidelines would be to facilitate interactions between actors, whereas other responsibilities, such as licensing for resource extraction, would be handled by states through domestic legislation. These guidelines would be non-binding, as well as encourage benefit-sharing and providing assistance to non-spacefaring nations. Regarding interactions, there are two key components that this international framework would establish: (1) internationally agreed rules surrounding safety zones and (2) a registry containing safety zones on a celestial body (in this case, the Moon) that are currently in effect.

The internationally agreed rules surrounding safety zones would resemble those that exist within The Hague Building Blocks and the Artemis Accords. They would serve as the primary form of managing harmful interference on a celestial body. Actors participating in space activities would be expected to set up a reasonable safety zone prior to beginning their operations. Similar to the two legislations above, these safety zones would be 'living areas' which would adapt as the scope of the activity changes. Safety zones would clearly be stated as not violating the appropriation principle in the OST (Article 22) and also not violating the freedom to explore (Article 11). This implies that a state is free to conduct activities in the safety zones of other states, however, there is a heightened risk of harmful interference. Disputes concerning safety zones, as well as disputes relating to space activities, would be settled through private arbitration. The exact nature of safety zones - rules, timing, authority, etc. - should be determined through international discourse and registered with the UN. This will ensure that whatever guidelines are reached will have the highest chance of being internationally accepted and non-biased towards a specific state. Registration with the UN does not mean that the body will enforce these guidelines. Instead, it will serve as a sentiment of neutrality in the guidelines and overcome exclusions and state-centric sentiments that are present in legislations such as the Artemis Accords. Providing detailed guidelines for inclusion within the framework is out of the scope of this paper.

Once safety zones are established, the framework will contain a public registry of these areas on a celestial body. This registry will include information that specifies to which state the safety zone belongs. It will also include optional state-supplied information concerning which actor is using the safety zone, its use case, the expected duration and change in the zone, and any other information of relevance. This registry is meant to serve as a method of international coordination. States are able to plan missions accordingly and limit instances of harmful interference. The system will function similarly to the ITU. As such, there is also an emphasis on international communication to maintain the legitimacy of claims. This will prevent misbehaviour by states, such as 'paper zones' - safety zones that are established but are not planned to be in use for some extended period of time.

This framework, including the 2 main components listed above, is within the international scope and imposes minimal requirements on states. Leaving licensing, liability, and other authorization details to

individual states provides them with greater flexibility. The framework also encompasses all existing domestic space resource legislation to date and, judging by the recent trend, most domestic legislation will follow. Additionally, by specifically stating the stipulations of appropriation, outlining interactions of all actors in space (via safety zones), and clarifying benefit-sharing, the framework clears up ambiguities present in the MA and incentivizes private investment. Benefit-sharing and transparency are encouraged, but as mentioned, minimum restrictions are imposed at the international scope to make this framework viable in the NewSpace Era.

The proposal outlined above is obviously similar in scope to the current status of the Artemis Accords. Does this mean that the proposed and intended status quo has already been reached? Additionally, how do we rectify the fact that there exists opposition to the Artemis Accords, specifically the fact that it is US-led? The answer to the second question will inform the first. While Russia and China voice strong opposition to the accords as an instrument of US foreign policy beholden to its interest in propagating a specific interpretation of the OST, more and more countries have adopted it, such as Israel, India, Saudi Arabia, Rwanda, the UAE, and Germany. The list of signatories as of 2023 surpasses the number of signatories to the MA. Aside from its association with the Artemis program itself, and its status towards signatories as a bilateral agreement between their government and that of the US, there is inherently nothing US-centric about the main novel additions presented in the accords, as evidenced by its wide-ranging acceptance even by not traditionally close US allies. While the provisions of the accords do serve American interests, all evidence points towards the fact that the interests of other countries are equally satisfied. Chinese private ambitions towards the Moon are well documented, and their government and industry would benefit likewise from having a set of universally acceptable principles that codify what is already the de jure reality in four distinct countries as domestic law (of the four, three legislations were implemented before the accords were introduced). The main issue of the bilateral nature of the accords can be mitigated by introducing the parallel development of an instrument like the accords in the UN, where the agreement will become multilateral and discussion can take place regarding the finer details of establishing, for example, the reasonable limits that define a safety zone. As stated by a Chinese law commentator, “The Artemis Accords are doing more agenda setting than law writing right now, but every space-capable nation could stand to gain cooperatively from moving this agenda forward” [56]. In the next few years, taking into account the various successful examples of international agreements, the pragmatic considerations of private actors and securing space resource ownership, the different stakeholders that drive policy and can create international law by customary practice, a comprehensive “three-tiered” regime might be one reasonable possibility for how the framework we seek will look like

Tier 1: The first tier is the currently accepted set of space law treaties (OST, RC, LC, and RA). These have been a successful bedrock for international space law for more than 50 years, have broad acceptance, and are sufficiently flexible that the near political impossibility of passing new instruments of space law internationally can be avoided with selective clarifications.

Tier 2: The second tier is a multilateral agreement, similar to that of the Artemis Accords, which is decoupled from the US-bilateral nature of its current state. The main clarifications to the OST are (1) space resource extraction does not constitute national appropriation per Article 2 of the OST and (2) while respecting the non-appropriation principle, safety considerations, and the need for private entities to at minimum the right to exclusion during commercial operations, “safety zones” similarly as they are described in the Artemis Accords are introduced. A system such as the New York Convention on private arbitration is introduced, where state parties to this agreement agree to enforce arbitration decisions on companies registered within them. The successful nature of the NYC terrestrially, and of private arbitration as a quick and fair dispute resolution mechanism in space today should not make this a contentious addition, and it removes some of the burden of creating detailed, overly restrictive and non-adaptive rules with regard to the definition of safety zones. At this level of multinational agreement, a land use registry would also be hosted, as per the previous discussions.

Tier 3: The final tier is the domestic laws of the signatory nations. As mentioned, and fully in line with what responsibilities are claimed under the current space resource domestic legislations emerging around the world since 2015, domestic laws are responsible for all aspects of regulating, taxing, and allowing/disallowing all private actor activities registered in their country. If a nation wants to levy a tax on each of its private space missions to fund a mission for a developing nation, it has the full freedom to do so here. All bilateral agreements between nations, MOUs, or other similar interests, are done at this level. The only requirements on the domestic legal systems of each signatory nation is to enforce the provisions agreed to in the multilateral agreement, and the obligations had underneath the main UNOOSA treaties.

The collection and interactions between these three systems of law, where international foundational law is connected to a relatively free system of domestic control by an agreement that introduces the minimal amount of mutually acceptable clarifications and regulations that prevent large-scale fragmentation, seems to be a likely candidate for how the near term future of space law will look like. Of course, there remain many unresolved and potential issues. For example, countries can introduce their domestic regulations under this framework in a way that incentivises companies to register underneath their flag, such as by introducing tax breaks or a lax registration process (that still meets the minimal requirements underneath the OST). This is a side effect we see on Earth as well, with most cruise ships registered in Panama due to favourable labour laws, and many US companies incorporated in the state of Delaware due to its tax and business-friendly legal system. Just as in these cases, companies will weigh the cost and benefits of incorporating in different locations, and countries such as the US are free to create their own domestic legislation to mitigate that issue (such as with ITAR). Another potential unresolved issue is with state-private entity arbitration. Existing mechanisms such as the International Centre for Settlement of Investment Disputes (ICSID) or terrestrially successful arbitration/mediation conventions (such as the NYC or Singapore conventions) will have to be adopted and codified to this environment, perhaps by new guidelines such as the 2011 Optional Rules for Arbitration of Disputes Relating to Outer Space Activities by the Permanent Court of Arbitration [58].

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