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SPACE LAW AND THE COMMERCIALIZATION OF OUTER SPACE: WHO OWNS THE MOON?

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1. ABSTRACT

As private enterprises increasingly venture into outer space, questions about ownership, resource exploitation, and legal accountability have come to the forefront of international discourse. The foundational principles of space law, particularly the 1967 Outer Space Treaty, prohibit national appropriation of celestial bodies, including the Moon. However, the treaty's ambiguity regarding private commercial activities has led to a surge in national legislation and corporate initiatives that challenge the existing legal framework. This paper critically examines the evolution of space law in the context of commercialization, focusing on the central question: Who owns the Moon? It analyzes the legal, ethical, and geopolitical implications of lunar resource extraction, evaluates emerging national laws such as the U.S. Commercial Space Launch Competitiveness Act (2015), and discusses the adequacy of current international agreements. The paper concludes by advocating for a multilateral regulatory framework that balances innovation with equitable access and environmental stewardship.

KEYWORDS:

Space Law, Outer Space Treaty, Moon, Commercialization, Artemis Accords, Resource Extraction, Legal Pluralism, International Law.

2. INTRODUCTION

The final frontier is no longer the exclusive domain of state actors. In the 21st century, space exploration is undergoing a dramatic transformation driven by the rise of private companies such as SpaceX, Blue Origin, and Relativity Space. These corporations, backed by billions in private investment, are launching satellites, planning lunar missions, and even envisioning human settlements on Mars. This commercialization of space raises urgent legal questions: Who governs space activities? Can private entities claim ownership of celestial bodies? And most provocatively—who owns the Moon?

The Moon, Earth's only natural satellite, has long captured human imagination. Once a symbol of mystery and exploration, it is now viewed as a potential source of vast economic value—rich in helium-3, rare earth elements, and water ice. As nations and corporations race to exploit these resources, the legal framework governing outer space is being tested like never before.

The cornerstone of space law, the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies—commonly known as the Outer Space Treaty (OST)—prohibits national appropriation of celestial bodies.¹ Yet, it remains silent on the rights of private actors to extract and own space resources. This legal gray area has prompted countries like the United States and Luxembourg to pass domestic laws allowing private ownership of space-mined materials, effectively circumventing the spirit, if not the letter, of international law.

This paper explores the tension between the foundational principles of space law and the realities of commercial space ventures. It examines the historical development of space law, analyzes key international treaties, evaluates national legislation enabling private space exploitation, and assesses the implications of the Artemis Accords—a U.S.-led initiative that seeks to establish norms for lunar exploration. Ultimately, it argues that without a robust, inclusive, and binding international regime, the commercialization of the Moon risks exacerbating global inequalities and triggering a new era of space colonialism.

3. HISTORICAL DEVELOPMENT OF SPACE LAW

The origins of space law can be traced to the Cold War era, when the United States and the Soviet Union engaged in a fierce space race. The launch of Sputnik 1 in 1957 marked the beginning of human activity in outer space and raised immediate legal and political concerns.² Could a nation claim sovereignty over space? Would space become a battlefield? In response, the United Nations established the Committee on the Peaceful Uses of Outer Space (COPUOS) in 1959 to develop international space law.³ Over the next decade, COPUOS drafted a series of treaties that form the backbone of the current legal regime.

¹ 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], art. II.

² Walter A. McDougall, *The Heavens and the Earth: A Political History of the Space Age* (Johns Hopkins University Press, 1985).

³ United Nations Office for Outer Space Affairs (UNOOSA), History of the Committee on the Peaceful Uses of Outer Space, <https://www.unoosa.org/oosa/en/ourwork/copuos/history.html>.

The first and most significant of these is the 1967 Outer Space Treaty, ratified by over 110 countries, including all major spacefaring nations.⁴ The treaty establishes five core principles:

1. Freedom of exploration and use of outer space by all states (Article I).
2. Prohibition of national appropriation of celestial bodies (Article II).
3. Non-militarization of celestial bodies (Article IV).
4. State responsibility for national space activities, including those of private actors (Article VI).
5. International liability for damage caused by space objects (Article VII).

Article II is particularly relevant to the question of lunar ownership. It states:

"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."⁵ This provision was designed to prevent a repeat of terrestrial colonialism in space. However, it does not explicitly address private appropriation or the ownership of resources extracted from celestial bodies. This ambiguity has become the focal point of legal debate in the age of commercial space.

Following the OST, several supplementary treaties were adopted:

- The Rescue Agreement (1968): Obliges states to assist astronauts in distress.⁶
- The Liability Convention (1972): Establishes fault-based liability for damage caused by space objects.⁷
- The Registration Convention (1975): Requires states to register space objects launched into orbit.⁸
- The Moon Agreement (1979): Declares the Moon the "common heritage of mankind" and calls for an international regime to govern resource exploitation.⁹

Despite its ambitious goals, the Moon Agreement has failed to gain widespread acceptance. As

⁴ Outer Space Treaty, art. I.

⁵ Id., art. II.

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.

⁷ Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 961 U.N.T.S. 187.

⁸ Convention on Registration of Objects Launched into Outer Space, Jan. 14, 1975, 1023 U.N.T.S. 123.

⁹ 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], art. 11.

of 2024, only 18 states have ratified it, and none are major spacefaring nations.¹⁰ The United States, Russia, China, and India—all of which have active lunar programs—have not signed the treaty. This lack of ratification severely undermines its legal authority and highlights the growing disconnect between international law and national interests.

4. THE RISE OF COMMERCIAL SPACE ACTIVITIES

The 21st century has witnessed a paradigm shift in space exploration. No longer dominated by government agencies like NASA or Roscosmos, the space sector is increasingly driven by private enterprises. Companies such as SpaceX, Blue Origin, and Rocket Lab are reducing launch costs, increasing mission frequency, and developing reusable rocket technology.

This shift is often referred to as the "New Space" era, characterized by innovation, agility, and profit-driven motives.¹¹ Private companies are now involved in satellite deployment, space tourism, and plans for lunar and Martian colonization.

NASA's Artemis Program, aimed at returning humans to the Moon by 2026, Exemplifies this public-private partnership. The agency has contracted companies like SpaceX to develop lunar landers and has invited private firms to bid on delivering scientific payloads to the Moon through its Commercial Lunar Payload Services (CLPS) program.¹²

This growing role of private actors raises a critical legal question: How can states ensure compliance with international law when commercial entities conduct space activities?

Article VI of the Outer Space Treaty provides the answer:

"States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the Moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities."¹³

This means that even if a private company launches a mission, the launching state remains legally responsible under international law. However, the treaty does not clarify whether private entities can own resources they extract from the Moon.

¹⁰ UNOOSA, Status of International Agreements Relating to Activities in Outer Space, <https://www.unoosa.org/oosa/en/ourwork/space/space-law/treaties/status/index.html>

¹¹ John M. Logsdon, The New Space Era: How Private Industry is Transforming Space, *The Space Review*, July 12, 2021.

¹² NASA, Commercial Lunar Payload Services (CLPS), <https://www.nasa.gov/clps>

¹³ Outer Space Treaty, art. VI.

5. NATIONAL LEGISLATION AND THE LEGALIZATION OF SPACE MINING

In the absence of clear international rules, several countries have enacted domestic laws to enable private space resource exploitation.

5.1 UNITED STATES – COMMERCIAL SPACE LAUNCH COMPETITIVENESS ACT (2015)

The most significant legislative development came in 2015 with the passage of the U.S. Commercial Space Launch Competitiveness Act (CSLCA), also known as the Spurring Private Aerospace Research and Development Act.¹⁴

Section 403 of the CSLCA states:

"A U.S. citizen engaged in commercial recovery of an asteroid resource or a space resource shall be entitled to possess, own, transport, use, and sell the asteroid resource or space resource obtained in accordance with applicable law."¹⁵

This law explicitly grants private companies the right to own and sell resources extracted from space, including the Moon. However, it carefully avoids claiming sovereignty over celestial bodies, thereby attempting to comply with Article II of the OST.

The U.S. government argues that owning resources is not the same as claiming territory. As then-President Barack Obama stated upon signing the bill:

"The ability to retain asteroid resources should not be interpreted as ownership of the asteroid itself."¹⁶

Critics, however, argue that this distinction is legally and semantically thin. By allowing private ownership of lunar materials, the U.S. may be engaging in de facto appropriation, undermining the principle of non-appropriation.

5.2 LUXEMBOURG – SPACE RESOURCES LAW (2017)

Luxembourg followed the U.S. model with its Law on the Exploration and Use of Space

¹⁴ U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114-90, 129 Stat. 704 (2015).

¹⁵ Id., § 403.

¹⁶ White House Press Release, Statement by the President on the Signing of S. 1297, the U.S. Commercial Space Launch Competitiveness Act, Nov. 25, 2015.

Resources in 2017.¹⁷ The law grants companies registered in Luxembourg the right to own space resources they extract. The country has since attracted major space mining firms, positioning itself as a European hub for space commerce.

5.3 UNITED ARAB EMIRATES AND JAPAN

The UAE enacted a Space Law (2020) that includes provisions for space resource utilization, while Japan passed the Act on the Promotion of Business Activities Related to the Exploration and Development of Space Resources in 2022.¹⁸

These national laws reflect a growing trend: countries are unilaterally creating legal frameworks to support commercial space ventures, even in the absence of international consensus.

6. THE ARTEMIS ACCORDS: A NEW FRAMEWORK FOR LUNAR GOVERNANCE?

In 2020, the United States launched the Artemis Accords, a set of bilateral agreements with partner nations to establish principles for lunar exploration.¹⁹ As of 2024, over 40 countries have signed the Accords, including Canada, Japan, the UK, India, and Brazil.²⁰

The Accords are not a treaty but a political agreement grounded in the Outer Space Treaty. They emphasize:

- Peaceful purposes
- Transparency
- Interoperability
- Emergency assistance
- Preservation of heritage
- Space debris mitigation
- Registration of space objects

Crucially, the Accords introduce the concept of "Safety Zones"—areas around lunar operations

¹⁷ Law of November 20, 2017, on the Exploration and Use of Space Resources, Mémorial A, No. 227 (2017).

¹⁸ Japan, Act on the Promotion of Business Activities Related to the Exploration and Development of Space Resources, Act No. 32 of 2022.

¹⁹ NASA, Artemis Accords, <https://www.nasa.gov/specials/artemis-accords/>

²⁰ Id.

where other actors must coordinate to avoid harmful interference.²¹

While proponents view the Accords as a practical step toward cooperation, critics argue they represent a U.S.-led effort to legitimize commercial exploitation of the Moon. By allowing signatories to establish safety zones, the Accords may enable de facto territorial control, even if not de jure sovereignty.

Moreover, key spacefaring nations like China and Russia have rejected the Accords, calling them unilateral and exclusionary.²² Instead, they are developing the International Lunar Research Station (ILRS), a rival project that emphasizes multilateralism and equitable access.²³

This geopolitical divide raises concerns about a new space race—not between ideologies, but between competing legal and economic systems.

7. LEGAL CHALLENGES AND INTERPRETATIONS

The central legal question—Can private entities own lunar resources?—remains unresolved. Two main interpretations have emerged:

7.1 THE "NON-APPROPRIATION" ARGUMENT

Scholars like Frans von der Dunk and Michael Listner argue that the Outer Space Treaty's prohibition on national appropriation extends to private actors and includes resources.²⁴ They contend that allowing ownership of lunar materials violates the spirit of Article II and the principle of space as the "province of all mankind."

They point to the Moon Agreement, which explicitly states:

"The Moon and its natural resources are the common heritage of mankind."²⁵

Even though the Moon Agreement lacks widespread ratification, its principles reflect a normative trend toward equitable sharing.

7.2 THE "RESOURCE UTILIZATION" ARGUMENT

Conversely, legal experts such as Joanne Irene Gabrynowicz and Christopher Johnson argue

²¹ Artemis Accords, Principle 7: "Safety Zones."

²² Xinhua News Agency, China Rejects U.S.-Led Artemis Accords as 'Unfair,' Jan. 30, 2023.

²³ CCTV, China and Russia to Build International Lunar Research Station, June 16, 2021.

²⁴ Frans G. von der Dunk, The Outer Space Treaty and Commercial Activities in Space, 40 *Journal of Space Law* 1 (2015).

²⁵ Moon Agreement, art. 11.

that the OST does not prohibit resource extraction, only territorial claims.²⁶They compare space mining to fishing in international waters—no one owns the ocean, but fishers can own the fish they catch.

This view is supported by the U.S. State Department, which maintains that the CSLCA is consistent with international law because it does not assert sovereignty.²⁷

The 1986 Declaration on the Principles Governing the Use of Space for the Benefit of All Mankind reinforces this interpretation, stating that space resources should be used "for the benefit of all countries."²⁸

However, "benefit" is vaguely defined. Does it mean profit-sharing? Technology transfer? Or merely non-exclusion?

8. ETHICAL AND GEOPOLITICAL IMPLICATIONS

The commercialization of the Moon is not just a legal issue—it is an ethical and geopolitical one.

8.1 RISK OF SPACE COLONIALISM

Without equitable governance, lunar resource exploitation could replicate patterns of terrestrial colonialism. Wealthy nations and corporations may monopolize access to the Moon, leaving developing countries behind.

As Dr. Ram Jakhu of McGill University warns:

"If we allow a few powerful actors to dominate space, we risk creating a two-tier system where space is for the rich and exclusionary."²⁹

8.2 ENVIRONMENTAL CONCERNS

The Moon is a pristine environment. Unregulated mining could cause irreversible damage—disrupting lunar geology, contaminating regolith, and destroying scientific sites like the Apollo landing zones.

²⁶ Joanne Irene Gabrynowicz, *Space Law in the 21st Century*, 45 Proceedings of the IISL Colloquium on the Law of Outer Space (2002).

²⁷ U.S. Department of State, *Legal Framework for Space Resource Utilization*, Apr. 2020.

²⁸ Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, U.N. Doc. A/RES/41/65 (Dec. 3, 1986).

²⁹ Ram S. Jakhu, *Global Space Governance: An International Study*, Springer (2019), p. 143.

The OST requires states to avoid "harmful contamination" of celestial bodies (Article IX), but enforcement mechanisms are weak.³⁰

8.3 MILITARIZATION RISKS

As nations establish lunar bases, the line between civilian and military use may blur. The OST bans weapons of mass destruction in space but allows conventional weapons.³¹ Future conflicts over lunar resources could lead to an arms race in space.

9. THE NEED FOR A MULTILATERAL REGULATORY FRAMEWORK

The current legal landscape is fragmented and increasingly unilateral. To prevent conflict and ensure equitable access, the international community must develop a binding multilateral framework for lunar governance.

9.1 STRENGTHENING COPUOS

The United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) remains the most legitimate forum for space law development. It should be empowered to:

- Clarify the legal status of space resources.
- Establish a licensing system for commercial activities.
- Create an international body to monitor compliance.

9.2 REVIVING THE MOON AGREEMENT

While the Moon Agreement is currently ineffective, its core principle—that space is the "common heritage of mankind"—remains morally compelling. A revised version, with incentives for participation and clear benefit-sharing mechanisms, could gain broader support.

9.3 ESTABLISHING A LUNAR RESOURCE AUTHORITY

Modeled after the International Seabed Authority (ISA), a Lunar Resource Authority (LRA) could regulate extraction, collect royalties, and distribute benefits to all nations, especially developing ones.

Such an authority could:

- Issue permits for mining operations.

³⁰ Outer Space Treaty, art. IX.

³¹ *Id.*, art. IV.

- Set environmental standards.
- Ensure transparency and accountability.

9.4 PROMOTING INCLUSIVE DIALOGUE

Any new framework must include voices from the Global South, indigenous communities, and civil society. The "One World, One Sky" principle should guide negotiations.

10. CASE STUDIES: RECENT DEVELOPMENTS

10.1 NASA'S CLPS PROGRAM AND PRIVATE LANDERS

In 2024, Intuitive Machines successfully landed its Odysseus spacecraft on the Moon, becoming the first private company to do so.³² While a NASA payload, the mission was privately funded and operated.

This blurs the line between state and private responsibility. Who is liable if the lander causes damage? Who owns the data and materials collected?

10.2 CHINA'S LUNAR SAMPLE RETURN AND ILRS

China's Chang'e 5 mission (2020) returned lunar samples to Earth, and the country plans to establish a robotic research station by 2030.³³ China has offered to share samples with other nations, but under its own terms.

This raises questions about data sovereignty and scientific collaboration.

10.3 RUSSIA'S LUNA-25 FAILURE

Russia's failed Luna-25 mission in 2023 highlighted the risks of space exploration.³⁴ Under the Liability Convention, Russia would be liable for any damage caused, but enforcement remains challenging.

11. CONCLUSION

The question "Who owns the Moon?" has no simple answer. Legally, no one does—under the Outer Space Treaty, celestial bodies cannot be owned by nations or, by extension, private entities. Yet, practically, the Moon is becoming a contested frontier, with powerful states and corporations staking claims through technological presence and national legislation.

³² NASA, NASA's First Commercial Lunar Mission Successfully Lands on Moon, Feb. 23, 2024.

³³ Xinhua, China's Chang'e-5 Returns Lunar Samples, Dec. 17, 2020

³⁴ BBC News, Russia's Luna-25 Moon Mission Ends in Failure, Aug. 20, 2023.

The commercialization of space presents both opportunities and dangers. It can drive innovation, reduce costs, and expand human presence beyond Earth. But without a fair and enforceable legal framework, it risks entrenching inequality, triggering conflicts, and despoiling a shared cosmic heritage.

The Artemis Accords and national space laws represent important steps, but they are insufficient. A truly global solution is needed—one that upholds the principles of equity, sustainability, and peaceful cooperation.

As humanity stands on the brink of a new era in space, we must ask not just can we go to the Moon, but how should we go there? The answer will define not only our future in space but our values on Earth.

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