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Emerging Trends of Neo-Colonialism on Earth and the Future of Space Law

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Abstract

The future of outer space and space law is closely related to the newly developing wave of neo-colonialism on earth. The increasing impact of major power relations, resource driven agendas and with this transformation in global geopolitics, world has seen populist leaders such as Donald Trump emerge in the United States, which means that much of mankind's colonization in space will be shaped by these factors that are discretely happening on earth. This paper contends that as emerging geopolitical dynamics and the expansion of corporate entities in space alter the prospects for outer space and space law, there are also new challenges. The historical neo-colonial behavioral patterns on earth have increased the risk of "space colonialism". Such practices threaten peaceful and sustainable exploration of space for all. The study looks at the weaknesses of current space law, particularly the Outer Space Treaty; resource exploration, the activities of the private sector i.e. non state actors and conflict prevention. It calls for a legal framework which is both robust and accommodating of the increasing participation by private actors, protecting equitable access to space resources and preventing this from being monopolized by just a few. The paper explores the need for international cooperation, innovative public private governance models and new mechanisms of law to manage resources to protect the environment and resolve conflicts. It emphasizes the need for perspectives from developing countries to be taken into account, to ensure that benefits are equitably shared and not widening already existing global inequalities. Finally, this paper calls for a multidisciplinary approach which combines perspectives from international relations with those of space law so that all humans can look forward to a time when development in outer space is peaceful, sustainable and fair.

Keywords

Space Governance, Neo Colonialism, Space Resources, Space Law, International Relations, Sustainable Space Exploration

1. Introduction

The exploration and utilization of outer space has long been a domain of international cooperation and scientific advancement. However, the recent geopolitical landscape and the emergence of new global powers have raised concerns about the potential for a new era of space colonization (Buono, 2020). The rise of neo-colonial tendencies, exemplified by the actions of the current US administration, has cast a shadow over the future of space law and the equitable distribution of the benefits derived from space resources (Tsigalidas, 2024; Connell, 2007).

The President of US Donald Trump, has taken a more aggressive assertive position in his foreign policy, which has raised concerns about the potential for the same radical policy changes for space as well like weaponization of space and the unilateral control of space resources (Bourbonnière & Lee, 2007). The previously revised National Space Policy, by the Bush Administration, was interpreted as a step towards the weaponization of space, despite the so called assurances by the leadership of that time that it does not necessarily weaponize space. That shift in US space policy was actually to undermine the principles of the Outer Space Treaty, which emphasized the peaceful use of outer space and the prohibition of the placement of weapons of mass destruction in outer space (Bourbonnière & Lee, 2007).

Private space companies, like SpaceX and Blue Origin, also added to the already complex nature of space governance. These private companies are not subject to the same level of international scrutiny and regulation as government sponsored space programs are, leading to concerns about the commercialization and privatization of space resources without any consideration for the global commons.[1] Additionally, the current tensions between the US and its international partners, like the ongoing conflict in Ukraine and the Gaza settlement, have raised serious concerns about the potential for the export of these earthly conflicts into the domain of space. The future of equal distribution of space resources and space law will be critical in determining the trajectory of outer space exploration and its utilization (Jones, 2014).

The European Space Agency has taken some proactive measures to tackle the challenges of space resources exploitation, especially in lunar mining, and still a lot is needed on the behalf of the international community as a whole to work together to ensure the development of space resources is guided by principles of mutual cooperation, environmental sustainability, and the equal distribution of benefits (Wini, 2024). As the new era of space exploration and resource utilization

[1]ESA, "ESA Space Resources Strategy".

begins, it is important that the world community establishes a robust and inclusive framework for space governance. Asking for suggestions, expertise and perspectives of different disciplines, including international relations and space law, as it will be crucial for the future of outer space and ensuring that it remains a frontier of peaceful exploration and collaboration among international community.[2] (Tsigalidas, 2024; Bourbonnière & Lee, 2007) How can international relations theories can inform us about the gaps in the emerging space law regime, and what role can these play in shaping the future of space governance, are imperative questions that are needed to be addressed in order to prevent the colonization of outer space (Joye, 2020).

Research Objective

The rapidly evolving space law regime, shaped by the interplay of powerful states and commercial interests, risks replicating colonial patterns of resource appropriation and geopolitical dominance, necessitating a critical and inevitable re-evaluation of existing frameworks to ensure equitable and sustainable space governance for all of humanity.

2. Methodology

This study employed a rigorous yet pragmatic methodological approach to ensure the credibility and relevance of its findings. Primary sources included key international treaties such as the Outer Space Treaty (1967) and Artemis Accords (2020), complemented by official policy documents from national space agencies to capture diverse institutional perspectives. Scholarly literature was carefully selected from peer-reviewed journals. Empirical evidence was triangulated through comparative case analysis, examining how states have navigated legal ambiguities in their space programs, and cross-referenced with doctrinal legal analysis to verify treaty interpretation consistency. This multi-layered approach ensured that each claim was substantiated by both authoritative legal instruments and real-world state practices, creating a robust bridge between theoretical propositions and practical application in the complex field of space governance.

2.1. Historical Context of Space Exploration

2.1.1. Early Space Exploration as a Domain of International Cooperation

While the phenomenon of "space race" between the Soviet Union & the US is fiercely competitive, early days witnessed international cooperation. The Year of 1957-1958, though occurred at the peak of the Cold War, fostered scientific collaboration, including the outer space research. This period laid the foundation for future cooperative efforts and demonstrated that even at the height of a geopolitical rivalry, shared scientific pursuits could bridge divides and foster cooperation. Braunschvig (Braunschvig, Garwin, & Marwell, 2003) mentions the International Space Station as an example of collaboration.

[2]ESA.

2.1.2. The Cold War Space Race and Its Legacy

It all started with the Soviet Union's launch of Sputnik in 1957 which initiated the "space race," thus laying foundation to an intense competition between the superpowers of that time for technological dominance in space (Ruhaeni & Izadi, 2020). Fueled by Cold War, this quickly accelerated advancements in rocketry, satellite technology, and human spaceflight. The race resulted in the US Apollo 11 moon landing in 1969. Fair to say that the legacy of this era is complex. It witnessed remarkable technological innovation but also militarized of space, contributing to the development of intercontinental ballistic missiles and surveillance technologies (Debusmann, 2024). The competition also established a framework for international space law, with the 1967 Outer Space Treaty serving as a primary effort to manage the risks and promote peaceful utilization of outer space (Buono, 2020).

2.1.3. Evolution of International Space Law Principles

The geopolitical context of the Cold War had a substantial impact on the evolution of international space law. The Outer Space Treaty of 1967 (Bartóki-Gönczy & Nagy, 2023). The outer space treaty laid down fundamental principles such as the non-appropriation of celestial bodies, the peaceful use of outer space and the liability of states for damages caused by their space objects. Some of the other treaties (Wickramatunga, 2023), such as the Rescue Agreement, the Liability Convention, and the Registration Convention, further explained these principles (Bartóki-Gönczy & Nagy, 2023). Yet these foundational treaties left many issues unaddressed, most notably in relation to resource extraction and the increasing role of private actors. An effort to avoid similar pitfalls with the Moon Agreement of 1979 foundered, as only 18 of 163 countries ratified it, rather limited for a treaty (Tsigalidas, 2024). With the rise of new spacefaring nations and the growing commercialization of space activities, the existing legal regime faces further challenges, necessitating continued discussion and potential amendment to ensure fair and sustainable governance (von der Dunk, 2011; Eijk, 2022).

2.1.4. The Shifting Landscape of Space Activities

Space activities are evolving from their traditional model to a multifaceted ecosystem. This shift is driven by several key factors:

2.1.5. Emergence of New Spacefaring Nations

In addition to the historical dominance of the United States and Russia, dozens of countries have developed their own space capabilities. Among these are established powers such as China, Japan and European countries via the European Space Agency[3], as well as emerging spacefaring nations like India (Murthi & Rao, 2015). Those countries chase different space objectives, including scientific research and Earth observation, telecommunications, and even lunar exploration.

[3]ESA, "ESA Space Resources Strategy".

These expanding actors Map different perspectives and priorities to the international space arena.

2.1.6. Growth of Private Sector Involvement

The private sector's role has grown exponentially. No longer just contractors to government space agencies, companies like SpaceX, Blue Origin, and Boeing are today building their own launch vehicles and spacecraft, and even threatening to revolutionize industries such as space tourism and natural resource extraction (Vernile, 2018; Samson, 2022). The growth has been driven by improvements in technology, lower launch costs, and a resurgence of enthusiasm for commercial space projects. However, Corado (Corrado, Cropper, & Rao, 2023) suggests in, this rise in private activity also calls for clear policy adjustments in R&D spending and space usage regulations. Public-private partnerships are becoming increasingly common, blurring the lines between public and private space activities (Tinoco, 2018).

2.1.7. Transformation from State-Centric to Multi-Actor Space Activities

These trends combine to create a multi-actor space environment, where states, private companies, international organizations, and even individuals interact with each other in complex ways. Hence, this shift presents both opportunities and challenges. On the one hand, it fosters innovation, reduces costs, and expands access to space. On the other hand, it raises new questions about governance, regulation, and the equitable distribution of benefits. Therefore, the evolving legal framework needs to adapt to this new reality. Buger and Bordacchini (Burger & Bordacchini, 2019) argue that, addressing issues like resource ownership (Weinzierl, 2018), damage, and conflict prevention in space. Incorporation of diverse actors also requires increased cooperation and coordination to ensure the sustainable and peaceful use of outer space (Connell, 2007). With more players, the democratization of space could also be good for policymaking, resulting in a more open and representative decision-making process, as pointed out by Sesay (Sesay, 2020).

3. Neo-Colonialism in Global Politics

Neo-colonialism denotes to the continuation of colonial-era exploitation and power imbalances, albeit through different mechanisms than direct political control. It often includes economic, political, or cultural influence exerted by powerful states over colonized regions or other less powerful nations. Critics argue that this perpetuates dependency and inequality. This concept is also brought up in the context of resource exploitation in outer space, where there is concern about powerful nations replicating similar power imbalances as seen in terrestrial history, (Sesay, 2020).

3.1. Assertive Pressured Diplomacy

More aggressive or driven diplomacy represented by muscle flexing, financial bul-

lying or threats has come to dominate international relations. Now only some of the tools of assertive diplomacy are legitimate; and the exercise of pressure tactics are evocating words about eroding international law and the norms of peaceful conflict resolution. This can result in a volatile context where might, not collaboration and mutual respect, determine the resolution of disputes within the global community.

3.2. Trump's Meeting with Zelenskyy and Plans for Gaza

Though the particulars of private meetings are not always made public, what the opponents say in their official statements and what they do following the meetings can be indicative of their implications. Nevertheless, drawing one-off meetings or plans together with over the longer run developments in the field of outer-space law must make suitable account of the factual backdrop and not excessive reiteration of speculative conclusions.

3.3. Implications for Geopolitics and Space Law

It is indeed hard not to see the emergence of neo-colonial trends and the aggressive diplomacy in Earth as not having bearing on the governance of outer space. With the growing of more active players on the space scene, state and private alike, the potential for competitive and conflict also waxes. The current legal framework, the Outer Space Treaty (Legal framework, 2024), On the one hand, the U.S. must reckon with new realities, especially regarding limited natural resource availability and private sector activity, that it is ill-equipped to confront. The danger is that if powerful states put national self-interest above the principles of peaceful cooperation and equitable access to space (ICRC, 2017), they would then use brutal tactics to either use weapons against their rivals or steal resources or strategic advantages in outer space, which could destabilize space and not prevent what happened to Earth to happen to outer space, as explored by Klinger (Klinger, 2019). Therefore, debates within the UN Committee on the Peaceful Uses of Outer Space[4] are critical to adapt the legal framework and ensure sustainable and equitable space governance, as emphasized by Tsigalidas (Tsigalidas, 2024). The expanding privatization of space activities (von der Dunk, 2015; Samson, 2022) complicates these issues further and requires careful consideration of the role of private sector within the legal framework.

3.4. The Colonization of Outer Space

Outer space exploration and utilization once conceived as a forum for international cooperation and scientific advancement is becoming a new arena of neo-colonization. Although space exploration was framed by cooperation it is in the process of being completely changed in light of a multi-polar world with certain nations pursuing confrontational policies, and the increased role of private actors, exacerbating questions of how outer space will be equitably and sustainably gov-

[4]"Report of the Committee on the Peaceful Uses of Outer Space."

erned. The vision of a future space law regime developed by powerful nation states and commercial interests threatens to replicate the past histories of resource extraction and colonialism in this new environment. Without a careful review of the current legal frameworks that govern space, as well as a positive one that is inclusive, this may be the road we are on, and only through these measurements can we follow a future path where space supports the rights of humanity.

3.5. The Rise of Neo-Colonial Tendencies in Outer Space

3.5.1. US Space Policy under Recent Administrations

A more assertive, unilateral approach to US space policy under recent administrations is a source of concern. Some have interpreted the new National Space Policy, which builds on the existing National Space Policy first issued during the Bush administration and subsequently modified under President Obama and President Trump, as a prescription for increasing weaponization of space and putting national interests over international action. Hence, this approach potentially ignores the principles of the Outer Space Treaty[5], which lays emphasis on the peaceful use of outer space and prohibits the placement of weapons of mass destruction in orbit.

3.5.2. US Space Policy Evolution

The more assertive direction of US space policy, especially since the Bush administration. This change also illustrates a broader understanding that outer space is a theater of operation with implications for national security, economic competitiveness and science; all three of which concern the people, through their representatives, following in making space policy. Let's dive into the major components:

3.5.3. From Bush to Trump Administrations, Assertive Space Policies

The Bush administration's 2006 National Space Policy[6] set the stage, calling for a more aggressive stance in space that would be rooted in the right of self-defense and call for American leadership in exploring and exploiting space resources. Following this framework, subsequent administrations approached national security with a more pronounced emphasis on strategic competition (between specific nation-states, chiefly China and Russia) and control over the space domain. Critics have interpreted these policy changes as evidence of a unilateralist Bourbonniere (Bourbonnière & Lee, 2007) discusses how a later US space policy explicitly rejected arms control in space, further highlighting this assertive stance.

3.5.4. Space Policy Directive 1 and Its Implications

Space Policy Directive 1 which President Trump signed, called on NASA to return astronauts to the Moon and then to Mars. This exploration-directed move is also laden with geopolitical implications. The focus on a long-term lunar presence. (Trump & Pence, 2019), coupled with the development of capabilities for resource

[5]"Report of the Committee on the Peaceful Uses of Outer Space."
[6]"The President Authorized a New National Space Policy."

utilization (Trump & Pence, 2019), is evidence as part of a broader strategy to secure a long-term strategic advantage and dominance in space.

3.5.5. Strategic Competition and Space Domain Control

The notion of space domain control means contemplating space as a warfighting domain like land, sea and air, and that U.S. needs to preserve that superiority and prevent adversary access. This has resulted in the creation of the US Space Force and increased investment in space-based military capabilities.[7] This growing emphasis on strategic competitiveness also raises fears of an arms race in space and conflict, as the current legal architecture cannot keep up with these trends (Klein & Boensch, 2019) underscores the significance of understanding escalation risks and strategic implications in space, which can be easily misdiagnosed by adversaries. Russo and Coco (RUSSO & Coco, 2023) aptly underscores how the dividing lines between social, security, and geopolitical components of space missions have been increasingly blurred.

The increasing privatization of space activities (Samson, 2022) further complicates this landscape. adds to the complexity of this landscape. Commercial partnerships can lead to innovation and reduced expenditure in the space sector, but they can also create a need for careful regulation to avoid the uncontrollable transformation of space resources and to enforce compliance with international standards for behavior in space. Adding to the challenge, collating private sector activity within a broader scope of international space law is an ongoing question (von der Dunk, 2015; Tsigalidas, 2024). The resolution emphasizes the importance of reaching international agreement and establishing a comprehensive legal framework before the exploitation of natural resources in outer space takes place to avoid any potential disputes. Report[8] offers a critical opportunity for such debates. It will be essential to find a middle ground and navigate space governance between the benefits of each nation's individual interests and a hope for an ounce of cooperation for the human species responsible for the use of such a shared domain.

4. Other National Approaches

Besides the US, other nations also have significant space ambitions that are shaping the future of space exploration and governance. Here's a look at some key players:

4.1. Russian Space Program Revival and Strategic Goals

In recent years, Russia has faced economic difficulties, but it remains a major space player with a long history of achievements in space exploration. Roscosmos, the Russian space agency that continues to fly the Soyuz spacecraft, a critical vehicle for access to the International Space Station. Russia has also been pursuing its own lunar exploration plans, including Luna-27[9], with a focus on resource po-

[7]"The National Space Policy."
[8]"Report of the Committee on the Peaceful Uses of Outer Space."
[9]ESA, "ESA Space Resources Strategy."

tential in the polar regions (Grush, 2020).

4.2. Emerging Space Powers: India, Japan, UAE

A number of other countries are advancing rapidly in space. The Indian Space Research Organization manages India's space program (Rao, Murthi, & Raj, 2017), has enjoyed some notable successes with lunar and Mars missions, while expanding its launch capabilities. Japan's space program (The Wire Staff2 mins read, 2019)[10], headed by the Japan Aerospace Exploration Agency, is devoted to scientific missions and technological development. The UAE has also become one of the world's most ambitious spacefaring nations, with missions to Mars planned and investments in space technology.[11] Asia's growing space capabilities, perfectly highlight the ambitions of China, India, and Japan. Report[12] further examines that strategic competition between states, especially between the US and China, extending into space, is an increased risk of militarization (Bakibinga-Gaswaga, 2018).

The emergence of these diverse actors in the space domain reflects the growing importance attached to space for scientific, economic, and strategic purposes. Growing competition in the utilization of outer space aerospace industries and systems, especially as it becomes more common for extended periods of low earth orbit for space missions and tourism caters to the growing customer base demand. (Rajagopalan, 2018) notes that outer space has become, as during the Cold War, an arena of strategic competition on Earth, supercharging the race to return to the Moon and asteroids in search of resources. Rajagopalan (Murthi & Rao, 2015) discusses the evolving role of India's space industry. Tsigalidas (2024) discusses Japan's growing partnerships between government and private sector in space. (Ismail, 2022) Ismail notes the historical and recent revival of Malaysia's space program. These recent developments highlight the increasingly complex and competitive landscape of space activities, demanding a careful navigation and collaboration to ensure long-term sustainability and peaceful exploration.

4.3. The Role of Private Space Companies

The growing involvement of privatized companies such as SpaceX and Blue Origin presents new challenges, as well. While these entities push innovation and reduce costs, their activities are not subject to the same degree of international oversight as government space programs. This leads to worries over the uncontrolled commercialization and privatization of astral wealth[13], doing so at the expense of developing nations, potentially beset inequalities and harm the interests of the international community. Without a clear legal framework for private space activities, disputes may arise over who owns and can utilize extraterrestrial re-

[10]undefined, "As China Surges Ahead in Space, India and Japan Band Together to Keep Up."
[11]"Asia in Space."
[12]"Asia's Space Ambitions: "Driving the Next Chapter in Global Space Competition."
[13]ESA, "ESA Space Resources Strategy."

sources (Hanlon, 2019; Hertzfeld & von der Dunk, 2005). The emphasis on commercial interests also opens the door for potential "flags of convenience," where companies may establish themselves in countries with little in the way of oversight to work around international standards (von der Dunk, 2015).

4.4. Major Private Space Companies

There is a transformative role of private companies in the space initiative, where there are no clear boundaries between scientific exploration, commercial enterprises, and national interests. Here's a closer look at some of the key players:

4.4.1. SpaceX's Starlink and Mars Colonization Ambitions

Elon Musk founded SpaceX and then changed the way we think about space launch with reusable rockets, lowering costs dramatically. Starlink is a satellite internet constellation being constructed by SpaceX providing satellite internet access globally (Corrado, Cropper, & Rao, 2023). SpaceX is also developing Starship (Tsigalidas, 2024), a fully reusable spacecraft capable of flying to Mars and "peak beyond," a key component of Musk's goal of creating a human settlement on Mars.

4.4.2. Blue Origin's Space Tourism and Resource Extraction Goals

Launched by Bezos, Blue Origin works on space tourism with its New Shepard suborbital vehicle (von der Dunk, 2006; Sammler & Lynch, 2019). They also have ambitions for lunar resource extraction (Tsigalidas, 2024)[14], seeing the Moon as a tool for other exploration and habitation in space (Mandela et al., 2003).

4.4.3. Other Key Players: Virgin Galactic, Axiom Space

Virgin Galactic, founded by Richard Branson, is another prominent player in space tourism (von der Dunk, 2006; Sammler & Lynch, 2019). Axiom Space (Sheetz, 2021; Kramer, 2021; Foust, 2023), specializes in developing commercial modules for the ISS and, eventually, a stand-alone commercial space station, representing one step towards privatizing infrastructure in low-Earth orbit [15]. They have already facilitated the first fully private astronaut mission to the ISS (Kramer, 2021; Sheetz, 2021).[16]

This trend of private sector participation leads to the challenges of regulating something that is more like a public good, and ensuring good governance. While these actors fuel innovation and lower costs (Corrado, Cropper, & Rao, 2023), their activities also require careful oversight to ensure responsible behavior, avoid unchecked commercialization, and keep space as a global common (Sammler & Lynch, 2019). In addition, existing legal Framework for a private space activity is not clear[17], particularly regarding resource extraction (Tsigalidas, 2024; Trump &

[14]ESA, "ESA Space Resources Strategy."
[15]"Axiom Reveals First All-Private Crew for Trip to International Space Station."
[16]"Axiom Reveals First All-Private Crew for Trip to International Space Station."
[17]ESA, "ESA Space Resources Strategy."

Pence, 2019) and potential conflicts ib space, denotes the need for international cooperation and the development of comprehensive space law (Hanlon, 2019).

5. Commercialization Trends

Space commercialization is progressing at breakneck speed due to a combination of technology and entrepreneurialism. Opportunities and challenges for the future of space activities This shift comes with both opportunities and challenges for the future of space activities.

5.1. Space Mining Ventures and Technological Developments

There is also huge investment and technological innovation around resource extraction on asteroids and the Moon. ESA[18] highlights in the latter paragraph the growing desire for lunar resources, explicitly noting such interest by companies like Blue Origin, Moon Express, and others. Robotics, autonomous systems, and resource processing technology will play an essential role in making space mining viable (Murray, 2023). However, Sanders et al. (2023) highlight the legal uncertainties over space resource ownership and exploitation under the Outer Space Treaty that may give rise to disputes as commercial activities expand (Crawford, 2016).

5.2. Space Tourism Market Growth Projections

Space tourism is real, no longer science fiction, with Virgin Galactic to Blue Origin to SpaceX operating suborbital around orbital flights. Brown (von der Dunk, 2011; Sammler & Lynch, 2019; Brown, 2004) analyzes Spaceport America as a case study of the continuing process of the realignment of public and private interests in off world activity. Though in its infancy, space tourism is expected to grow significantly in coming decades, with greater public interest and lower launch costs enabling the industry to expand Increasingly, a number of emerging private spaceflight companies are competing in the space tourism space (pun intended) and other commercially utilized forays, including space bases (such as Axiom Space's planned commercial space station) that are radically democratizing space to new levels of accessibility (Vernile, 2018; Sammler & Lynch, 2019). Nevertheless, the ecological implications of space tourism and its role in generating space debris must be addressed (Corrado, Cropper, & Rao, 2023).

5.3. Private Sector Influence on Policy-Making

Data is generated up to October 2023. It goes far beyond technology, where companies such as SpaceX are not only building technologies, but they are also promoting through lobbying and other means the types of regulatory frameworks that will facilitate their business models (Alexander et al., 2018). Such influence of the private sector can lead to potential conflicts of interest and the need for trans-

[18]ESA, "ESA Space Resources Strategy."

parent and accountable governance mechanisms. Firms should be aware of the growing problem of "flag of convenience" states, which lure businesses with weak regulation and threaten international norms, says Messier. This new reality has emerged needed to be managed for ensuring responsible and sustainable exploitation of this new space frontier. The books by Tkatchova (Tkatchova, 2017) and Vernile (Vernile, 2018) provide perspective on the commercialization of space and the emergence of private actors, focusing on the opportunities, threats, and potential future trajectories of this evolving dynamic (Apakhayev et al., 2017).

5.4. Geopolitical Conflicts and Space Security

5.4.1. Terrestrial Conflicts Extending to Space

The growing dependence on space-based infrastructure for civilian and military purposes has created a gray space between terrestrial versus space-based conflict. Here are some key developments that illustrate this increased interconnection:

5.4.2. Ukraine Conflict and Satellite Infrastructure Targeting

The Ukraine war has shown that in an era of terrestrial warfare, space assets are vulnerable. Given their importance for warfare (providing communications, navigation, intelligence gathering, etc.), space systems thus become critical. Any disruption or destruction of these systems can seriously affect military operations. And the conflict has revealed the increasing threat of cyberattacks on satellite infrastructure and ground stations.

5.4.3. Cyber-Attacks on Space Systems

As space systems become more interlaced with terrestrial networks, they are increasingly vulnerable to cyberattacks. The attacks can involve anything from jamming and spoofing signals, to seizing control of satellites and manipulating their functions. With the shift to this form of cyber warfare in space, military and civilian applications of cyber warfare are becoming significant threats to the protection of space assets, underlining the need for cyber security in these systems. Weeden (Weeden, 2010) talks about how challenging it is to assess intentional or unintentional disruption to satellite operations.

5.4.4. Anti-Satellite Weapon Testing and Debris Concerns

Tests conducted by Russia, US and China, ASAT tests, they generate huge amounts of space debris, posing a long-term threat to all spacefaring nations (Rao & Rondina, 2024). The debris generated by such tests can persist in orbit for decades, posing an added hazard to both functioning satellites and the International Space Station. Rao and Rondina (Rao & Rondina, 2024) illustrates how more and more debris could even lead to a Kessler Syndrome, a catastrophic chain of collisions that would make orbital space unusable. The development and testing of ASAT weapons only adds to the militarization of space, creating tensions and stimulating an arms race in orbit (Hitchens, 2017; Jones, 2015) mentions current fears over Russia's possible use of a nuclear ASAT weapon, which could severely

threaten space security and violate the Outer Space Treaty (Debusmann, 2024). indicates further technical details about different types of space weapons. There is also a growing expectation of international norms of behaviour and agreements in this field who might become a weapon and presage long-term space sustainability (Hitchens, 2017). Without specific rules and proper accountability, the risk of miscalculation and escalation is high, which jeopardizes the stability of the space domain and the safety of all nations' space assets (Klein & Boensch, 2019).

6. Space as a Battlefield

The growing military assets deployed in outer space raise important questions regarding the future of space security and the possible conflict of space.

6.1. Militarization vs Weaponization Distinctions

This matters because it is critical to differentiate between the militarization of space (the use of space for military objectives, for example, communications, navigation and intelligence) versus the weaponization of space (placing weapons in orbit or systems specifically designed to destroy space-based assets). Space has inescapably militarized to the extent that numerous nations are currently employing space for military support functions. But drawing the weaponization of space is a serious escalation with global ramifications (Klein & Boensch, 2019). As space law revisited report notes, the Outer Space Treaty of 1967[19], while advocating for peaceful uses of outer space, lacks a clear definition of "peaceful purposes," leaving ambiguity surrounding state military use of outer space. This ambiguity has fueled an ongoing debate over the mounting of weapons in orbit.

6.2. Current International Security Frameworks

The primary legal framework governing space activities is the Outer Space Treaty[20], which forbids weapons of mass destruction from being placed in orbit but doesn't specifically prohibit other types of weapons. These loopholes have raised concerns about the possibility of an arms race in outer space. Mostershar (Mosteshar, 2017) goes on to explore what is meant by "peaceful use" and "weapon" in the area of international space law and notes the uncertainties and difficulties that exist in defining these terms.[21] "Report of the Committee on the Peaceful Uses of Outer Space," 2019 observed the increasing concern about space debris caused by anti-satellite missile tests. Testing of ASAT weapons is also a major point of contention between countries. Despite calls by many countries to have such a treaty, there are currently no binding international agreements that prohibit conventional weapons in space. Harrison (2020) provides an overview of the various perspectives on space weapons across the world and the limitations of current agreements.

[19]"The Outer Space Treaty."
[20]"The Outer Space Treaty."
[21]"Report of the Committee on the Peaceful Uses of Outer Space."

6.3. Potential Arms Control Measures

Any number of proposals have emerged to deal with the advancing militarization of space, including a ban on testing or deployment of space weapons; rules of engagement for military action in space; and transparency and confidence building among space-faring countries. Nonetheless, reaching a consensus on such measures is still difficult because of conflicting national interests and divergent interpretations of existing treaties. Scholars (Bourbonnière & Lee, 2007; Hansel, 2010) address the question of the legality of positioning conventional weapons in Earth orbit, and how this can be described as a balance between space law and law of armed conflict. Hitchens (Hitchens, 2017) stresses diplomacy be developed, with military preparedness, to deter an arms race in space and foster stability in that medium.

The ongoing discussions within the United Nations Committee on the Peaceful Uses of Outer Space[22] provides an important forum for discussing these matters and creating a legal framework that will ensure the responsible and sustainable use of outer space. Decisions made now will determine if authoritarian and democratic states alike can work together to maintain space as a global common with established rules that prevent an arms race.

6.4. The Intersection of Terrestrial Conflicts and Space

A growing concern is that terrestrial geopolitical tensions could migrate to the space domain. With the growing militarization of space, the possibility of conflict crossing an atmospheric barrier becomes more probable. Although there have not been any directly involved examples to date, the absence of specified norms could lead to tensions or accidental crashes with catastrophic implications in outer space (Johnson, 2024).

6.5. Gaps in the Emerging Space Law Regime

Indeed, the current legal framework governing outer space activities, though fundamental, shows evident weaknesses in light of new neo-imperial tendencies.

The Outer Space Treaty Regime

1) Core Principles Analysis

The Outer Space Treaty of 1967[23] forms the basis of international space law, setting out the principles that govern activities in outer space.

2) The common heritage of mankind principle:

This commitment embedded in Article I of the Outer Space Treaty states that the exploration and use of outer space, including the Moon and other celestial bodies, shall be conducted for the benefit and in the interests of all countries, regardless of the level of economic or scientific development and shall be the province of all mankind, highlights the need for international cooperation in space

[22]"Report of the Committee on the Peaceful Uses of Outer Space."
[23]"The Outer Space Treaty."

activities, especially in providing information on possible dangers detected in space. It is that space is a global common, and no nation can claim sovereignty over it. Marino & Cheney (Marino & Cheney, 2022) gives historical depth, illustrating how the negotiation of the treaty despite its multilateral nature was controlled by the US and Soviet Union. Eijk (Eijk, 2022) play a critical role in this process, as in his article offer a need of equitable access and participation for all states, especially developing world in the context of history of space law (Cristin Finnigan, 2023).

3) Non-appropriation and peaceful purposes provisions:

Article II of the Treaty states, inter alia, that outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means. (Report of the Committee on the Peaceful Uses of Outer Space, 2019)[24] highlight in particular the continuing significance of non-appropriation, especially as it relates to emerging activities in the commercial space resource sector. The Treaty also emphasizes the peaceful uses of outer space[25] makes it clear that it prohibits the creation of military bases, weapons testing or military exercises on celestial bodies. However, "peaceful purposes" is not definitively defined in the Treaty, and so it remains unclear what military activities short of deploying weapons of mass destruction in orbit would be illegal in space under the Treaty. Johnson-Freese & Burbach (Johnson-Freese & Burbach, 2019) explores the meaning of "peaceful purposes," and some of the implications for space militarization.

4) State responsibility and liability regimes:

The antecedent and more relevant treaty is the Outer Space Treaty that affirms the principle of state responsibility for national activities in outer space, whether conducted by government or non-governmental entities specifically states that states bear international responsibility for their space activities and must see to it that these activities are in accord with the provisions of the treaty. Article VI provides that states shall be internationally responsible for national activities in outer space, including the Moon and other celestial bodies, whether such activities are carried out by governmental or non-governmental entities. It also provides that the activities of nongovernmental entities in outer space require authorization and continuing supervision by the State Party to the Treaty responsible for those activities. Mosteshar (Mosteshar, 2017) These arguments are based on state sovereignty and international law principles relevant to space activities and the function of treaties that create binding obligations.

The Outer Space Treaty a milestone in international law has been slow to adapt to the developing realities of space activities, such as the growing privatization of space exploration, advances in space technology, and the ability to exploit space resources. Buono (Buono, 2020) is then set in a deeper historical context, with implications for how we should think about the Outer Space Treaty and the de-

[24]"Report of the Committee on the Peaceful Uses of Outer Space."
[25]"The Outer Space Treaty"; "Fact Sheets & Briefs."

bates surrounding it, contradicting some conventional interpretations while highlighting complexities. The limitations of the Outer Space Treaty[26] highlight the imperative of continual dialogue and planetary collaboration to guarantee the peaceful, sustainable and equitably sharing of outer space for the benefit of all humanity." (Report of the Committee on the Peaceful Uses of Outer Space, 2019)[27] and suggest that work in this area continues in the UN Committee on the Peaceful Uses of Outer Space.

7. Contemporary Challenges to Space Governance

There are several large challenges to the governance of outer space today, and these challenges are threatening the long-term sustainability and peaceful use of this vital realm of activity...

7.1. Ambiguities in Resource Utilization

The Outer Space Treaty while banning national appropriation of celestial bodies, does not explicitly address the commercial exploitation of space resources. This uncertainty drives discussion and speculation, especially with respect to asteroid mining and lunar resource extraction (Tsigalidas, 2024). Yao (Yao, 2024) discusses the absence of a concrete implementing mechanism regarding benefit-sharing as the core principle of the Outer Space Treaty, which params for the equitable distribution of benefits derived from the exploration and use of outer space to all countries. Hickman (Hickman, 2023) claims that the Treaty's constraints have curtailed exploration and development by removing potential rewards. The 1979 Moon Agreement, for example, tries to clarify how resources should be shared, but has faced a lack of support from major spacefaring countries. (Tsigalidas, 2024). Eijk (Eijk, 2022) added that calls for "Third World" perspectives and equitable access need to be paid attention to. The absence of a defined legal framework leaves room for grey areas that would lead to disputes and conflict as commercial interests propel rapid technological advancements in space resource extraction, says arguments that suggest government authorization and supervision of resource extraction do not constitute appropriation at the national level.

7.2. Private Actor Regulation Gaps

The growing engagement of private actors in space activities creates new challenges. Existing space law[28] offers little in the way of regulation for private space activities, such as resource extraction (Samson, 2022). The growing presence of commercial space companies means that officials need to ensure compliance with international norms and prevent a "race to the bottom," whereby companies register in jurisdictions with less-draconian rules (Tepper, 2019). Until such time as a proper regulatory framework is established, little progress will be possible in the

[26]"The Outer Space Treaty."
[27]"Report of the Committee on the Peaceful Uses of Outer Space."
[28]"The Outer Space Treaty."

establishment of a responsible and sustainable space environment. Bartoki-Gonczy & Nagy (Bartóki-Gönczy & Nagy, 2023) highlights ongoing efforts to advance international practices for utilization of resources, demonstrates how existing treaties already have applicability to contemporary private sector activities.

7.3. Enforcement Mechanisms Weaknesses

State responsibility for compliance plays a central role in international space law. But these enforcement mechanisms are weak, especially when it involves non-state actors. This, however, leaves a significant gap in the current governance system: there are no effective means of addressing violations of space law or resolving disputes. This disability highlights the requirements of more powerful intercontinental collaboration and more efficient enforcement components to assure accountability and compliance with recognized guidelines and other behavior codes in area. Tepper (Tepper, 2019) notes the deadlock in United Nations space governance efforts. Koplow (Koplow, 2017) suggests that current legal rules are inadequate for today's threats and proposes diplomatic initiatives. Marino & Cheney (Marino & Cheney, 2022) critiques the dominance of powerful states in space law development. These challenges pose contemporary implications that speak to the need for a more flexible and comprehensive international legal regime for space governance that is able to address the extraction of valuable resources, the regulation of private actors, and enforcement mechanisms. The success of the international community in working together to implement a comprehensive legal framework that promotes the long-term viability of and peaceful access to outer space will determine the trajectory of extraterritorial activities for the foreseeable future.

7.4. The Moon Agreement and Its Status

7.4.1. Provisions and Ideals

The 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, known as the Moon Agreement.

The 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, known as the Moon Agreement. (Mosteshar, 1995), sought to expand upon the Outer Space Treaty of 1967[29] through the establishment of a precise international regime for the use of resources from the Moon and other celestial bodies.

7.4.2. Resource Sharing and International Regime Concept

The Moon Agreement establishes that the Moon and its natural resources are the common heritage of mankind (Mosteshar, 1995). If we think of lunar resources as a global common, this means that most of the benefits of those resources should be equally shared by all countries, especially those in the developing world (Dennis O'Brien, 2023). The Agreement anticipates the development of an international regime to regulate the extraction of these resources when such activities

[29]"The Outer Space Treaty."

become practicable[30]. This regime (again according to the Agreement) shall oversee the exploration, exploitation, and utilization of resources, with the particulars to be determined at a time when exploitation appears likely. This provision has caused dispute among some players. Tsigalidas (Tsigalidas, 2024) who believe it would hurt commercial and national interests.

7.4.3. Environmental Protection Measures

The Moon Agreement (Mosteshar, 1995) stresses that the lunar environment should be protected and that harmful contamination should be prevented. This means that the Agreement obliges states parties to take action to ensure that the existing state of balance in the environment of the Moon is not disrupted and that harmful contamination does not come from Earth or from space (Durrieu & Nelson, 2013).

7.4.4. Development Dimension Considerations

By establishing lunar resources as the "common heritage of mankind," The Moon Agreement seeks to guarantee the benefits of the use of Outer Space resources be shared for the development of all nations, not solely technologically advanced nations. But the Agreement is devoid of a mechanism to operationalize this goal (Adebayo & Werker, 2021), complicating pre-existing vagueness on distribution and benefits.

Although the Moon Agreement is an important step towards more robust legal framework for activities in outer space, its scant ratification by major spacefaring nations. (Tsigalidas, 2024) greatly inhibits its effectiveness. Only a handful of countries have ratified or acceded to the Agreement in the formal sense, and none with interpretative declarations including France[31], calling into question its capacity to respond to the new challenges of exploiting space resources (Finarelli & Pryke, 2007). Debate continues over the future role the Moon Agreement could play, a reflection of broader discussions over what the proper legal regime for space activities in the twenty-first century will be.

7.4.5. Limited Ratification Analysis of the Moon Agreement

The Moon Agreement (Mosteshar, 1995), despite its lofty aims, has struggled to gain traction, particularly among the world's leading spacefaring countries. This limited ratification opens up important questions about its current and future role of governing lunar activity (Hein et al., 2019).

7.4.6. Political Reasons for Non-Adoption by Major Powers

The most common explanation for the low ratification rate among major space powers is concerns about the Agreement's resource-sharing provisions (Tsigalidas, 2024). And although the "common heritage of mankind" principle may appear fair on the surface, some view it as a potential impediment to the commercial exploitation of space resources[32]. The idea of an international regime controlling

[30]Team Interstellar, "The Moon: A New Arena for Space Exploration and Global Diplomacy."
[31]"Collection Des Traités Des Nations Unies."
[32]ESA, "ESA Space Resources Strategy."

resource exploitation whose particulars remain to be decided leaves private firms and states investing in space mining technologies with a sense of uncertainty. This uncertainty, along with a perceived limitation on resource-endowed roll or the national sovereignty on resources extracted from the territory accentuates the fact that some countries misinterpreted the Agreement attitude towards the property rights which made many states reluctant to ratify the Agreement. They view it as a challenge to national interests that are seeking an edge by enacting their own space legislation.

7.4.7. Legal Implications of Limited Acceptance

Hampering the legal force and applicability of the Moon Agreement is the lack of ratification thereof. Although the Treaty does pose legal obligations for the States Parties that have ratified it, its limited uptake by major spacefaring nations casts doubts on its efficacy as an overarching legal framework for lunar activities (Wrench, 2019). Such legal uncertainty may become a source of controversy down the road, as the Moon's land is put under increasing commercial pressure for resource extraction. This issue can create uncertainty for businesses as well (O'Brien, 2020), meaning an international legal framework for private action in space and to avoid disputes over independent claims of property. Macfarlane (Macfarlane, 2021) indicates that there is precedent for hyper-specific international agreements, if the subject matter is complicated, as cryptocurrency is, and no other framework addresses it.

7.5. Potential Pathways for Revitalization

Although the Moon Agreement has challenges, there are many roads that can lead to its revival. Bringing more awareness of and education around the Agreement's provisions, particularly its emphasis around the protection of the environment and sustainable use of resources, could help garner more support from states, underlines how existing treaties, such as The Outer Space Treaty of 1967[33] and informal agreements, do not speak to pressing contemporary questions such as deconfliction and resource use underscoring the need for a renaissance in international space law. In this respect, the development of an implementing agreement that would embed economic rights and promote sustainable extraction could address some of the fears relating to the economic ramifications of the Agreement (Kovic, 2024). Engaging commercial space companies in international space law negotiations (Bartóki-Gönczy & Nagy, 2023) may help better align the interests of the private sector with the principles of sustainable and equitable use of space resources. In conclusion, the Moon Agreement has a future, rooted in the international legal regime governing outer space, with the potential to inform future lunar activities and cultivate a collaborative approach among international actors. That said, the discussion could also touch on benefit-sharing agreements for local communities in the vicinity of a mine (Adebayo & Werker, 2021), as well as im-

[33]"The Outer Space Treaty."

pact agreements (St-Laurent & Billon, 2015). Community benefit agreements (Salkin, 2007) Could also serve as a template for a possible future regime for space law and policy internationally. current Legal Efforts in the UN Committee on the Peaceful Uses of Outer Space. Report[34] Offer the forum for ongoing discussions on how existing agreements and frameworks might need to be redesigned to meet 21st century needs and challenges. The Artemis Accords (Bartóki-Gönczy & Nagy, 2023), while its emphasis on space resource extraction and deconfliction is yet another important advancement in space law, its informal character renders it unlikely to supplant the function of a reformed multilateral treaty.

7.5.1. National Legislation and Unilateral Approaches

Countries such as the United States, Luxembourg, and Japan have adopted laws to establish national legal regimes for space resource activities, leading to increasing complexity and fragmentation of both national and international applicable legal positions.

7.5.2. US Space Resource Exploration and Utilization Act

Enacted in 2015, this Act (Tsigalidas, 2024) gives US companies the right to extract and use space resources while claiming the activities do not establish a claim of sovereignty over celestial bodies. This law was designed to encourage private sector investment in space mining, yet to comply with the non-appropriation provision of the Outer Space Treaty[35]. Yet it has given rise to questions as to whether the conference fits in with international law, in particular the Moon Agreement. Mosteshar (Mosteshar, 1995), calls for an international regime to govern space resource utilization, notes that spacefaring nations have not ratified the Moon Treaty, and states that its intent was the establishment of an international regime to govern extraction of resources.

7.5.3. Luxembourg's Space Resources Law

In 2017, Luxembourg became the first European country to pass a law regulating space resource activities (Tsigalidas, 2024). This law allows private companies to own and use the space resources they extract and is intended to encourage mining companies to locate in Sweden, and thereby to make Sweden a center of activity in space resources. Similar to the US Act, Luxembourg's legislation aims to balance national interests in resource utilization against international obligations under the Outer Space Treaty (Legal framework, 2024).

7.5.4. Implications for International Legal Harmony

These national measures are merely a piece of legislation that promotes commercial space activities but might also have negative effects by fragmenting international space law. The absence of a widely recognized framework for governing resource extraction could result in overlapping claims, conflicts, and legal uncertainty. These unilateral approaches could also risk undermining the current inter-

[34]"Report of the Committee on the Peaceful Uses of Outer Space."
[35]"The Outer Space Treaty."

national legal framework; their deployment could present challenges in the area of property (O'Brien, 2020). Of course, the legal regime governing space resource activities still needs to be further unified through international cooperation. The current UN COPUOS framework may not be enough to stop nations from evading international standards to develop their space law. and informal companionships such as the Artemis Accords do not replace a renewed and ratified international treaty (Bartóki-Gönczy & Nagy, 2023). This as well raises the question of Third World countries receiving fair and equitable access to space resources and gains (Eijk, 2022). These concerns underscore the need for new legal regimes that protect commercial interests while maintaining space as a "province of all mankind (Buono, 2020). Current international debate on space law especially at the UN Committee on the Peaceful Uses of Outer Space (Braunschvig, Garwin, & Marwell, 2003), provide the foundation for such a framework.

The evolving legal framework surrounding space resource activities highlights the necessity of continued communication and cooperation among countries and stakeholders. To ensure that space activities are responsible and sustainable, effectively promoting the common interests of all States, the future of space exploration and use depends on the framework of its legal regime being understandable, consistent and practical.

7.5.5. Pathways to Equitable Space Governance

Fair regulation of space cannot be seen giving rise to unilateral, bilateral or unilateral appropriation of these celestial resources due to the multilateral nature of this frontier as well as the limited access to the highest seat of international law. This requires a framework that balances sustainability with equal access for all nations under the complexities of resource extraction and commercial activities in space.

7.6. Multilateral Approaches

International cooperation facilitated by existing and new mechanisms is essential for effective space governance:

7.6.1. Strengthening the Committee on the Peaceful Uses of Outer Space

COPUOS is the main body for the development of international space law. From (Report of the Committee on the Peaceful Uses of Outer Space, 2019)[36] notes the need for intense political commitment to preserve the sustainability of outer space activities and acknowledges the important role played by the Committee in governing outer space. Improving the Agency's mandate and resources may enhance coordination, and help develop new legal instruments to respond to emerging challenges such as space resource utilization. (Report of the Committee on the Peaceful Uses of Outer Space, 2019) include the Committee discusses the need for reinforcing space governance for sustainable use of outer space activities.

[36]"Report of the Committee on the Peaceful Uses of Outer Space."

7.6.2. Potential for New International Treaties

The existing Outer Space Treaty establishes a broad framework but may need to be supplemented with new ones to cover particular topics, including the ownership of space resources and the sharing of benefits. And these treaties should be broad and cover developing countries to ensure fairness in space conduct (Tavares et al., 2021).

7.6.3. Regional Space Cooperation Frameworks

Regional agreements can supplement global governance efforts by focusing on the unique needs of each region, including collaborative efforts among adjacent countries. Regional collaborations can center around specific joint projects, capacity building and developing regional space policies. Public-Private Governance Models As the role of the private sector expands and becomes deeper, it necessitates solid models of governance that harmonize commercial interests with those at the societal level: Regulatory frameworks for commercial activities: Without clear regulations for private sector activities in space, including accountability, liability, and environmental protection, there are risks for both the earth and space environment. They must also balance accountability and transparency with innovation.

Ethical guidelines development: The development of ethical guidelines concerning space activities, including resource extraction measures and commercial ventures engaged with space poses, is necessary to promote responsible activity in space and minimize the potential negative impact upon the space environment or on the cultural heritage in space. Incentives for sustainable practices: Governments may also provide incentives, such as tax breaks or subsidies, to encourage private companies to practice sustainably in space, such as debris mitigation and responsible resource management.

7.6.4. Innovative Legal Mechanisms

Innovative legal avenues can pave the way for fair and sustainable space governance: Space resource management regimes: The establishment of clear legal frameworks regarding ownership and utilization rights is critical for avoiding conflict in outer space and ensuring countless nations have access to such resources. Even though these regimes must respect the premises of international law, including the common heritage of mankind. Environmental impact assessment protocols: Protocols for environmental impact assessments of space activities can reduce the environmental footprint of space exploration and resource extraction at Earth and beyond. (Report of the Committee on the Peaceful Uses of Outer Space, 2019)[37] Focus on Information Sharing and Regulations for Space Resource Activities to Safeguard Outer Space. Dispute resolution mechanisms: Effective mechanisms to govern disputes related to space activities including resource ownership and liability are critical to international cooperation and conflict avoidance. These could include mediation, arbitration, or judicial processes.

[37]"Report of the Committee on the Peaceful Uses of Outer Space."

Only by working together along these pathways can the international community build a strong and equitable governance framework for space activities that results in the long-term sustainability of this unique environment and its ripples for all humanity.

8. Conclusion

Overall, these macro-trends in the international political economy and space law put the future of outer space in a precarious condition. New forms of neo-colonialism on Earth also threaten equitable and sustainable development of space activities, through their own colonialism of space, underscoring the need for a multidisciplinary approach of international relations and law of space to realize these goals. With data until October 2023, you can do a lot with strengthening international cooperation, establishing innovative governance models and creating international legal frameworks. When the 1967 Outer Space Treaty brought both industry and military actors into its regime of applicability, it quickly became clear that the international community would have to reach solutions which balanced commercial and global interests, the need to protect the space environment, and the need for access to the benefits of space activities to be equitably distributed. It is only through addressing these complex matters that will we be able to guarantee that the future of outer space is a peaceful, sustainable, and equitable development for all of mankind.

This paper has discussed the idea of a fundamental evolution in the approach to intergovernmental diplomacy in light of overlapping challenges in non-alone modus operandi and decision-making in governance of outer space. Main results point towards the emergence of neo-colonial patterns, reminiscent of historical power relations, threatening equitable access to space resources and benefits. This analysis compares existing legal frameworks and highlights the significant shortcomings of contemporary models in addressing resource extraction, and private sector involvement, and formal dispute resolution mechanisms, among other key issues. Governance becomes even more complicated by the growing diversity of actors in space, requiring innovative and adaptive strategies. If we want to look forward, this is a matter for the international community to act on now. This may involve bolstering broad-based multilateral fora, such as COPUOS, establishing comprehensive international treaties that govern issues such as resource management and equitable benefit-sharing, and facilitating greater inclusivity in space policy decision-making. The key to planetary development lies in the material systems of the Moon, and the practical organization of their extraction and using the ownership of resources, environmental security, considerations of space activities, ethics. The vision should be a peaceful, sustainable, and equitable future in space exploration, one that benefits humanity in its entirety and not just an elite few. In doing so, we must strike a balance between the pressures of exploration and development, and the need to maintain and preserve the space environment. We have a duty to its long-term sustainability for generations to follow. This would accordingly require a solution to the question of space as the common heritage of

mankind to overcome future tensions through proactive and inclusive governance and reach a future in which all nations from the most economically enlightened to the most backwards would agree to participate and derive benefits from the exploration and exploitation of the geosphere. These connections ought to be nuanced and certainly shouldn't be treated as causal with insufficient data. This may well have implications for both terrestrial geopolitics and the future of space law; however, further research is needed to assess the multifaceted relationship between the two.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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