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EDITED BY

Alanna Krolkowski,
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United States

REVIEWED BY

Eligar Sadeh,
Astroconsulting International LLC, United States

*CORRESPONDENCE

Sibsankar Palit,
✉ executive.lifetoandbeyond@gmail.com

RECEIVED 15 March 2025

ACCEPTED 26 June 2025

PUBLISHED 10 July 2025

CITATION

Palit S, Dias TS and Hazra S (2025) Rebalancing
space governance: a global south perspective
on outer space as a global commons.
Front. Space Technol. 6:1594352.
doi: 10.3389/frspt.2025.1594352

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Rebalancing space governance: a global south perspective on outer space as a global commons

Sibsankar Palit^{1,2*}, Thiago S. Dias^{1,3} and Subhajit Hazra¹

¹LIFE-To & Beyond Foundation®, Asansol, West Bengal, India, ²ACES Worldwide, Arlington, VA, United States, ³Universidade da Força Aérea (UNIFA), Rio de Janeiro, Brazil

Human activities beyond Earth are increasing, encompassing military, commercial, and scientific dimensions. In such a scenario, the concept of outer space as a shared heritage of humankind faces an unprecedented pressure. Originally dominated by military applications following World War II, outer space has transformed into an arena where public and private space agencies are increasingly interested in utilizing space resources. On the one hand, the US Artemis Accords and Indian Space Policy 2023 facilitate space commercialization, which potentially compromises the global commons principle. On the other hand, pressing issues such as the proliferation of space debris, militarization tendencies, and planetary protection issues necessitate concerted and anticipatory international actions. This has resulted in a scenario where fair and equitable access to space governance for the Global South is more than just a symbolic representation. Therefore, this manuscript aims to examine space governance structures, particularly from the perspective of the Global South, where, through the analysis of structural imbalances in existing governance frameworks, we find avenues guided by the spirit of environmental law towards a more participatory engagement that guarantees outer space to remain a global commons serving all of humanity and not a projection of earthly power imbalances into space.

KEYWORDS

space law, global south, environmental law, global commons, outer space, space sustainability, space governance, space exploration

1 Introduction

Historically, developed countries have dominated outer space exploration, leading to a disparity in access to space. In such a scenario, attempts have been made, through collective actions, to address global problems under the liberal international order established after World War II, leading to the development of the Outer Space Treaty (OST). However, the space race (1957–1969) between the superpowers during the Cold War deflected enormous resources toward nationalistic prestige schemes instead of collective solutions to global problems. More so, it militarized space technologies, fuelling global tensions while simultaneously excluding developing countries from access to and participation in vital space advancements. This resulted in the creation of a technology or a chronic “space gap” that continued to compound global economic inequity and hinder development across the Global South in the form of space resource (resources situated in the Karman line and beyond) utilization. Broadly, these space resources can be divided into two categories: limited natural resources in Earth’s orbit, like the GEO (Geostationary Earth Orbit) or orbital slot designations including the radio frequency allocations (controlled by the

International Telecommunications Union) and the planetary resources controlled under the OST of 1967 and the Moon Agreement of 1979. It is important to note that OST is generally abided by most nations globally; however, the Moon Agreement is not viewed as being impactful, given that no space powers have ratified the agreement. The basic legal characteristic of outer space excludes the exercise of state sovereignty, making it conceptually a shared resource domain (Kaul, 2024). Despite marginal roles in early space exploration, nations from the Global South, such as China and India, have come to play active roles in developing space law as a way to promote fair access and peaceful utilisation of outer space. Still, the gap between the established and emerging space powers remains enormous, with the latter building political blocs in space whose geostrategic interests drive their formation. This bloc process often aligns the emerging space-capable nations with the strategic interests of the major space-faring nations. Consequently, establishing inclusive conversations and multinational alliances is critical to equal and joint space management, benefiting the inherent interests of human development worldwide (Centre for International Governance Innovation, 2024; Mas Vivancos, 2025). Thus, democratizing access to space would not only promote inclusive stakeholder participation but also fair access, which is integral to the attainment of sustainable development and equitable global governance. This is more so as space capabilities continue to shape a nation's economic development, environmental monitoring, and secure infrastructures globally (Mas Vivancos, 2025).

The United Nations recognizes four global commons (an international, supranational, and global resource domain containing common-pool resources that lie beyond national jurisdictions): the high seas, the atmosphere (airspace over high seas), Antarctica, and outer space (Kaul, 2024). But the status of 'outer space' as a global commons has been in dispute, particularly by those in the US through the 'United States Executive Order of 2020', which formally dismissed such an attribution at a moment when the commercial use of planetary resources was gaining pace (The White House, 2020). Beyond the 2020 Executive Order, U.S. policy further opposes the idea of outer space as a global commons through the Commercial Space Launch Competitiveness Act of 2015, which explicitly grants private entities the right to own and use space resources. Additionally, the U.S. has also refused to ratify the 1979 Moon Agreement, which frames celestial resources as the "common heritage of mankind," signaling a clear rejection of a regime based on global commons and aiming to promote commercial investment by establishing property rights rather than treating space as a shared resource (Jakhu et al., 2017). Hence, as is obvious, this denial has heated up arguments among the global community, who insist on maintaining the *status quo* (i.e., the current international approach to outer space), to avoid negative consequences for those who have yet to set foot in the space domain. Moreover, space governance overlaps with environmental conservation issues, especially when it comes to the sustainable use of resources in Earth's orbit (i.e., geosynchronous orbital slots and available radio frequencies) (Kaul, 2024). This is principally true for the Global South, where space technologies are crucial for applications in agriculture, disaster management, and climate monitoring (Mas Vivancos, 2025). Sadly, these countries cannot usually participate fully in major discussions on space security and sustainability. For example, in the efforts by the COPUOS

(Committee on the Peaceful Uses of Outer Space) consensus system, though participatory, it enables one dissenting state to veto decisions, rendering it useless in dealing with pressing matters such as space debris or arms control (Secure World Foundation, 2024; Arms Control Association, 2022). Again, a good example of exclusion of the Global South from advancing in space research is the U.S. Wolf Amendment, which prohibits NASA from cooperating with China, limiting wider international cooperation on space governance (Qi, 2022). Thus, the increasing dependence on space-based technologies highlights the imperative of keeping outer space a secure and sustainable environment for every nation and not a selected few, which, in turn, can only be done once we are fully acquainted with the challenges associated with the rational use of space as a 'Global Commons'.

2 Challenges associated with the governance of space resources and their sustainable management

Outer Space governance is an important international issue confronting humanity. As more human activities gain momentum, the existing domain of space as a common pool of resources is subjected to unprecedented stress in multiple directions, as opposed to its initial days (when the arena was controlled by national military in the aftermath of World War II). Since then, the space frontier has evolved exponentially to include commercial ventures and scientific exploration, which has raised fundamental issues regarding the principle of 'outer space as a global commons' and how such a principle can be sustained. Issues related to the governance of space cut across more than one dimension and can be summed up under the following.

2.1 Commercial activities in space

The entry of private actors in space exploration has brought along its associated opportunities and challenges. Commercial players like SpaceX and Blue Origin have transformed the efficiency and cost of space launch (and for the good). Still, their increasing role casts doubts about the equity of access to space resources. For instance, the executive order on *Encouraging International Support for the Recovery and Use of Space Resources* issued under the first Trump (US) administration on 6 April 2020, explicitly mentions,

"Outer space is a legally and physically unique domain of human activity, and the United States does not view it as a global commons" (The White House, 2020).

The '2023 Indian Space Policy' also openly allows non-governmental enterprises (NGEs) to commercialize technology, including the recovery and sale of resources from asteroids (ISRO, 2023). Likewise, the US *Artemis Accords* encourage cooperative partnerships with commercial companies for exploring the moon with a focus on interoperability and shared infrastructure (NASA, 2020). This shift could lead to a few powerful corporations or countries dominating space resources, further

creating global inequalities where nuclear weapons are concentrated in a few countries only, further deepening global inequalities. It also threatens the idea of space as a shared resource for humanity that can be accessed by all of humankind. In this, commercialized exploitation, in the form of mining our moon, planets, or other celestial objects, would then produce legal ambiguity. The current international laws, like the OST, prevent countries from claiming ownership but do not clearly address commercial resource extraction. Similarly, the Indian Space Policy permits NGEs to “possess, own, transport, use, and sell” asteroid resources; the policy fails to address how such practices correspond with the values of global commons. This contradiction illustrates why there is a requirement for refreshed international regulation to align private innovation with the concept of shared access.

2.2 Risks of space militarization and weaponization

The militarization of outer space has become a pressing issue as states progress towards establishing defensive space capabilities that may lead to space warfare in the future. States such as the United States, China, Russia, and India have professional space forces that engage in operations of satellite reconnaissance to anti-satellite (ASAT) missile testing. For instance, Russia’s 2021 ASAT test produced debris that caused the International Space Station (ISS) to make two evasive maneuvers in 2022 to dodge collisions, thus highlighting the dangers of unchecked military activities. Hence, such tests not only pose a risk to critical infrastructure but also increase geopolitical tensions, which could destabilize the space and global geopolitical environment. Additionally, the spread of ASAT weapons and satellite-based military systems is a matter of legal and ethical concern. There is a risk of indiscriminate harm to civilian infrastructure (like navigation satellites), the creation of long-lasting space debris, and the potential to undermine the peaceful use of outer space, which is considered a global commons. Moreover, the destruction or disabling of satellites can disrupt vital services relied upon by civilians worldwide and jeopardize the sustainability of world order through interruption of global communications, banking, and military operations (Blatt, 2020; Sparks, 2024; Marketsandmarkets.com, 2024). Existing international treaties, including the OST, ban the use of nuclear weapons or ‘any other weapons of mass destruction’ in space but do not specifically prohibit conventional weapons. This vagueness provides a loophole for countries to create dual-use technologies, like maneuverable satellites that can be weaponized. To counter these dangers, global platforms need to codify norms against weaponization, possibly in the form of binding agreements or new guidelines under the UN-COPUOS.

2.3 Space debris management and planetary protection

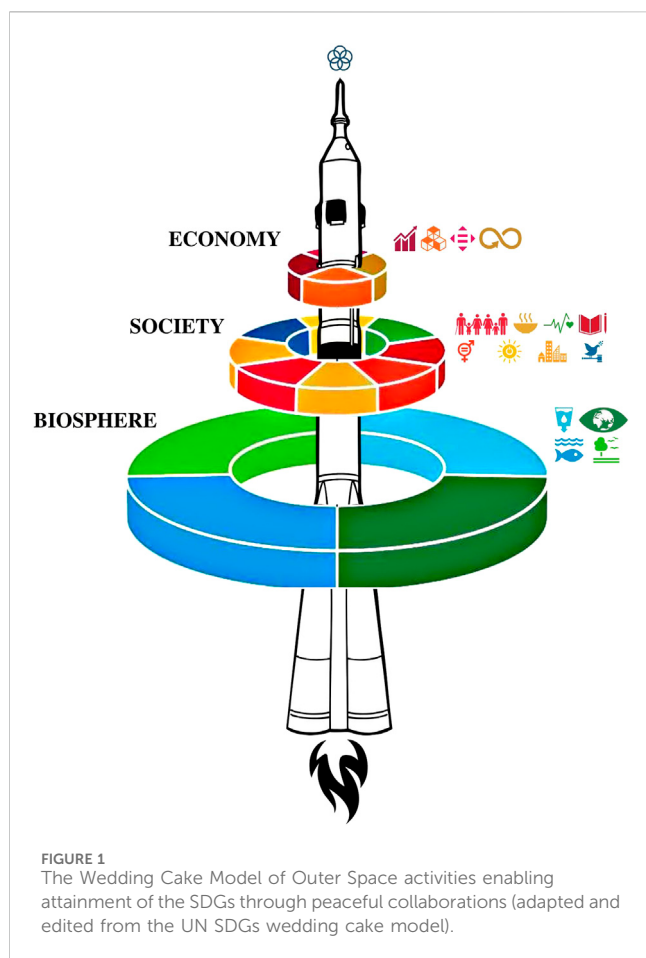
Another vital threat to long-term space operations is the build-up of space junk in Earth’s orbit. With more than 40,500 trackable objects >10 cm (as of 6 March 2025) in Earth’s orbit (ESA, 2023), there is a potential for collisions, which could cause a cascading

chain reaction referred to as Kessler Syndrome, making LEO unusable. For example, the ISS’s routine debris-avoidance maneuvers, such as those caused by Russia’s 2021 ASAT test, illustrate operational expenses and safety concerns. Hence, planetary protection is not only for Earth but also for extraterrestrial environments (Santomartino et al., 2023).

NASA’s Office of Planetary Protection has strict sterilization procedures in place for spacecraft to avoid biosphere contamination in possible biospheres, like the ‘special regions’ of planet Mars that have high water activity (NASA, 2019). In the same manner, COSPAR (Committee on Space Research) has improved planetary protection guidelines since 1958, which include Mars missions to prevent interference with life-detection experiments. Nonetheless, governments across the world have varied opinions owing to issues of ownership and liability. For instance, no country has jurisdiction to retrieve debris from retired satellites of any other nation, and this is a loophole in the law that stops mitigation from being fully implemented.

While considering the challenges regarding space governance, it becomes apparent that the governance of space resources now requires new strategies for international cooperation, fair access, protection of the environment, and prevention of conflict. Therefore, the sustainable management of outer space resources is no longer just a necessity for sustained space exploration, but an approach to use space technologies to solve Earth’s most critical challenges through the implementation of Sustainable Development Goals (SDGs). These have been detailed later, which necessitates harmonization with worldwide frameworks, as those framed by the UNOOSA (United Nations Office for Outer Space Affairs). These frameworks include the Guidelines for the Long-term Sustainability of Outer Space Activities, the Working Group on Space Resources, and the Space 2030 Agenda, which collectively aim to harmonize national efforts, promote responsible resource management, and ensure the long-term sustainability of outer space activities (United Nations Office for Outer Space Affairs, 2021; UNOOSA, 2025a; UNOOSA, 2025b; UNOOSA, 2025c).

For example, Earth observation satellites directly contribute to targets that form the 17 UN SDGs, showing space’s facilitation of a global public good (World Space Week Association, 2022; Palit et al., 2022). Using the space domain to support the SDGs is especially significant from a Global South perspective because many developing countries lack indigenous space capabilities and depend on access to space-based technologies for critical needs like disaster management, agriculture, and climate monitoring. International frameworks and initiatives such as UNOOSA’s Access to Space for All and Space4SDGs are designed to bridge this gap by building capacity, fostering partnerships, and ensuring that space-derived benefits reach countries that are otherwise marginalized in the global space arena. This approach helps reduce inequalities, aligns with the SDG principle of “leaving no one behind,” and empowers the Global South to leverage space technology for sustainable development (UNOOSA, 2023; Zhao, 2025; Prabhu, 2024). Besides, the UNOOSA guidelines promote closed-loop systems and minimal terrestrial reliance in deep space missions to maintain long-term resource usability. This supports the UN SDGs’ wedding cake model, placing space sustainability at the nexus of the biosphere, social, and economic layers. Figure 1 below has been adopted from the UN SDGs wedding cake model and



edited on the lines of space sustainability on attaining sustainability in space (for deep space missions) and sustainability from space on Earth (for the global public good). So, space sustainability at the biosphere, social and economic levels can only be attained through peaceful collaborations and when attaining the SDGs.

3 Inspiration for inclusive space governance from environmental governance

While playing a relatively limited role in the early days of space developments, countries from the Global South have not only contributed to the field of space law, but also have pushed for the just access and peaceful utilization of outer space. Nevertheless, they continue to face challenges such as unfair access to space technologies and insufficient representation in the global space governance dialogues, resulting in a power asymmetry between major and emerging space powers (Mas Vivancos, 2025). Certain principles in environmental law present useful frameworks that can also be applied to space for inclusive governance with relevance to the Global South context. Table 1 attempts to draw inspiration from the Principles of Environmental Law that can find application in space governance and can be relevant to the global south context.

The above table draws direct parallels between foundational principles of environmental law and their application to space

governance, with a particular emphasis on inclusivity and the interests of the Global South. It highlights how treating the space environment as a “common concern of humanity” acknowledges historical inequities and promotes broader participation. Strengthening the enforcement of planetary protection principles and adopting the “polluter pays” approach to hold both public and private actors accountable for space debris, thereby preventing monopolization of space orbital resources. Annual environmental impact assessment is also recommended to safeguard orbital resources critical for development, especially for emerging space nations. The precautionary principle advocates restraint in deploying large satellite constellations to protect future access for developing countries. Furthermore, it also underscores the importance of proactive public participation, timely notification, and consultation among stakeholders to ensure transparency and give the Global South a meaningful voice in decision-making. Finally, it calls for a commitment to sustainable development in and from space, ensuring that present activities do not compromise the ability of future generations and emerging nations to benefit from space exploration. It is important to note that the OST already addresses few of these principles, such as recognizing outer space as the province of all humankind (common concern), prohibiting harmful interference with space activities (non-interference), and establishing the obligation not to cause harm to space objects of other states or the space environment. Collectively, these principles, reinforced and expanded by lessons from environmental governance, offer a robust framework for building a more equitable, sustainable, and inclusive model of space governance. With support from the UNCOPOUS, new models like TWAIL (Third World Approaches to International Law) seek to reform global space governance schemes by reimagining international law foundations that have hitherto denied Global South input (Minneti, 2018; Luchetti and Space Generation Advisory Council, 2021).

In brief, the viewpoint from the Global South calls for a paradigm shift in space governance beyond current models typified by limited enforcement and Northern-dominated regulatory approaches. As revealed by terrestrial environmental governance challenges, sustainable space management demands governance systems that emanate from the Global South and not be imposed upon them (OECD, 2008). Therefore, formulating an inclusive conversation and multinational collaborations constitutes a critical pathway toward equitable and cooperative space management that serves the development of the human world, especially as space-based technologies progressively facilitate essential services such as telecommunication, climatic monitoring, and disaster control for emerging nations continuing to develop space capabilities (Mas Vivancos, 2025).

4 The global south's perspective towards an 'inclusive space governance'

Equitable access to outer space is vital to ensure that sustainable development can be achieved under rapidly evolving conditions. Outer Space governance is one of the most critical issues in

TABLE 1 Inspiration from existing environmental principles and their application to Space governance with relevance to the global south.

Specific principles of environmental law (Drishti IAS, 2024; United Nations, 1992; United States Department of State, 2019; United Nations, 1987)	Application to space governance	Relevance to global south and space governance
1. Common Concern (Antarctic Treaty, 1959; The Brundtland Report 1987)	Space Environment should equally be a common concern for Humanity	Acknowledges historical inequities while enabling participation in space
2. Duty Not to Cause Environmental Harm (Rio Declaration Principle 6, 1992)	Strengthening the enforcement of Planetary Protection Principles	Promotes sustainable and ethical space practices, ensuring long-term access for the global space stakeholders including the Global South
3. The “Polluter Pays” Principle (OECD 1972; Rio Declaration Principle 16, 1992)	Space stakeholders (Public or Private) contributing to a greater percentage of space debris must also bear the cost of removing them as well	Holds entities accountable for space debris, preventing space resource monopolization
4. Environmental Impact Assessment (EIA) (Rio Declaration Principle 17, 1992)	Yearly assessment of space debris and its impact on the space environment, especially in Earth’s orbit	Protects orbital resources vital for Global South development
5. The Precautionary Principle (Rio Declaration Principle 15, 1992)	Unnecessarily populating space environments with bigger constellations of satellites or spacecrafts that could pose serious future threats should be prevented	Protects future access for developing space programs
6. Public Participation (Rio declaration principles 7, 14, 18, 19 and 27, 1992)	Proactive Public Participation the key to informed Space law and policy reforms	Involves professionals from Global South nations in international space policy-making
7. Notification and Consultation (Rio Declaration Principles 7, 14, 18, 19 and 27, 1992)	Requirement of stakeholders to provide prior and timely notification to, and consult with each other on activities that may have a significant adverse effect on space objects of other stakeholders	Ensures transparency and Global South input in space decisions
8. Sustainable Development (The Brundtland Report 1987; Rio Declaration Principle 3 and 27)	Space developments should ensure to meets the needs of the present without compromising the ability of future generations/emerging nations to meet their own needs through space exploration	Ensures that developmental opportunities remain available

international affairs today. Here, voices from the Global South (i.e., countries from Latin America, Africa, Asia, and Oceania) can transform space governance mechanisms to forge more representative and inclusive structures as they are increasingly reliant on space technologies for essential developmental requirements. Notably, the Moon Agreement was significantly influenced by the Global South, as many developing countries pushed for its provisions on the equitable sharing of benefits and the management of lunar resources as the “common heritage of mankind.” This approach within the agreement seeks to prevent the monopolization of lunar resources by a few powerful actors and instead promotes collective management and benefit-sharing, reflecting the priorities and perspectives of emerging space nations.

Traditionally, space discourse has been dominated by the major space powers. Democratizing governance necessitates placing Global South voices at the forefront for several reasons. First, space technologies directly support 65 targets forming the UN SDGs through Earth observation satellites, and equitable access becomes a development necessity and not just a luxury. Second, these countries are confronted with certain vulnerabilities from militarization and commercialization trends that undermine the notion of outer space as a global commons. Third, their engagement adds legitimacy and effectiveness to international frameworks by bringing a variety of views on resource use, debris management, and planetary protection. Various zones in the Global South exhibit diverse paradigms of space management. For example, South America has led in models of regional

collaborations through organizations that share resources for collective satellite systems. Asia features a mixed picture where rising space nations such as China and India are formulating robust frameworks (demonstrated by developments like the Chinese Tiangong Space Station showcasing China’s high-tech indigenous space capabilities and India’s Space Policy 2023 facilitating non-governmental organizations to commercialize space resources) while also promoting equitable access paradigms at the same time. African countries have prioritized capacity-building programs via the African Space Agency, focused on downstream space applications that solve continental issues, such as drought monitoring and telecommunications connectivity to remote communities.

The UN COPUOS is still the main international governing platform, with discussions through its scientific and legal subcommittees. Its consensus-based system, however, tends to produce non-binding recommendations with few enforcement tools, which again affects the status of the Global South. The Artemis Accords, through encouraging global collaboration of 55 state signatories as of 15 May 2025, may have a wide applicability, but they exclude important parties such as Russia and China, thereby leaving parallel systems of governance that fracture global initiatives. Environmental governance principles provide useful templates for inclusive space governance. Drawing lessons from multilateral environmental agreements, space governance can borrow principles recognizing differential capacities while ensuring a global engagement.

5 Recommendations for inclusive and equitable space governance

To ensure that outer space remains accessible, sustainable, and equitable for all nations, especially those in the Global South, it is essential to move beyond aspirational statements and voluntary cooperation. The following recommendations outline practical steps for building a more inclusive and just space governance framework.

- *Mandate Technology Transfer*: Establish obligatory technology transfer requirements to ensure that developing and underdeveloped nations can access and benefit from advanced space technologies.
- *Capacity-Building Initiatives*: Implement robust capacity-building programs to empower countries with limited space capabilities, enabling broader participation in space activities (Palit et al., 2024).
- *Fair Benefit-Sharing Mechanisms*: Create enforceable frameworks for the equitable sharing of benefits derived from space resources, ensuring that all nations, especially those in the Global South, receive a fair share.
- *Strengthen UNOOSA's Enforcement Powers*: Enhance the authority of UNOOSA by moving from voluntary guidelines to binding resolutions, promoting greater compliance and accountability among states.
- *Introduce Salvage Rights for Space Debris*: Establish 'salvage rights' for space debris management, drawing on maritime law principles, to incentivize debris removal and clarify liability for space actors.
- *Transition to Binding Treaties*: Shift from voluntary coordination to binding international treaties that balance innovation with equity, ensuring responsible action and long-term sustainability in space governance.
- *Leverage Global Platforms*: Utilize high-level forums such as the G20, particularly as they are increasingly hosted by Global South countries to elevate space governance issues to the highest political agenda and foster inclusive dialogue.

By implementing these measures, the international community can foster a cooperative, transparent, and fair approach to space governance. This will help prevent the concentration of space benefits among a few and ensure that outer space truly serves as a global commons for present and future generations.

6 Conclusion

Space resource governance today is dealing with complex challenges to balance technological progress with the ideals of equity and sustainability. There exist substantial lacunae in the existing frameworks, most notably in commercial regulation and guaranteeing substantial participation of the Global South stakeholders. Though institutions such as the UN COPOUS offer important platforms for debate, their consensus-driven model frequently results in non-binding recommendations that lack

enforcement measures. The experience of environmental governance is rich in lessons, and it indicates that those concepts can be borrowed for space governance to recognize different capacities and to foster a truly global participation. Ultimately, sustainable management of space resources hinges on understanding their dual nature: as sources of innovation and economic growth and as indispensable tools for achieving the UN SDGs utilizing downstream space technologies like Earth observation and related technologies. It is only through inclusive governance that the idea of outer space as a global commons can be truly achieved.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

SP: Project administration, Writing – review and editing, Conceptualization, Writing – original draft. TD: Writing – original draft. SH: Writing – review and editing.

Funding

The author(s) declare that no financial support was received for the research and/or publication of this article.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The author(s) declare that no Generative AI was used in the creation of this manuscript.

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