

DEFINE OUR FUTURE

NASA's Artemis Moon Base Announcement, Space Industry Roundup,
and an Analysis of the UN Space Resources Principles

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INTRODUCTION

For decades, returning humans to the Moon has been framed as an act of exploration. What NASA is now planning is something considerably more ambitious: not a visit, but a permanent address. The agency's Moon Base programme, targeting the lunar South Pole, represents the most consequential and complex civil space undertaking since the International Space Station, and arguably since Apollo itself. Its goal is not simply to land astronauts on the lunar surface, but to establish the infrastructure, logistics and operational capability required for a continuous human presence, and to do so in one of the most demanding environments in the solar system.

The programme is built around a phased, iterative approach, moving from robotic scouting and technology demonstration through early habitation and toward full sustained operations. It is an architecture that reflects hard-earned lessons from the ISS era: that living and working in space requires systems which are tested, refined and proven before lives depend on them at scale. It also reflects the broader strategic shift that has defined NASA's direction under the current administration, a turn toward commercial partnerships, accelerated timelines, and an explicitly competitive posture relative to China's parallel lunar ambitions.

Phase One (Now to 2029): Learn, Test, Build

The first phase is defined by pace and purpose. NASA will begin with a rapid series of robotic missions to scout the lunar South Pole region, test technologies, and prepare for surface operations. The scale of activity is striking: up to 25 missions, including 21 landings, are planned within this phase, delivering a total of four tons of payload to the surface to test what works in the lunar environment.

The commercial sector is central to this effort from the outset. Blue Origin's Blue Moon Mark 1 lander, known as Endurance, will operate under NASA's Commercial Lunar Payload Services initiative, demonstrating key technologies for future lunar surface operations, including precision landing, cryogenic propulsion, and autonomous guidance, navigation, and control. Astrobotic's Griffin 1 mission will carry the largest commercial payload yet sent to the lunar surface, including Astrolab's FLIP rover, which will itself carry ten additional payloads. Intuitive Machines' IM 3 mission will deliver science investigations to the Reiner Gamma region, including the Lunar Vertex payload designed to investigate the Moon's magnetic anomalies.

Perhaps the most novel element of Phase One is the deployment of MoonFall drones, four highly mobile aerial vehicles built on the legacy of NASA's Ingenuity Mars Helicopter, designed to survey terrain that rovers cannot reach. The drones will scout locations that are difficult or impossible for traditional rovers to access, including steep terrain and permanently shadowed regions that may contain water ice and other valuable resources. Each drone will operate independently over the course of a lunar day, approximately 14 Earth days, making multiple propulsive flights and gathering high-definition imagery of the South Pole environment.



Images: Rendering of NASA's MoonFall drones (NASA)

Mobility is a foundational requirement from the very beginning. Both crewed and uncrewed Lunar Terrain Vehicles are planned for Phase One, with uncrewed variants expected to feature basic autonomy and teleoperations, operate for a minimum of one year, and travel at least 800 kilometres. Crewed variants will extend that range further, enabling astronauts to reach sites far beyond the immediate vicinity of their landers.

One of the most technically significant Phase One priorities is thermal and power management. Unlike Earth, the Moon has little atmosphere to retain heat, and temperatures in shadowed regions or during the lunar night can plunge to extreme lows. To address this, NASA is deploying radioisotope heating units, devices which use the natural heat generated by decaying radioisotope material to keep electronics, batteries and mechanical systems within safe operating temperatures. Demonstrating this capability in Phase One is not merely a technical exercise; it is a prerequisite for everything that follows.

Underpinning all surface activity is the VIPER rover, scheduled for delivery by Blue Origin in late 2027. Equipped with several science instruments and a one-metre drill, VIPER will analyse lunar soil at multiple depths and temperatures to detect and study volatiles, and is capable of entering permanently shadowed craters, some of the coldest locations in the solar system, where ice may have been preserved for billions of years. The data it gathers will directly inform where the Moon Base is sited and how its resource strategy is designed.

Phase Two (2029 to 2032): Early Habitation

By 2029, the programme transitions from scouting to building. Phase Two is defined by the arrival of semi-permanent infrastructure and the beginning of human habitation on the lunar surface. The logistics ambition alone is considerable: delivery of up to 60 tons of cargo through as many as 24 landings using low, medium, and heavy-class cargo landers.

The most significant new asset in this phase is a pressurised rover, supplied by JAXA in partnership with Toyota, which will serve as both transport and mobile habitat. Designed to support two astronauts in a shirt-sleeve environment for up to 30 days, the pressurised rover will allow crews to explore geographically diverse regions and conduct science far beyond the immediate vicinity of landing sites or fixed habitats. With an expected operational lifespan of approximately ten years, it is designed for the long haul, not a short-term demonstration.

Power is a defining challenge of this phase. Deployment of expanded solar power systems and initial nuclear surface power capabilities, potentially including fission reactors and radioisotope power systems, are planned for Phase Two. Solar arrays will be deployed and tested alongside battery storage and distribution systems, with permanent infrastructure ultimately required to generate more than ten kilowatts during illuminated periods and provide up to 360 kilowatt-hours of stored energy through the lunar night. Radioisotope thermoelectric generators will demonstrate the nuclear power approaches that will scale up significantly in Phase Three.

Communications infrastructure will also be expanded in Phase Two, with surface-to-orbit stations deployed and surface nodes providing coverage of approximately ten kilometres per node, functioning similarly to cellular network towers on Earth, creating a connected and resilient architecture across the South Pole region.

Phase Three (2032 and Beyond): A Sustained Human Presence

Phase Three is where the Moon Base becomes, in the fullest sense of the term, a base. Routine crew rotations, continuous surface activity and an operational logistics network mark the transition from expedition to occupation. Delivery of up to 38 tons of cargo annually will sustain habitats, power systems, science outposts and logistics operations, enabled by the low-cost reusable heavy-lift capabilities that are expected to be operational by this stage.

Habitation modules will expand in scale and capability, incorporating airlocks and module aggregation nodes to support interconnected habitats. Full fission surface power systems will come online, providing the reliable, high-output energy that sustained operations demand.

In-situ resource utilisation, the extraction and use of materials already present on the Moon, will move from demonstration to implementation. Planned activities include extracting oxygen, water, and hydrogen from lunar regolith, alongside techniques for converting regolith into durable construction materials through approaches such as sintering, corbelling, and 3D printing.

Phase Three also introduces uncrewed cargo return capability, enabling the transport of scientific samples, hardware and research payloads back to Earth, closing the loop on what will, by this point, be a genuinely two-way logistics chain between Earth and the Moon.

Why It Matters

NASA's Moon Base plan is, at one level, a detailed engineering programme with phases, payloads and power budgets. At another, it is an expression of a strategic conviction: that establishing a permanent human presence on the Moon is both achievable and necessary, and that the United States intends to lead that effort. The commercial architecture at its core, CLPS missions, commercial landers, international partnerships with JAXA and others, reflects a deliberate choice to leverage the full breadth of the space industry rather than rely solely on government programmes.

That choice comes with both advantages and risks. Commercial partners bring speed, innovation and cost efficiency, but also the unpredictability of a young industry still validating its systems. The Moon is an unforgiving environment, and the gap between ambition and execution has humbled space programmes before. What Phase One must ultimately demonstrate is not just that individual technologies work, but that the integrated architecture, the landers, the rovers, the power systems, the communications networks, can function reliably and in concert in one of the harshest settings human beings have ever attempted to inhabit.

If it succeeds, the Moon Base will be more than a scientific outpost. It will be the first permanent human settlement beyond Earth, and the foundation from which the next destination, Mars, becomes reachable.

NEWS ANALYSIS



A|NEWS

OPINION | ANALYSIS

Space Industry Roundup: AI, Infrastructure and the Expanding Lunar Economy

Rendering of Astrobotic's Griffin lander (Image: Astrobotic)

The Moon

The lunar economy continues to attract attention, spanning robotics, communications, resources and infrastructure. NASA payloads have been confirmed to fly aboard Astrolab's first lunar rover, deepening the agency's reliance on commercial surface mobility providers. Astrolab's FLIP rover, scheduled for a 2026 lunar landing, will also carry instruments tasked with prospecting for helium-3, adding a resource economics dimension to what is already a scientifically ambitious mission.

NASA's emerging Moon base programme has identified semiconductor supply as a critical dependency, and Taiwan has reportedly received what is being described as 'the call' to support that need, a development which adds a new dimension to Taiwan's strategic importance in the space economy, beyond its already well-established role in terrestrial chip manufacturing. The Canadian Space Agency has awarded \$1 million in funding for studies into lunar power and mining, a modest but meaningful signal that Canada is positioning itself as a contributor to the infrastructure layer of the lunar economy. More ambitiously, researchers have proposed that lasers placed in permanently shadowed lunar craters could form the basis

of a lunar GPS system, providing the positioning and navigation infrastructure that sustained surface operations will require.

Beijing has revealed an AI-powered lunar robot intended to support its 2029 Moon mission, with the system designed to operate autonomously in the demanding lunar environment. The development is consistent with China's broader strategy of deploying AI as an enabling technology across its space programme, and reflects the growing convergence between AI capability and space operations that is a defining feature of this era. iSpace, meanwhile, has signed a payload service agreement with the University of Leicester for a lunar Raman spectrometer mission, adding to the growing suite of scientific instruments being manifested on commercial lunar landers. In a significant consolidation of the US commercial lunar sector, Voyager Technologies has announced the acquisition of Astrobotic, a move described as accelerating America's path to the Moon and one which further concentrates capability within a smaller number of well-capitalised players.

Intuitive Machines continues to expand its lunar ambitions, announcing two prime lunar reconnaissance contracts and acquiring Goonhilly Earth Station in the UK to bolster its deep space communications infrastructure. The Goonhilly acquisition is a notable strategic move, adding a high-heritage ground station with existing deep space tracking credentials to Intuitive Machines' network, and strengthening the commercial ground segment that will underpin both NASA and commercial lunar operations.

Launch & Infrastructure

The launch and in-space infrastructure segments are gaining substantial investment, with a new cohort of European providers developing alongside the established US and Chinese players. Isar Aerospace has secured €270 million to advance its sovereign launch capability, a raise which cements its position as one of Europe's most credible new launch entrants. The Exploration Company, which is developing logistics services for the ISS and beyond, has completed a drop test of its Nyx capsule and announced plans to develop a reusable heavy-lift rocket; an ambition which, if realised, would significantly broaden Europe's independent access to space. Venturi Space has committed €250 million in investment in France, with 200 jobs expected by 2030, reflecting the growing industrial and economic weight of the new space sector in Europe.

Blue Origin is seeking to resume New Glenn launches before the end of the year, following the anomaly that grounded the vehicle earlier in 2026. A successful return to flight would be significant, both for Blue Origin's commercial ambitions and for the competitive dynamics of

the heavy-lift market. Firefly Aerospace, meanwhile, is expanding its Central Texas operations to scale production of both lunar and orbital vehicles, signalling a transition from a development-phase company to volume manufacturer. Impulse Space has raised \$500 million to advance its in-space transportation services, one of the largest raises in the orbital logistics segment to date and a further indication of investor confidence in the emerging market for last-mile delivery in orbit.



New Glenn April launch (Image: Blue Origin)

Blue Origin aiming to return New Glenn to flight before the end of the year.

 **ANASDA**

Orbit & AI

Artificial intelligence is moving from a supporting role in space operations to an operational capability in its own right.

StarCatcher has raised \$65 million to develop what it describes as the world's first power grid in space, using laser-based wireless power transmission to deliver energy between spacecraft and potentially to surface assets. The concept addresses one of the most fundamental constraints on in-space operations, reliable power supply, and if validated at scale could prove a genuinely enabling technology for the next generation of orbital infrastructure. It sits alongside the laser-based lunar navigation concept noted above as evidence that directed energy technologies are finding an expanding range of applications in the space domain.

ICEYE, the Finnish synthetic aperture radar satellite operator, has raised €450 million in a Series F round. The funding will support the continued expansion of its SAR constellation, which has established itself as a critical intelligence, surveillance and reconnaissance asset, as well as a commercial Earth observation platform.

Samsung Foundry's continued advances in space semiconductor technology, noted last month, are finding practical expression in the supply chain: Taiwan's call-up to support NASA's Moon base chip requirements illustrates how the convergence of terrestrial semiconductor expertise and space programme demand is creating new industrial relationships.

Global Partnerships

The Artemis Accords network continues to grow. Thailand has set its sights on a role in lunar missions through Artemis cooperation, joining the expanding group of nations seeking to position themselves within the US-led framework for civil space activity. The involvement of Southeast Asian nations in the Artemis architecture is a relatively recent but accelerating trend, reflecting both the growing accessibility of space participation and the diplomatic weight that Accords membership carries.

The Exploration Company is seeking UAE investors for a \$200 million financing round, reflecting the continued interest of Gulf sovereign and institutional capital in the European new space sector. The UAE's recent discussions with Elon Musk on space cooperation, noted last month, sit within this broader pattern of Gulf engagement with the global space industry. The joint Vega-C launch of the European-Chinese SMILE space weather satellite provides a further data point in the ongoing story of scientific cooperation between Europe and China, even as the regulatory and commercial relationship between the two remains complex.

The cumulative picture is of an industry that has moved decisively beyond its pioneering phase. Capital is flowing at scale, supply chains are internationalising, AI is becoming operational, and the Moon is attracting the kind of multi-sector, multi-national attention that was, until recently, the preserve of scientific exploration. The central challenge now is whether the governance, regulatory and cooperative frameworks being built around it can keep pace with the speed of that growth.

SPACE LAW REVIEW



SPACE LAW & POLICY

SUSTAINABLE & PEACEFUL USES OF OUTER SPACE

Discussing the challenges, threats and opportunities to international space law and governance, arising out of evolving international relations, geopolitical dynamics and more.

(Image: United Nations in Vienna, home of COPUOS and the UNOOSA)

Key terms: COPUOS; LSC; Outer Space Treaty; Moon Agreement; UNOOSA; ISRU; Space Resources; ATLAC; SRWG; Draft Principles on Space Resource Activities; Registration Convention; Rescue Agreement; Artemis Accords.

How will Governance Developments Align with Established National and International Law Frameworks on Space Resources? - Pt 2

Initial Recommended Principles for Space Resource Activities: 2022-2026

In our previous Review, our research analysed developments regarding established and emerging governance regimes for space resource activities, specifically exploring the critical developments at the UN Committee On Peaceful Uses of Outer Space (COPUOS), as well as observing the national regimes being established. The research also noted concerns relayed from the Outer Space Institute (OSI) to COPUOS in 2020, stating that uncertainty surrounding international frameworks for resource activities had led to the establishment of national frameworks,¹ leading to the establishment of the Working Group on Legal Aspects of Space

Resource Activities (SRWG) to develop ‘...a set of initial recommended principles for such activities, taking into account the need to ensure that they are carried out in accordance with international law’.²

In this second Part, the research will aim to analyse the development of these Principles. Within the Mandate outlined at the COPUOS meeting 2021, the group are tasked to:

- “(a) Collect relevant information concerning activities in the exploration, exploitation and utilization of space resources, including with respect to scientific and technological developments and current practices, taking into account their innovative and evolving nature;
- (b) Study the existing legal framework for such activities, in particular the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, and other applicable United Nations treaties, also taking into account other relevant instruments, as appropriate;
- (c) Assess the benefits of further development of a framework for such activities, including by way of additional international governance instruments;
- (d) Develop a set of initial recommended principles for such activities, taking into account the need to ensure that they are carried out in accordance with international law and in a safe, sustainable, rational and peaceful manner, for the consideration of and consensus agreement by the Committee, followed by possible adoption by the General Assembly as a dedicated resolution or other action;
- (e) Identify areas for further work of the Committee and recommend next steps, which may include the development of potential rules and/or norms, for activities in the exploration, exploitation and utilization of space resources, including with respect to related activities and benefit sharing.”³

Further to this, in 2022, the SRWG established a five-year workplan,⁴ beginning with ‘...initial administrative, information-collection and stocktaking tasks...including through submissions by States members of the Committee...’ This was followed, in 2023, by a collation and dissemination of these submissions by the Chairs, collecting relevant information on resource activities and its innovative nature, and in 2024, to review and assess the benefits of a resources framework. By 2025, an Initial draft set of recommended principles for space resource activities was submitted to be debated at COPUOS.⁵ Steps taken in 2026 at the COPUOS Legal Subcommittee Meeting included the delivery of more State and Observer

delegation responses to the latest Draft,⁶ which has now gone through multiple iterations, taking into account those responses, the work of the Working Group, and discussion at intercessional meetings.

Introduction and Preamble

The Preamble, in its current form, starts by reaffirming core principles of the Outer Space Treaty,⁷ and interpreting their meaning in relation to resource activities, affirming that ‘...the exploration and use of outer space, including space resource activities, “shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all [hu]mankind.”’⁸ Firstly, identifying resource activities as a ‘province of all humankind’ aligns these activities to the principle of *res communis*,⁹ potentially equating resources to a ‘global commons’, which cannot be occupied or nationally appropriated, while the use outer space cannot ‘...be undertaken for the sole advantage of one country, but done only for the benefit of the international community.’¹⁰ Both appropriation and the benefit-sharing concept appear as key themes throughout the text, but it may be critical at this point to refer to the conflicting views of what benefit sharing actually will look like.

The preamble also goes on to state that ‘...resources originated from and located in outer space are an integral part of outer space and that space resource activities are a branch of space activities and that the international legal regime governing outer space activities, including the Outer Space Treaty, [applies] [might apply] [governs] [is relevant] to space resources activities...’,¹¹ which reminds States of their obligation to apply the body of international space law to resource activities. ‘Option 2’ text here makes direct reference to the binding obligations under Article VI of the OST, that States are required to authorise and supervise the activities of their governmental and non-governmental resource activities. While the Preamble contains different texts to consider before its final drafting, there is critically, an essential principle being relayed, that is, that resource activities are part of space activities, and therefore sit within that broader legal regime.

Another critical note is made, which is that:

“including those reiterating the obligations of the [Outer Space Treaty] [United Nations Space Treaties], are non-binding and do not create new legal rights or obligations, but are intended to guide conduct in a manner fully consistent with existing international law, including the Outer Space Treaty and other applicable United Nations Space Treaties.”¹²

The Principles themselves are non-binding, and act as a tool for States to guide their compliance with international space law, and they may also provide interpretations of the treaties in regard to resource activities. However, they do not themselves represent any binding principles. In this form they may be comparable to the 'Guidelines for the Long-term Sustainability of Outer Space Activities' (the 'LTS Guidelines'),¹³ which themselves provide a set of guidelines on conducting space activities in outer space in a safe, sustainable and transparent manner. Yet the approach to non-binding frameworks at the UN-level has gained much traction in recent years. Speaking at the 2025 COPUOS legal subcommittee (LSC) meeting, the US delegation stated that they '...see potential benefits of a general, high-level initial set of non-binding principles...'¹⁴ However, Sandler writes that '...while the Long-Term Sustainability guidelines demonstrate UNCOPUOS's power to create consensus, they also show the limits of a voluntary approach to international space governance',¹⁵ meaning that the non-binding nature allows States to apply them variably and inconsistently, which could deepen legal misalignment.

Nonetheless, the Draft Principles, should they be adopted, should be approved by consensus and may set the stage for an adaptive form of law-making, as opposed to the long, politically charged process of negotiating and drafting a new binding treaty.

Draft Principles: Principles 1-10 (and X)

The April 2026 version of the Principles comes with significant changes compared to the March 2025 version. Principle 1 provides more clarity regarding compliance with existing international law, stating that they '...are intended to complement and not to supersede existing international law applicable to outer space activities, including the Outer Space Treaty and other relevant international agreements',¹⁶ positioning the Principles as a manual to assist with the implementation of binding law regarding resource activities, and request that States '...shall carry on activities in the exploration and use of outer space, including the moon and other celestial bodies, in accordance with international law, including the Charter of the United Nations...'",¹⁷ referencing the binding notion of Article III of the Outer Space Treaty (the 'OST'). Principle 2 continues to address the contentious issue of the prohibition on the national appropriation of outer space, as set out in OST Article II.¹⁸ Lyall and Larsen write that by '...giving citizens entitlement to any resource so obtained, including rights of possession, ownership, transportation, use and sale...would therefore be an act of national appropriation.'¹⁹ However, the US and Artemis partners have applied that the OST Article I states that outer space '...shall be free for exploration and use by all States...'²⁰ meaning that resource extraction '...is permitted by Article I of the Treaty, which provides that outer space, including the Moon and other celestial bodies, shall be free for exploration and use by all States.'²¹

However, Jakhu and Freeland write that Article II also states that outer space ‘is not subject to’ appropriation by way of use, stating that ‘...it follows that no amount of the use of outer space will ever suffice to justify, from a legal viewpoint, a claim of ownership rights over the whole, or any part of outer space, including the moon and other celestial bodies.’²²

The Principles do then seek to provide clarification and guidance, with Principle 2(A)(a) providing that ‘...States, international intergovernmental organizations or non-governmental organizations, national organizations or non-governmental entities, and natural persons may explore and extract resources from the Moon and other celestial bodies and utilize them.’²³ They also provide explicit provisions regarding commercial resource activities, stating that:

“Commercial extraction and utilization of space resources may be conducted provided that it does not violate the Outer Space Treaty and it is in compliance with the provisions of the Recommended Principles concerning particularly the principle of “the benefit and interests of all humankind”, the mechanism of registration, and the arrangement of benefit-sharing.”²⁴

Principle 3 addresses the ‘peaceful purposes’, specifically stating that, in its current form, “The Moon and other celestial bodies shall be used [by all States] exclusively for peaceful purposes”, including with respect to space resource activities.’²⁵ The wording here should be noted, as there is a critical difference between the ‘for peaceful purposes’ provision, and the ‘exclusively for peaceful purposes’ wording.

Being that the Principles find their meaning from the OST, Article IV of that treaty can provide more clarity. Firstly, the Vienna Convention on the Law of Treaties (the ‘VCLT’) states that ‘A treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose’,²⁶ while Article 31(3)(b) adds that ‘There shall be taken into account, together with the context...any subsequent practice in the application of the treaty which establishes the agreement of the parties regarding its interpretation...’²⁷

Therefore, the meaning of OST and Article IV applies to the interpretation of the Principles. In context, Schrogl and Neumann point out that ‘Article IV of the Outer Space Treaty constituted “the most important arms control development since the limited test ban treaty of 1963”’,²⁸ and came at a time of heightened threats of the placement of nuclear weapons in outer space. Article IV then reads:

"States Parties to the Treaty undertake not to place in orbit around the earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner.

The moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes. The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies shall be forbidden. The use of military personnel for scientific research or for any other peaceful purposes shall not be prohibited. The use of any equipment or facility necessary for peaceful exploration of the moon and other celestial bodies shall also not be prohibited."²⁹

The 'peaceful' provision can then be read as the prohibition on the placement of WMDs in outer space, including on the Moon. However, as Freeland writes, '...the development of space-related technology was, at least initially, inextricably related to military strength...,'³⁰ essentially meaning that 'peaceful' does not mean 'non-military', and could rather be interpreted as 'non-aggressive'. Furthermore, the addition of 'exclusively' in Paragraph 2 provides specific meaning to military uses of the Moon, which Schrogl and Neumann describe as '...no room for any military use whatsoever, even if non-aggressive.'³¹ Furthermore, given that Paragraph 2 also provides exceptions to this prohibition (scientific or *any other* peaceful purposes), military uses of the Moon cannot be carried out. Regarding resource activities, this could essentially be interpreted as not using in-situ resources to fuel or develop military operations, ensuring that activities related to military offensive or defensive purposes, or that activities such as the use of exclusion zones, are not used for military purposes.

Principles 4 and 5 address the safety and sustainability of resource activities, which can find much of their meaning from Article IX of the OST, specifically the principles of giving 'due regard', preventing 'harmful interference', and seeking consultations. While Principle 4 calls on States to provide assistance to others in distress, reflecting on the provisions of the Rescue Agreement (1968),³² Option 2 of the current Draft also stipulates that 'Measures adopted for safety or coordination shall be temporary, proportionate, transparent, and shall not constitute, nor be invoked as evidence of appropriation', further proofing the provisions of the OST Article II.

Principle 5 (Option 1) currently writes that space resource activities should preserve the long-term sustainability of outer space, and '...ensures that such activities ensure coherence between environmental protection, equitable access, due regard, and international cooperation.'³³ This introduces different dynamics surrounding the concept of 'due regard',

such as considerations regarding environmental damage, and maintaining free access for others, while Option 2 calls for implementing the LTS Guidelines in regard to space resource activities. Curiously, Option 3 calls for due regard to be given to future generations by conducting operations in a sustainable manner,³⁴ which could include extracting quantities of resources which are 'reasonable'. Marchisio writes that this principle is '...directly connected with the principle of free exploration and use of outer space and is particularly important since many States Parties to the Outer Space Treaty cannot participate in peaceful space exploration and research without resorting to some form of international co-operation...'³⁵ This is particularly important, as it again refers to the binding principles within OST Article I, but then limits that freedom in a manner which preserves access for States which do not have independent access to the Moon, while also considering the freedoms of future generations.

Principle 6 provides guidelines that similarly protect the freedom of scientific exploration, and that States should give due regard to '...scientific research and investigation missions that [aim to give rise to benefits to and] promote the interests of all countries...'³⁶ It also calls for the release of scientific data, as a possible benefit-sharing initiative. This may well align with Artemis Accords Signatories, with Accords Section 8 calling on States to be '...committed to the open sharing of scientific data.'³⁷ However, Section 8(3) also provides protections for commercial activities, stating that '...commitment to openly share scientific data is not intended to apply to private sector operations unless such operations are being conducted on behalf of a Signatory to the Accords.'³⁸ This may somewhat conflict with the themes of Principle 7, with Option 4 asking that States concerned with commercial resource activities '... shall periodically review the implementation of benefit sharing arrangements by the space resource activity entities they authorize.' It is to be seen exactly what those benefit-sharing mechanisms might be. Lyall and Larsen describe the contentious provision of the Moon Agreement, which details space resources as a 'common heritage of (hu)mankind' ('CHM'),³⁹ as part of '...the drive towards a New International Economic Order (NIEO), introduced by the developing countries into international discussion and negotiations in the 1960s and 1970s.'⁴⁰ By the terms of the Moon Agreement, that provision can be inferred as meaning sharing '...the benefits derived from those resources, whereby the interests and needs of those developing countries, as well as the efforts of which have contributed either directly or indirectly to the exploration of the moon, shall be given special consideration.'⁴¹

However, the overwhelming rejection of the Moon Agreement, coupled with the Trump Administration denying space as a global commons, challenges the notion of any benefit-sharing regime.⁴² Furthermore, the 'Principle X', in the current Draft, also states that 'When establishing benefit-sharing arrangements, special consideration should be given to the interests and needs of developing countries...',⁴³ yet the statement from the US at the 2026 COPUOS Legal Subcommittee was that some distractions must be avoided toward

developing a ‘...safer and more prosperous outer space environment...’, such as ‘...ambiguous terms like “developing countries.”’⁴⁴ Principle X then provides examples of exactly what benefits could be shared, perhaps inviting broader participation in this area, as opposed to a more binding regime as stipulated in the Moon Agreement. This may include:

“(a) sharing of scientific information, raw and processed data, metadata, research findings, technical knowledge, scientific samples and, where appropriate, other non-commercial outputs derived from space resource activities, for scientific, educational, and public-benefit purposes;

(b) capacity-building and training opportunities for developing countries and emerging space nations;

(c) cooperation in scientific and technical research programs and international partnerships;

(d) financial contributions, if feasible, in cases of commercial space resource activities generating economic returns by returning space resources to earth for commercial sale, without prejudice to other monetary or non-monetary forms of benefit-sharing;

(e) contributions to international or multilateral financial arrangements established for the purposes of this Principle

(f) other practical arrangements, aimed at advancing the inclusive and peaceful exploration and use of outer space.”

Lastly, Principle 9 again refers to obligations on due regard in relation to coordination, and calls for States to consult when planning and carrying out resource activities, in pursuit of safety and preventing harmful interference, something which may eventually be coordinated through a new mechanism being explored by the COPUOS Action Team on Lunar Activities Consultation (ATLAC). Furthermore, Principle 10 seeks to establish principles regarding the registration of resource activities,⁴⁵ which would be kept within a domestic register, and also furnished to the UN Secretary-General, reflecting the provisions of space object registration within the Registration Convention.⁴⁶ While such a commitment would significantly enhance transparency, it must be considered whether such registrations could be delivered in good time (or preferably real-time) in order to contribute to safety of operations and benefit-sharing, for example, especially considering the limited resources of the UNOOSA at this moment in time.

Conclusion

The Principles, at this stage, represent a high-level attempt to establish guidelines for resource activities, which are critically based upon the provisions of binding international law. At the heart of the Draft are safety, transparency, deconfliction, benefit-sharing, and sustainability, achieved through interpretation of the Treaties from the perspective of resource use and extraction. This research has not been exhaustive, and the Draft is still in the development stage, so ongoing research is required. Nonetheless, what can be seen is that there are plenty of areas of alignment, and certainly a means to establish these Principles as an adaptive and evolving document.

Fragmentation remains over key areas such as what form of benefit sharing will take place, the limitations of commercial resource depletion, and what level of transparency will be agreed upon. Moreover, it is to be seen how the Principles might be implemented domestically, and how the growing interest in the value of the lunar economy might reinforce or dilute any commitments at the international level.



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