

Policy Brief No. 190 – October 2024

Ensuring Stability in Lunar Activities

Nivedita Raju

Key Points

- Recently, there has been a visible surge in ambitions to return to the Moon. In planned missions today, however, the diversity of participants and plans to extract and utilize lunar resources are significant differences from the past.
- The international framework governing lunar activities has tangible gaps, although it does state that the Moon has a higher standard of demilitarization as compared to the rest of outer space. Still, there is no consensus on rules for resource utilization, distribution of benefits and, notably, no measures for conflict prevention and coordination.
- Amid these gaps, there are factors that risk heightening tensions and creating friction among participants in lunar activities. Taking steps to address these factors will be essential for collective security and stability in lunar activities.

Introduction

More than 50 years have passed since the United States' historic Moon landing. Today, interest is fast growing in the Moon, with numerous planned missions involving states as well as commercial entities. There are many drivers behind these lunar missions: notably, there is a desire to obtain the prestige and symbolic power behind such missions, as they exhibit technological superiority. And there is also a perceived competitive advantage in being "first comers" to benefit from the Moon's resources. However, while planned missions are under way, there are gaps in the international framework governing lunar activities and factors that risk heightening tensions among its participants.

This policy brief outlines upcoming missions and corresponding gaps in lunar governance. It then highlights factors that could heighten tensions, spark misunderstandings and undermine stability in lunar activities. Finally, it concludes with recommendations to address these factors and ensure collective security and stability in lunar activities.

About the Author

Nivedita Raju is a researcher and facilitator at the Stockholm International Peace Research Institute (SIPRI). Her recent work focuses on escalation risks at the space-nuclear nexus, the role of space systems in nuclear deterrence, and transparency and confidence building in space activities. She is also a project coordinator on behalf of SIPRI in the EU Non-Proliferation and Disarmament Consortium. Prior to joining SIPRI, she conducted research on space law and policy issues as a research fellow at Open Lunar Foundation and as a research assistant at the Institute of Air and Space Law at McGill University. Nivedita holds a master's degree in air and space law from McGill University, where she was awarded the Erin J. C. Arsenault Fellowship in space governance. Earlier, she was a practising lawyer, steering negotiations for commercial disputes and aviation matters.

Planned Missions

Multiple lunar missions are being planned: these include crewed and uncrewed missions on both the lunar surface and the area near the Moon, commonly referred to as “cislunar space.”¹ The diversity of interested stakeholders is a marked departure from the 1960s, when few actors had the capacity to pursue lunar ambitions. Several states have since made advancements through national space programs and have planned various activities over the next two decades: these include China, having conducted successful robotic missions under its Lunar Exploration Program, and India, which made history in 2023 by becoming the first nation to successfully land its spacecraft near the Moon's south pole. Many others also have lunar ambitions, including Australia, the European Space Agency, Luxembourg, Japan, Mexico, South Korea and the United Arab Emirates (UAE).² Most of these initiatives have a civilian focus in that they are conducted by national space agencies and motivated by scientific or economic objectives.

Among these objectives, there is considerable interest in lunar resources. There are potentially valuable resources on the lunar surface such as ice deposits, which could make hydrogen and oxygen available for missions, including possibly providing rocket fuel. Other materials may be available, such as helium-3, thorium and uranium (Krolikowski and Elvis 2024). There are also other types of resources, such as strategically relevant locations: for instance, specific areas on the Moon that receive more sunlight and provide optimal conditions for crews. Analysis of the availability, value and utility of these resources is still under way, but the fact that these resources are not infinite has pre-emptively created a scarcity-driven mindset among some stakeholders and the perceived need to seize a competitive advantage. This scenario raises concerns about coordination in the face of potential friction, in particular between states that already have difficult relations.

1 Note that the term “cislunar space” is not defined under the international framework governing space activities.

2 For an overview of planned lunar missions, see Johnson (2022).

Initiatives by China, Russia and the United States

China, Russia and the United States are key actors engaged in strategic rivalry and competition, and these dynamics extend to space (see Raju and Wan 2024). All three states have lunar ambitions. China has conducted several lunar missions, including sample return, and aims to have humans on the Moon by 2030. Russia, despite its 2023 spacecraft crash-landing on the Moon 47 years after the Soviet-era mission, also intends to send humans to the Moon. The United States is pursuing the Artemis program, which aims to return to and establish a long-term presence on the Moon, eventually preparing for human missions to Mars. The Artemis program prioritizes partnerships with international and commercial entities in its implementation, with the National Aeronautics and Space Administration (NASA) adopting bilateral agreements with several space agencies, such as the Canadian Space Agency, the European Space Agency, the Japan Aerospace Exploration Agency and the UAE Mohammed Bin Rashid Space Centre. The United States also adopted the Artemis Accords in 2020, a series of non-binding principles to establish a common vision with signatories while advancing the Artemis program. The Artemis Accords largely restate obligations under international space law, but also introduce some new interpretations and concepts (see below).³ Following the announcement of the Artemis Accords, China and Russia announced the International Lunar Research Station (ILRS) in 2021. The objectives of the ILRS likewise entail establishing a lunar base and extracting and utilizing lunar resources; the initiative has expanded its signatories to 11 states as of June 2024, as well as several universities and associations. But with multiple lunar missions in the pipeline, there remains an overarching issue: gaps in the international framework governing lunar activities.

3 Signatories to the Artemis Accords are not necessarily participants in the Artemis program; this requires a different bilateral agreement between concerned space agencies.

Gaps in Governance

Lunar activities are subject to the same framework governing space activities, which includes treaties, UN resolutions, principles, guidelines, domestic legislations and norms. The 1967 Outer Space Treaty (OST) distinguishes between the Moon and the rest of outer space in the degree of restrictions placed on military activities there; the preamble of the OST recognizes the use of outer space for “peaceful purposes.”⁴ Although the preamble of a treaty is non-binding, it does hold significant weight as it can indicate the treaty’s object and purpose, which is relevant in interpreting that treaty’s operative provisions.⁵ National submissions and UN General Assembly resolutions also frequently refer to the obligation to use space for peaceful purposes, which suggests that the obligation is possibly a customary norm of international law. The term “peaceful purposes” is not defined in the OST: some argue that the term means “non-aggressive” while others believe that the term should mean “non-military.” However, state practice establishes that outer space has been and continues to be used for military purposes, enabling functions such as missile early warning, communications, intelligence, surveillance, and reconnaissance and navigation, suggesting that “peaceful purposes” means “non-aggressive” and not “non-military” (see Bowen 2022, 50-51).

This wording about peaceful purposes in the preamble to the OST is different from the stated obligation to use the Moon and other celestial bodies “*exclusively* for peaceful purposes” in the operative part of the treaty (author’s emphasis).⁶ This provision also prohibits the establishment of military bases, installations and fortifications, as well as the testing of any type of weapons and conduct of military manoeuvres, although it clarifies that the deployment

4 *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies*, GA Res 2222 (XXI), UNOOSA, 21st Sess, RES 2222 (1966) preamble, online: <www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introouterspacetreaty.html>.

5 *Vienna Convention on the Law of Treaties*, 23 May 1969, 1155 UNTS 331, 8 ILM 679 art 31 (entered into force 27 January 1980), online: <https://legal.un.org/ilc/texts/instruments/english/conventions/1_1_1969.pdf>.

6 *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies*, GA Res 2222 (XXI), UNOOSA, 21st Sess, RES 2222 (1966) art IV, online: <www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introouterspacetreaty.html>.

of military personnel for scientific research, as well as equipment or facilities necessary for peaceful exploration, are not prohibited.⁷ There is no clarity on the meaning of “exclusively peaceful purposes,” but it can be reasonably inferred that lunar activities require a higher standard of demilitarization — and would therefore entail more restrictions on military use than the rest of outer space. In addition to refraining from destabilizing behaviour, this wording also suggests a positive obligation to actively take steps toward de-escalation or deconfliction.

Additionally, the remaining laws governing the space environment apply to the Moon. Aside from the OST, this includes the 1968 Agreement on Rescue and Return of Astronauts and Space Objects, the 1972 Liability Convention and the 1974 Registration Convention. These agreements have received widespread (though not universal) ratification. In addition, there is the 1979 Moon Agreement, which is binding on its 18 state parties. Among ratifications, the larger space powers are absent, with the exception of Australia, as well as France and India, which have both signed but not ratified the treaty. States’ reluctance to ratify the Moon Agreement could be attributed to its relatively stronger obligations: it requires states to establish an international regime for the exploitation of lunar resources “as such exploitation is about to become feasible.”⁸ This proposed international regime is mandated to include “equitable benefit-sharing” of resources, prioritizing the needs of developing states and states that have contributed to missions.⁹ But different states do not share the same views regarding these commitments, and the treaty does not provide further instructions regarding the coordination of activities for resource utilization, leaving this up to the “international regime.” Decades later, there is no regime yet in place. Discussions on legal aspects of space resources were initiated in 2021 in a working group at the UN Committee on Peaceful Uses of Outer Space (COPUOS), and these deliberations are still ongoing.¹⁰

The Artemis Accords

Having rejected the Moon Agreement and with gaps in governance in mind, the United States developed the Artemis Accords to establish guiding principles with like-minded partners in pursuit of the Artemis program. While most of the principles restate prior commitments under the space treaties, two issues are controversial. First, the Accords state that exploitation of space resources is permissible under the space treaties, an issue that is still undergoing debate in the United Nations. The OST presently has a stringent prohibition against “national appropriation” by states by any means and emphasizes the overarching rights of all states to benefit from outer space. Second, signatories of the Accords commit to coordinating with “any relevant actor” to avoid harmful interference by creating “safety zones,”¹¹ which has been met with concern. Some contend that the wording unfairly highlights the interests of the party establishing the safety zone, rather than balancing these interests with those of successor states (Wang 2020). Accordingly, it has been argued that safety zones risk becoming “de facto spheres of influence” (ibid.) because they may be used to deny others access.

As of June 2024, the United States has significantly expanded its signatories to the Accords to 43 states.¹² These signatories include some allied states, as well as others that ostensibly aim to benefit from US cooperation to further develop their own domestic space programs. While the Accords are non-binding, they are still relevant from a legal perspective. These signatories have essentially endorsed American views regarding space resource utilization and safety zones, which suggests an expression of “*opinio juris*,” or a state’s belief that entails a legal obligation to act a certain way. This element could contribute to the formation of a new norm of customary law, which is another source of international law in addition to treaties.¹³ As states may have to join the Artemis Accords in order to cooperate with the United States on lunar missions, the Accords could be seen as a political tool to assert an American-dominant view on the international community, while also possibly dividing allies (see European Space Policy Institute

7 Ibid.

8 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 5 December 1979, 1363 UNTS 3 (entered into force 11 July 1984), online: <www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/intromoon-agreement.html>.

9 Ibid.

10 See www.unoosa.org/oosa/en/ourwork/copuos/lsc/space-resources/index.html.

11 See NASA (2022).

12 See www.nasa.gov/artemis-accords for signatories to the Artemis Accords as of April 23, 2024.

13 International Law Commission, Draft Conclusions on Identification of Customary Law, 70th Sess, UN Doc A/73/10 (2018), online: <https://legal.un.org/ilc/texts/instruments/english/draft_articles/1_13_2018.pdf>.

2020). The Accords thus highlight the current gaps in lunar governance, and the need for a consensus-based framework to regulate upcoming missions.

Factors That May Heighten Tensions and Spark Friction

Signalling Military Interest

Planned lunar missions largely focus on civilian objectives; however, there has also been some signalling of military interest. In 2020, the United States announced a memorandum of understanding between its Space Force and NASA to collaborate in “furtherance of space exploration, scientific discovery and security.”¹⁴ While this memorandum does not focus on lunar activities, it does underscore the importance of new collaborations linking NASA with the Space Force’s objective to operate “safely and securely in these distant frontiers.”¹⁵ The US Department of Defense has also expressed interest through its Defense Advanced Research Projects Agency (DARPA). DARPA is reportedly pursuing different projects, including a 10-year architecture capability study that will engage commercial entities in developing a lunar infrastructure framework.¹⁶ The US Air Force Research Lab also announced a program to develop situational awareness for cislunar space to detect and study spacecraft, called “Oracle” (previously named the “Cislunar Highway Patrol System”).¹⁷

Such military interest raises concerns about compliance with the high demilitarization standard for the Moon. Although this standard has been observed for many decades, signalling military interest may raise questions about possible violations of the demilitarization requirement in lunar activities. This signalling may also raise concerns from American rivals or competitors, such as China and Russia, potentially even inciting them to respond and mirror actions by involving their own militaries.

In this manner, signalling military interest in lunar activities may become a self-fulfilling prophecy and heighten tensions in an environment that has hitherto enjoyed peaceful use and international cooperation.

Limited Transparency

There is no uniformity in regard to information sharing about lunar activities, whether in national policies or in practice. For example, there was no information shared about China’s maneuvering and repositioning of Chang’e-5 into a new orbit around a Lagrange point, a specific location where spacecraft can benefit from nullified gravitational forces, near the Moon in 2021.¹⁸ This manoeuvre would have gone entirely unnoticed had it not been for amateur trackers, and it underscores the need for states to regularly share information about lunar activities to avoid miscommunications and misperceptions.

China has so far maintained a civilian focus for lunar missions, but more transparency by communicating intent through national policies, in addition to regular updates about missions, would be helpful.¹⁹ China’s 2019 defence white paper notes that space is a “critical domain in international strategic competition,” yet its space doctrine remains relatively opaque (Saalman 2022; Raju and Wan 2024). Limited transparency can widen the scope for misunderstandings about a state’s mission objectives and conduct. For instance, there are allegations by the United States about Chinese attempts to “control access to the Moon for strategic aims.”²⁰ States may prefer to rely on strategic ambiguity, assuming that this strengthens their own deterrent, yet unless states clearly convey what they wish to deter and how they wish to deter it, this would not necessarily work. For lunar activities, this will require some degree of transparency about objectives and sharing information at regular stages of missions. Since missions are being conducted for civilian objectives, enhancing transparency for lunar activities should be more feasible.

Inaccurate Rhetoric

This limited transparency is related to the issue of rhetoric concerning lunar activities: state representatives can make statements that are not entirely accurate, failing to account for the unique

¹⁴ See NASA and the United States Space Force (2020).

¹⁵ *Ibid.*, 2.

¹⁶ See David (2023).

¹⁷ See Dailey (2022).

¹⁸ See Jones (2022).

¹⁹ See The State Council Information Office of the People’s Republic of China (2022).

²⁰ See US-China Economic and Security Review Commission (2023, 453–4).

nature of outer space and the lunar environment specifically. In some instances, representatives may also make provocative statements as a means of posturing or deterring an adversary. Yet, if not carefully managed, such rhetoric is capable of further heightening tensions. For instance, in April 2024, NASA administrator Bill Nelson accused China's civilian space program of masking a military program, claiming that "we are in a race" and comparing lunar missions to territorial disputes in the South China Sea.²¹ This comparison is unhelpful, not least due to physical differences between the lunar and maritime environments and governing legal regimes, but also because current missions are being conducted for civilian objectives. Furthermore, agencies are not shifting timelines to respond to those of a perceived competitor, which shows that the sense of urgency and "race" framing to which Nelson referred is also not quite accurate.

There has been similar rhetoric about cislunar space from officials who have likened the Lagrange points to "critical choke points."²² Again, this is not an accurate analogy, and it additionally fails to convey the limited testing and missions that have been conducted in these locations thus far (Schingler, Samson and Raju 2022). Rhetoric and posturing from officials can fuel worst-case-scenario thinking and negatively influence any potential for coordination with rival states, which will be essential given the number of upcoming planned missions.

Lack of Coordination between Artemis and ILRS Programs

Both the Artemis and ILRS initiatives have welcomed participation from other states and entities, but there has been no public engagement between the two initiatives. This fragmented approach may magnify already formidable challenges in space security governance to establish common rules of the road, resulting in agreement on rules among like-minded states only, with little room for agreement among rivals. For lunar missions, the need for a consensus-based approach is particularly evident. Resources in the lunar surface are seemingly concentrated in specific areas, which means that states will likely be interested in the same or overlapping sites.²³ States will also seek sites

21 See Agence France-Presse (2024).

22 See Butow et al. (2020).

23 See Xin (2023).

with suitable conditions for extraction, including appropriate elevation and lighting. The Artemis signatories appear to resort to safety zones for this purpose; however, it is unclear how these zones can be lawfully implemented. It is also unclear how they will be executed if there are non-signatories that do not expressly agree with the concept.

China has clarified its position on lunar resources at the UN COPUOS Working Group, stating that "activities [would] probably be conducted in certain specific areas" and that the Working Group should aim to develop "initial recommended principles as tools to implement the principle of co-operation and mutual assistance in space resource activities, which would ensure the safe and orderly conduct of such activities, and promote coordination among relevant States."²⁴ This suggests that there may be similar approaches in both the ILRS and Artemis initiatives, and that there may be potential for some agreement on shared principles to guide upcoming missions.

Policy Recommendations

Consensus-Based, Rather Than Fragmented Approaches to Governance

The Artemis Accords exhibit an approach to "space law making" outside UN fora, as exhibited by multilateral agreements between specific entities such as the International Space Station (ISS) Intergovernmental Agreement. However, despite the finite future of the ISS, one prominent difference is that it arguably helped facilitate cooperation between two states with a long history of rivalry — the United States and Russia — rather than focusing only on like-minded states.²⁵ Another difference is that states joining the Accords have no say over its text. This approach has not always been constructive for space security governance, an example being the EU (later rebranded "International") Code of Conduct for Outer Space Activities, which collapsed

24 UNOOSA, China – Input to the Working Group on Legal Aspects of Space Resource Activities, COPUOSOR, 63rd Sess, UN Doc A/AC.105/C.2/2024/CRP.5 (2024), online: <www.unoosa.org/res/oosadoc/data/documents/2024/aac_105c_22024crp/aac_105c_22024crp_5_0_html/AC105_C2_2024_CRP05CE.pdf>.

25 As of June 2024, Russia has stated that it will remain a partner of the ISS until 2028.

in negotiations in 2015. A reason for this was that some, such as the founding BRICS states (Brazil, China, India, Russia and South Africa), felt excluded from the drafting process and preferred negotiations within the UN framework (Raju 2021). Similarly, the draft treaty on the prevention of placement of weapons in outer space proposed by China and Russia continues to receive support only from certain states and has been criticized for its wording and focus. Being the first to propose how lunar activities should be conducted will thus only go so far if the rules in question are not consented to by all.

Avoiding a fragmented approach to lunar governance and instead aiming for a consensus-based framework is essential. Best practices for lunar missions, including protocols for cooperation and coordination, should be discussed under the auspices of the UN COPUOS. Notably, the UN COPUOS has been more successful than the examples described above, at reaching consensus on safety and sustainability rules for space activities, though its deliberation processes do take time.²⁶ In the meantime, it would also be useful for China and Russia to make the ILRS principles publicly available to identify wider opportunities for cooperation.

Bilateral Engagement

While US-Russian relations currently have limited avenues for cooperation pursuant to Russia's invasion of Ukraine, there is potential for the United States to engage with China. This is still difficult due to a 2011 US law, known commonly as the Wolf Amendment, that requires express approval from the US Congress and the Federal Bureau of Investigation for bilateral cooperation with Chinese entities.²⁷ Yet, while the Wolf Amendment has presented challenges, the law has not fully prevented cooperation in lunar activities. For example, in 2019, NASA provided support for China's Chang'e-4 lunar landing.²⁸ More recently, NASA researchers were granted permission to apply to the China National Space Administration for samples from China's Chang'e-5 lunar landing, although China has not yet officially responded to this request.²⁹ Nevertheless, these

cases demonstrate that cooperation on scientific and technical bases could help rebuild trust between the United States and China. Low-hanging fruit for bilateral engagement on lunar missions could include shared commitments to provide emergency assistance, which would be necessary for all lunar crews regardless of nationality. Furthermore, commitments to share information while conducting lunar activities, in particular on the nature, purpose and location of spacecraft, could be another avenue for discussion among the space agencies.

Minimize Signalling of Military Interest and Ensure Careful Rhetoric

The threat perceptions of China, Russia and the United States regarding outer space and strategic stability primarily focus on developments in Earth orbits, such as low-Earth, medium-Earth, geostationary and highly elliptical orbits (see Raju and Wan 2024). States therefore have little to gain from military interest in the Moon. Indeed, states would benefit from preserving the higher standard of demilitarization for the Moon rather than incentivizing rivals to test these boundaries and sparking action-reaction cycles. Minimizing such signalling and ensuring careful, informed rhetoric are therefore imperative. This approach requires ensuring that lunar activities are primarily conducted by civilian space agencies and clearly articulating mission objectives. Public engagement and awareness raising about the unique nature of the lunar environment, including the Moon's surface and Lagrange points, would also be useful, with such engagement potentially involving both legal and technical experts.

Space Diplomacy by Emerging Space Nations

Lunar missions also present an opportunity for states beyond the traditional "space powers" to actively practise space diplomacy. Small and middle-power states have historically played key mediation roles in peace processes and have considerable power for convening and facilitation. As emerging space nations, these states can harness convening power for the exchange of views between participants of the Artemis and ILRS initiatives. There is also the potential for BRICS states, including their newer members, to consider joining the Artemis Accords in addition to the ILRS. Doing so would drive development of their own programs through partnerships with the United States on one hand, and China and Russia

²⁶ See COPUOS (2018).

²⁷ *Consolidated and Further Continuing Appropriations Act*, Pub L No 112-55, 552 Stat 125 at 551 (2012), online: <www.govinfo.gov/content/pkg/PLAW-112publ55/html/PLAW-112publ55.htm>.

²⁸ See Xinhua (2019).

²⁹ See Jones (2022).

on the other, while also challenging the perception of these two partnerships as competing blocs.

Emerging space nations have strong incentives to shape the normative and legal framework and avoid a fragmented regime, as the actions of one power risk endangering the entire outer space environment to the detriment of all users. At the national level, this could mean addressing the governance gap by providing state practice in lunar missions in accordance with existing international space law. For example, article XI of the OST provides a broad commitment to share information on space activities with the UN Secretary-General and the international community. Some states, such as India during its 2023 Chandrayaan mission, have shared updates about the location of their spacecraft throughout the mission. Linking such information sharing to the article XI obligation under the OST, and expressly providing state practice for this provision, would be an opportunity for emerging space nations to demonstrate leadership by strengthening the existing legal framework.

Implementing Tools to Enhance Transparency

All states with lunar ambitions share a common hurdle: protecting their spacecraft and crews from the hazards posed by the outer space environment. States also share limited capacity for situational awareness in regard to activities on the lunar surface and in cislunar space, because current capabilities mostly focus on Earth orbits. Tracking and monitoring the location of objects and exchanging space situational awareness (SSA) data will help improve transparency among stakeholders participating in lunar activities and reduce the scope for misunderstandings by allowing shared access to the location and purpose of spacecraft. As multiple entities have now expressed lunar ambitions, there is the potential for resources to be shared for SSA data collection, which may not only help limit costs but also increase the sources of information to be shared, contributing to enhanced accuracy and coordination for lunar missions.

Conclusion

Numerous lunar missions are being planned amid gaps in the international governance framework. Rather than reinforcing a fragmented approach to lunar governance, prioritizing a consensus-based framework through the UN COPUOS is essential. Coordination for lunar activities can simultaneously be pursued through bilateral engagement between states leading lunar partnerships and space diplomacy initiatives from emerging space nations. New rules of the road need widespread acceptance to ensure a stable, secure environment for lunar activities.

While these rules are being developed, it is critical to address factors that risk heightening tensions and creating friction between competing states. Steps must be taken to minimize signalling military interest in the Moon, and political optics must be carefully managed. This will also require more informed and nuanced rhetoric from state representatives regarding lunar missions. Additionally, enhancing transparency in policy and practice is essential for lunar activities, and such measures can be feasibly implemented under the existing international framework. Ultimately, maintaining the higher standard of demilitarization on the Moon will contribute to stability in lunar activities, which is in the interest of all stakeholders.

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67 Erb Street West
Waterloo, ON, Canada N2L 6C2
www.cigionline.org