


ORIGINAL ARTICLE

INTERNATIONAL LAW AND PRACTICE

Legal measures to preserve lunar security and safety in the context of China–US competition to the Moon: An appraisal from China’s perspective

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Abstract

Following the announcement of lunar programs by the US and China in recent years, a new round of lunar competition has commenced. In the absence of effective international regimes, there is a pressing need to develop legal measures to preserve lunar security and safety. Rules on demilitarization and deconfliction are particularly crucial. The 1967 Outer Space Treaty establishes the principles of ‘peaceful purposes’ and ‘exclusively for peaceful purposes’, but their interpretation remains contested. The rise of cislunar space strategies further complicates the application of these principles. Meanwhile, for managing daily operations on the lunar surface, the US-led Artemis Accords propose safety zones to prevent harmful interference. However, non-signatories like China and Russia are not bound by these provisions. As a significant player in the lunar competition, China should contribute to the establishment and improvement of legal measures to ensure lunar security and safety. For lunar demilitarization, China should refine the PPWT draft to address the specific security demands of cislunar space and the Moon. Concurrently, China should actively participate in formulating norms, rules, and principles of responsible behavior to mitigate threats in cislunar space and on the Moon until a universally accepted legally binding treaty is achieved. For lunar deconfliction, considering that the creation of safety zones may become the earliest practice to fulfill the obligation to avoid harmful interference, China needs to coordinate with the US to negotiate detailed rules on the size, scope, nature, behavior, and dispute settlement measures related to safety zones.

Keywords: cislunar space strategy; competition to the Moon; deconfliction rules of the Moon; demilitarization rules of the Moon; Lunar security and safety

1. Introduction

Lunar exploration has experienced a resurgence in recent years, driven by ambitious programs from the US and China. This renewed wave of lunar activity reflects a competitive dynamic between these two major spacefaring nations. The US aims to establish a sustainable human presence on the Moon through its Artemis Program.¹ Meanwhile, China, in collaboration with Russia, is advancing its International Lunar Research Station (ILRS) project.² This intensifying

^{*}The author sincerely thanks the anonymous reviewers and editors for their insightful and constructive comments and recommendations.

¹‘The Artemis Accords: Principles for Cooperation in the Civil Exploration and Use of the Moon, Mars, Comets, and Asteroids for Peaceful Purposes’, NASA, 13 October 2020, available at <www.nasa.gov/specials/artemis-accords/index.html>.

²Deep Space Exploration Laboratory of CNSA, ‘International Lunar Research Station (ILRS)’, UNOOSA, 29 May 2023, available at <www.unoosa.org/documents/pdf/copuos/2023/TPs/ILRS_presentation20230529_pdf>.

competition underscores the necessity for robust legal measures to ensure the security and safety of lunar activities.³

The lack of effective international regimes tailored to the complexities of contemporary lunar activities presents significant challenges. Both the China and US are independently developing frameworks for their respective programs, yet there is a glaring lack of coordination between the two. This disjointed approach risks escalating conflicts and undermining the overarching goal of peaceful and sustainable lunar exploration.

The ongoing China–US competition on the Moon has brought critical issues related to the security and safety of lunar activities to the forefront. Section 2 of this article delves into these issues, examining the competitive landscape and the imperative for coordinated legal measures. A key aspect of lunar security is the demilitarization of the Moon, as mandated by the 1967 Outer Space Treaty.⁴ Section 3 addresses the challenges to these demilitarization rules within the framework of evolving cislunar space⁵ strategies. Another crucial element is the establishment of deconfliction rules, particularly the creation of safety zones to prevent harmful interference between lunar missions. Section 4 examines the rationality and necessity of such zones. Given its significant role in the lunar competition, China has a responsibility to lead efforts in establishing effective legal measures for lunar security and safety. Section 5 outlines China’s potential contributions.

2. China–US lunar competition and the necessity for coordinated legal measures for lunar security and safety preservation

Lunar exploration and exploitation are not new to humanity. In 1969, the US successfully completed a manned Moon landing.⁶ The famous saying by astronaut Neil Armstrong, ‘That’s one small step for a man, one giant leap for mankind,’⁷ continues to inspire subsequent generations. However, the particularities of the new wave of lunar exploration and exploitation, as well as the necessity for China–US coordination to improve legal measures for preserving the security and safety of activities on the Moon, must be addressed.

2.1 China–US competition in the new era of lunar exploration: Security and safety concerns

The new round of lunar exploration and exploitation is characterized by the Artemis Program proposed by the US and its partners,⁸ as well as the ILRS by China and Russia. The Artemis Program is committed to achieving ambitious goals, including landing the first woman and the first person of color on the Moon, using innovative technologies to explore more of the lunar surface than ever before, and establishing the first long-term presence on the Moon.⁹ The ILRS is

³This research focuses on lunar exploration and exploitation, which is considered the first step toward deep space exploration and the utilization of other celestial bodies, such as Mars. The study does not extend to the exploration and use of other planets.

⁴1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, 610 UNTS 205.

⁵Cislunar space is generally defined as ‘spherical volume that extends outward from Earth’s geostationary orbit region to encapsulate the Moon’s orbit and its Lagrange points’. See M. Byers and A. Boley, ‘Cislunar Space and the Security Dilemma’, (2022) 17 *Bulletin of the Atomic Scientist*, available at <thebulletin.org/premium/2022-01/cis-lunar-space-and-the-security-dilemma/>.

⁶N. Drake and J. Howard, ‘A Brief History of Moon Exploration’, *National Geographic*, 18 July 2020, available at <www.nationalgeographic.com/science/article/moon-exploration/>.

⁷July 20, 1969: One Giant Leap for Mankind’, NASA, 20 July 2019, available at <www.nasa.gov/history/july-20-1969-one-giant-leap-for-mankind/>.

⁸When the Artemis Accords were adopted on 13 October 2020, eight states signed the agreement as founding partners of the Artemis Program: Australia, Canada, Italy, Japan, Luxembourg, the United Arab Emirates, the United Kingdom, and the United States. As of today, a total of 54 states have signed the Artemis Accords.

⁹See ‘The Artemis Accords’, *supra* note 1.

defined as a scientific program by its sponsors. According to the 'ILRS Guide for Partnership (V 1.0)' released in June 2021, the ILRS is designed for multi-disciplinary and multi-purpose scientific research activities. These activities include exploration and use of the Moon, Moon-based observation, fundamental research experiments, and technology verification, with the capacity for long-term unmanned operation and the prospect of subsequent human presence.¹⁰

A prominent feature of the new round is the China–US lunar competition. China and the US are not participating in each other's lunar programs. Additionally, both parties intend to establish frameworks for their programs without coordinating with each other at the present stage. From the perspective of the US, China's lunar activities are perceived as a serious threat to its interests. In July 2022, in an interview with the German newspaper 'Bild', NASA Administrator Bill Nelson criticized China, accusing it of seeking to militarize the Moon.¹¹ In January 2023, in another interview, Administrator Nelson warned that 'Beijing could establish a foothold and try to dominate the most resource-rich locations on the lunar surface – or even keep the US out.'¹² Moreover, former commander of the International Space Station and Space Shuttle, Terry Virts, pointed out that 'there is potentially mischief China can do on the Moon. If they set up infrastructure there they could potentially deny communications, for example.'¹³

From China's perspective, officials have stated that 'there is no intent to militarize the Moon'¹⁴ and called Nelson's claims 'reckless and false'.¹⁵ Chinese official media also pointed out that the so-called 'race'¹⁶ to the Moon is a notion imagined by the US, in which China has no intention of participating.¹⁷ However, China does not deny the existence of a new round of lunar exploration competition.¹⁸ After the success of the Chang'e-6 mission to the far side of the Moon on 2 June 2024, observers noted that the pace of China's ambitions has drawn concern from the US, which is China's major rival in the new round of the 'space race'.¹⁹

A new era of lunar exploration and exploitation has begun. Whether acknowledged or not, this new phase is characterized by competition (if not termed as a 'race') between the major participants, namely China and the US.

Several new characteristics distinguish the current lunar activities from those of the Cold War era. Firstly, both parties' lunar programs are not solely focused on returning humans to the Moon

¹⁰International Lunar Research Station (ILRS) Guide for Partnership', *China National Space Administration*, 16 June 2021, available at <www.cnsa.gov.cn/english/n6465652/n6465653/c6812150/content.html>.

¹¹C. Hughes, 'China Rejects "Concern" by NASA Chief about Beijing Militarizing the Moon', *UPI*, 5 July 2022, available at <www.upi.com/Science_News/2022/07/05/military-moon-nasa-bill-nelson/7981657035964/>.

¹²B. Bender, "'We Better Watch Out': NASA Boss Sounds Alarm on Chinese Moon Ambitions', *Politico*, 1 January 2023, available at <www.politico.com/news/2023/01/01/we-better-watch-out-nasa-boss-sounds-alarm-on-chinese-moon-ambitions-00075803>.

¹³*Ibid.*

¹⁴*Ibid.*

¹⁵Z. Liu, 'China Takes Aim at NASA Chief's Moon Military Takeover Claims', *South China Morning Post*, 4 July 2022, available at <www.scmp.com/news/china/diplomacy/article/3184094/china-takes-aim-nasa-chiefs-moon-military-takeover-claims>.

¹⁶In fact, during the Cold War era, the US and the Soviet Union engaged in a 'space race', with a primary focus on reaching the Moon. For further details on this competition, see A. S. Erickson, 'Revisiting the U.S.–Soviet Space Race: Comparing Two Systems in their Competition to Land A Man on the Moon', (2018) 148 *Acta Astronautica* 376.

¹⁷Global Times Editorial, 'China Has No Intention of Participating in the "Space Race" Imagined by the US', *Global Times*, 19 January 2024, available at <www.globaltimes.cn/page/202401/1305700.shtml>.

¹⁸A New Round of the Global Lunar Exploration Competition Begins', *HuanQiu (Chinese Version of Global Times)*, 15 August 2023, available at <tech.huanqiu.com/article/4E8CEJTxu5S?imageView2/2/w/228>.

¹⁹See D. Thomas, 'China's Chang'e 6 Mission: A New Era in the Space Race', *Medium*, 20 June 2024, available at <medium.com/the-geopolitical-economist/chinas-chang-e-6-mission-a-new-era-in-the-space-race-00579634b3ac>. When the Chang'e-6 mission was first launched to the far side of the Moon, analysts shared similar perspectives. See H. Davidson, 'The New "Space Race": What Are China's Ambitions and Why is the US so Concerned?', *The Guardian*, 5 May 2024, available at <www.theguardian.com/world/article/2024/may/05/the-new-space-race-what-are-chinas-ambitions-and-why-is-the-us-so-concerned>.

but also aim to establish a framework for sustainable and cooperative lunar activities. To achieve this, their missions encompass both lunar orbit and lunar surface operations.²⁰ Secondly, the new round of lunar exploration places a greater emphasis on the economic potential of the Moon, such as the extraction of lunar resources. The Artemis Program, spearheaded by the US, highlights collaboration with commercial and international partners.²¹ This includes non-governmental enterprises, which are now considered crucial participants alongside traditional state actors. These non-governmental entities are primarily interested in commercial benefits from lunar activities, such as resource extraction.²² Consequently, a stable legal framework to protect their rights to these benefits, including extracted lunar resources, is essential.²³ Thirdly, specific controversies regarding lunar regulations focus on two key aspects: the rules for extracting resources on the Moon and the establishment of safety zones.

The first controversy emerged with the adoption of the 'Space Resource Exploration and Utilization Act' (2015 Act) by the US,²⁴ which authorizes US citizens to extract resources from celestial bodies.²⁵ The Artemis Accords adopt a similar stance.²⁶ The Outer Space Treaty mandates that outer space, including the Moon and other celestial bodies, be explored and utilized for the benefit of all countries. This has raised legal debates over whether US activities on space resource extraction comply with existing international law.²⁷ China has not officially reacted to the US's

²⁰For example, within the context of the Artemis program, the US and its partners plan to construct a more permanent lunar base to enhance lunar exploration, utilize lunar resources, and conduct extensive scientific research. This effort aims to pave the way for sustained human presence on the Moon and eventual missions to Mars (Artemis IV and beyond). Moreover, they intend to establish a space station in lunar orbit to support long-term human and scientific operations on the Moon (Station in lunar orbit). Similarly, China, Russia, and their partners plan to complete the construction of the ILRS, including laboratories, living quarters, and other facilities, during Phase 3 of the program (2031–2035: Station Construction and Operations). This phase aims to initiate long-term scientific missions and experiments. Programs in lunar orbit are also planned to coordinate and support ILRS activities on the Moon. See 'Artemis', NASA, available at <www.nasa.gov/humans-in-space/artemis/>. See also 'International Lunar Research Station (ILRS) Guide for Partnership', *supra* note 10.

²¹Commercial partners, including Aerojet Rocketdyne, Axiom Space, Bechtel, Blue Origin, Boeing, Jacobs, Lockheed Martin, Maxar Space Systems, Northrop Grumman, and SpaceX, play a crucial role in developing key components for lunar exploration. Their contributions span the lunar spaceport at NASA's Kennedy Space Center, the Orion spacecraft, the Space Launch System (SLS) rocket, the Gateway space station, human landing systems, as well as spacesuits and mobility systems designed for lunar operations. See 'Artemis Partners', NASA, available at <www.nasa.gov/artemis-partners/>.

²²For details on companies focused on lunar resource extraction, see R. Lindbergh, 'Space Resource Extraction: Overview and Issues for Congress', *Congressional Research Service*, 29 July 2024, available at <sgp.fas.org/crs/space/R48144.pdf>.

²³The extraction of natural resources from the Moon is expected to become an irreversible trend in the coming decades, presenting significant commercial opportunities for participants to provide products and services to other actors. While the activities of non-governmental entities on the Moon require legal regulation, this research primarily focuses on ensuring the security and safety of lunar operations, including private sector involvement. However, other legal issues related to non-governmental entities fall beyond the scope of this study.

²⁴Space Resource Exploration and Utilization Act of 2015, H.R.1508, 114th Congress (2015–2016).

²⁵*Ibid.*, §51302: Commercialization of Space Resource Exploration and Utilization.

²⁶See Artemis Accords, *supra* note 1, Section 10: Space Resources.

²⁷In a report delivered at the 61st Session of the Committee on the Peaceful Uses of Outer Space (COPUOS) Legal Subcommittee, the U.S. Head of Delegation provided a comprehensive explanation of the legality of the 2015 US Act and the Artemis Accords (see '2022 COPUOS LSC-US on National Legislation Relevant to the Peaceful Exploration and Use of Outer Space', *US Mission to International Organizations in Vienna*, 5 April 2022, available at <vienna.usmission.gov/2022-copuos-lsc-u-s-on-national-legislation-relevant-to-the-peaceful-exploration-and-use-of-outer-space/>). While COPUOS plays a critical role in shaping international space governance, it lacks enforcement authority and cannot adjudicate treaty compliance. Instead, it serves as a forum for dialogue, international cooperation, and the development of soft law, while enforcement remains a matter of state responsibility and diplomatic engagement. The International Institute of Space Law (IISL) addressed the legal implications of space resource extraction in its Position Paper on Space Resources Mining (2015), noting that the 2015 US Act represents a possible interpretation of the Outer Space Treaty (see IISL, 'Position Paper on Space Resources Mining', Adopted by consensus by the Board of Directors, 20 December 2015). While the IISL's position holds academic significance, debates over the legality of the 2015 U.S. Act continue. For further analysis, see S. Mallick and R. Rajagopalan, 'If Space is "the Province of Mankind", Who Owns Its Resources? The Potential of Space Mining and its Legal Implications', (2019) 182 *ORF Occasional Paper*, 1, at 10–13. For more recent developments, see F. G. Von Der Dunk,

2015 Act but has outlined its position on space resource extraction. In a document submitted in March 2024 to the Working Group on Legal Aspects of Space Resource Activities of the Legal Subcommittee of the COPUOS,²⁸ China stated that space resource utilization is permissible but must comply with the 1967 Outer Space Treaty.²⁹ Certain analysts believe this submission indicates a convergence between US and Chinese positions, recognizing the necessity and legality of space resource activities under the Outer Space Treaty for any long-term presence in space.³⁰ The five-year work plan of the Working Group, agreed upon at the 61st session of the LSC, aims to finalize a set of initially recommended principles for space resource activities for the Committee's consideration and consensus in 2027.³¹ However, creating a detailed international agreement on space resources is not part of this initial plan, though more detailed consensus is anticipated.

Resource exploitation is only one aspect of lunar exploration and exploitation. Many other complex issues, such as the establishment of safety zones, directly impact lunar security and safety. Controversies surrounding safety zones must be carefully addressed, and coordination between China and the US on these rules will be complex but necessary. Issues concerning safety zones are crucial for deconflicting lunar exploration, which will be analyzed in the following section.

Considering the China–US competition and the particularities of this new round of lunar exploration, the following aspects for preserving lunar security and safety should be emphasized:

Firstly, the aspect of demilitarization in lunar exploration needs to be addressed. In the context of China–US competition, military concerns surrounding the Moon are increasing. According to the 'ILRS Guide for Partnership', the ILRS is intended solely for scientific purposes, excluding military or commercial objectives.³² However, China's capability to operate on the lunar surface poses a potential threat to the security and safety of the US and its partners. While it is difficult to definitively assert that military conflicts on the Moon are unavoidable in the future, growing military interest in the Moon is evident. Furthermore, given that both parties have designed comprehensive lunar missions, military concerns are no longer confined to the lunar surface alone; both cislunar space and the lunar surface must be considered as a whole. This situation challenges the principles and rules established by existing international space treaties,³³ which primarily focus on activities below the geostationary orbit, thereby posing potential conflict risks for the future.

Secondly, the aspect of deconfliction in lunar exploration must be considered. Currently, 54 states have shown interest in participating in US-sponsored lunar programs by signing the

'Property Rights over the Moon or on the Moon? The Legality of Space Resource Exploitation on Celestial Bodies', (2023) 6 *Journal of Law & Innovation* 95, at 120–5.

²⁸At the 60th session of the United Nations Committee on the Peaceful Uses of Outer Space Legal Subcommittee (UNCOPUOS-LSC) in 2021, the 'Working Group on Legal Aspects of Space Resource Activities' was established. See 'Working Groups of the Committee and its Subcommittees', UNOOSA, available at <www.unoosa.org/oosa/en/ourwork/copuos/working-groups.html>.

²⁹Submission by the Delegation of China to the Working Group on Legal Aspects of Space Resource Activities of the Legal Subcommittee of the Committee on the Peaceful Uses of Outer Space', UNOOSA, available at <www.unoosa.org/documents/pdf/copuos/lsc/space-resources/LSC2024/English_Chinas_submission_to_the_working_group_on_space_resources.pdf>.

³⁰This is the opinion of Christopher Johnson, director of legal affairs and space law for the Secure World Foundation, see A. Jones, 'China Outlines Position on Use of Space Resources', *Space News*, 6 March 2024, available at <spacenews.com/china-outlines-position-on-use-of-space-resources/>.

³¹'Five-Year Workplan and Methods of Work for the Working Group', UNOOSA, available at <www.unoosa.org/oosa/en/ourwork/copuos/lsc/space-resources/index.html>.

³²See 'International Lunar Research Station (ILRS) Guide for Partnership', *supra* note 10.

³³The five most well-known space law treaties adopted under the auspices of the United Nations are as follows: the 1967 Outer Space Treaty (see *supra* note 4); the 1968 Rescue Agreement, formally titled the Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched into Outer Space, 672 UNTS 119; the 1972 Liability Convention, or Convention on the International Liability for Damage Caused by Space Objects, 961 UNTS 187; the 1974 Registration Convention, or Convention on Registration of Objects Launched into Outer Space, 1023 UNTS 15; and the 1979 Moon Agreement, or Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 UNTS 3. These treaties collectively provide the legal framework applicable to lunar activities.

Artemis Accords.³⁴ These Accords are a set of nonbinding principles designed to guide the conduct of states involved in the civil exploration and use of the Moon, Mars, comets, and asteroids.³⁵ For the ILRS, several states, such as Belarus, Pakistan, Azerbaijan, Venezuela, South Africa, Egypt, Nicaragua, Thailand, and Serbia have committed to joining.³⁶ Unlike the US, which has formulated the Artemis Accords to facilitate further negotiation of detailed rules among its partners,³⁷ China and Russia have only proposed several fundamental principles for ILRS participants. It can be anticipated that as the ILRS program progresses, China and Russia will establish rules concerning cooperation under the ILRS.

However, the sponsors of the two lunar programs – the US for Artemis and China and Russia for the ILRS – have not joined each other's initiatives. Since no existing international regime is currently capable of effectively addressing the emerging lunar activities,³⁸ rules applying only to specific lunar programs will serve as the main legal basis to ensure orderly and safe operations on the Moon. The divergent operational rules applied to different lunar programs could lead to safety concerns in daily activities on the lunar surface. If the future ILRS rules conflict with the requirements of the Artemis Accords, tensions between these two competing camps will likely deepen, increasing the risk of conflicts.

2.2 China-US coordination: A crucial step in establishing rules for lunar security and safety

Stable legal instruments to prevent conflicts are crucial for all participants conducting activities on the Moon. While existing international space treaties have established various principles and rules, they remain insufficient to guarantee the security and safety of activities conducted on the Moon. This gap motivates participants to seek improvements or establish new rules. As the main players in the new wave of lunar activities, China and the US are obliged to find appropriate coordinating measures, even amidst competition.³⁹

Among the five space treaties, the 1967 Outer Space Treaty and the 1979 Moon Agreement are particularly relevant to preserving the security and safety of lunar activities. The 1967 Outer Space Treaty, regarded by some as the Magna Carta of contemporary outer space law,⁴⁰ stipulates a

³⁴See 'List of the Signatories by Date', NASA, available at <www.nasa.gov/wp-content/uploads/2024/10/signatories-02.pdf?emrc=1d6fd5>.

³⁵A. Azcárate Ortega, 'Artemis Accords: A Step Toward International Cooperation or Further Competition?', *Lawfare*, 15 December 2020, available at <www.lawfareblog.com/artemis-accords-step-toward-international-cooperation-or-further-competition>.

³⁶A. Jones, 'Serbia Becomes Latest Country to Join China's ILRS Moon Base Project', *Space News*, 10 May 2024, available at <spacenews.com/serbia-becomes-latest-country-to-join-chinas-ilrs-moon-base-project/>.

³⁷As indicated by the Artemis Accords, cooperative activities related to the exploration and use of outer space can be facilitated through various instruments, such as Memoranda of Understanding, Implementing Arrangements under existing Government-to-Government Agreements, Agency-to-Agency arrangements, or other relevant instruments. These instruments should reference the Artemis Accords and incorporate suitable provisions for implementing the principles outlined therein. See Artemis Accords, *supra* note 1, Section 2: Implementation, Artemis Accords.

³⁸For a detailed analysis of the ineffectiveness of the existing legal framework in addressing emerging lunar activities, particularly in ensuring the security and safety of such activities, see Sections 2.2, 3.1, and 3.2, *infra*.

³⁹It is important to recognize that the ILRS is a joint initiative between China and Russia. However, China's leading role in lunar exploration is largely attributed to its rapid advancements and ambitious plans in space activities. The US views China as a key competitor in the evolving space race, particularly in the context of lunar exploration. China's Chang'e missions have showcased its growing capabilities and strategic ambitions in this domain. Additionally, China has actively expanded international collaboration on the ILRS, securing agreements with over ten countries and international organizations. Given that this research examines lunar competition primarily between China and the US, the ILRS is analyzed as a significant lunar initiative in which China plays a central role. Therefore, when discussing this program, particular emphasis is placed on China's involvement.

⁴⁰See Q. He, 'The Outer Space Treaty in Perspective', (1997) 25 *Journal of Space Law* 93. See also J. F. Galloway, 'Report of the Space Law Committee, 2009–2010', available at <ila-americanbranch.org/wp-content/uploads/2020/10/2009-2010_Space_Law_Committee_Report.pdf>.

series of fundamental principles. These include the peaceful use of outer space,⁴¹ the non-appropriation of outer space,⁴² the ban on nuclear weapons or any other kinds of weapons of mass destruction in outer space,⁴³ the exclusively peaceful use of the Moon and other celestial bodies,⁴⁴ international responsibility for national space activities,⁴⁵ the authorization and supervision of non-governmental space activities,⁴⁶ international space cooperation,⁴⁷ and the protection of the space environment.⁴⁸ These principles are essential for guiding participants in lunar programs to conduct their activities on a basis of demilitarization and deconfliction. However, the treaty lacks detailed provisions for implementing these principles. Researchers have noted that the Outer Space Treaty possesses a unique character in international law, serving as the foundation for an interconnected framework of bilateral agreements between individual countries and intergovernmental organizations, as well as for several subsequent treaties.⁴⁹ The signatories, including major spacefaring nations such as the US, China, and Russia, may exploit the ambiguity of these principles to interpret them in ways that align with their own interests, particularly when applying them to emerging domains. This could potentially lead to misunderstandings and conflicts.

The 1979 Moon Agreement, aims to define and develop the provisions of international instruments related to the Moon and other celestial bodies.⁵⁰ Similar to other space treaties, the Moon Agreement further elaborates certain provisions of the Outer Space Treaty.⁵¹ It elaborates on fundamental principles contained in the Outer Space Treaty, such as in Article 3, which provides more detailed regulations on the principle of ‘exclusively peaceful uses of the Moon’. Additionally, the Moon Agreement proposes the creation of an international regime, including appropriate procedures, to govern the exploitation of the natural resources of the Moon as such exploitation becomes feasible.⁵² One purpose of this regime is to ensure the orderly and safe development of these resources.⁵³

Despite offering clearer rules for preserving lunar security and safety, the Moon Agreement has been signed and ratified by a relatively small number of countries. As of now, major space-faring nations such as the US, China, and Russia have not signed the Moon Agreement.⁵⁴ A widely acknowledged reason why major spacefaring nations rejected the Moon Agreement is its introduction of the Common Heritage of Mankind (CHM) principle in Article 11 – the first instance of this concept being explicitly incorporated into space law. CHM was seen as an evolution of the vague expression ‘province of all mankind’ found in the 1967 Outer Space Treaty.⁵⁵ However, the precise meanings of both terms remain controversial.

⁴¹The concepts of the ‘use of outer space for peaceful purposes’ or ‘peaceful exploration and use of outer space’ are embedded in many sections of the main space law treaties. For example, these notions are found in the Preamble, Paras. 3 and 5, and Art. XI of the Outer Space Treaty; the Preamble, Para. 4 of the Rescue Agreement; the Preamble, Para. 2 of the Liability Convention; and the Preamble, Para. 2 of the Registration Convention.

⁴²See Outer Space Treaty, *supra* note 4, Art. II.

⁴³*Ibid.*, Art. IV, Para. 1.

⁴⁴*Ibid.*, Art. IV, Para. 2.

⁴⁵*Ibid.*, Art. VI.

⁴⁶*Ibid.*

⁴⁷*Ibid.*, Art. IX.

⁴⁸*Ibid.*

⁴⁹J. I. Gabrynowicz, ‘The “Province” and “Heritage” of Mankind Reconsidered: A New Beginning’, in W. W. Mendell (ed.), *The Second Conference on Lunar Bases and Space Activities of the 21st Century* (1992), 691 at 692.

⁵⁰See Moon Agreement, *supra* note 33, Preamble, Para. 8.

⁵¹S.-M. Wedenig and J. Wright Nelson, ‘The Moon Agreement: Hanging by a Thread?’, *McGill: Institute of Air and Space Law*, 26 January 2023, available at <www.mcgill.ca/iasl/article/moon-agreement-hanging-thread>.

⁵²See Moon Agreement, *supra* note 33, Art. 11 (5).

⁵³*Ibid.*, Art. 11 (7)-(a).

⁵⁴On 5 January 2023, the Government of Saudi Arabia notified the Secretary-General of its decision to withdraw from the Moon Agreement, effective 5 January 2024, in accordance with Art. 20 of the Agreement. As of July 2024, only 17 states remain parties to the Moon Agreement. See ‘Agreement governing the Activities of States on the Moon and Other Celestial Bodies’, available at <treaties.un.org/Pages/ViewDetails.aspx?src=IND&mtdsg_no=XXIV-2&chapter=24&clang=_en>.

⁵⁵See Outer Space Treaty, *supra* note 4, Art. I, Para. 1.

An analysis of the Moon Agreement's negotiation history reveals three primary interpretations of the CHM principle. The US viewed CHM and the 'province of all mankind' as essentially indistinguishable, interpreting them as an extension of the *res communis* principle in international law, which traditionally implies that a resource cannot be appropriated by states. The Soviet Union insisted on drawing a clear distinction between the two concepts.⁵⁶ Less developed countries at the time collectively argued that they had the right to define international law as it applied to them, given that most existing legal frameworks had been established before they attained nationhood status. Regarding the definition of the CHM principle, they asserted that it granted all nations inherent rights to shared resources, which should be equitably distributed among them.⁵⁷ With the development of the Law of the Sea and the Moon Agreement, the distinction between the two principles has become clearer, although no consensus has been fully reached.⁵⁸ A prevailing view is that the term 'province' is associated with territorial responsibility and governance, implying a form of control rather than ownership or economic benefit. In contrast, 'heritage' is directly linked to property and ownership, emphasizing the collective entitlement of humanity to shared resources.⁵⁹

To understand the meaning of the CHM principle in space activities, the Moon Agreement serves as the primary reference.⁶⁰ Article 11 of the Moon Agreement establishes that the Moon and other celestial bodies are subject to a form of common ownership, requiring the mandatory sharing of benefits derived from any exploitation of celestial resources.⁶¹ This means that any benefits gained from extracting natural resources must be shared internationally. Consequently, resource exploitation by commercial entities would be considered inappropriate unless their activities contribute to the common benefit of all humankind. However, the extent and mechanism of this benefit-sharing obligation remain undefined, leaving significant uncertainty about its practical implementation.⁶² Furthermore, Article 11(5) of the Moon Agreement states that an international regime must be established to regulate the exploitation of lunar resources once such activities become feasible. Based on this provision and the CHM principle, there is an argument that harvesting lunar resources is prohibited unless conducted under an internationally agreed-upon framework specifically designed to govern their exploitation.⁶³

The limitations of existing international space treaties highlight the urgent need for coordination between major spacefaring nations, particularly China and the US. However, this effort faces several significant challenges that must be addressed. China has initiated the ILRS, which is currently the only rival to the US's Artemis Program. China advocates for negotiating a multilateral agreement through the COPUOS as the acceptable approach to addressing lunar activities.⁶⁴ The US has formulated the Artemis Accords to facilitate further negotiation of detailed

⁵⁶See Gabrynowicz, *supra* note 49.

⁵⁷Initially, less developed countries centered their arguments on the 'province of all mankind' principle, asserting that, under this framework, all nations held vested rights in common resources, which should be equitably shared among them. However, during negotiations on the Law of the Sea, these nations shifted their focus away from the 'province of all mankind' principle in favour of the CHM principle. See Gabrynowicz, *supra* note 49.

⁵⁸See A. J. Simon-Butler, 'Bifurcated Sovereignty and the Territorial Conception of "The Province of all Mankind"', (2019) 43(1) *Journal of Space Law* 1, at 16–19.

⁵⁹C. R. Buxton, 'Property in Outer Space: The Common Heritage of Mankind Principle vs. the First in Time, First in Right, Rule of Property', (2004) 69(4) *Journal of Air Law and Commerce* 689, at 697–8.

⁶⁰R. Jakhu et al., 'Art. 11-Common Heritage of Mankind/International Regime MOON', in S. Hobe, B. Schmidt-Tedd, and K-U. Schroll (eds.), *Cologne Commentary on Space Law* (2013), Vol. II, 388 at 394–5.

⁶¹M. Davis and R. Lee, 'Twenty Years Later – The 1979 Moon Agreement and its Legal Controversies', (1999) 4 *Australian International Law Journal* 9, at 19.

⁶²*Ibid.*, at 20–21.

⁶³M. Listner, 'The Moon Treaty: Failed International Law or Waiting in the Shadows?', *The Space Review*, 24 October 2011, available at <www.thespacereview.com/article/1954/1>.

⁶⁴As outlined in the latest version of China's white paper on space activities, China intends to uphold the international order in outer space based on international space law and contribute to a fair and reasonable global governance system for outer

rules among its partners. The Artemis Accords are designed to foster international cooperation and prevent conflicts in space. They include principles such as conducting activities for peaceful purposes,⁶⁵ sharing space policies and plans transparently,⁶⁶ developing interoperable space systems to ensure cooperation among nations,⁶⁷ providing emergency assistance to astronauts in distress,⁶⁸ and planning for the safe disposal of spacecraft and management of orbital space debris.⁶⁹ These principles are crucial for preserving lunar security and safety. Additionally, the Artemis Accords endorse the establishment of safety zones as a measure to avoid harmful interference, which is an existing obligation under the 1967 Outer Space Treaty.

When developing rules for lunar activities, each participant in the lunar competition aims to dominate the process.⁷⁰ If we consider the commonly accepted 'province of all mankind' principle discussed above, along with Article I, Paragraph 1 of the Outer Space Treaty, the appropriate approach to ensuring that space governance reflects the interests of all humankind – rather than those of specific nations – would be to formulate a new international agreement or amend existing treaties, such as the Moon Agreement, through the UN platforms.⁷¹ However, the failure of the Moon Agreement and the current work agenda of COPUOS suggest that the prospect of establishing a new international treaty in the near future is highly unlikely. Since the adoption of the Moon Agreement, no new legally binding space treaties have been created. Furthermore, while COPUOS has periodically considered the possibility of reviewing the Moon Agreement, it has not made any formal recommendations to the UN General Assembly regarding the revision of its terms, as stipulated in Article 18 of the treaty.⁷² China's advocacy for an international agreement is seen as a strategy to hinder the US's progress in lunar exploration and to create opportunities to establish a China-centric legal framework for governing lunar activities, thereby setting precedents for other states.⁷³ On the other hand, the Artemis Accords represent US-centric rules. Some believe that by implementing the Artemis Accords, the US could ensure its interpretation of international space law prevails and position itself as the licensing nation for most of the world's space companies, effectively becoming the *de facto* gatekeeper to the Moon.⁷⁴

space. See 'China's Space Program: A 2021 Perspective', *The State Council Information Office of the People's Republic of China*, January 2022, available at <english.www.gov.cn/archive/whitepaper/202201/28/content_WS61f35b3dc6d09c94e48a467a.html>.

⁶⁵See Artemis Accords, *supra* note 1, Section 3: Peaceful Purposes.

⁶⁶*Ibid.*, Section 4: Transparency.

⁶⁷*Ibid.*, Section 5: Interoperability.

⁶⁸*Ibid.*, Section 6: Emergency Assistance.

⁶⁹*Ibid.*, Section 12: Orbital Debris.

⁷⁰See R. Pillai Rajagopalan, 'The Artemis Accords and Global Lunar Governance', *The Diplomat*, 7 June 2021, available at <thediplomat.com/2021/06/the-artemis-accords-and-global-lunar-governance/>. See also D. Cheng, 'China and Space: The Next Frontier of Lawfare', *United States Institute of Peace*, 2 August 2023, available at <www.usip.org/publications/2023/08/china-and-space-next-frontier-lawfare>.

⁷¹For a detailed analysis of the 'province of all mankind' principle in the Outer Space Treaty, see S. Hobe, 'Art. 1 of the Outer Space Treaty', in S. Hobe, B. Schmidt-Tedd, and K.-U. Schroggl (eds.), *Cologne Commentary on Space Law* (2009), Vol. I, 25 at 38–39.

⁷²Art. 18 of the Moon Agreement states: 'Ten years after the entry into force of this Agreement, the question of the review of the Agreement shall be included in the provisional agenda of the General Assembly of the United Nations in order to consider, in light of past application of the Agreement, whether it requires revision.' In 1994, ten years after the Moon Agreement entered into force, UNCOPUOS considered the issue of its review during its 37th session. Following these discussions, UNCOPUOS submitted a recommendation to the UNGA; however, the General Assembly took no further action regarding any potential revision of the treaty. In recent years, UNCOPUOS has revisited the possibility of reviewing the Moon Agreement but has yet to make any formal recommendations to the UNGA. For further details on discussions related to the potential revision of the Moon Agreement, see S. Freeland, 'Article 18-Review/Revision MOON', in Hobe, Schmidt-Tedd, and Schroggl, *supra* note 60, 415 at 415–16.

⁷³W. A. Smith, 'Using the Artemis Accords to Build Customary International Law: A Vision from A US-Centric Good Governance Regime in Outer Space', (2021) 86 *Journal of Air Law & Commerce* 661, at 697.

⁷⁴A. Boley and M. Byers, 'US Policy Puts the Safe Development of Space at Risk', (2020) 370 *Science* 174, at 174.

Even though China–US competition is a key feature of the new era of lunar exploration, to promote the coordination of the two major players of lunar activities, is a crucial initial step to at the present stage preserve the security and safety of activities on the Moon. As indicated, it is impossible to establish a comprehensive multilateral agreement addressing lunar activities in the short term. The membership of COPUOS has more than doubled since 1975, making it very challenging to achieve consensus.⁷⁵ Even if a treaty similar to the Moon Agreement could be adopted, it would likely face the same challenges without the participation of major space-faring states, resulting in another ineffective agreement concerning the Moon. Given these constraints, alternative legal approaches must be pursued to address immediate concerns. Furthermore, there are feasible ways to facilitate this coordination. The reasons are illustrated as follows:

Firstly, most principles in the Artemis Accords are rooted in existing international space treaties and are also accepted by China and its partners in the ILRS program. These include principles such as conducting lunar activities for peaceful purposes, avoiding harmful interference, and fostering lunar cooperation.⁷⁶ As the ILRS program progresses, formal legal regimes will be established. It is expected that more principles from existing international space treaties, which are included in the Artemis Accords, will also be incorporated into the ILRS legal framework. This shared foundation will provide a strong basis for promoting further coordination between China and the US.

Secondly, states participating in both the Artemis Program and the ILRS could play a crucial role in improving US–China relations and facilitating coordination in rule-making for lunar activities. As both initiatives continue to expand, more states, international organizations, and non-governmental entities are becoming involved. As of now, more than 50 states have signed the Artemis Accords, demonstrating widespread international support for the US-led initiative. On the other hand, the ILRS has attracted nearly 20 national governments and international organizations, along with over 40 non-governmental entities, which have signed cooperation agreements with China.⁷⁷ Notably, Thailand holds a unique position as the only country that has signed agreements with both the Artemis Program and the ILRS.⁷⁸ Similarly, Bahrain has signed agreements with China covering lunar and deep space exploration,⁷⁹ Bangladesh and Peru, as members of the Asia-Pacific Space Cooperation Organization – a regional entity backed by China – participates in the ILRS through the organization.⁸⁰ The growing number of countries with a ‘dual identity’ in both lunar programs could potentially ease coordination efforts between the US and China.⁸¹

⁷⁵J. Wright Nelson, ‘The Artemis Accords and the Future of International Space Law’, (2020) 24 *American Society of International Law: Insights* 1, at 5.

⁷⁶It is important to note that these principles are widely recognized, largely due to the broad acceptance of the 1967 Outer Space Treaty, which has 115 member states. By analyzing state practice in international space activities, some researchers contend that the fundamental principles established by the treaty have acquired the status of customary international law, while others dispute this view. For further details, see R. S. Jakhu and S. Freeland, ‘The Relationship Between the Outer Space Treaty and Customary International Law’, SSRN, 13 June 2019, available at [dx.doi.org/10.2139/ssrn.3397145](https://doi.org/10.2139/ssrn.3397145). See also M. Friedl and C. D. Johnson, *The COPUOS Briefing Book (2023 Edition)* (SWF Publication: PP.04, 2023), at 34.

⁷⁷See ‘Update: Lunar Research Station A Cradle for International Space Talents – UN Official’, *Xinhuanet*, 28 November 2024, available at english.news.cn/20241128/ed99bafc87524b62a6f3321690e621aa/c.html.

⁷⁸See J. Foust, ‘Thailand Signs Artemis Accords’, *Space News*, 17 December 2024, available at spacenews.com/thailand-signs-artemis-accords/.

⁷⁹See L. Xin, ‘China’s Next Moon Mission to Include Egypt and Bahrain, Member of US Artemis Accords’, *South China Morning Post*, 12 June 2024, available at www.scmp.com/news/china/science/article/3266253/chinas-next-moon-mission-include-2-arab-states-including-us-artemis-accords-member.

⁸⁰See Q. Yu, ‘APSCO’s Initiatives in Space Exploration – Moon and Beyond’, *Agenda Item 14–66th Session of the UNCOPUOS*, available at www.unoosa.org/documents/pdf/copuos/2023/TPs/14_APSCO_7June_PM.pdf.

⁸¹However, it is important to note that other major Asian spacefaring nations, such as India and Japan, have signed the Artemis Accords but have engaged in only minimal substantive space cooperation with China. Moreover, competition between China and these regional powers – particularly in the realm of lunar activities – is evident (for further insights into China’s space relations with its Asian neighbors, please refer to J. C. Moltz, ‘Asia’s Space Race’ (2011) 480 *Nature* 171, at 172). What should be emphasized is that both India and Japan have significant experience in lunar exploration and exploitation, along with advanced technical capabilities. Their involvement in the Artemis Program gives them a meaningful role in shaping

To sum up, the competition between China and the US is a significant characteristic of the new era of lunar exploration. China and the US are not like-minded states and hold different opinions on creating rules for lunar activities. However, as analyzed, coordination between China and the US on crucial rules is essential to preserve lunar security and safety in the absence of comprehensive international regulations. From China's perspective, taking measures to coordinate with the US is an effective way to address misunderstandings about China's lunar activities, particularly among the states participating in the Artemis program.

3. Challenges to Moon demilitarization rules in the context of cislunar space strategy

The 1967 Outer Space Treaty mandates that the Moon and other celestial bodies be used exclusively for peaceful purposes. However, the interpretation of this provision varies, particularly concerning the extent to which military activities on the Moon are permitted. Additionally, the strategic layout of cislunar space by spacefaring states further challenges the demilitarization rules governing the Moon.

3.1 The exclusively peaceful uses of the Moon

The 1967 Outer Space Treaty in various sections refers to the use of outer space for peaceful purposes, yet it does not explicitly define 'peaceful'. According to subsequent practices, the term 'peaceful purposes' is generally interpreted as 'non-aggressive' rather than 'non-military'.⁸² Article IV, paragraph 2 of the Outer Space Treaty, for the first time, pairs 'exclusively' with 'peaceful purposes'. It has been suggested that this wording allows no room for any military use, even if non-aggressive.⁸³ However, the same paragraph lists specific prohibitions of military activities on the Moon and other celestial bodies, such as establishing military bases, installations, and fortifications; testing any type of weapons; and conducting military manoeuvres. Moreover, the use of military personnel for scientific research or other peaceful purposes, as well as the use of equipment or facilities necessary for the peaceful exploration of the Moon and other celestial bodies, are explicitly allowed as exceptions. This raises the question of whether Article IV, Paragraph 2, provides a comprehensive and exhaustive list of prohibited military activities, leaving room for differing interpretations.

The Vienna Convention on the Law of Treaties⁸⁴ mandates that treaty interpretation be conducted in good faith, adhering to the ordinary meaning of the terms within their context and in light of the treaty's object and purpose.⁸⁵ When the application of these principles under Article 31 results in ambiguity, obscurity, or an interpretation that is manifestly absurd or unreasonable, supplementary means of interpretation may be employed. These include the treaty's preparatory work and the circumstances surrounding its conclusion, either to confirm the intended meaning or to resolve uncertainties in interpretation.⁸⁶ Applying these principles to Article IV, Paragraph 2 of the Outer Space Treaty, the inclusion of the term exclusively suggests that the list of prohibited

space governance and contributing to rule-making efforts. As a result, the Artemis Accords have greater potential to evolve and gain wider recognition among non-signatory states. From this perspective, the present research underscores the necessity for China to explore avenues for enhanced coordination with its Asian neighbors in space governance and cooperation. Strengthening collaboration with India and Japan could not only expand China's ILRS partnerships but also serve as a constructive approach to improving its relationship with the US in the domain of lunar activities.

⁸²S. Hobe and N. Hedman, 'Preamble of the Outer Space Treaty', in Hobe, Schmidt-Tedd and Schrogl, *supra* note 71, 19, at 22.

⁸³K-U. Schrogl and J. Neumann, 'Art. IV of the Outer Space Treaty', in Hobe, Schmidt-Tedd and Schrogl, *supra* note 71, 70, at 82.

⁸⁴1969 Vienna Convention on the Law of Treaties, 1115 UNTS 331.

⁸⁵*Ibid.*, Art. 31(1).

⁸⁶*Ibid.*, Art. 32.

military activities should not be considered exhaustive. This is particularly relevant given that the Outer Space Treaty, as a product of its time, could not have anticipated all potential future scenarios. Furthermore, the exclusively peaceful purposes clause in Article IV, Paragraph 2 was drafted with reference to the Antarctic Treaty.⁸⁷ The latter's phrase used for peaceful purposes only has been widely interpreted as requiring complete demilitarization of Antarctica.⁸⁸ Given this precedent, it is reasonable to conclude that the drafters of the Outer Space Treaty intended to establish a framework for the demilitarization of the Moon and other celestial bodies.⁸⁹

The 1979 Moon Agreement aims to establish the Moon as a completely demilitarized zone, similar to the Antarctic Treaty. Article 3 of the Moon Agreement explicitly prohibits any threat or use of force, or any other hostile act on the Moon. The expression of Article 3 is potential to make the 'exclusively peaceful purposes' clause of the Outer Space Treaty more clearly.⁹⁰ As noted, since its opening for signature, only a limited number of states have ratified it, significantly limiting its relevance as a reflection of broadly accepted state practice.⁹¹ Some argue that the primary reason for the treaty's lack of acceptance was not the inclusion of the exclusively peaceful purposes clause.⁹² Consequently, they suggest that Article 3 of the Moon Agreement, which elaborates on the provisions of the Outer Space Treaty, still holds potential for broader acceptance.⁹³ However, in recent years, major spacefaring nations – particularly the US – have taken steps to minimize the Moon Agreement's potential influence on future lunar exploration efforts. In April 2020, the White House issued the 'Executive Order on Encouraging International Support for the Recovery and Use of Space Resources', which explicitly rejects the notion that the Moon Agreement reflects or expresses customary international law.⁹⁴ Consequently, from the US perspective, the provisions of the 1967 Outer Space Treaty remain the primary and sole binding international legal framework governing the exclusively peaceful use of the Moon.

As lunar activities continue to advance, the need for greater specificity in the interpretation of Article IV, Paragraph 2 of the Outer Space Treaty becomes increasingly evident. Based on the analysis above, it is widely acknowledged that the Moon should be demilitarized and used exclusively for peaceful purposes. However, further clarification and legal refinement are still required. Some commentators argue that permitting the use of military personnel, equipment, and facilities for scientific research and other peaceful exploration undermines the 'exclusively peaceful purposes' principle, as it is difficult to separate the military character of personnel or equipment from their stated civilian functions.⁹⁵ As the distinction between military and civilian

⁸⁷B Cheng, 'Properly Speaking, Only Celestial Bodies Have Been Reserved for Use Exclusively for Peaceful (Non-Military) Purposes, but Not Outer Void Space', in M. N. Schmitt (ed.), *International Law Across the Spectrum of Conflict* (2000), 81 at 94–5.

⁸⁸*Ibid.*

⁸⁹See Schrogl and Neumann, *supra* note 83.

⁹⁰A comparison between the Outer Space Treaty and the Antarctic Treaty reveals that the latter employs more explicit language regarding military restrictions. Article I (1) of the Antarctic Treaty states: 'Antarctica shall be used for peaceful purposes only. There shall be prohibited, *inter alia*, any measure of a military nature, such as the establishment of military bases and fortifications, the carrying out of military maneuvers, as well as the testing of any type of weapon.' See 1959 Antarctic Treaty, 402 UNTS 71, Art. I(1). The use of *inter alia* indicates that the listed examples are not exhaustive, suggesting that other military-related activities, even if not explicitly mentioned, are also prohibited in Antarctica. By contrast, the wording in Article IV, Paragraph 2 of the Outer Space Treaty lacks similar clarity, leaving room for differing interpretations regarding the extent of military activity restrictions on the Moon. To address these ambiguities, the Moon Agreement sought to clarify and expand upon the provisions of the Outer Space Treaty, particularly through Article 3, serving as a subsequent agreement that further elaborates on the original treaty.

⁹¹See Vienna Convention on the Law of Treaties, *supra* note 84, Art. 31(3).

⁹²See Schrogl and Neumann, *supra* note 83, at 83.

⁹³*Ibid.*

⁹⁴'Executive Order on Encouraging International Support for the Recovery and Use of Space Resources', White House, 6 April 2020, available at <trumpwhitehouse.archives.gov/presidential-actions/executive-order-encouraging-international-support-recovery-use-space-resources/>.

⁹⁵See Davis and Lee, *supra* note 61, at 15.

applications of space technology becomes increasingly blurred, this issue is likely to gain further prominence.⁹⁶ Additionally, some scholars argue that under Article IV, Paragraph 2 of the Outer Space Treaty, certain activities on the Moon are not explicitly prohibited. These include the presence of facilities, provided they are not designated as military bases, installations, or fortifications, as well as activities that do not constitute ‘maneuvers’.⁹⁷ While these activities may not be classified as explicitly military, they have the potential for dual-use applications. Therefore, it is necessary to consider how such activities, if conducted on the Moon, should be addressed within the framework of the ‘exclusively peaceful purposes’ principle.

For a long time after the Cold War, civil and commercial benefits were the primary drivers for space-faring nations to engage in space activities, making military concerns less prominent. Resource mining has been a major impetus for lunar exploration and exploitation.⁹⁸ However, recent developments indicate an increasing military interest in the Moon, especially in the context of competition between China and the US. Analysts now view the Moon as an emerging military high ground and a potential conflict zone.⁹⁹ Military presence is considered necessary to ensure the stability and security of lunar civil and commercial interests.¹⁰⁰ The 1967 Outer Space Treaty allows for varying interpretations regarding military-related activities on the Moon, further contributing to these concerns. Additionally, the cislunar space strategies proposed by major space powers further challenge the existing Moon demilitarization rules. This growing militarization trend underscores the need to revisit and potentially strengthen international legal frameworks to prevent conflicts.

3.2 Cislunar space strategy and challenges to the Moon demilitarization rules

A report published by the US Air Force Research Laboratory in June 2021 suggests that military officials should prepare for operations in cislunar space.¹⁰¹ A recent statement by Jared Isaacman, NASA’s next administrator appointed by President Donald Trump, further underscores the role of military officials in space. He suggested that the military might one day deploy troops in outer space,¹⁰² a scenario that could potentially extend to cislunar space, which is part of outer space. Historically, the strategic value of cislunar space has been overlooked by space powers, and no specialized regulations have been formulated for this vast area. Cislunar space is part of outer space, so existing international space treaties apply.

Regarding demilitarization rules, national practices in implementing space treaties below Earth’s geosynchronous orbit illustrate that the military use of outer space for non-aggressive purposes has become a widely accepted norm. Furthermore, Article IV, Paragraph 1 of the 1967 Outer Space Treaty prohibits only the placement, installation, and stationing of objects carrying nuclear weapons or other weapons of mass destruction in orbit around the Earth or in outer space.

⁹⁶*Ibid.*

⁹⁷D. Stephens and L. Blake, ‘Good Fences Make Good (Space) Neighbors’, (2021) 8 *Griffith Journal of Law & Human Dignity* 212, at 214.

⁹⁸N. Goswami, ‘China in Space: Ambitions and Possible Conflict’, (2018) 12 *Strategic Studies Quarterly* 74, at 77.

⁹⁹L. David, ‘Military Interest in the Moon is Ramping Up’, *Space.com*, 6 December 2021, available at <www.space.com/military-interest-moon-cislunar-space>.

¹⁰⁰See Stephens and Blake, *supra* note 97, at 227–8.

¹⁰¹See M. J. Holzinger, C. C. Chow, and P. Garretson, ‘A Primer on Cislunar Space’, *Air Force Research Laboratory*, 3 May 2021, available at <https://www.afrl.af.mil/Portals/90/Documents/RV/A%20Primer%20on%20Cislunar%20Space_Dist%20A_PA2021-1271.pdf?ver=vs6e0sE4Puj51QC-15DEfg%3D%3D>. See also E. Howell, ‘US Space Force Has New Guidelines for Working at and Around the Moon’, *Space.com*, 28 June 2021, available at <www.space.com/space-force-guidance-for-moon-cislunar-space>.

¹⁰²C. Albon, ‘Trump’s NASA Pick Says Military Will Inevitably Put Troops in Space’, *Defense News*, 11 December 2024, available at <www.defensenews.com/space/2024/12/11/trumps-nasa-pick-says-military-will-inevitably-put-troops-in-space/>.

Conventional weapons, military satellites, and other objects with attack capabilities are not mentioned in this provision.¹⁰³

Factors in cislunar space that are beneficial for military purposes include: (i) Lunar orbit: The lunar orbit can host infrastructure such as satellites that provide communication and navigation services for missions in cislunar space.¹⁰⁴ Similar to the situation on Earth, satellite communication and navigation around the Moon serve dual purposes, supporting both civilian and military operations. (ii) Lagrange points¹⁰⁵: Lagrange points offer ideal locations for placing spacecraft for surveillance or as communication relays. Satellites positioned at Lagrange points can maintain communication with Earth while monitoring activities on the far side of the Moon.¹⁰⁶ The success of China's Chang'e-4 mission, which was the first spacecraft to land on the Moon's far side, has raised concerns in the US.¹⁰⁷ This achievement allows China to conduct scientific, military, or other activities without observation or interference.¹⁰⁸ Consequently, developing monitoring capabilities at Lagrange points holds strategic and military significance for the US and other space-faring nations.

Additionally, activities conducted at lunar bases have the potential to contribute to military purposes in cislunar space, which may breach the principle of 'exclusively peaceful purposes' stipulated by the 1967 Outer Space Treaty. For example, the resources obtained from these bases could support military activities in cislunar space, even if the bases are owned and operated for purely civil purposes. One of the goals of the Defense Advanced Research Projects Agency's project, Novel Orbital and Moon Manufacturing, Materials, and Mass-efficient Design, is to study resources obtained from the Moon's surface and their applications to future defense missions.¹⁰⁹

So far, the US has announced two significant military ventures in cislunar space: the Cislunar Highway Patrol Satellite (CHPS) and the Defense Deep Space Sentinel (D2S2). CHPS is a spaceflight experiment designed to demonstrate foundational space domain awareness capabilities within the cislunar regime.¹¹⁰ D2S2 is a highly manoeuvrable spacecraft capable of conducting 'rendezvous/proximity operations', as well as 'space object removal and recovery', and other applications in defensive space operations.¹¹¹ As lunar exploration and exploitation progress, it is anticipated that more military plans for cislunar space will be developed by space-faring nations.

The US military's strategic plans for cislunar space encompass the following key considerations: (i) Trust issues with China: The US military is concerned that China may not pursue only peaceful aims and could leverage its lunar program for both economic and military

¹⁰³See Schrogl and Neumann, *supra* note 83, at 78.

¹⁰⁴M. Zemba et al., 'NASA's Lunar Communications and Navigation Architecture', *2023 Moon to Mars Architecture Concept Review*, available at <www.nasa.gov/wp-content/uploads/2024/01/lunar-communications-and-navigation-architecture.pdf?emrc=fla91a>.

¹⁰⁵Lagrange points are positions in space where objects sent there tend to stay put. At Lagrange points, the gravitational pull of two large masses precisely equals the centripetal force required for a small object to move with them. These points in space can be used by spacecraft to reduce fuel consumption needed to remain in position. For more details, see NASA/WMAP Science Team, 'What is a Lagrange Point?', *NASA Science*, 27 March 2018, available at <solarsystem.nasa.gov/resources/754/what-is-a-lagrange-point/>.

¹⁰⁶See Byers and Boley, *supra* note 5.

¹⁰⁷For more details, please see S. Kaplan, G. Shih, and R. Noack, 'China Lands Spacecraft on the Far Side of the Moon, A Historic First', *The Washington Post*, 3 January 2019, available at <www.washingtonpost.com/science/2019/01/03/china-lands-spacecraft-far-side-moon-historic-first/>.

¹⁰⁸See T. Copp, 'If China and the US Claim the Same Moon-Base Site, Who Wins?', *Defense One*, 8 August 2021, available at <www.defenseone.com/technology/2021/08/if-china-and-us-claim-same-moon-base-site-who-wins/184352/>.

¹⁰⁹See 'Orbital Construction: DARPA Pursues Plan for Robust Manufacturing in Space', *Defense Advanced Research Project Agency*, 5 February 2021, available at <www.darpa.mil/news-events/2021-02-05>.

¹¹⁰Cislunar Highway Patrol System (CHPS), *The Air Force Research Laboratory*, available at <www.afrl.af.mil/News/Photos/igphoto/2002556344/mediaid/4752579/>.

¹¹¹For more details concerning the D2S2, see T. Hitchens, 'Space Force: AFRL to Demo Mobile Lunar Spy Sat', *Breaking Defense*, 30 November 2020, available at <breakingdefense.com/2020/11/space-force-afrl-to-demo-mobile-lunar-spy-sat/>.

advantages.¹¹² Therefore, the US must maintain comprehensive awareness capacities in cislunar space to monitor all potential interferences. (ii) Protection of space assets: To ensure the security of US space assets on the lunar surface, in cislunar space, and even in Earth's orbit,¹¹³ the US needs to develop both attack and defense capacities in cislunar space.

Lunar operations have never been more prominent in military planning than they are now.¹¹⁴ As analyzed, activities in cislunar space and on the lunar surface will inevitably interact. The military strategy for cislunar space aims to protect activities on the lunar surface, while operations on the lunar surface could potentially support military endeavors in cislunar space. This interaction further diminishes the effectiveness of Article IV of the 1967 Outer Space Treaty, which seeks to demilitarize operations on the lunar surface. This introduces uncertainty into the future of lunar exploration and exploitation. Moreover, the cislunar space military strategy introduces new risks in competing for limited resources in this area, such as the Lagrange points. To avoid potential conflicts, reasonable rules need to be coordinated among the main participants in lunar exploration.

4. Deconfliction rules and the establishment of safety zones for lunar exploration

How can harmful interferences be avoided in daily operations on the lunar surface? This question becomes critical when multiple operators exist on the Moon. If these operators are competitive or even hostile, finding a proper solution becomes urgent.

4.1 The rationality to establish safety zones on the Moon

Article IX of the 1967 Outer Space Treaty stipulates that space activities should be guided by the principles of cooperation and mutual assistance. It requires that states conduct their activities in outer space, including on the Moon and other celestial bodies, with due regard to the interests of all other parties. If space activities are likely to cause potentially harmful interference with other activities, the relevant states must undertake appropriate international consultations before proceeding. Additionally, states that have reason to believe their activities might cause harmful interference can request consultations concerning these activities. The principles of cooperation, mutual assistance, and due regard to others' interests outlined in this provision are somewhat ambiguous, allowing states parties considerable flexibility in their implementation.¹¹⁵ Regarding the obligation to avoid harmful interference, Article IX mandates consultations but does not preclude other necessary measures.

The principles and obligations of due regard and consultation to avoid harmful interferences in space activities form the legal basis for establishing safety zones on the Moon. According to the Artemis Accords, signatories are required to provide notification of their activities and coordinate with relevant actors to prevent harmful interference within designated areas, referred to as safety

¹¹²B. Bender, 'Moon Battle: New Space Force Plans Raise Fears Over Militarizing the Lunar Surface', *Politico*, 12 March 2022, available at <www.politico.com/news/2022/03/12/space-force-moon-pentagon-00016818>.

¹¹³Some military leaders of the US propose that space objects placed in cislunar space could swing around the Moon and potentially come back to attack a satellite in geostationary space. See E. Berger, 'The US Space Force Plans to Start Patrolling the Area Around the Moon', *Ars Technica*, 3 March 2022, available at <arstechnica.com/science/2022/03/the-us-space-force-plans-to-extend-its-operations-to-the-moon/>.

¹¹⁴See Bender, *supra* note 112.

¹¹⁵The principle of cooperation has been further developed by the UNGA through the Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries, A/RES/51/122 (4 February 1997) (1996 Declaration). According to the 1996 Declaration, international space cooperation should be taken based on the free of determination of fair, equitable, and mutually acceptable contractual terms. For more details on the principles of cooperation, mutual assistance, and due regard to the others' interests in outer space, see S. Marchisio, 'Art. IX of the Outer Space Treaty', in Hobe, Schmidt-Tedd and Schrogl (eds.), *supra* note 71, 169 at 174–6.

zones.¹¹⁶ Some researchers contend that safety zones are necessary, practical, and compliant with existing international law.¹¹⁷

The concept of safety zones is not new. During the Cold War era, safety zones were primarily discussed as a means of conflict deterrence.¹¹⁸ In maritime contexts, safety zones are defined as areas extending a reasonable distance around a facility to ensure its safety by promoting safe navigation in its vicinity.¹¹⁹ The ‘Building Blocks for the Development of an International Framework on Space Resource Activities’, released by the Hague International Space Resources Governance Working Group in 2019 (the Hague Building Blocks),¹²⁰ suggests that states and international organizations responsible for space resource activities should be allowed to establish safety zones or other area-based safety measures to ensure safety and prevent harmful interference with those activities.¹²¹

By incorporating technological and hazard-based considerations into space activities, creating safety zones is seen as an appropriate measure for minimizing risks. On the Moon, two key safety risks are particularly notable due to its low gravity and lack of atmosphere: (i) Lunar dust from landing, launching, and surface operations can indiscriminately damage other spacecraft over long distances. (ii) The embedded energy in spacecraft fuel and energy systems can create an explosion hazard with far-reaching impacts.¹²²

In the absence of an international consensus on a lunar legal framework, safety zones are established by the operators of specific installations or facilities on the lunar surface, operating on a ‘first come, first served’ basis. These zones occupy territory on the lunar surface, and activities within them are subject to safety restrictions. Consequently, many critics argue that safety zones could become areas of national influence or *de facto* appropriation, violating Articles I and II of the 1967 Outer Space Treaty.¹²³ While the Artemis Accords emphasize the importance of compliance with international space treaties,¹²⁴ they also explicitly affirm that their provisions do not intend to contravene Article II of the Outer Space Treaty.¹²⁵ To avoid breaching space treaty obligations, legal arrangements for safety zones must be carefully elaborated.

To establish and operate safety zones without infringing on international obligations, the following fundamental criteria should be adhered to: (i) Ensure transparency in the creation and maintenance of safety zones. (ii) Ensure that the establishment or operation of a zone does not grant sovereign rights. (iii) Ensure that fundamental space rules, particularly the established principles from international space law such as the 1967 Outer Space Treaty, are equally applicable both inside and outside of safety zones.¹²⁶ In other words, the freedom to explore and use outer space provided by the 1967 Outer Space Treaty is not absolute and must be balanced against the

¹¹⁶See Artemis Accords, *supra* note 1, Section 11: Deconfliction of Space Activities.

¹¹⁷M. Daniels, ‘The Artemis Accords: What Comes after the Moon’, (2021) 32 *Principium* 25, at 27.

¹¹⁸L. Mallowan, L. Rapp and M. Topka, ‘Reinventing Treaty Compliant “Safety Zones” in the Context of Space Sustainability’, (2021) 8 *Journal of Space Safety Engineering* 155, at 156.

¹¹⁹See *ibid.*

¹²⁰‘Building Blocks for the Development of an International Framework on Space Resource Activities’, available at <www.universiteitleiden.nl/binaries/content/assets/rechtsgeleerdheid/instituut-voor-publiekrecht/lucht-en-ruimterecht/space-resources/revised-building-blocks-following-the-meeting-of-april-2019.pdf>.

¹²¹*Ibid.*, Section 11.3.

¹²²A. Q. Gilbert, ‘Safety Zones for Lunar Activities under the Artemis Accords’, *Open Lunar Foundation*, 11 January 2022, available at <static1.squarespace.com/static/659ddc41121da9469c35e2b1/t/6707354ecc317f1c97176ccd/1728525646818/1691606337-61de2458e7af966b631a7f67_copy-of-pre-print-safety-zones-for-lunar-activities-aqg-open-lunar-foundation-compressed.pdf>.

¹²³See Smith, *supra* note 73, at 692.

¹²⁴As indicated in the preamble of the Artemis Accords, the signatories desire ‘to implement the provisions of the Outer Space Treaty and other relevant international instruments’.

¹²⁵See Artemis Accords, *supra* note 1, Section 10(2).

¹²⁶See Mallowan, Rapp and Topka, *supra* note 118, at 164.

legitimate interests of other states.¹²⁷ Therefore, even if the creation of safety zones is necessary to preserve safe operations on the Moon, rules applicable to safety zones and all space activities must be strictly observed.

Establishing safety zones is one of several possible ways to implement Article IX of the Outer Space Treaty.¹²⁸ Given the harsh natural environment on the Moon, safety zones are seen as an effective measure to ensure the safe and sustainable development of lunar programs. China and Russia, as competitors to the US, might find no better way to avoid harmful interference when operating on the Moon within the context of the ILRS. It is highly probable that China and Russia will establish safety zones around the ILRS. The fundamental criteria for safety zones should be uniformly applicable. However, since China and Russia are not signatories to the Artemis Accords, they are not required to follow the detailed rules for establishing and operating safety zones that apply to Artemis partners.¹²⁹ This discrepancy could lead to conflicts, which warrant careful attention.

4.2 Safety zones rules and the necessity of harmonization

The Hague Building Blocks outline several fundamental rules that must be recognized by states or international organizations that establish safety zones or other area-based measures. Specifically, safety measures must not impede the free access of personnel, vehicles, and equipment of other operators to any area of outer space, in accordance with international law.¹³⁰ Additionally, states or international organizations may restrict access for a limited period, provided that timely public notice is given, detailing the reasons for such restrictions.¹³¹

The Artemis Accords embrace a similar approach to the Hague Building Blocks regarding the establishment of safety zones, providing more detailed guidelines. These guidelines cover aspects such as the size and scope of a safety zone, the nature and existence of a safety zone, and rules of behavior within safety zones. However, further coordination is required regarding the size, scope, nature, and establishment of safety zones, as well as the specific behavioral guidelines governing activities within these zones.

First, regarding the size and scope of a safety zone, the Artemis Accords propose that these should reflect the nature of the operation and the environment in which it is conducted. Furthermore, the size and scope should be determined reasonably, leveraging commonly accepted scientific and engineering principles.¹³² In comparison, the law of the sea authorizes a relatively fixed size for safety zones around artificial islands, installations, and structures located in the

¹²⁷M. Stubbs, 'The Legality of Keep-Out, Operational, and Safety Zones in Outer Space', in C. Steer and M. Hersch (eds.), *War and Peace in Outer Space: Law, Policy, and Ethics* (2020), 201 at 206.

¹²⁸R. Deplano, 'The Artemis Accords: Evolution or Revolution in International Space Law?', (2021) 70 *International & Comparative Law Quarterly* 799, at 801.

¹²⁹Both the Artemis Program and the ILRS are open to international cooperation. In principle, China and Russia could join the Artemis Program by signing the Artemis Accords, just as the US could potentially participate in the ILRS. NASA Deputy Administrator Pamela Melroy has explicitly stated, 'China is free to sign the Accords any time they want to' (see J. Foust, 'Artemis Accords Signatories Look to Recruit New Members', *Space News*, 17 October 2024, available at spacenews.com/artemis-accords-signatories-look-to-recruit-new-members/). Similarly, China and Russia have affirmed their commitment to 'facilitate extensive cooperation in the ILRS, open to all interested countries and international partners' (see CNSA, 'China and Russia Welcome International Participation in Lunar Research Station Project', (2021) 35(2) *Bulletin of the Chinese Academy of Sciences*, at 68–9.). However, as analyzed in Section 2 of this research, despite these formal invitations, competition between the US and China in lunar exploration and resource utilization is expected to remain the dominant trend in the near future.

¹³⁰See 'Building Blocks for the Development of an International Framework on Space Resources Activities', *supra* note 120, Section 11.3.

¹³¹*Ibid.*

¹³²See Artemis Accords, *supra* note 1, Section 11 (7)-(a), (b).

exclusive economic zone.¹³³ The proposal in the Artemis Accords is more ambiguous, relying on the nature of the operations, the environment, and commonly accepted scientific and engineering principles as essential criteria. For non-signatories of the Accords, it is uncertain whether these criteria will be accepted. Even if they are acknowledged, several issues need to be addressed, including which authority is qualified to evaluate the operation's nature and environment, what specific scientific and engineering principles must be considered, and whether there are any other impacting factors that need to be taken into account.

Second, concerning the nature and existence of a safety zone, the Artemis Accords indicate that the size and scope of a safety zone should be adjusted over time to correspond with the status of relevant operations. Furthermore, safety zones are ultimately temporary and should be terminated once the relevant operations cease.¹³⁴ Rules confirming the nature and existence of a safety zone are beneficial for ensuring operators' compliance with Article II of the 1967 Outer Space Treaty. All operators on the Moon, whether signatories of the Artemis Accords or not, must accept these rules. For non-signatories, establishing harmonized standards to determine changes in the status of relevant operations would be more reliable.

Third, concerning rules of behavior in safety zones, the Artemis Accords oblige signatories to respect reasonable safety zones to avoid harmful interference with operations by providing prior notification to and coordinating with each other before conducting operations within a safety zone.¹³⁵ The requirements for notification and coordination are supported by Article IX of the Outer Space Treaty. However, due to the lack of details, it is questionable whether these procedures are sufficient in practice. Safety zones are established to prevent harmful interference; they could encompass anything from a narrow radius around a space object to large swathes of space where access would be temporarily restricted.¹³⁶ As indicated in the Hague Building Blocks, one state may exclude or restrict other states or their nationals within safety zones for security and safety reasons. However, the legality of these safety zones is determined by the extent and manner of such exclusions and restrictions. Therefore, for the US and its Artemis partners, as well as other non-signatories, formulating clear and reasonable rules of behavior in safety zones is not only essential to ensure regular lunar operations but also necessary to fulfill international obligations.

Rules not contained in the Artemis Accords but relevant to lunar activities must also be emphasized. For instance, regulations addressing overlapping safety zones and dispute settlements between different entities are necessary. The south pole of the Moon holds the majority of relatively accessible ice, and the race to operate there has already begun.¹³⁷ While it is difficult to predict immediate crowding at the lunar south pole, the overlap of safety zones

¹³³ Art. 60(4), (5) of the United Nations Convention on the Law of the Sea stipulate the establishment, scope, and size of safety zones in the exclusive economic zone. Art. 60(4) states: 'the coastal State may, where necessary, establish reasonable safety zones around such artificial islands, installations and structures in which it may take appropriate measures to ensure the safety both of navigation and of the artificial islands, installations and structures'. Art. 60(5) states:

the breadth of the safety zones shall be determined by the coastal State, taking into account applicable international standards. Such zones shall be designed to ensure that they are reasonably related to the nature and function of the artificial islands, installations or structures, and shall not exceed a distance of 500 meters around them, measured from each point of their outer edge, except as authorized by generally accepted international standards or as recommended by the competent international organization. Due notice shall be given of the extent of safety zones.

¹³⁴ See Artemis Accords, *supra* note 1, Section 11 (7)-(c).

¹³⁵ *Ibid.*, Section 11 (10).

¹³⁶ See Gilbert, *supra* note 122.

¹³⁷ A. Jones, 'NASA and China are Eyeing the Same Landing Sites Near the Lunar South Pole', *Space News*, 31 August 2022, available at <spacenews.com/nasa-and-china-are-eyeing-the-same-landing-sites-near-the-lunar-south-pole/>.

between different operators is a possibility. For countries involved in the Moon race, the pioneer establishing a safety zone at the lunar south pole will gain priority. However, in the long term, formulating appropriate rules and mechanisms to prevent and resolve potential overlaps and disputes will be the optimal choice to safeguard the safe and sustainable development of lunar activities.

In summary, creating safety zones on the Moon is a necessary step to implement Article IX of the Outer Space Treaty. However, this action could potentially breach other provisions of the Outer Space Treaty (Articles I and II), making it essential to establish clear criteria for safety zones to ensure their legality. The US's competitors on the Moon, namely China and Russia, have not accepted the Artemis Accords as signatories. Despite this, China and Russia may find no better measures than creating safety zones to avoid harmful interference. Safety zones could potentially be accepted by all lunar operators. Therefore, it is crucial to formulate specific rules concerning the size, scope, nature, existence, management, and dispute settlement of safety zones that are agreed upon by all participants in lunar activities.

5. Recommendations for China on establishing rules for lunar security and safety

As a participant in the lunar competition, China should take measures to promote the establishment of effective rules to ensure the safe development of lunar activities. However, from a realistic perspective, it is unlikely that a comprehensive international treaty on lunar activities, which China supports, can be concluded in the short term. Therefore, China needs to find a way to coordinate with its competitor, the US.

5.1 Participating in the creation of international norms, rules, and principles for the demilitarized use of the Moon

In 2008, China and Russia submitted a 'Draft Treaty on the Prevention of Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects' (PPWT) to the Conference on Disarmament (CD).¹³⁸ A revised version was submitted in 2014.¹³⁹ The PPWT aims to fill the gaps of the 1967 Outer Space Treaty by proposing to prevent the placement of any type of weapons in outer space, including on the Moon and other celestial bodies. Additionally, the PPWT stipulates prohibiting any actions involving the threat or use of force against space objects.¹⁴⁰ However, the PPWT lacks consensus among significant space powers, with the US being the major objector.¹⁴¹ Conversely, the European Union initiated a non-legally binding model, the 'Draft Code of Conduct for Outer Space Activities' (ICoC). The first version of the

¹³⁸'Draft Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects', *Ministry of Foreign Affairs of PRC*, 12 February 2008, available at <www.mfa.gov.cn/eng/wjzb/zjzg_663340/jks_665232/kjfywj_665252/202406/t20240606_11405272.html>.

¹³⁹'Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects (Draft)', available at <[docs-library.unoda.org/Conference_on_Disarmament_\(2014\)/1319%2BRussian%2BFederation%2BDraft%2BUpdated%2BPPWT%2B.pdf](https://docs-library.unoda.org/Conference_on_Disarmament_(2014)/1319%2BRussian%2BFederation%2BDraft%2BUpdated%2BPPWT%2B.pdf)>.

¹⁴⁰*Ibid.*, Art. 2.

¹⁴¹After the PPWT Draft was submitted in 2008 and 2014 by China and Russia, the US respectively submitted letters to the Secretary-General of the CD to transmit comments on the Drafts. For more details, see 'Letter Dated 19 August 2008 from the Permanent Representative of the United States of America Addressed to the Secretary-General of the Conference Transmitting Comments on the Draft Treaty on "Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force Against Outer Space Objects" (PPWT) as contained in Document CD/1839 of 29 February 2008', CD/1847 (2008). 'Note Verbale Dated 2 September 2014 from the Delegation of the United States of America to the Conference on Disarmament Addressed to the Acting Secretary-General of the Conference Transmitting the United States of America's Analysis of the 2014 Russian-Chinese Draft Treaty on the "Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force Against Outer Space Objects"', CD/1998 (2014).

ICoC was published in 2008,¹⁴² and the latest draft was published in March 2014.¹⁴³ The ICoC aims to enhance the safety, security, and sustainability of all outer space activities related to space objects and the space environment.¹⁴⁴

The debate over whether a hard law or soft law model is better to prevent the arms race and weaponization in outer space was a key point of contention.¹⁴⁵ However, after the latest versions of the PPWT and ICoC were proposed in 2014, the debate seemed to be suspended. Recently, the idea of reducing space threats through norms, rules, and responsible behaviors was proposed by the United Kingdom,¹⁴⁶ bringing renewed emphasis on the model for governing space military activities and weaponization.

The 'Reducing Space Threats through Norms, Rules and Principles of Responsible Behaviours' resolution, adopted by the UN General Assembly, calls on all Member States to work toward a shared understanding of measures to mitigate threats to space systems. Its primary objective is to ensure that outer space remains a peaceful, safe, stable, and sustainable environment – free from conflict and an arms race – for the benefit of all.¹⁴⁷ Pursuant to the UN General Assembly Resolution, an Open-Ended Working Group (OEWG) was convened to develop recommendations on possible norms, rules, and principles of responsible behavior related to space security.¹⁴⁸ The OEWG held four substantive sessions: the first session reviewed existing legal frameworks and assessed the current state of outer space security; the second session examined current and potential threats to space systems, including those arising from Earth-based activities; the third session explored possible norms, rules, and principles to enhance space security and mitigate threats; the fourth session aimed to consolidate recommendations and draft a final report for the UN General Assembly.¹⁴⁹ Despite extensive discussions, the OEWG failed to reach a consensus on its final report.¹⁵⁰ However, its work remains a significant contribution to advancing space security and preventing an arms race in outer space.¹⁵¹ In 2023, the UN General Assembly approved the establishment of a new Open-Ended Working Group to further develop the concept of responsible behaviors in space and make recommendations on preventing an arms race. This

¹⁴²For more specifics concerning the draft process of the ICoC, see M. Dickow, 'The European Union Proposal for A Code of Conduct for Outer Space Activities', in K.-U. Schrogl, C. Mathieu, and N. Peter (eds.), *Yearbook on Space Policy (2007/2008)* (2009), 152 at 153–4. See also N.-L. Remuss, 'Space and Security', in C. Bruenner and A. Soucek (eds.), *Outer Space in Society, Politics and Law* (2011), 519 at 540–1. The first version of the ICoC announced was in 2008, it was entitled 'Draft Code of Conduct for Outer Space Activities', see 'Draft Code of Conduct for Outer Space Activities', *Council of the European Union*, 17 December 2008, available at <data.consilium.europa.eu/doc/document/ST-17175-2008-INIT/en/pdf>.

¹⁴³'Draft International Code of Conduct for Outer Space Activities', 31 March 2014, available at <www.eeas.europa.eu/site/s/default/files/space_code_conduct_draft_vers_31-march-2014_en.pdf>.

¹⁴⁴*Ibid.*, Part I-1–1.1.

¹⁴⁵F. Tronchetti, 'A Soft Law Approach to Prevent the Weaponization of Outer Space', in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-binding Norms in International Space Law* (2012), 361 at 368–76.

¹⁴⁶In 2020, the UK tabled a new resolution on 'reducing space threats through norms, rules and principles of responsible behaviors', which galvanized a global discussion on what constitutes responsible space behavior. The work is part of Preventing an Arms Race in Outer Space (PAROS). And it was passed by the UN GA's First Committee in November 2021. For more details see 'UN General Assembly's First Committee Approves UK Push to Tackle Threatening Space Behavior', *GOV.UK*, 1 November 2021, available at <www.gov.uk/government/news/un-general-assemblys-first-committee-approves-uk-push-to-tackle-threatening-space-behaviour>.

¹⁴⁷United Nations General Assembly, Reducing Space Threats through Norms, Rules and Principles of Responsible Behaviours, A/RES/76/231 (2021).

¹⁴⁸*Ibid.*

¹⁴⁹A. Azcárate Ortega and S. Erickson, 'OEWG on Reducing Space Threats: Recap Report', *UNIDIR*, 15 March 2024, available at <unidir.org/publication/oewg-on-reducing-space-threats-recap-report/>.

¹⁵⁰*Ibid.*

¹⁵¹See United Nations General Assembly, Reducing Space Threats through Norms, Rules and Principles of Responsible Behaviours, A/RES/78/20, (2023); United Nations General Assembly, Reducing Space Threats through Norms, Rules and Principles of Responsible Behaviours, A/RES/79/22 (2024).

new OEWG is tasked with submitting its report to the General Assembly at its 81st session and is required to adopt its final conclusions and recommendations by consensus.¹⁵²

Compared to the PPWT, the proposal for responsible behaviors is more comprehensive and flexible. Some have put forward the idea that like-minded states should first reach a consensus on the fundamental criteria of responsible behavior, then promote these criteria to other states and non-governmental space entities.¹⁵³ If major space powers and commercial space entities accept them, universally applicable norms, rules, and principles can eventually be established.

China continues to advocate for negotiating a legally binding treaty based on the PPWT to prevent an arms race and weaponization in outer space.¹⁵⁴ Additionally, China is concerned that the binary distinction between responsible and irresponsible behaviors in outer space could be used as a political tool.¹⁵⁵ Consequently, China voted against the UNGA resolution on responsible behaviors.¹⁵⁶

In October 2023, the First Committee of the UN voted to support the US and its allies, as well as China and Russia, in organizing two working groups to develop different measures for preserving space security.¹⁵⁷ The working group led by the US and its allies will continue negotiating norms of responsible behavior, while the China/Russia-led working group will focus on a legally binding model to prevent the deployment of space weapons.¹⁵⁸ These parallel paths further confirm the coexistence of hard law and soft law models.

The particularities of the new round of lunar exploration and exploitation, such as the participation of non-governmental entities and the emphasis on commercial benefits, demand a stable legal regime to ensure safe and sustainable operations on the Moon. However, various factors make the creation of a new treaty unlikely in the near future. The responsible behaviour proposal aims to establish a soft law framework as a first step, with the creation of legally binding instruments as a long-term goal. This does not contradict China's proposal of the PPWT. China has acknowledged that the responsible behaviour proposal can be included as an agenda item for the Prevention of an Arms Race in Outer Space and has expressed its intention to participate in further discussions.¹⁵⁹

It is recommended that China, as a significant player in lunar activities, both improve the PPWT and actively engage in creating norms, rules, and principles of responsible behaviour for lunar exploration and use. As indicated, space powers have already identified cislunar space as a strategic military area. While conducting military activities in cislunar space may not violate

¹⁵²See [Ibid.](#), Reducing Space Threats through Norms, Rules and Principles of Responsible Behavior (2023).

¹⁵³B. McClintock, et al., 'Responsible Space Behavior for the New Space Era: Preserving the Province of Humanity', *Rand Corporation*, 2021, available at <www.rand.org/pubs/perspectives/PEA887-2.html>.

¹⁵⁴United Nations General Assembly, Further Practical Measures for the Prevention of An Arms Race in Outer Space, A/RES/76/230 (2021).

¹⁵⁵Document of the People's Republic of China pursuant to UNGA Resolution 75/36 (2020)', available at <front.un-arm.org/wp-content/uploads/2021/05/Chinas-Position-on-Outter-Space-SecurityEnglish.pdf>.

¹⁵⁶‘Reducing Space Threats through Norms, Rules and Principles of Responsible Behaviours: Resolution/Adopted by the General Assembly, Vote Summary, Vote Date 24 December 2021’, available at <digitallibrary.un.org/record/3952170?ln=en&n.un.org/record/3952170?ln=en%E3%80%82%E3%80%82>.

¹⁵⁷T. Hitchens, 'UN Takes "Parallel" Paths on Space Security Amid Geopolitical Rift', *Breaking Defense*, 8 November 2023, available at <breakingdefense.com/2023/11/un-takes-parallel-paths-on-space-security-amid-geopolitical-rift/>.

¹⁵⁸‘Consensus Scuttled in First Committee over Two Competing Draft Resolutions on Space Security, Creating Parallel Processes, Polarization, Say Speakers’, *United Nations: Meetings Coverage and Press Releases*, 31 October 2023, available at press.un.org/en/2023/gadis3730.doc.htm.

¹⁵⁹China has actively participated in the Open-Ended Working Group. According to the General Remarks by H.E. Amb. LI Song, China hopes that the OEWG could base itself on its mandate as stipulated by the UNGA resolution, facilitate the comprehensive exchange of views on norms, rules, and the principles of responsible behaviours, and develop convergence on the basis of collective wisdom, so as to contribute to achieving the goal of prevention of an arms race in outer space and safeguarding security in outer space. For more details, see 'General Remarks by H.E. Amb. Li Song at the First Session of the Open-Ended Working Group on Reducing Space Threats through Norms, Rules and Principles of Responsible Behaviours', available at documents.unoda.org/wp-content/uploads/2022/05/EN-Remarks-by-H.E.-Amb.-LI-Song-at-the-Space-OEWG.pdf.

existing space treaties, these activities are relevant to the safe and sustainable development of lunar surface operations. Consequently, clarifying fundamental principles through the PPWT and establishing norms, rules, and principles of responsible behaviour in cislunar space will help prevent conflicts and arms races. Additionally, some activities are not explicitly prohibited on the Moon under the existing legal framework, which may deviate from the principle of exclusively peaceful use and needs to be addressed and evaluated by the criteria of responsible behaviour.

5.2 Coordinating with the US on harmonized safety zones rules for lunar operations

Once lunar programs are established by the US and China, harmonized deconfliction rules will become urgent, with the most significant being the rules for safety zones. In 2011, the US Congress included a passage in an appropriations bill, known as the Wolf Amendment,¹⁶⁰ forbidding NASA from cooperating with China due to fears of technological theft or espionage.¹⁶¹ However, the Wolf Amendment does not explicitly ban all cooperation between NASA and Chinese counterparts but rather prohibits NASA from using government funds to cooperate with China without direct Congressional approval.¹⁶² Some argue that without cooperation between the US and China, space cannot be safe.¹⁶³ The two countries need to set aside their mistrust to establish harmonized rules necessary for ensuring safety lunar operations.

China is advised to coordinate with the US to formulate rules on enhancing the transparency of lunar operations and activities in safety zones. Transparency is fundamental for creating and maintaining safety zones to avoid harmful interference in daily activities and is a measure to safeguard the security, safety, and sustainability of space activities.¹⁶⁴ Both the US and China support establishing transparency and confidence-building measures in outer space,¹⁶⁵ providing opportunities for further negotiation concerning safety zone rules.

The US, within the framework of the Artemis Accords, will establish detailed rules concerning safety zones with its partners. To ensure the safe and sustainable implementation of lunar activities, it is anticipated that China and Russia will take similar steps under the ILRS. Fragmented deconfliction rules of lunar programs from different camps could result in collisions. Therefore, it is recommended that China coordinate with the US to harmonize the details of safety zones, including size and scope, nature and existence, rules of behaviour, and dispute settlement measures. Formulating these details will take time, even with a China–US coordinating system in place. However, actively coordinating with its rival on the Moon will benefit China by reducing misunderstandings of Chinese lunar activities and lowering the possibility of conflicts on the Moon.

The UNCOPUOS has discussed the dangers of unilateral regulation of lunar activities and the advantages of international regulation for ensuring compliance with the Outer Space Treaty.¹⁶⁶ However, the Artemis Accords, criticized as unilateral measures, cannot be judged to breach

¹⁶⁰For more details and a comprehensive analysis of the Wolf Amendment, please see J. Foust, 'Defanging the Wolf Amendment', *The Space Review*, 3 June 2019, available at <www.thespacereview.com/article/3725/1>.

¹⁶¹W. Marshall and C. Hadfield, 'Why the U.S. and China Should Collaborate in Space', *Time*, 15 April 2021, available at <time.com/5954941/u-s-china-should-collaborate-in-space/>.

¹⁶²A. Gadd, 'The US Cooperates with Russia in Space. Why Not China?', *The Diplomat*, 30 September 2021, available at <thediplomat.com/2021/09/the-us-cooperates-with-russia-in-space-why-not-china/>.

¹⁶³B. Li, 'Space Won't Be Safe until the US and China Can Cooperate', *Scientific American*, 9 May 2022, available at <www.scientificamerican.com/article/space-wont-be-safe-until-the-u-s-and-china-can-cooperate1/>.

¹⁶⁴R. S. Jakhu, 'Transparency and Confidence-building Measures for Space Security', in A. Lele (ed.), *Decoding the International Code of Conduct for Outer Space Activities* (2012), 35 at 35–46.

¹⁶⁵The US is a supporter of the soft law model on space arms control, which can be concluded from its statements about the relevant proposed instruments. From the perspective of China, PPWT indicates that the states parties shall promote transparency and confidence-building in outer space activities on a voluntary basis, with a view to facilitate assurance of compliance with the Treaty provisions.

¹⁶⁶P. Larsen, 'Is There a Legal Path to Commercial Mining on the Moon?', (2021) 83(1) *University of Pittsburgh Law Review* 1, at 46.

existing international law. As previously noted, by sponsoring the Artemis Accords, the US aims to build a US-centric regime of governance in lunar exploration and exploitation.¹⁶⁷ In contrast, some observers suggest that, although China and Russia have expressed support for developing an international regime through the COPUOS, they are unlikely to accept commitments that might constrain their strategic interests on the Moon.¹⁶⁸ Instead, they appear to be pursuing the creation of a Sino-Russian-centered governance model – through multilateral cooperation platforms – as a counterweight to the Artemis Accords.¹⁶⁹

To avoid conflicts on the Moon and ensure lunar security and safety, neither a US-centric nor a Sino-Russian-centric regime will benefit humanity. Coordination between them is necessary as a starting point. Concerning demilitarization rules surrounding lunar activities, establishing norms, rules, and principles of responsible behavior in cislunar space and on the Moon can be a transitional measure until an international treaty is adopted. While creating safety zones on the Moon may not be the best choice to implement Article IX of the 1967 Outer Space Treaty, with the development of lunar programs, safety zones may become the earliest practice of lunar deconfliction. In this case, effective coordination on specific rules between space powers that can establish a presence on the Moon, namely the US and China/Russia, is essential. Furthermore, coordination between these competitive camps is crucial for promoting further negotiations under the UNCOPUOS.

6. Conclusion

Creating an effective legal regime to avoid potential conflicts is essential for ensuring the security and safety of activities on the Moon, benefiting both governmental and non-governmental operators of lunar programs. However, the failure of the 1979 Moon Agreement makes the negotiation of a new international treaty through an authoritative multilateral platform, such as UNCOPUOS, unlikely in the short term. Conversely, the US has established the Artemis Accords among its partners, outlining a fundamental framework for further cooperation. Meanwhile, China and Russia have proposed the ILRS but have yet to announce instruments for this program.

During President Donald Trump's previous administration, US space policy placed increasing emphasis on the militarization of space – a shift that China perceived as a direct threat to the peaceful use and security of outer space. Given this trajectory, a renewed Trump administration is likely to continue viewing China as a strategic competitor in space. As a result, reaching a comprehensive legal framework to fully harmonize US–China lunar activities in the near future remains challenging. However, despite these tensions, legal measures focused on demilitarization and deconfliction are essential to prevent conflicts and ensure a stable environment for lunar activities. At this stage, China should take a proactive approach by advocating for improvements to the PPWT to specifically address the challenges of lunar security while simultaneously promoting the development of norms, rules, and principles of responsible behavior for activities in both cislunar space and on the lunar surface. Furthermore, China should engage in dialogue with the US to establish detailed regulations for safety zones, ensuring a framework that minimizes risks and enhances coordination in lunar exploration and utilization.

¹⁶⁷See Smith, *supra* note 73, at 687.

¹⁶⁸*Ibid.*, at 674.

¹⁶⁹*Ibid.*, at 696.