

Outer Space Militarization and Normative Gaps in International Space Law: A Comparative Legal Analysis

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Abstract

Disagreements between spacefaring states' strategic activities and the normative goals of international space law have persisted despite space's growing militarization. At the heart of this conflict is the fact that different legal understandings of the term "peaceful purposes" in the 1967 Outer Space Treaty have coexisted with growing military operations in orbit, due to the ambiguity of this term. This research takes a normative juridical stance, drawing on statutory, conceptual, and comparative methods to assess whether the current international legal system adequately addresses modern trends of space militarization. States are able to operationalize military space tactics without clear legal limitation, as the analysis shows that current legal instruments offer limited normative direction and lack effective enforcement mechanisms. The study looks for interpretive fragmentation and structural inadequacies in international space law by comparing state space doctrines and institutional reactions, instead of evaluating military results experimentally. The essay uses this legal analysis to provide prescriptive suggestions for improving normative clarity, such as limiting the testing of anti-satellite weapons, improving the operational definition of "peaceful use," and holding private actors more accountable under state oversight. This research does not assert empirical verification, but rather provides a normative legal assessment of the regulatory gaps that now exist and suggests reform strategies to strengthen space governance's consistency, transparency, and stability.

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Introduction

The transformation of outer space from a peaceful domain of scientific exploration into a theatre of strategic competition reflects a critical juncture in the evolution of global power dynamics. Initially governed by the idealism of the 1967 Outer Space Treaty—which envisioned outer space as a commons for the benefit of all humankind—contemporary space activities increasingly serve national defense agendas. The proliferation of military satellites, anti-satellite (ASAT) weapons, and orbital surveillance technologies among spacefaring powers has rendered space not only militarized but arguably weaponized.¹ This paradigm shift, underpinned by the pursuit of strategic deterrence and technological superiority, exposes a deep tension between normative legal commitments and the geopolitical reality. While the United States allocates over 58% of its space budget to military objectives and maintains an independent Space Force, countries like Russia and China have adopted similar trajectories, albeit with differing strategic rationales and legal interpretations.² These developments suggest not only a growing arms race but a fragmentation of the original legal consensus.

Comparative analysis of national space doctrines reveals that the term “peaceful purposes,” central to the OST’s regulatory framework, has been variably interpreted to accommodate militarized objectives. The United States tends to justify space-based defense systems under the principle of self-defense, while China and Russia frame their militarization efforts as reactive strategies to counter Western dominance.³ Such divergence in legal reasoning undermines the universality and enforceability of international space law. Furthermore, emerging space actors such as India and France are increasingly adopting hybrid strategies that blur the lines between civilian and military applications. This legal and strategic ambiguity poses systemic risks to global stability and undermines the legitimacy of multilateral institutions such as UNCOPUOS.⁴ As military presence in space intensifies without a coherent and enforceable legal regime, the future of outer space as a peaceful domain hangs in the balance—challenged by conflicting national interests, asymmetric capabilities, and an outdated legal architecture. However, while these divergent national practices have been widely discussed in policy and strategic literature, their implications for the coherence, normativity, and institutional viability of international space law remain insufficiently articulated in doctrinal legal analysis.

Although the 1967 Outer Space Treaty affirms the use of outer space exclusively for peaceful purposes, its failure to define “peaceful” with legal precision has created a vacuum that powerful states exploit to legitimize militarized activities beyond Earth’s

¹ Adam Bower and Jeffrey S. Lantis, “Contesting the Heavens: Us Antipreneurship and the Regulation of Space Weapons,” *European Journal of International Security* 9, no. 1 (2024): 1–22, <https://doi.org/10.1017/eis.2023.2>.

² Alexandros Kolovos, “Strengthening Links Between European Union Space and Defence: Adopting a Combined Approach,” *Space Policy* 63 (February 2023): 101534, <https://doi.org/10.1016/j.spacepol.2022.101534>.

³ Fradhana Putra Disantara, “The Development of Space Law: Applying the Principles of Space Law and Interpreting “Peaceful Purposes” in the Outer Space Treaty 1967,” *Volksgeist: Jurnal Ilmu Hukum Dan Konstitusi* 4, no. 1 (2021): 69–84, <https://doi.org/10.24090/volksgeist.v4i1.4352>.

⁴ Jakub Pražák, “On the Threshold of Space Warfare,” *Astropolitics* 20, nos. 2–3 (2022): 175–91, <https://doi.org/10.1080/14777622.2022.2142351>.

atmosphere. This ambiguity has enabled major space actors such as the United States, China, and Russia to develop and deploy anti-satellite weapons, orbital defense systems, and military satellite constellations under divergent legal justifications.⁵ While the United States frames such initiatives within the paradigm of strategic deterrence and national security, China and Russia position their militarization as reactive countermeasures to perceived Western hegemony, thus intensifying the asymmetry in interpretation and enforcement of space law.⁶ Compounding this issue is the inability of multilateral bodies like UNCOPUOS to enforce compliance or adapt to technological advancements. The resulting regulatory inertia poses a significant threat not only to global stability and security but also to the integrity of international legal norms.⁷ Hence, a pressing legal and political dilemma arises: to what extent can the existing international legal framework restrain state behavior in space, and how should it evolve to address the accelerating militarization that now defines outer space affairs?

This research aims to critically assess the extent to which the current international legal framework—particularly the 1967 Outer Space Treaty—is capable of regulating the growing militarization of outer space, amidst intensifying geopolitical competition and divergent national doctrines. By employing a normative-comparative legal methodology, the study seeks to uncover how major space powers operationalize and interpret the legal concept of “peaceful purposes” to justify militarized space strategies. It further aims to evaluate the systemic inadequacies of global institutions such as UNCOPUOS in responding to technological militarism, while highlighting discrepancies between Western-centric and Eastern-aligned space policies. Through this analysis, the study aspires to identify actionable pathways for legal reform and propose an adaptive, enforceable framework that ensures outer space remains a demilitarized and cooperative domain. The overarching goal is not only to bridge doctrinal gaps between international norms and national practices but also to restore normative coherence in the governance of outer space, before legal fragmentation leads to irreversible strategic instability.

Recent scholarship has extensively examined the militarization of outer space from strategic and policy-oriented perspectives. Studies in *Astropolitics* and *Space Policy* have analyzed space deterrence dynamics, dual-use satellite technologies, and the strategic rationales behind anti-satellite (ASAT) capabilities, particularly in the context of U.S.–China–Russia competition. Parallel contributions in the *Journal of Conflict and Security Law* and related international law journals have interrogated the interpretation of Article IV of the Outer Space Treaty, the legality of ASAT weapons, and the limits of existing arms control regimes.⁸ However, these strands of literature largely develop in parallel rather

⁵ Sahba El-Shawa et al., “Space as a Zone of Peace: Envisioning a Resolution for the Demilitarization of Outer Space,” *22nd IAA Symposium on Security, Stability and Sustainability of Space Activities*, 2024, 96–103, <https://doi.org/10.52202/078386-0011>.

⁶ Kiseok Michael Kang, “Extended Space Deterrence: Providing Security Assurance in Space,” *Journal of Strategic Security* 16, no. 2 (2023): 11–25, <https://doi.org/10.5038/1944-0472.16.2.2095>.

⁷ Zhanna Zavalna et al., “The Problem of Ineffectiveness of International Legal Norms in the 21st Century,” *Social and Legal Studies* XI, no. 6 (n.d.): 2023.

⁸ Giulia Pascuzzi and Leonardo Cerisano, “The Lunar Chessboard: Assessing Diplomatic Strategies in the New Space Age,” *IAF Space Exploration Symposium*, 2024, 2173–79, <https://doi.org/10.52202/078357-0249>; Elena E. Cirkovic and Danielle R. Wood, “Complex Earth–Outer Space Systems and New Spacetime for International Law,” *International Journal of Law in Context*, June 20, 2025, 1–14, <https://doi.org/10.1017/S1744552325100086>.

than in integration. Strategic studies tend to prioritize capability, deterrence, and escalation logic, often treating legal norms as background constraints, while doctrinal legal analyses frequently focus on treaty interpretation without systematically incorporating empirical patterns of state practice or institutional behavior. As a result, there remains limited comparative legal scholarship that jointly examines how strategic militarization trends interact with normative fragmentation and institutional inertia within international space law.

Furthermore, the intersection between national space militarization doctrines and the erosion of multilateral legal authority has not been critically mapped in current research. While data on space budgets, ASAT tests, and defense payloads are increasingly available, few studies integrate these empirical trends into legal scholarship to expose the global implications of regulatory stagnation.⁹ The rising involvement of private aerospace actors like SpaceX and Blue Origin also remains under-theorized in legal analysis, despite their significant role in shaping a hybrid civil-military space ecosystem.¹⁰ This research fills the gap by offering a multidimensional comparison of national legal practices, strategic postures, and institutional failures—providing not only a critique of existing frameworks but also a foundation for rethinking global space governance in light of accelerating militarization.

This research offers a novel contribution by bridging the normative aspirations of international space law with the empirical realities of militarized orbital strategies, through a comparative legal analysis that exposes the interpretive asymmetries among dominant spacefaring nations. Unlike prior studies that either idealize the Outer Space Treaty or treat militarization as an inevitable strategic evolution, this study critically interrogates the legal, political, and institutional complacency that enables such developments. Its novelty lies in mapping how specific legal ambiguities—particularly around the term “peaceful purposes”—have been differently instrumentalized by the United States’ preemptive defense doctrine, China’s reactive strategic posture, and Russia’s retaliatory policies, while juxtaposing them with emerging actors like India and France. By integrating doctrinal interpretation, strategic behavior, and geopolitical trends, the research not only identifies regulatory obsolescence but also formulates normative recommendations for treaty reform, institutional revitalization, and the reconstruction of multilateral trust in space governance. In doing so, it responds to an

⁹ Justinas Žilinskas and Tomas Marozas, “Weapons Reviews for Asats: Assessing Distinction, Proportionality, and Effects on the Natural Environment of Space,” *Air and Space Law* 47, no. Issue 2 (2022): 209–32, <https://doi.org/10.54648/AILA2022012>; Anelí Bongers and José L. Torres, “Star Wars: Anti-Satellite Weapons and Orbital Debris,” *Defence and Peace Economics* 35, no. 7 (2024): 826–45, <https://doi.org/10.1080/10242694.2023.2208020>; Victoria Samson, “Deliberately Creating Debris on Orbit: Building Upon Existing Norms to Eliminate This Threat to Space Security and Stability,” *22nd IAA Symposium on Security, Stability and Sustainability of Space Activities*, 2024, 123–36, <https://doi.org/10.52202/078386-0014>.

¹⁰ Darija Maraš and Miloš Dangubić, “Cooperation Between Government Agencies and Private Companies in Space: The Case of the United States,” *Astropolitics* 20, nos. 2–3 (2022): 226–37, <https://doi.org/10.1080/14777622.2022.2146495>; Svetla Ben-Itzhak, “The Role of Commercial Actors and States in Space Travel and Exploration,” in *Routledge Handbook of Space Policy*, 1st ed., by Thomas Hoerber et al. (Routledge, 2024), <https://doi.org/10.4324/9781003342380-10>.

urgent global need: safeguarding outer space from becoming a fragmented, conflict-prone domain of unchecked militarization.

Problem Statement

The fundamental problem addressed in this study is the growing dissonance between the normative ideals of the 1967 Outer Space Treaty and the strategic behaviors of contemporary spacefaring states, which increasingly exploit legal ambiguities—particularly the undefined notion of “peaceful purposes”—to legitimize military activities in outer space. This has resulted in a fragmented legal landscape wherein major powers such as the United States, China, and Russia interpret and operationalize space law based on national interest rather than collective security, fueling an arms race beyond Earth’s atmosphere. The absence of clear legal thresholds, binding enforcement mechanisms, and institutional coordination has rendered multilateral bodies like UNCOPUOS largely ineffective in restraining the militarization of space. Consequently, the regulatory vacuum not only threatens the integrity of international law but also undermines global stability, erodes mutual trust, and risks transforming space into a domain of confrontation rather than cooperation. This study therefore seeks to interrogate the extent to which the existing legal architecture can accommodate current strategic realities—and what reforms are necessary to prevent further legal and geopolitical deterioration.

Methods

This research adopts a normative juridical method that integrates three interrelated approaches: the statutory approach, the conceptual approach, and the comparative approach.¹¹ In this article, the statutory approach is operationalized by reading the Outer Space Treaty and related instruments against specific regulatory problems generated by contemporary militarization—namely definitional ambiguity (‘peaceful purposes’), limits of prohibition (WMD versus conventional/dual-use capabilities), and the absence of verification and enforcement. The conceptual approach is applied as an interpretive benchmark to clarify legal meaning and to evaluate whether existing principles (e.g., due regard, non-appropriation, state responsibility) can accommodate dual-use and deterrence-driven practices without eroding normative coherence

The comparative approach in this study operates as a structured diagnostic method to examine how major spacefaring actors—namely the United States, China, Russia, India, and France—operationalize international space norms through doctrinal interpretation, policy instruments, and patterns of state practice. Accordingly, the unit of comparative analysis is not militarization in the abstract, but the legal-interpretive and institutional consequences of militarization as reflected in official positions on “peaceful purposes” and self-defense, the design and mandate of military or security-oriented space institutions, and publicly documented practices related to anti-satellite capabilities and

¹¹ Irwansyah Irwansyah, *Penelitian Hukum: Pilihan Metode & Praktik Penulisan Artikel* (Mirra Buana Media, 2020); M Riadhussyah et al., “Forming International Instrument Through One Health Approach for Health Justice,” *Jurnal IUS Kajian Hukum Dan Keadilan* 11, no. 3 (2023): 492–551, <https://doi.org/10.29303/ius.v11i3.1246>.

dual-use orbital systems. The adequacy or inadequacy of the Outer Space Treaty and related instruments is assessed using explicit analytical benchmarks, including the clarity of key legal concepts, the substantive coverage of conventional and dual-use threats beyond weapons of mass destruction, the availability of enforcement and verification mechanisms, the institutional capacity of multilateral bodies such as UNCOPUOS to respond to technological change, and the consistency of legal interpretation in light of divergent state doctrines. Legal materials utilized in this research include primary sources (international treaties, national space legislation, official government policies), secondary sources (legal doctrines, academic literature, and expert commentaries), and tertiary sources (space defense statistics and institutional reports).¹² The analysis applies a prescriptive legal technique, aiming not only to interpret law as it exists (*lex lata*), but also to propose legal and institutional reforms (*lex ferenda*) that respond to the challenges of space militarization. This analytical model ensures that the research is not merely descriptive, but offers forward-looking recommendations grounded in comparative legal reasoning and normative coherence.

Reconstructing the Legal and Strategic Architecture of Outer Space: A Critical Analysis of Militarization, Governance Deficits, and Future Normative Trajectories

“This discussion employs an explicit analytical lens that combines (i) legal realism (treating treaty interpretation as shaped by strategic interests and capability asymmetries), (ii) institutional compliance theory (focusing on how ambiguity, monitoring deficits, and weak enforcement mechanisms condition patterns of compliance), and (iii) global commons governance (conceptualizing outer space as a shared domain where coordination failures and collective-action problems intensify as actors and technologies proliferate). This framework is used to interpret how normative commitments under the Outer Space Treaty interact with power asymmetry, dual-use technologies, and institutional constraints, thereby enabling the reader to trace the pathway from empirical indicators (e.g., budgets, ASAT testing, doctrine) to legal outcomes (interpretive divergence, compliance elasticity, and governance deficits).”

1. Conceptual and Legal Foundations of Outer Space Militarization

The conceptual dichotomy between the peaceful use of outer space and its militarization has become one of the most contested arenas in contemporary international law. Historically, space was envisioned as *res communis omnium*, a domain belonging to all humanity and reserved exclusively for peaceful exploration and scientific collaboration. This principle, codified in the 1967 Outer Space Treaty (OST), sought to preclude national appropriation and militarized confrontation beyond Earth.¹³

A central legal ambiguity lies in the interpretation of “peaceful purposes” under Article IV of the OST. This term remains undefined, opening wide interpretive space for

¹² Nurul Qamar Farah Syah Rezah, *Metode Penelitian Hukum Doktrinal Dan Non-Doktrinal* (Social Politik Genius, 2020).

¹³ Setsuko Aoki, “Outer Space Treaty and Fundamental Principles,” in *International Space Law in the New Space Era*, 1st ed., ed. Sandeepa Bhat B. et al. (Oxford University Press/Oxford, 2024), <https://doi.org/10.1093/9780198909415.003.0004>.

individual states to justify military infrastructure in space under the guise of non-aggression or self-defense.¹⁴ The United States, for instance, has long advanced a doctrine that equates peaceful purposes with non-hostile intent, allowing the development of extensive space-based surveillance and missile defense programs, including the U.S. Space Force.¹⁵ Conversely, China and Russia criticize this position, yet simultaneously expand their own military capabilities in orbit—Russia through the PL-19 Nudol system and orbital nuclear experimentation,¹⁶ and China through its SC-19 ASAT program.¹⁷ Such divergences illustrate the absence of a shared legal language, resulting in a fragmented and self-serving global discourse on space governance.

The conceptual distinction between “militarization” and “weaponization” of space has further contributed to the legal ambiguity. Militarization refers broadly to the use of space for military support functions—such as navigation, reconnaissance, and communication—whereas weaponization entails the deployment of active offensive or defensive weapon systems in orbit.¹⁸ Current legal frameworks implicitly tolerate the former while attempting to restrict the latter. However, with the rise of dual-use technologies and directed-energy systems, this distinction has become increasingly blurred.¹⁹ As Table 1 below illustrates, many nations have invested heavily in systems that fall into this gray zone, exploiting the lack of explicit prohibitions.

Table 1. *Comparative Overview of Major Powers’ Military Use of Outer Space (as of 2023-2024)*

Country	Military Space Budget (USD Bn)	% Military Use	ASAT Capability	Legal Interpretation of “Peaceful” Use
United States	41.5 (out of 73.2)	58%	Yes	Non-hostile intent (self-defense)
China	4.8 (out of 12.0)	40%	Yes	Defensive Modernization
Russia	2.2 (out of 3.6)	62%	Yes	Strategic parity and deterrence
India	0.6 (out of 1.9)	31%	Yes	Limited and strategic necessity
France	1.4 (out of 3.2)	45%	Yes	Security integration via EU-NATO

¹⁴ P J Blount, “The Shifting Sands of Space Security: The Politics and Law of The Peaceful Uses of Outer Space,” *Indonesian Journal of International Law* 17, no. 1 (2019), <https://doi.org/10.17304/ijil.vol17.1.776>.

¹⁵ Peter L. Hays, “What Should the Space Force Do? Insights from Spacepower Analogies, Doctrine, and Culture,” in *War and Peace in Outer Space*, 1st ed., ed. Cassandra Steer and Matthew Hersch (Oxford University Press New York, 2020), <https://doi.org/10.1093/oso/9780197548684.003.0007>; Everett C. Dolman, “War, Policy, and Spacepower: Us Space Security Priorities,” in *Handbook of Space Security*, ed. Kai-Uwe Schrogl (Springer International Publishing, 2020), https://doi.org/10.1007/978-3-030-23210-8_124.

¹⁶ Paul B Larsen, “Outer Space Arms Control: Can the Usa, Russia and China Make This Happen,” *Journal of Conflict and Security Law* 23, no. 1 (2018): 137–59, <https://doi.org/10.1093/jcsl/krw026>.

¹⁷ Yuan-Chou Jing and Yi-Ren Lai, “The People’s Liberation Army Rocket Force in Space Warfare: With Available but Incomplete Capabilities,” *The Korean Journal of Defense Analysis* 33, no. 3 (2021): 403–27, <https://doi.org/10.22883/KJDA.2021.33.3.003>.

¹⁸ Larsen, “Outer Space Arms Control.”

¹⁹ Yasin Çağlar Kaya and Hasret Kaya, “Global Energy Policy: A Legal Perspective on Renewable Energy Initiatives,” *Sustainability* 17, no. 9 (2025): 3991, <https://doi.org/10.3390/su17093991>.

Source: Adapted from BryceTech Global Space Economy Report (2023) and Secure World Foundation (2024)

What emerges from this comparative data is a pattern of asymmetry in both military capability and legal interpretation. While the OST assumes a level of normative consensus among signatories, state behavior reflects a growing divergence rooted in geopolitical rivalry and national interest. The strategic postures adopted by space powers reflect not a rejection of the OST per se, but a selective reinterpretation of its provisions to suit evolving security needs. This practice undermines the foundational legal principle of *pacta sunt servanda*—that treaties must be observed in good faith—and introduces a dangerous relativism into the regime of international space law.²⁰

Complicating matters further is the increasing involvement of non-state actors in outer space operations. Companies such as SpaceX, Blue Origin, and China's CASC have blurred the lines between commercial innovation and military integration, operating under contracts with national defense agencies while technically remaining outside traditional state accountability structures.²¹ The OST does assign responsibility to states for private activities under their jurisdiction, but provides no practical enforcement mechanisms. In this light, the legal foundations of space demilitarization are not only contested at the inter-state level but are also being eroded by the privatization and commercialization of strategic space functions—a trend insufficiently addressed in both legal doctrine and treaty practice.²²

The conceptual and legal foundations of outer space militarization are characterized by definitional ambiguity, doctrinal fragmentation, and regulatory inertia. The principle of peaceful use, once a cornerstone of global space cooperation, has become a flexible tool shaped by national interests and strategic calculations. Without urgent legal clarification and normative convergence, the foundational ideals of the OST risk collapse under the weight of geopolitical realignment and technological militarism. To preserve the legitimacy of international space law, the discourse must move beyond passive interpretation toward active normative reform—anchored in legal precision, mutual accountability, and enforceable mechanisms.

2. Empirical Trends and Strategic Doctrines: A Comparative Overview

The empirical trajectory of outer space activities in the 21st century indicates a decisive pivot from civilian-scientific exploration toward military and strategic functions. Although space programs were initially established under the aegis of scientific inquiry and peaceful cooperation, the steady militarization of orbital domains has become increasingly explicit and institutionalized. The establishment of dedicated military

²⁰ Paul Meyer, "Arms Control in Outer Space: A Diplomatic Alternative to Star Wars," in *Security in the Global Commons and Beyond*, ed. J. Martín Ramírez and Bartolomé Bauzá-Abril, Advanced Sciences and Technologies for Security Applications (Springer International Publishing, 2021), https://doi.org/10.1007/978-3-030-67973-6_6.

²¹ Darija Maraš and Miloš Dangubić, "Cooperation Between Government Agencies and Private Companies in Space: The Case of the United States," *Astropolitics* 20, nos. 2–3 (2022): 226–37, <https://doi.org/10.1080/14777622.2022.2146495>.

²² Laura Yvonne Zielinski, "Rights Without Remedies? The Role of Arbitration in Enforcing International Space Law for Private Parties," in *Regulation of Outer Space*, 1st ed., by Claudia Cinelli (Routledge, 2024), <https://doi.org/10.4324/9781003512677-6>.

branches—such as the U.S. Space Force in 2019—signals the normalization of space as a battlefield of the future. In this context, defense budgets allocated to space activities serve as quantifiable indicators of shifting national priorities and strategic doctrines.²³ Notably, spacefaring nations are not merely expanding their technological capabilities but embedding space power within broader geopolitical and security frameworks.

According to the 2023 Global Space Economy Report by BryceTech, the United States led with a staggering USD 73.2 billion space budget, of which 58% was directed toward military applications. This includes the development of missile defense shields, early-warning systems, and kinetic kill vehicles capable of disabling or destroying enemy satellites.²⁴ China followed with a USD 12 billion budget, allocating around 40% to military components, particularly ASAT systems and dual-use surveillance satellites.²⁵ Russia, although operating with a significantly smaller total budget of USD 3.6 billion, devoted the highest proportion—62%—to military objectives, reflecting a prioritization of asymmetric deterrence strategies rather than full-spectrum dominance.²⁶ From a compliance perspective, higher military allocation amplifies incentives to preserve interpretive flexibility in Article IV, because restrictive readings would directly constrain capability development. Conversely, asymmetry also increases mistrust and weakens the plausibility of voluntary restraint, thereby widening the gap between treaty idealism and operational state practice. These figures reveal not only quantitative disparities but qualitative divergences in how nations conceive and operationalize space as a security domain.

Table 2. *National Space Budgets and Military Allocation (2023)*

Country	Total Space Budget (USD Bn)	% Military Allocation	Strategic Focus
United States	73.2	58%	Dominance, deterrence, early warning
China	12.0	40%	Counterbalance, orbital intelligence
Russia	3.6	62%	Retaliation, asymmetric disruption
India	1.9	31%	National surveillance, deterrence
France	3.2	45%	European defense integration

²³ David Christopher Arnold, “The United States Space Force,” in *Understanding the U.S. Military*, 1st ed., by Katherine Carroll and William B. Hickman (Routledge, 2022), <https://doi.org/10.4324/9781003154877-10>.

²⁴ Firat Cem Doğan and Mehmet Hanifi Aslan, “Future of Humanity: New Era Space Economy,” in *Advances in Logistics, Operations, and Management Science*, ed. Salim Kurnaz et al. (IGI Global, 2024), <https://doi.org/10.4018/979-8-3693-0908-7.ch014>.

²⁵ Kyle Ann Sebastian, “UCS Satellite Database,” 2023, <https://www.ucs.org/resources/satellite-database>.

²⁶ U.S. Space Command Public Affairs Office, “Russian Direct-Ascent Anti-Satellite Missile Test Creates Significant, Long-Lasting Space Debris,” 2021, <https://www.spacecom.mil/newsroom/news/Article/2842957/russian-direct-ascent-anti-satellite-missile-test-creates-significant-long-last/>.

Source: BryceTech (2023), processed in article data.

These financial commitments are reinforced by doctrinal developments. The United States views space as a warfighting domain requiring proactive capability development to deter peer adversaries. The U.S. Space Force's Next Generation Interceptor (NGI) program, with a USD 17 billion allocation, reflects a doctrinal shift from strategic ambiguity to explicit preparedness for orbital engagement.²⁷ China's doctrine, while framed as defensive modernization, emphasizes denial strategies—disabling adversarial assets to neutralize asymmetric power advantages.²⁸ Russia, facing NATO encirclement and technological lag, focuses on strategic disruption through kinetic and potentially nuclear-based orbital platforms.²⁹ These contrasting doctrines reflect broader strategic cultures: where the U.S. leans toward full-spectrum dominance, China and Russia lean toward denial and disruption.

India, though often excluded from space superpower discourse, has demonstrated increasing ambition through initiatives like Mission Shakti (2019), which successfully tested a direct-ascent ASAT weapon. Its space program straddles the line between scientific innovation and military necessity, underpinned by regional threat perceptions, especially vis-à-vis China.³⁰ France, as a representative of European strategic posture, has taken a hybrid approach—integrating military space capabilities within a broader framework of European Union and NATO defense cooperation. The emphasis here is less on unilateral capability and more on collective security mechanisms, though France's increasing budget and laser-defense development show a growing strategic consciousness.³¹

What is particularly notable across all these countries is the convergence around dual-use technologies, which blur the line between civilian and military intent. Satellites originally designed for earth observation or weather forecasting are now being repurposed for battlefield reconnaissance, electronic jamming, and precision targeting.³² The deployment of constellations such as Starlink by SpaceX also raises concerns about private-sector entanglement with state defense agendas—especially given Starlink's use in Ukrainian military operations. While these technologies remain ostensibly commercial, their strategic utility in modern conflict effectively collapses the distinction

²⁷ Steve Lambakis, "Space as a Warfighting Domain: Reshaping Policy to Execute 21st Century Spacepower," *Comparative Strategy* 41, no. 4 (2022): 331–69, <https://doi.org/10.1080/01495933.2022.2087419>.

²⁸ K. Bogdanov and M. Yevtodyeva, "U.S.–China: Mechanisms and Dynamics of Arms Race," *World Economy and International Relations* 65, no. 6 (2021): 42–50, <https://doi.org/10.20542/0131-2227-2021-65-6-42-50>.

²⁹ Jaganath Sankaran, "Russia's Anti-Satellite Weapons: A Hedging and Offsetting Strategy to Deter Western Aerospace Forces," *Contemporary Security Policy* 43, no. 3 (2022): 436–63, <https://doi.org/10.1080/13523260.2022.2090070>.

³⁰ Rajeswari (Raji) Pillai Rajagopalan and Dimitrios Strokos, "The Metamorphosis of India's Space Policy in a Changing Space Order*," in *Routledge Handbook of Space Policy*, 1st ed., by Thomas Hoerber et al. (Routledge, 2024), <https://doi.org/10.4324/9781003342380-43>.

³¹ Makena Young, "French Views and Actions in Space Security," *Proceedings of the International Astronautical Congress, IAC, 2022*.

³² Jane Vaynman and Tristan A. Volpe, "Dual Use Deception: How Technology Shapes Cooperation in International Relations," *International Organization* 77, no. 3 (2023): 599–632, <https://doi.org/10.1017/S0020818323000140>.

between state and non-state orbital actors.³³

Beyond hardware and budgets, strategic space doctrines are increasingly codified in national policy documents. The U.S. National Defense Space Strategy (2020) and China's White Paper on Space Activities (2021) articulate space as a critical domain for defense, economic development, and international prestige.³⁴ Russia, while less transparent, has integrated space into its 2020 Military Doctrine and National Security Strategy. These documents share a common feature: the acknowledgment that space supremacy is now inseparable from terrestrial power. However, they differ significantly in their legal framing and interpretation of international obligations.³⁵ The U.S. often invokes the right to self-defense under the UN Charter, while China and Russia accuse the West of violating the spirit—if not the letter—of the OST.

The intensification of military activities in space has also triggered a rapid increase in ASAT development and testing. The United States, China, India, and Russia have all conducted ASAT tests in the past two decades, generating thousands of pieces of orbital debris and severely threatening both civilian and military space infrastructure.³⁶ Russia's 2021 test alone created over 1,500 traceable debris fragments. This escalation undermines the viability of space as a shared domain and demonstrates the inadequacy of current international agreements in addressing such behavior. Despite widespread concern, there is still no binding international instrument specifically prohibiting ASAT testing.³⁷

The convergence of these trends indicates a strategic reordering of space: from a global commons governed by mutual restraint to a fragmented arena shaped by national calculations and technological competition. Each nation's investment trajectory, doctrinal rationale, and interpretation of legality collectively form a mosaic of conflict potential. Without a unified legal framework that mandates restraint, transparency, and accountability, the trajectory toward open confrontation in orbit becomes increasingly plausible. Thus, empirical patterns must be read not merely as national defense posturing, but as early signals of a systemic shift in the role of space within global security.

3. Legal Inadequacy and Doctrinal Fragmentation in International Space Law

Despite its historical significance and normative ambition, the 1967 Outer Space Treaty (OST) now struggles under the weight of technological evolution and state behavior that it can no longer effectively regulate. At its core, the OST affirms that outer space shall be

³³ Omar Pimentel Marte and Sariah Fischer, "The Space Rubicon: The Catch-22 for Governments in Protecting Commercial Space Assets," *22nd IAA Symposium on Security, Stability and Sustainability of Space Activities*, 2024, 185–97, <https://doi.org/10.52202/078386-0019>.

³⁴ Dolman, "War, Policy, and Spacepower."

³⁵ Nicole J. Jackson, "Russia's Space Security Policy," in *Handbook of Space Security*, ed. Kai-Uwe Schrogl (Springer International Publishing, 2020), https://doi.org/10.1007/978-3-030-23210-8_128.

³⁶ Anish Dey and Jithin Jagadanandan, "Study on Space Debris Mitigation Under the National Space Laws," *University of Bologna Law Review*, June 5, 2024, 45-72 Pages, 45-72 Pages, <https://doi.org/10.6092/ISSN.2531-6133/19718>.

³⁷ Žilinskas and Marozas, "Weapons Reviews for Asats."

used exclusively for “peaceful purposes” and prohibits the placement of weapons of mass destruction in orbit.³⁸ However, it falls short in explicitly prohibiting conventional or dual-use military capabilities—such as kinetic anti-satellite (ASAT) systems or directed-energy weapons—thus enabling strategic exploitation by states seeking orbital supremacy. The treaty’s silence on conventional weaponization has created interpretive space wide enough for global powers to militarize space without formally breaching their treaty obligations.³⁹

Furthermore, the existing legal framework fails to address the emergence of new classes of threats, including space debris from weapons testing, dual-use satellite constellations, and the integration of civilian-commercial infrastructure into military operations. For instance, the Russian ASAT test in 2021, which generated over 1,500 pieces of orbital debris, had no immediate legal consequence under current international law.⁴⁰ The absence of enforceable liability, verification, or compliance mechanisms renders Article IX of the OST—which calls for “due regard” and consultation—functionally obsolete. In essence, legal obligations are reduced to diplomatic gestures, not enforceable norms.⁴¹

Compounding this legal fragility is the institutional inadequacy of multilateral bodies tasked with overseeing space governance. UNCOPUOS, established in 1959, remains the principal UN body addressing space affairs, yet its non-binding resolutions and consensus-based procedures have stifled decisive legal progress.⁴² The Prevention of an Arms Race in Outer Space (PAROS) resolution, tabled annually at the UN General Assembly, garners broad support but remains stalled due to the opposition of key space powers. Efforts such as the Russia-China-backed draft Treaty on the Prevention of the Placement of Weapons in Outer Space (PPWT) have failed to gain traction due to U.S. concerns over verification and the exclusion of ground-based ASAT systems.⁴³

At the same time, interpretive divergence should not automatically be read as pure failure. From the standpoint of legal pluralism, a degree of normative diversity may signal an emerging legal order adapting to novel technologies and security conditions, where multiple interpretive communities compete to define legitimate conduct. The problem, however, is that pluralism becomes destabilizing when it is not accompanied by shared benchmarks, transparency obligations, or institutional pathways for settling interpretive contestation. In the current space domain, pluralism lacks an authoritative harmonizing mechanism, which is why it manifests not as productive evolution but as fragmentation with escalatory potential

³⁸ El-Shawa et al., “Space as a Zone of Peace.”

³⁹ Aoki, “Outer Space Treaty and Fundamental Principles.”

⁴⁰ Jie Long and Chuying Huang, “Obligations and Liabilities Concerning the Active Removal of Foreign Space Debris: A Global Governance Perspective,” *Acta Astronautica* 222 (September 2024): 422–35, <https://doi.org/10.1016/j.actaastro.2024.06.036>.

⁴¹ Elena Carpanelli, “Unweaving the Tangled Web: The Due Regard Obligation Under Article IX of the Outer Space Treaty,” *Air and Space Law* 49, no. Issue 1 (2024): 35–58, <https://doi.org/10.54648/AILA2024012>.

⁴² Zeina Ahmad and Shadi A. Alshdaifat, “Legal Challenges in Establishing Human Settlements in Space,” in *Proceedings of the 14th Arabic Conference of the Arab Union for Astronomy and Space Sciences*, vol. 420, ed. Hamid M. K. Al Naimiy et al., Springer Proceedings in Physics (Springer Nature Singapore, 2025), https://doi.org/10.1007/978-981-96-3276-3_17.

⁴³ Bower and Lantis, “Contesting the Heavens.”

The doctrinal fragmentation of space law is also evident in how states selectively incorporate space-related norms into their national legal orders. The United States, for instance, integrates space defense strategy through its Space Policy Directives (SPD I–IV), while Russia and China embed space policy into broader military doctrines. Table 3 below illustrates the contrasting legal-institutional postures of major powers toward international space law, reflecting asymmetric commitments and legal maneuvering.

Table 3. *Comparative Postures Toward International Space Law (2023)*

Country	Interpretation of OST "Peaceful Purposes"	Domestic Legal Integration	Treaty Reform Position	Institutional Participation
United States	Non-aggressive use permissible	Space Policy Directives I–IV	Opposes PPWT, favors voluntary norms	Active in UNCOPUOS, abstains on PAROS
China	Non-military use preferred (formally)	White Paper on Space (2021)	Co-sponsor of PPWT	Active in UNCOPUOS and COPUOS-LTS
Russia	Non-military use preferred (formally)	National Security Strategy 2020	Co-sponsor of PPWT	Active in UNCOPUOS, supports PAROS
India	Strategic-neutral interpretation	No comprehensive national space law	Supportive of PAROS in principle	Observes UNCOPUOS, limited legislative alignment

Source: UNCOPUOS records, national space policy documents (2023)

This legal asymmetry reflects a deeper structural problem: international space law has not evolved in pace with the technological sophistication or geopolitical intensity of space activities. Unlike other domains of international law—such as arms control, maritime law, or cyber law—there is no verification body, sanctions regime, or arbitration framework in space law to address violations or resolve disputes.⁴⁴ This absence enables legal opportunism, wherein states can engage in potentially escalatory military behavior with little legal consequence, relying on interpretive flexibility or political impunity.

Philosophically, the current legal condition reveals a crisis of normative authority in the international legal order. The OST, once hailed as a triumph of legal idealism, now functions as a symbolic regime more than a regulatory one. The foundational notion that outer space is the "province of all mankind" has become hollow rhetoric in the face of state-driven securitization and technological enclosure. Without a renewed legal vision—

⁴⁴ Ali Masyhar et al., "Legal Challenges of Combating International Cyberterrorism: The NCB Interpol Indonesia and Global Cooperation," *Legality: Jurnal Ilmiah Hukum* 31, no. 2 (2023): 344–66, <https://doi.org/10.22219/ljih.v31i2.29668>; Ridwan Arifin et al., "Transforming Legal Scholarship: Strategic and Innovative Approaches to Developing a Student Edited Law Journal Toward International Recognition," *Litigasi* 25, no. 2 (2024): 440–68.

anchored in enforceability, transparency, and equitable access—the legitimacy of international space law will continue to erode, ultimately risking a collapse of legal order in the final frontier.

The novel finding advanced here is that the core regulatory weakness is not simply the absence of rules, but the interaction between (i) interpretive ambiguity in ‘peaceful purposes,’ (ii) capability-driven incentives reflected in militarized budget priorities and dual-use architectures, and (iii) institutional paralysis that prevents interpretive contestation from being managed through authoritative benchmarks. Prior literature often treats these elements separately—either as doctrinal indeterminacy, strategic deterrence dynamics, or institutional gridlock—whereas this study shows how their combination produces compliance elasticity: states can plausibly claim formal treaty alignment while materially expanding military-relevant capacity, thereby normalizing militarization without triggering clear legal breach

4. Strategic Implications for Global Stability and International Security

The militarization of outer space does not merely represent a technological transformation; it constitutes a fundamental shift in the architecture of global security. Once celebrated as a symbol of peaceful scientific cooperation, space is now entangled in national defense doctrines, strategic posturing, and great-power rivalry.⁴⁵ This evolution undermines the foundational vision of outer space as a demilitarized and cooperative domain, replacing it with a contested arena marked by asymmetrical capabilities, normative ambiguity, and increasing risk of armed conflict. The implications of this shift are not abstract—they reverberate through the fragile equilibrium of international security and threaten to disrupt geopolitical stability at a systemic level.⁴⁶

At the core of these implications is the destabilizing nature of asymmetrical space capabilities. Countries like the United States, China, and Russia possess sophisticated anti-satellite (ASAT) systems and space-based surveillance networks, enabling them to project power across multiple domains. These systems grant first-mover advantages in the event of crisis or war, particularly through the ability to disable adversaries’ communications, missile defenses, and reconnaissance infrastructure.⁴⁷ Meanwhile, emerging space actors such as India, Iran, and North Korea are developing rudimentary space defense tools, often through ballistic adaptations, creating a multipolar competition layered with technological disparity and doctrinal unpredictability.⁴⁸ The resulting asymmetry generates both deterrence instability and escalatory potential.

One of the most immediate and measurable consequences of space militarization is the

⁴⁵ Jinyuan Su, “Outer Space: From Sanctuary to Warfighting Domain?,” *Chinese Journal of International Law* 22, no. 2 (2023): 263–305, <https://doi.org/10.1093/chinesejil/jmad025>.

⁴⁶ Juan Antonio Moliner Gonzalez, “Ethical and Moral Dimension of Possible Military Conflicts in the Outer Space,” *Araucaria*, no. 53 (2023): 336–56, <https://doi.org/10.12795/araucaria.2023.i53.13>.

⁴⁷ V. Klimov, “The Missile Defense Systems and Concepts of Limited Nuclear War,” *World Economy and International Relations* 66, no. 8 (2022): 16–24, <https://doi.org/10.20542/0131-2227-2022-66-8-16-24>.

⁴⁸ Mian Zahid Hussain and Raja Qaiser Ahmed, “Space Programs of India and Pakistan: Military and Strategic Installations in Outer Space and Precarious Regional Strategic Stability,” *Space Policy* 47 (February 2019): 63–75, <https://doi.org/10.1016/j.spacepol.2018.06.003>.

proliferation of space debris, especially following kinetic ASAT tests. Russia's 2021 direct-ascent missile test against COSMOS 1408, which produced more than 1,500 trackable debris fragments, serves as a case in point.⁴⁹ These fragments now threaten not only military satellites but also civilian assets used for navigation, weather forecasting, and humanitarian monitoring. Such debris fields are essentially indiscriminate hazards, potentially affecting the infrastructure of neutral or uninvolved states.⁵⁰ The lack of a binding legal regime governing debris mitigation or ASAT testing exacerbates the risk of cascading orbital instability, known as the Kessler Syndrome.

In parallel, the securitization of space assets has become a structural component of national security doctrines, thereby entrenching the possibility of cross-domain escalation. For instance, the U.S. Space Force explicitly integrates space-based capabilities into its missile defense and early-warning systems. Any attack—real or perceived—on those satellites could trigger terrestrial retaliation under national self-defense doctrines, potentially invoking Article 51 of the UN Charter.⁵¹ Similar integration exists in China's BeiDou and Russia's GLONASS programs, which are indispensable to their military command and control. In this configuration, satellites become not only strategic assets but high-value targets—thus rendering orbital space a vulnerable first-strike domain in future conflicts.⁵²

Furthermore, the diffusion of dual-use satellite technology complicates traditional distinctions between military and civilian targets, increasing the risk of miscalculation. Commercial systems like Starlink have already been deployed in military contexts, as seen in the Ukraine conflict. This convergence of private and state-controlled assets introduces legal and ethical dilemmas around attribution, neutrality, and proportionality under international humanitarian law.⁵³ It also challenges existing arms control models, which are ill-equipped to regulate privately operated, state-funded, or dual-use systems that fall outside the classic military classification.

The strategic consequences extend beyond material infrastructure into the erosion of international trust and cooperative norms. As states perceive one another's space activities as opaque, threatening, or escalatory, the diplomatic space for arms control narrows. Forums like UNCOPUOS and the Conference on Disarmament have repeatedly failed to achieve consensus on binding norms, while voluntary initiatives such as the Hague Code of Conduct or proposed space conduct codes remain non-compulsory and largely ignored by major powers. The collapse of confidence-building measures in the orbital domain may thus trigger an arms race not just in capability, but in institutional

⁴⁹ Žilinskas and Marozas, "Weapons Reviews for Asats."

⁵⁰ Prerna Baranwal et al., "Analysis of Space Debris Mitigation and Removal Techniques for Small Satellites in Low Earth Orbit in Purview of the Guidelines Issued by the FCC," *Proceedings of the International Astronautical Congress, IAC*, 2023.

⁵¹ Ludmila V. Pankova et al., "International Cooperation in Space Activities Amid Great Power Competition," *Russia in Global Affairs* 19, no. 4 (2021), <https://doi.org/10.31278/1810-6374-2021-19-4-97-117>.

⁵² Wei Li et al., "Comprehensive Evaluation of Real-Time Uncombined-Ppp/Ins Tightly Coupled Integration with Bds-3 Ppp-B2b Service in Urban Environments," *Measurement Science and Technology* 36, no. 2 (2025): 026310, <https://doi.org/10.1088/1361-6501/ada1ec>.

⁵³ Pimentel Marte and Fischer, "The Space Rubicon."

disengagement.

Ultimately, the cumulative effect of space militarization is the strategic destabilization of both terrestrial and extraterrestrial environments. Unlike conventional warfare domains, the effects of conflict in space—through debris, system disruption, or navigation interference—can be transnational, immediate, and irreversible. A satellite collision or targeted attack could jeopardize civilian telecommunications, GPS systems, financial transactions, and even nuclear early-warning architectures. Therefore, any failure to regulate space militarization is not a failure of legal imagination alone, but a direct threat to the structural integrity of global peace and security. Without urgent international action to establish legally binding norms, institutional enforcement, and transparency regimes, space may become the next theater of uncontrolled strategic confrontation—with consequences reaching far beyond the vacuum it occupies.

5. Reassessing the Role and Capacity of International Institutions

The intensifying militarization of outer space has revealed the structural limitations of existing international institutions, particularly in their capacity to provide enforceable legal oversight, facilitate binding consensus, and adapt to the strategic complexities of the 21st century. The United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS), despite its early contributions to space governance—including the formulation of the 1967 Outer Space Treaty—has become increasingly symbolic rather than substantive.⁵⁴ Its consensus-based decision-making model, while inclusive, has also rendered it procedurally paralyzed in the face of diverging state interests, especially among major space powers. As militarization accelerates, UNCOPUOS' regulatory inertia stands in stark contrast to the pace of technological and doctrinal advancement in military space operations.⁵⁵

Equally limited is the role of the Conference on Disarmament (CD), which has consistently failed to deliver a binding treaty on the prevention of an arms race in outer space (PAROS). Draft proposals such as the China-Russia-sponsored Treaty on the Prevention of the Placement of Weapons in Outer Space (PPWT) have languished without adoption due to geopolitical mistrust, concerns over verification, and exclusions—such as ground-based ASAT systems.⁵⁶ The United States and its allies have expressed skepticism about such treaties, citing their potential for strategic asymmetry and lack of enforceability. This institutional deadlock reflects a deeper legal-philosophical impasse: whether space should be governed by idealist universalism or realist national prerogatives.

A comparative analysis of institutional engagement reveals significant asymmetry in how

⁵⁴ Theresa Hitchens, "Norm Setting and Transparency and Confidence-Building in Space Governance," in *War and Peace in Outer Space*, 1st ed., ed. Cassandra Steer and Matthew Hersch (Oxford University Press New York, 2020), <https://doi.org/10.1093/oso/9780197548684.003.0003>.

⁵⁵ Rebecca Connolly, "Space Security and Dual-Use Technology – Challenges in Establishing Norms for Safe and Responsible Behaviour in Space.," *22nd IAA Symposium on Security, Stability and Sustainability of Space Activities*, 2024, 147–59, <https://doi.org/10.52202/078386-0016>.

⁵⁶ Paul Meyer, "Could an Optional Protocol Be the Way to Stop the Weaponization of Outer Space?," *International Journal: Canada's Journal of Global Policy Analysis* 76, no. 2 (2021): 332–39, <https://doi.org/10.1177/002070202111020521>.

states interact with and leverage international space forums. While China and Russia actively promote legal codification through PPWT and PAROS resolutions, they are simultaneously developing advanced ASAT and satellite disruption systems. The United States, in contrast, supports voluntary norms, transparency measures, and technical guidelines, but opposes legally binding mechanisms that could constrain its military flexibility. Middle-power countries such as India and France occupy a more pragmatic middle ground, often advocating for peaceful use while quietly advancing strategic capabilities. This fragmented participation undermines the credibility of collective governance and exposes international institutions to instrumentalization by dominant actors.

Table 4. *Comparative Engagement with International Space Institutions*

Country	Support for PPWT	PAROS Voting Pattern	UNCOPUOS Role	Legal Preference
United States	Opposes	Abstains	Active, critical	Voluntary norms, strategic flexibility
China	Co-sponsor	Supports	Active, expansionist	Legally binding treaty framework
Russia	Co-sponsor	Supports	Active, assertive	Treaty-based governance
India	Neutral-support	Supports	Observing role	Cautious support for binding rules
France	Conditional	Supports	Cooperative	EU-aligned, hybrid regulation

Source: UNCOPUOS and UNGA records (2023–2024)

Beyond state actors, the growing presence of commercial space enterprises—such as SpaceX, Blue Origin, and CASC—has added another layer of regulatory complexity that international institutions have yet to address coherently. While Article VI of the OST stipulates that states bear responsibility for private actors under their jurisdiction, it offers no substantive mechanism for oversight or liability enforcement. As these companies increasingly collaborate with defense departments and operate dual-use systems, their strategic impact grows, yet they remain largely outside formal legal accountability.⁵⁷ Institutions like UNCOPUOS have made minimal progress in incorporating commercial actors into meaningful regulatory discussions, highlighting a critical institutional blind spot.

To remain relevant, international institutions must undergo structural and normative reform. This includes transitioning from soft law instruments and declaratory resolutions toward enforceable treaty regimes with verification protocols, sanctions mechanisms, and dispute resolution processes. An independent space oversight body—with investigatory and technical mandate—could be established under UN auspices to monitor compliance, investigate violations, and facilitate transparency across national

⁵⁷ Christian Joseph Robison, “Changing Responsibility for a Changing Environment: Reevaluating the Traditional Interpretation of Article VI of the Outer Space Treaty in Light of Private Industry,” *University of Bologna Law Review* Vol 5 (March 2020): 1-27 Pages, 1-27 Pages, <https://doi.org/10.6092/ISSN.2531-6133/10654>.

and commercial actors. Furthermore, meaningful institutional revitalization requires depoliticizing space forums to prioritize planetary security over geopolitical rivalry. Such transformation demands not only legal innovation but political will—currently a scarce commodity in international space diplomacy.

The current landscape of international institutional governance is ill-equipped to manage the growing complexity and danger of outer space militarization. Without structural reform, UNCOPUOS and related bodies risk becoming irrelevant, offering only symbolic legitimacy while substantive governance collapses. As the geopolitical logic of space intensifies, the international community must make a collective choice: preserve space as a domain of shared security through enforceable multilateralism, or allow it to become a fragmented battlefield shaped by unilateralism and technological coercion. The window for institutional transformation is narrowing—action must follow before irreversibility sets in.

6. Proposals for Legal Reform and Strategic Governance

The increasing militarization of outer space, compounded by legal ambiguity and institutional inertia, underscores the urgent need for a recalibration of international space law and governance. Existing frameworks, particularly the 1967 Outer Space Treaty, were not designed to address the complexities of modern military technologies, asymmetric power competition, and dual-use systems that now define orbital dynamics. Reform must begin by rearticulating the foundational concept of "peaceful purposes" with precise legal boundaries—moving beyond rhetorical affirmations to an operational definition that delineates between acceptable defensive functions and prohibited offensive capabilities. This would allow for differentiated, enforceable norms tailored to contemporary strategic realities.

A second axis of reform lies in establishing a binding multilateral instrument that directly prohibits kinetic ASAT weapons testing and the deliberate creation of long-lasting orbital debris. Unlike current soft-law guidelines such as the Long-Term Sustainability (LTS) Guidelines of UNCOPUOS, which remain voluntary, a legally binding treaty could draw from environmental law models—specifically the precautionary principle and the polluter-pays principle—to regulate debris generation and assign liability.⁵⁸ The treaty should also address new threats posed by directed energy weapons, proximity operations, and space-based missile interceptors. Importantly, this instrument must be accompanied by independent verification protocols and compliance enforcement, avoiding the ineffectiveness that has plagued existing declarations.

Third, a comprehensive governance model must integrate private actors into the legal fabric of space security. As commercial enterprises like SpaceX and Blue Origin increasingly develop and operate dual-use constellations—some in partnership with defense ministries—they cannot be shielded by the legal fiction of civilian independence.⁵⁹ States must be legally obligated under Article VI of the OST not merely

⁵⁸ Samson, "Deliberately Creating Debris on Orbit."

⁵⁹ Alyson C. Decker, "Private Entities as Actors in Regional Space Governance Organizations," paper presented at ASCEND 2023, *ASCEND 2023*, October 23, 2023, <https://doi.org/10.2514/6.2023-4600>.

to authorize and supervise, but to enforce compliance by their nationals, including through licensing conditions, transparency obligations, and data-sharing mandates with international institutions. This will require revising national space legislation to incorporate clear thresholds for militarization risk and technical safeguards for non-aggressive use.⁶⁰

From a geopolitical standpoint, reform must also address the trust deficit among major powers. A tiered approach could be adopted, beginning with confidence-building measures—such as real-time notification of launches, satellite maneuver transparency, and reciprocal inspections—before progressing toward arms control commitments.⁶¹ Drawing lessons from the Antarctic Treaty System and the Chemical Weapons Convention, states could agree to establish a permanent multilateral verification body for space-related military activity, independent from UNCOPUOS, but with reporting channels linked to the UN Security Council. This could enhance credibility, reduce suspicion, and create entry points for phased legal convergence even among strategically adversarial states.

Additionally, legal reform must acknowledge the differentiated capabilities and responsibilities of spacefaring versus non-spacefaring nations. A balanced treaty framework must include provisions for equitable access to space technology and data-sharing, especially for countries in the Global South, to prevent strategic exclusion and reinforce the idea of outer space as a shared resource. Without redistributive justice embedded in the governance system, regulatory asymmetries will continue to entrench power hierarchies and generate resistance from emerging space actors. Legal reform, therefore, must be not only strategic and technical, but also distributive and inclusive.

Table 5. *Summary of Strategic Legal Reform Proposals*

Reform Area	Proposal Description	Comparative Basis	Legal Instrument Type
Definition Reform	Operationalize "peaceful purposes" with binding criteria	OST Article IV reinterpretation	Treaty amendment or protocol
ASAT & Debris Regulation	Prohibit kinetic ASAT and impose debris liability via treaty	Environmental law principles	New binding treaty
Private Sector Governance	Impose licensing and compliance for commercial actors with military links	OST Article VI enforcement	National law + global regime

⁶⁰ Rudi Natamiharja et al., "Law Making Treaties: The Implication of International Law towards Indonesia's Legislations," *Jambe Law Journal* 3, no. 2 (2021): 191–210, <https://doi.org/10.22437/jlj.3.2.191-210>.

⁶¹ Matthew Bunn, "Opportunities for U.s.-China Nuclear Tension-Reduction," *China International Strategy Review* 6, no. 2 (2024): 197–215, <https://doi.org/10.1007/s42533-024-00176-3>.

Transparency Measures	Mandatory launch/satellite maneuver reporting; reciprocal inspection rights	Confidence-building from CWC, Vienna Doc	Political-military protocol
Verification Mechanism	Establish independent multilateral oversight body	Chemical Weapons Convention (OPCW model)	New UN-linked body
Equity & Inclusion	Space access support and tech-sharing for Global South	Common heritage of mankind principle	Treaty annex or declaration

Source: BryceTech (2023), processed in article data.

The current legal void surrounding outer space militarization cannot be resolved through minimalist revisions or declaratory norms. A robust, multidimensional reform agenda is needed—one that redefines key legal concepts, imposes binding constraints on destabilizing behaviors, integrates non-state actors, and institutionalizes verification. This reform must be driven not merely by reactive diplomacy but by a philosophical commitment to safeguard the future of outer space as a domain of cooperation, not conflict. Without such a paradigm shift, the drift toward orbital arms competition may soon become irreversible.

7. Philosophical Reflection and Future Legal Trajectory

The militarization of outer space raises not only legal and strategic dilemmas, but also philosophical questions about the nature of sovereignty, power, and collective responsibility beyond Earth. At its inception, international space law reflected an aspiration rooted in post-war idealism: that space should remain a domain free from territorial conquest and militaristic ambition.⁶² This vision, embodied in the 1967 Outer Space Treaty, was built on the foundational premise that outer space is *res communis omnium*—a shared heritage beyond national appropriation. Yet, contemporary practices increasingly reflect a regression into realist geopolitics, where state interests, technological supremacy, and unilateral security dominate legal interpretation and policy direction.

This shift reveals a deeper philosophical tension between cosmopolitanism and techno-sovereignty. On one hand, the cosmopolitan ideal posits that space belongs to all humanity and should be governed by universal principles aimed at peace and inclusion. On the other hand, techno-sovereignty manifests in state behavior that weaponizes orbital infrastructure for national dominance, often under the doctrine of strategic

⁶² Shakeel Ahmad, "India's Anti-Satellite Test: From the Perspective of International Space Law and the Law of Armed Conflict," *International Criminal Law Review* 21, no. 2 (2021): 342–66, <https://doi.org/10.1163/15718123-bja10046>.

necessity.⁶³ The divergence between these worldviews is vividly illustrated in the contrasting doctrines of the United States, which emphasizes deterrence and operational readiness, and China–Russia, which frame their militarization as reactive to perceived Western hegemony. Both sides, however, engage in similar technological escalation, suggesting that rhetoric of restraint is insufficient without structural legal commitments.

From a legal-theoretical perspective, the disintegration of normative consensus in space governance signals the limitations of treaty-based idealism in a multipolar world. The OST's soft principles, while morally powerful, lack legal enforceability and adaptability. Without legal modernization anchored in jus cogens-level norms—such as the prohibition of space-based weapons of mass destruction—the regime risks further fragmentation.⁶⁴ A reconstitution of legal philosophy is required: one that redefines sovereignty not as dominion over space, but as stewardship of a fragile commons shared by all, including future generations. In doctrinal terms, this reframing aligns with the OST's non-appropriation logic and the due regard obligation, but it requires operational criteria and compliance mechanisms to move from aspiration to legal constraint

In the future, environmental ethics pertaining to permanent damage (such as transboundary risks posed by long-lived debris) and well-established jurisprudential disputes on cosmopolitan law and the management of global commons can provide the basis for normative suggestions in space governance. This perspective holds that the term "stewardship" is more than just empty rhetoric; it may be interpreted as a set of legal obligations that include proper consideration, precautionary restraint, and increased accountability for those whose actions cause systemic risk. Instead than seeing competing interpretations as opportunities for unilateral gain, a deliberative governance strategy encourages openness, dispute management, and verifiable promises.⁶⁵

Comparative legal experience from other domains offers instructive models. The Antarctic Treaty System prohibits military activity in a geographically contested but ecologically sensitive zone, while the Law of the Sea balances sovereign rights with international responsibilities. Both frameworks recognize that geopolitical rivalry can be mediated—not eliminated—through robust legal architecture.⁶⁶ By analogy, outer space governance must develop from declarations of intent to enforceable obligations. Legal pluralism must be respected, but unified under common normative foundations. Countries such as France and India, which adopt hybrid positions between superpower assertiveness and multilateral responsibility, may serve as mediators in constructing this new legal paradigm.

⁶³ Nikola Schmidt, "A Cosmopolitan Theory for Space Policy and Governance," in *Routledge Handbook of Space Policy*, 1st ed., by Thomas Hoerber et al. (Routledge, 2024), <https://doi.org/10.4324/9781003342380-6>.

⁶⁴ Hitchens, "Norm Setting and Transparency and Confidence-Building in Space Governance."

⁶⁵ Jessica West, "Military Strategy in Outer Space," in *The Militarization of European Space Policy*, 1st ed., by Thomas Hoerber and Iraklis Oikonomou (Routledge, 2023), <https://doi.org/10.4324/9781003230670-15>.

⁶⁶ Jeffrey McGee et al., "Scenario Analysis and the Classical View of Antarctic Geopolitics," in *The Future of Antarctica*, by Jeffrey McGee et al., Springer Polar Sciences (Springer Singapore, 2022), https://doi.org/10.1007/978-981-16-7095-4_9.

Ultimately, the philosophical stakes of space militarization extend beyond jurisdictional control—they speak to the kind of world order humanity is willing to build in the cosmos. If legal frameworks continue to serve as tools of strategic maneuvering rather than collective restraint, outer space may devolve into a theater of confrontation mirroring Earth's most destructive impulses. However, if reform is guided by a reinvigorated legal and moral imagination—grounded in responsibility, equity, and enforceability—then space can remain a domain of shared peace, technological wonder, and human unity.

Conclusion

Interpretive ambiguity, capability-driven strategic incentives, and institutional compliance deficits not only constitute the fundamental flaw of modern international space law, but this study also shows that normative gaps and out-of-date treaty design are not the only causes of this weakness. The article reframes space militarization as a problem of compliance elasticity. It integrates doctrinal legal analysis with comparative assessment of state practice and institutional performance. This means that states can plausibly maintain formal treaty alignment while materially expanding military-relevant capabilities. This work provides a legal-theoretical explanation for the continued existence of current norms in the absence of effective restriction, going beyond merely descriptive descriptions of militarization.

The proposal to reconceptualize sovereignty as stewardship is advanced here not as a moral abstraction, but as a legally operational principle that can be embedded within existing space law architecture. In doctrinal terms, stewardship can be translated into strengthened due regard obligations, precautionary limits on debris-generating activities, and enhanced state responsibility for both public and private actors operating under national jurisdiction. Rather than displacing sovereignty, this approach recalibrates it by conditioning legitimate space activity on the management of systemic risk, thereby aligning sovereign discretion with collective security interests under the Outer Space Treaty.

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