
SPACE LAW - OPEN SKIES CONCEPT AND ITS CHALLENGES IN THE MODERN ERA

Mussa Idris Mshanga, BBA LL.B. (Hons), LL.M., JSS Law College, Mysuru

ABSTRACT

The Open Skies regime is a central principle of international space law, grounded in the idea that outer space lies beyond national sovereignty and is freely accessible to all States on a non-discriminatory basis. Emerging during the Cold War and formally articulated in the 1967 Outer Space Treaty, the regime sought to reconcile strategic competition with transparency, peaceful use, and international cooperation. By rejecting territorial appropriation and affirming freedom of exploration and use, the Open Skies philosophy has facilitated scientific advancement, satellite communications, Earth observation, and collaborative space activities.

In the contemporary context, however, the regime faces mounting challenges. The militarization of outer space, particularly through anti-satellite weapon tests and the expansion of dual-use technologies, has strained existing legal constraints. At the same time, the accumulation of space debris presents serious environmental and safety risks, threatening effective access to orbital regions without formal exclusion. The rapid growth of commercial space activities, including large satellite constellations operated by private actors, has further intensified concerns relating to congestion, inequality, and regulatory fragmentation.

This study evaluates the resilience of the Open Skies regime in light of these developments and argues that its sustainability depends on enhanced regulatory responses. Stronger debris mitigation standards, improved transparency measures, and clearer State responsibility for private actors are essential to preserve outer space as a shared domain.

Keywords: Open Skies Regime; International Space Law; Outer Space Treaty; Space Debris; Space Commercialization.

1. INTRODUCTION

Space law constitutes a distinct and rapidly evolving branch of public international law that regulates activities carried out beyond the territorial limits of states, namely in outer space, including the Moon and other celestial bodies. Its development reflects the international community's collective effort to prevent outer space from becoming an arena of conflict, territorial conquest, or unregulated exploitation. Central to this legal regime is the principle of freedom of exploration and use of outer space, a concept closely aligned with the broader philosophy of "open skies." Although the term "open skies" originated in the context of aviation and arms control, its normative essence of openness, transparency, non-sovereignty, and cooperative use has profoundly influenced the architecture of space law.

The importance of space law has increased exponentially in the 21st century due to the commercialization of space activities, the proliferation of satellites, the emergence of private space actors, and renewed military interest in outer space. As states and corporations compete for strategic, economic, and scientific advantages, the foundational principles of space law are being tested. This makes a comprehensive examination of space law and the open skies principle not only academically significant but also practically essential.

This article adopts an analytical and doctrinal approach to examine the historical evolution of space law, the major international treaties governing outer space, the rights and obligations arising under those treaties, and the relevance of the open skies principle in contemporary space governance. It further evaluates judicial and quasi-judicial developments, United Nations resolutions, and state practice, before critically assessing the challenges confronting the current legal regime and proposing reforms to ensure the sustainable and peaceful use of outer space.

2. HISTORICAL BACKGROUND OF SPACE LAW

The historical development of space law is inseparably linked to humanity's evolving relationship with the sky and outer space. Long before the advent of rockets and artificial satellites, the skies were perceived as a shared and largely unregulated domain. In classical legal thought, airspace was initially treated as an extension of the Roman law principle of 'Res Communis', meaning a thing common to all and incapable of private ownership. This understanding prevailed for centuries because, until the 20th century, no State possessed the technological capability to exercise effective control over the vertical dimension of territory.

As a result, legal regulation of the skies was unnecessary and largely theoretical.

The emergence of powered flight in the early 20th century fundamentally altered this position. With the invention of aircraft and their use for both civilian and military purposes, States began to assert sovereignty over the airspace above their territory. This marked a decisive shift from the idea of open skies to a regime of territorial control. The Paris Convention of 1919 and later the Chicago Convention on International Civil Aviation, 1944,¹ firmly established the principle that States enjoy complete and exclusive sovereignty over the airspace above their land and territorial waters. This legal development is significant for space law because it demonstrates that the openness of the skies was abandoned in air law once technological realities made control feasible. Space law would later deliberately choose a different path.

The origins of modern space law lie in the geopolitical and technological context of the Cold War. The launch of Sputnik 1 by the Union of Soviet Socialist Republics on 4 October 1957 marked the beginning of the Space Age and exposed a fundamental legal vacuum. For the first time, a man-made object orbited the Earth and passed repeatedly over the territories of other States without their consent. Despite this apparent intrusion, no State protested on grounds of airspace sovereignty. This silence is widely regarded as crystallizing a new customary international law principle: that outer space is not subject to national sovereignty and is freely accessible for exploration and use by all States.

The absence of protest following Sputnik was not accidental but reflected a pragmatic recognition by States that extending airspace sovereignty indefinitely upward would make satellite operations impossible. Both superpowers had a mutual interest in allowing satellite overflight, particularly for reconnaissance and early-warning purposes. Thus, strategic necessity contributed to the acceptance of freedom of outer space and laid the foundation for the open skies principle as applied beyond the atmosphere.

In response to the rapid militarization and strategic significance of outer space, the United Nations assumed a central role in shaping the emerging legal framework. In 1958, the United Nations General Assembly adopted a resolution 1348 (XIII)² that recognized the common interest of all mankind in the peaceful use of outer space. In the same year, the General

¹ Convention on International Civil Aviation (Chicago Convention) (adopted 7 December 1944, entered into force 4 April 1947) 15 UNTS 295.

² 1348 (XIII).

Assembly established the Committee on the Peaceful Uses of Outer Space (COPUOS),³ mandating it to study legal problems arising from space exploration and to develop appropriate international rules. COPUOS became the principal institutional forum for the codification and progressive development of space law.

The historical evolution of space law thus reflects a deliberate normative choice by the international community. Having witnessed the transformation of airspace from an open domain to one of exclusive sovereignty, States consciously adopted a different approach for outer space. The open skies principle, as embodied in space law, represents an attempt to balance freedom of access with collective responsibility, ensuring that outer space remains a shared realm dedicated to peaceful purposes and the benefit of all humanity. This historical background is essential for understanding contemporary debates on commercialization, militarization, and governance of outer space, as these challenges test the durability of the original vision that shaped the law of outer space.

3. THE EMERGENCE OF THE OPEN SKIES CONCEPT

The concept of “Open Skies” originated outside the space law context, primarily in relation to arms control and aerial surveillance. In 1955, U.S. President Dwight D. Eisenhower proposed an Open Skies plan that would allow reciprocal aerial reconnaissance flights between the United States and the Soviet Union to reduce the risk of surprise military attacks. Although the proposal was rejected by the Soviet Union, it introduced a powerful idea: that transparency through freedom of observation could enhance international security.

Chicago Convention & ICAO Practice in Relation to Open Skies: The practice under the Chicago Convention provides an important institutional contrast that indirectly supports the open skies philosophy in space law. The Convention codified the principle that every State enjoys complete and exclusive sovereignty over the airspace above its territory. This principle has been consistently implemented through the regulatory framework of the International Civil Aviation Organization (ICAO), which requires prior authorization, bilateral air service agreements, and compliance with national aviation regulations for any foreign aircraft operations within sovereign airspace.

³ UNGA Res 1348 (XIII), ‘Question of the Peaceful Use of Outer Space’ (13 December 1958) UN Doc A/RES/1348(XIII).

Significantly, ICAO's regulatory competence has never been extended to activities in outer space. Despite the increasing use of satellites for communication, navigation, and remote sensing, ICAO has not asserted jurisdiction over satellite overflight or orbital operations. This institutional practice reflects a clear legal distinction between airspace and outer space. If satellite overflight were considered an infringement of airspace sovereignty, ICAO would necessarily have developed authorization or consent mechanisms similar to those governing civil aviation. The absence of such regulation constitutes persuasive evidence of State acceptance of the open skies principle in outer space.

This consistent practice under the Chicago Convention reinforces the understanding that while airspace is subject to territorial sovereignty, outer space remains a legally distinct domain governed by principles of freedom of access and use. As such, ICAO practice operates as indirect confirmation of the open skies philosophy, supporting the view that satellite overflight does not require territorial consent and does not violate international law.

This philosophy later materialized in the Treaty on Open Skies⁴, which permits unarmed aerial observation flights over the entire territory of its state parties. While the treaty applies exclusively to airspace, its underlying principles of transparency, confidence-building, and mutual trust are highly relevant to space activities. In outer space, the absence of sovereignty and the legality of satellite overflight have effectively created a de facto open skies regime, enabling states to observe Earth from orbit without violating international law.

U-2 Incident (United States v. USSR, 1960).⁵ The U-2 reconnaissance aircraft incident provides an important contrast to the open skies philosophy. In 1960, a U.S. U-2 spy plane was shot down over Soviet territory. The Soviet Union treated the overflight as a serious violation of sovereignty, leading to international condemnation and diplomatic fallout.

This incident highlights the strict sovereignty regime of airspace, in contrast to outer space. It explains why States were unwilling to accept open skies in air law but later embraced it in space law. The case indirectly supports the open skies philosophy by illustrating the impracticality and instability that would result if satellite overflight were treated as unlawful in the same way as aerial intrusion. (KOPAL, 2008)

⁴ Treaty on Open Skies (adopted 24 March 1992, entered into force 1 January 2002) 1358 UNTS 85.

⁵ Question of the U-2 Incident, G.A. Res. 1576 (XV), U.N. Doc. A/RES/1576(XV) (Dec. 20, 1960).

The acceptance of reconnaissance satellites during the Cold War represents one of the most significant practical applications of the open skies philosophy in space. Despite their military utility, reconnaissance satellites were widely tolerated because they contributed to strategic stability by enabling verification of arms control agreements. This acceptance was later reinforced by the International Court of Justice's emphasis on the importance of transparency and verification in its Advisory Opinion on the Legality of the Threat or Use of Nuclear Weapons.⁶

*Cosmos 954 (Canada v. USSR) (1978).*⁷ The Cosmos 954 incident is the most frequently cited practical example demonstrating how the open skies philosophy operates alongside State responsibility. In 1978, a Soviet nuclear-powered satellite, Cosmos 954, re-entered the Earth's atmosphere uncontrollably and crashed over Canadian territory, dispersing radioactive debris. Canada undertook extensive clean-up operations and subsequently presented a diplomatic claim against the Soviet Union under the Convention on International Liability for Damage Caused by Space Objects, 1972.

Although the dispute was resolved through diplomatic settlement rather than judicial adjudication, its legal significance is substantial. The Soviet Union did not deny the legality of the satellite's prior overflight of Canadian territory. Instead, liability was addressed only after physical damage occurred, reinforcing the principle that satellite overflight itself is lawful under the open skies regime. The case thus illustrates that the open skies philosophy does not imply immunity from responsibility; rather, it balances freedom of access with accountability. (KOPAL, 2008)

4. SUBSEQUENT SPACE LAW CONVENTIONS AND THEIR CONTRIBUTION TO OPENNESS

Following the adoption of the Outer Space Treaty, 1967, the international community sought to elaborate and operationalize the principle of openness through a series of supplementary conventions. These instruments were not intended to replace the foundational treaty but to strengthen its normative framework by addressing specific practical issues arising from space activities. Collectively, these conventions reinforce the open skies philosophy by facilitating

⁶ Legality of the Threat or Use of Nuclear Weapons (Advisory Opinion) [1996] ICJ Rep 226.

⁷ Claim Against the Union of Soviet Socialist Republics for Damage Caused by Cosmos 954, Jan. 23, 1979, 18 I.L.M. 899 (1979); see also Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 961 U.N.T.S. 187.

access, cooperation, transparency, and accountability in outer space, while simultaneously preventing the emergence of exclusive control or sovereignty claims.

The *Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, 1968*, represents the first concrete step in translating openness into operational cooperation. By characterizing astronauts as “envoys of mankind,” the Agreement reflects the idea that human activity in outer space transcends national boundaries. It obliges States to provide assistance to astronauts in distress and to return them safely to their launching State, irrespective of nationality. This obligation underscores the cooperative dimension of the open skies philosophy, emphasizing that outer space activities are conducted in a shared domain where humanitarian considerations override territorial or political interests. The duty to notify and assist further promotes transparency and mutual trust among States engaged in space exploration.⁸

The *Convention on International Liability for Damage Caused by Space Objects, 1972*, significantly strengthens the open skies regime by addressing concerns that freedom of access could lead to unregulated and harmful activities. Rather than restricting access to outer space, the Convention adopts a liability-based approach, imposing absolute liability for damage caused by space objects on the surface of the Earth and fault-based liability for damage occurring in outer space. This framework preserves openness while ensuring accountability, thereby preventing States from invoking safety concerns as a justification for territorial exclusion. The practical application of this Convention in the Cosmos 954 incident demonstrates how openness is balanced through responsibility rather than sovereignty.⁹

Transparency, an essential component of openness, is further advanced by the *Convention on Registration of Objects Launched into Outer Space, 1975*. The Registration Convention requires States to maintain national registries of space objects and to furnish relevant information to the United Nations. This obligation promotes openness by ensuring that space activities are visible and traceable, reducing uncertainty and mistrust among States. Registration does not confer ownership over outer space itself; rather, it establishes jurisdiction and control over space objects while preserving the non-appropriation principle. In this way,

⁸ Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (adopted 22 April 1968, entered into force 3 December 1968) 672 UNTS 119.

⁹ Convention on International Liability for Damage Caused by Space Objects (adopted 29 March 1972, entered into force 1 September 1972) 961 UNTS 187.

the Convention supports open access to outer space while providing an orderly legal structure for its use.¹⁰

The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1979 represents the most ambitious attempt to advance openness by explicitly framing celestial bodies as part of the common heritage of mankind. Although the Moon Agreement has not achieved widespread ratification, its normative contribution remains significant. It seeks to prevent unilateral exploitation by emphasizing international cooperation and equitable sharing of benefits derived from space resources. While its limited acceptance reflects States' reluctance to commit to detailed resource governance, the Agreement nonetheless reinforces the principle that openness in outer space must be accompanied by fairness and collective interest, particularly in relation to future exploitation.¹¹

Together, these subsequent conventions demonstrate a consistent legal strategy: rather than constraining access to outer space, the international community has chosen to preserve openness by embedding it within a framework of cooperation, responsibility, and transparency. Each convention addresses a specific risk associated with freedom of access whether humanitarian emergencies, physical damage, legal uncertainty, or inequitable exploitation without undermining the foundational principle that outer space remains open to all States. This approach reflects a conscious effort to maintain outer space as a shared domain governed by law rather than by power.

In doctrinal terms, the contribution of these conventions lies in their reinforcement of the open skies philosophy through functional regulation. They confirm that openness does not imply an absence of law, but rather a commitment to regulating activities in a manner that preserves freedom while preventing conflict and harm. As space activities become increasingly commercialized and technologically complex, the continued relevance of these conventions will depend on their capacity to adapt, but their collective affirmation of openness remains a cornerstone of the international legal regime governing outer space.

5. OBJECTIVES AND PRINCIPLES OF THE OPEN SKIES REGIME

The Open Skies regime in international space law is founded on a coherent set of objectives

¹⁰ Convention on Registration of Objects Launched into Outer Space, Jan. 14, 1975, 1023 U.N.T.S. 15.

¹¹ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (adopted 5 December 1979, entered into force 11 July 1984) 1363 UNTS 3.

and principles aimed at preserving outer space as a domain beyond national sovereignty, accessible to all States, and governed by norms of peaceful use and cooperation. These objectives emerged during the Cold War, when rapid technological developments in satellite and missile systems made it evident that the absence of a legal framework could lead to conflict and destabilization. The regime ultimately found formal legal expression in the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies 1967 (Outer Space Treaty), which remains the cornerstone of space law.¹²

One of the primary objectives of the Open Skies regime is to prevent the extension of State sovereignty into outer space. In contrast to airspace, which is subject to complete and exclusive national sovereignty under the Chicago Convention, outer space is treated as a global commons.¹³ Article II of the Outer Space Treaty explicitly prohibits national appropriation of outer space, whether by claims of sovereignty, occupation, or any other means.¹⁴ This principle reflects a deliberate departure from traditional territorial concepts in international law and seeks to prevent geopolitical rivalry over celestial bodies and orbital regions. By denying exclusive control, the Open Skies regime aims to ensure equal access for all States, regardless of their technological or economic capabilities.

Closely linked to non-appropriation is the principle of freedom of exploration and use. Article I of the Outer Space Treaty affirms that outer space shall be free for exploration and use by all States without discrimination and on a basis of equality.¹⁵ This principle has enabled the development of satellite communications, remote sensing, navigation systems, and scientific research missions that benefit the international community as a whole. However, this freedom is not absolute. States are required to exercise due regard for the corresponding interests of other States and to conduct activities in accordance with international law.¹⁶ The Open Skies regime therefore balances freedom with responsibility, ensuring that access to space does not result in harmful interference or exclusion in practice.

¹² Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (adopted 27 January 1967, entered into force 10 October 1967) 610 UNTS 205.

¹³ Convention on International Civil Aviation (Chicago Convention) (adopted 7 December 1944, entered into force 4 April 1947) 15 UNTS 295.

¹⁴ Outer Space Treaty (n 1) art II.

¹⁵ Outer Space Treaty (n 1) art I.

¹⁶ Outer Space Treaty (n 1) art IX.

Another central objective of the Open Skies regime is the promotion of the peaceful uses of outer space. Article IV of the Outer Space Treaty prohibits the placement of nuclear weapons or other weapons of mass destruction in orbit or on celestial bodies.¹⁷ While the Treaty does not ban all military activities in space, it establishes an important normative constraint against the weaponisation of outer space in ways that could threaten international peace and security. The International Court of Justice has confirmed that general principles of international law apply to activities in outer space, reinforcing the relevance of humanitarian and security considerations beyond Earth.⁷ This objective has gained renewed importance in light of recent anti-satellite weapon tests and growing concerns about the militarization of space.

Transparency and confidence-building constitute another implicit but vital objective of the Open Skies regime. During the Cold War, the acceptance of satellite overflight contributed to strategic stability by reducing secrecy and miscalculation. This practice later received normative reinforcement through United Nations General Assembly resolutions encouraging transparency and confidence-building measures in outer space activities.¹⁸ Instruments such as the Registration Convention and voluntary information-sharing mechanisms serve to operationalize openness by enabling monitoring and accountability.¹⁹

Finally, the Open Skies regime is guided by the broader objective of ensuring that outer space is used for the benefit and in the interests of all humankind. Article I of the Outer Space Treaty emphasizes that space activities should be carried out for the benefit of all countries, irrespective of their level of development.²⁰ This principle underscores the collective character of outer space and reinforces the idea that openness must be accompanied by cooperation, sustainability, and equitable access. Together, these objectives and principles form the normative foundation of the Open Skies regime and continue to shape the governance of outer space in an increasingly complex and contested environment.

6. RIGHTS AND OBLIGATIONS UNDER THE OPEN SKIES REGIME

The open skies regime in space law is founded on a careful balance between the recognition of

¹⁷ Outer Space Treaty (n 1) art IV.

¹⁸ Legality of the Threat or Use of Nuclear Weapons (Advisory Opinion) [1996] ICJ Rep 226.

¹⁹ UNGA Res 68/50, 'Transparency and Confidence-Building Measures in Outer Space Activities' (5 December 2013).

²⁰ Convention on Registration of Objects Launched into Outer Space (adopted 14 January 1975, entered into force 15 September 1976) 1023 UNTS 15.

broad freedoms and the imposition of corresponding legal obligations. Unlike classical regimes of territorial sovereignty, which prioritize exclusion and control, the open skies framework seeks to facilitate access to outer space while ensuring that such access does not undermine international peace, safety, or the collective interests of humanity. The rights and obligations flowing from this regime are primarily articulated in the Outer Space Treaty, 1967, and further developed through subsequent conventions, State practice, and judicial reasoning.

1. Right of free exploration and use of outer space.

Article I of the Outer Space Treaty affirms that outer space, including the Moon and other celestial bodies, shall be free for exploration and use by all States without discrimination of any kind. This right is not limited to technologically advanced States; rather, it is framed as a universal entitlement available to all members of the international community.

The principle of freedom of use reflects the rejection of sovereignty-based exclusion and embodies the open skies philosophy by guaranteeing access irrespective of political or economic power.²¹

2. Right of satellite overflight

Right of satellite overflight, which has become one of the most practically significant manifestations of the open skies regime. Although not explicitly stated in the treaty text, the legality of satellite overflight is firmly established through State practice following the launch of Sputnik in 1957 and the absence of protest by overflown States. This acceptance has been widely regarded as evidence of *Opinio Juris*, forming a rule of customary international law. The open skies regime thus permits continuous and unrestricted orbital passage over national territories, a right that would be inconceivable under the sovereignty-based framework of air law.²²

3. The right of free access is accompanied by the obligation of non-appropriation, enshrined in Article II of the Outer Space Treaty.

States are prohibited from claiming sovereignty over any part of outer space by means of use,

²¹ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (adopted 27 January 1967, entered into force 10 October 1967) 610 UNTS 205, art I.

²² Bin Cheng, *Studies in International Space Law* (Clarendon Press 1997) 216–18.

occupation, or any other method. This obligation ensures that openness is preserved over time and prevents the fragmentation of outer space into zones of exclusive national control. The non-appropriation principle has been central to maintaining outer space as a global commons and has consistently been reaffirmed in United Nations General Assembly resolutions.²³

4. Another critical obligation under the open skies regime is the duty to use outer space for peaceful purposes.

While the Outer Space Treaty does not prohibit all military activities, it explicitly bans the placement of nuclear weapons or other weapons of mass destruction in orbit or on celestial bodies. The International Court of Justice, in its Advisory Opinion on the Legality of the Threat or Use of Nuclear Weapons, acknowledged that outer space is subject to specific legal principles aimed at preserving peace and security. This obligation reinforces openness by preventing the transformation of outer space into an arena of territorial or strategic domination.²⁴

5. The open skies regime also imposes a duty of due regard and international cooperation.

Article IX of the Outer Space Treaty requires States to conduct their activities with due regard to the corresponding interests of other States and to undertake consultations where activities may cause potentially harmful interference. This obligation qualifies the freedom of use by embedding it within a cooperative legal framework. It reflects the understanding that openness cannot be absolute but must be exercised responsibly to prevent conflict and environmental harm, particularly in an increasingly congested orbital environment.²⁵

6. Article VI of the Outer Space Treaty establishes that States bear international responsibility for national activities in outer space, whether carried out by governmental or non-governmental entities.

²³Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (adopted 27 January 1967, entered into force 10 October 1967) 610 UNTS 205, art II; UNGA Res 1962 (XVIII), 'Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space' (13 December 1963).

²⁴Legality of the Threat or Use of Nuclear Weapons (Advisory Opinion) [1996] ICJ Rep 226, 25–27.

²⁵Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (adopted 27 January 1967, entered into force 10 October 1967) 610 UNTS 205, art IX.

This principle is operationalized by the Liability Convention, 1972, which imposes absolute liability for damage caused by space objects on the surface of the Earth and fault-based liability for damage in outer space. The Cosmos 954 incident illustrates how this liability regime functions in practice. When a Soviet satellite crashed in Canada, liability was addressed through compensation rather than restrictions on access, demonstrating that openness is preserved through accountability rather than exclusion.²⁶

7. Transparency obligations further support the open skies regime.

Under the Registration Convention, 1975, States are required to furnish information about space objects launched into orbit. This requirement enhances openness by reducing uncertainty and mistrust, enabling States to identify space objects and assess potential risks. Registration does not confer sovereignty over outer space but merely establishes jurisdiction over space objects, thereby maintaining the distinction between control of objects and appropriation of space itself.²⁷

Judicial and quasi-judicial reasoning, although limited, supports this balanced structure of rights and obligations. The absence of contentious litigation challenging satellite overflight is itself indicative of broad acceptance of the open skies regime. Where disputes have arisen, such as in the Cosmos 954 claim, they have focused on responsibility for damage rather than the legality of access. This pattern confirms that the international community views openness as a settled legal principle, tempered by clearly defined obligations.

7. CHALLENGES TO THE OPEN SKIES REGIME IN THE MODERN ERA

The principle of open skies in outer space law was conceived during a period when space activities were limited in number, primarily State-driven, and largely exploratory in character. In contrast, the contemporary space environment is marked by strategic competition, technological sophistication, and intense commercial activity.

These developments have posed significant challenges to the continued viability of openness as a governing legal norm. While the foundational treaties remain formally intact, real-world

²⁶ Convention on International Liability for Damage Caused by Space Objects (adopted 29 March 1972, entered into force 1 September 1972) 961 UNTS 187; Claim against the Union of Soviet Socialist Republics for Damage Caused by Cosmos 954 (Canada v USSR) (1979) 18 ILM 899.

²⁷ Convention on Registration of Objects Launched into Outer Space (adopted 14 January 1975, entered into force 15 September 1976) 1023 UNTS 15.

practice increasingly exposes tensions between the ideal of unrestricted access and the realities of modern space use.

7.1. Militarization of Outer Space,

Although the Outer Space Treaty prohibits the placement of nuclear weapons and other weapons of mass destruction in orbit, it does not comprehensively demilitarize space. This legal gap has allowed States to deploy satellites for intelligence gathering, targeting support, and strategic communication.

The permissibility of such activities has blurred the distinction between peaceful use and military exploitation, raising concerns that openness may be exploited for strategic advantage rather than shared benefit. The transformation of space into a domain of military planning risks undermining confidence in the neutral character of outer space.²⁸

A landmark example is China's 2007 ASAT test, in which a Chinese missile destroyed the Fengyun-1C weather satellite in low Earth orbit. This single act generated more than 3,000 trackable debris fragments, many of which remain in orbit today. Although China did not violate any explicit treaty prohibition, the test severely compromised orbital safety and contradicted the obligation under Article IX of the Outer Space Treaty to conduct activities with due regard to the interests of other States.

The global reaction to the incident illustrates how military demonstrations can undermine the practical openness of space by rendering shared orbital pathways dangerous. (Weeden, Nov. 23, 2010)

Similar concerns arose following India's Mission Shakti ASAT test in 2019, which involved the destruction of one of its own satellites. Although conducted at a lower altitude to minimize debris persistence, the test nonetheless generated debris that temporarily threatened operational satellites, including the International Space Station. This incident underscores the tension between national security objectives and collective access to space. Even when States emphasize compliance with existing legal obligations, such actions expose the fragility of the

²⁸ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (adopted 27 January 1967, entered into force 10 October 1967) 610 UNTS 205, art IV.

open skies regime in the absence of binding restrictions on debris-creating military activities²⁹

Beyond kinetic tests, the establishment of dedicated military space commands represents a structural form of militarization. The creation of the United States Space Force (USSF) in 2019 marked the formal recognition of space as an independent warfighting domain. Similar organizational developments have occurred in China and Russia. While these institutional changes do not violate treaty obligations, they reflect an emerging consensus among major powers that dominance in space is essential to terrestrial military superiority. This strategic mindset challenges the original vision of space as a realm insulated from armed conflict.³⁰

Militarization is also evident in non-kinetic counter-space capabilities, such as cyber interference, electronic jamming, and satellite “inspection” maneuvers. Incidents involving close-proximity operations by military satellites have raised concerns about covert hostile actions that are difficult to attribute or regulate. These activities exploit legal ambiguities within space law, enabling States to pursue military objectives without crossing clear treaty thresholds. Such conduct threatens stability while remaining formally within the bounds of legality. (Kopal, 2008)

United Nations practice reflects growing awareness of these risks. General Assembly debates and resolutions on the prevention of an arms race in outer space (PAROS) repeatedly acknowledge that existing legal instruments are insufficient to address modern military technologies. Although these resolutions are not binding, they constitute important evidence of collective concern regarding the trajectory of militarization and its implications for the open skies regime.³¹

7.2. Space Debris and Environmental Threats

Space debris has emerged as a structural threat to openness in outer space. The accumulation of defunct satellites, fragments from collisions, and debris generated by ASAT tests significantly restricts safe access to orbital paths. The phenomenon known as the Kessler Syndrome, whereby cascading collisions could render certain orbits unusable, directly

²⁹ Rajeswari Pillai Rajagopalan, ‘India’s ASAT Test: Strategic Signaling or Space Militarization?’ (Observer Research Foundation, 28 March 2019) <https://www.orfonline.org/expert-speak/indias-asat-test-strategic-signaling-or-space-militarization/> accessed 6 February 2026.

³⁰ National Defense Authorization Act for Fiscal Year 2020, Pub L No 116-92, §§ 951–961 (2019).

³¹ UNGA Res 76/231, ‘Prevention of an Arms Race in Outer Space’ (24 December 2021).

contradicts the principle of free and equal access to outer space.

China's Anti-Satellite Test (2007). Although not recent in time, the 2007 Chinese ASAT test remains central to contemporary debris discourse due to its long-term consequences. The destruction of the Fengyun-1C satellite generated over 3,000 trackable debris fragments, many of which remain in orbit and continue to pose collision risks.³² This incident is frequently cited in subsequent UN discussions as a paradigmatic example of environmentally harmful state conduct in outer space.

Another example, the Russian ASAT test of 2021 involved the destruction of the Cosmos-1408 satellite. The debris generated by the test forced astronauts aboard the International Space Station to take emergency shelter. This incident provoked strong diplomatic condemnation and renewed calls within the United Nations for restraint in space. It exemplifies how military actions by one State can endanger multinational cooperative ventures and undermine the perception of space as a secure and open environment.

7.3. Commercialization and the Rise of Mega-Constellations

The commercialization of outer space, particularly through private actors deploying mega-constellations of satellites, presents another modern challenge. Companies such as SpaceX (Starlink) and OneWeb have launched thousands of satellites, effectively occupying Low Earth Orbit (LEO) on an unprecedented scale. Although private activities are permitted under Article VI of the Outer Space Treaty, States bear international responsibility for national activities, whether carried out by governmental or non-governmental entities.³³

This raises concerns about de facto appropriation of orbital slots and radio frequencies, especially disadvantaging developing countries with limited launch capabilities. While formal sovereignty claims remain prohibited under Article II of the Outer Space Treaty, excessive occupation of orbital space risks creating functional exclusivity, thereby eroding the egalitarian foundation of the Open Skies regime.

³² Brian Weeden, 'China's 2007 Anti-Satellite Test' (Secure World Foundation 2007).

³³Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (adopted 27 January 1967, entered into force 10 October 1967) 610 UNTS 205, art VI.

7.4. Surveillance, Data Control, and National Security

Advances in remote sensing, satellite imagery, and data analytics have also complicated the Open Skies concept. High-resolution Earth observation satellites enable continuous monitoring of State territory without physical intrusion. While this aligns with the principle of freedom of observation, it has reignited sovereignty and national security concerns reminiscent of the U-2 Incident (1960), where aerial surveillance was treated as a violation of airspace sovereignty.³⁴

In contrast, satellite surveillance from outer space is generally regarded as lawful under international law, reflecting a shift toward acceptance of openness. However, the absence of clear limitations on data use, dissemination, and military exploitation has led some States to view unrestricted satellite observation as a strategic vulnerability rather than a cooperative benefit.

7.5. Weak Enforcement and Institutional Fragmentation

A fundamental challenge to the Open Skies regime lies in the weak enforcement mechanisms of space law. The United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) and related General Assembly resolutions largely rely on soft-law instruments, such as the UN Guidelines for the Long-Term Sustainability of Outer Space Activities (2019).³⁵ While normatively valuable, these guidelines lack binding force and effective compliance mechanisms.

Moreover, geopolitical fragmentation has impeded consensus on new binding treaties, particularly regarding space weapons and traffic management. The failure to adopt a comprehensive Space Traffic Management (STM) regime further exacerbates congestion and conflict risks, undermining open and safe access to outer space.

7.6. Withdrawal from Cooperative Frameworks

Finally, the erosion of trust in openness is reflected in withdrawals from cooperative regimes. Although primarily related to aerial observation, the United States' withdrawal from the Open Skies Treaty (2020) underscores a broader skepticism toward transparency-based security

³⁴ U-2 Incident (United States v Union of Soviet Socialist Republics) (1960) ICJ Pleadings 3.

³⁵ UNGA Res 74/82, 'Guidelines for the Long-Term Sustainability of Outer Space Activities' (13 December 2019).

arrangements.³⁶ This retreat from openness has symbolic implications for space governance, reinforcing unilateral approaches over multilateral cooperation.

8. SUGGESTIONS AND OPINION ON DEALING WITH CHALLENGES OF THE OPEN SKIES REGIME

The Open Skies regime, established to ensure that outer space remains free for exploration and use by all on an equal basis, faces multidimensional challenges in the modern era. These stem from technological advancements, geopolitical competition, commercial expansion, and environmental degradation. While early space law assumed that the mere absence of sovereignty would secure openness, recent developments demonstrate that openness must be actively protected and regulated to preserve its substance. The following suggestions, grounded in real cases and examples, offer ways to strengthen the Open Skies regime.

8.1. Establishing Binding Rules on Militarization and ASAT Activities

One of the most pressing modern challenges stems from deliberate anti-satellite (ASAT) tests and other military activities that generate space debris and increase strategic tensions. Although the Outer Space Treaty prohibits weapons of mass destruction in orbit, it does not categorically ban conventional weapons or tests with destructive effects.³⁷ This has enabled States to conduct destabilizing activities that have far-reaching implications for the sustainability of space.

Example is Russia's 2021 destruction of the Cosmos-1408 satellite via a direct-ascent ASAT weapon. The resulting debris cloud endangered the International Space Station (ISS) crew and other satellites, forcing temporary shelter protocols on board the ISS.³⁸

States should negotiate a legally binding treaty or protocol prohibiting debris-generating ASAT tests, coupled with a verification mechanism. A starting point could be to expand the language of the Draft Treaty on the Prevention of the Placement of Weapons in Outer Space (PPWT) to include debris considerations. Even if consensus on a comprehensive arms control treaty is elusive, an ASAT Moratorium Agreement could be negotiated among major space powers to

³⁶ United States Department of State, 'Withdrawal from the Treaty on Open Skies' (22 November 2020)

³⁷ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (adopted 27 January 1967, entered into force 10 October 1967) 610 UNTS 205, art IV.

³⁸ United States Department of State, 'Statement on Russia's Destructive Anti-Satellite Missile Test' (15 November 2021).

preserve the practical aspects of open access.

8.2. Strengthening Environmental Protection Through Binding Debris Mitigation Obligations

Space debris is now widely recognized as a major threat to sustainable access. Debris from past collisions and tests continues to place satellites at risk, restricting usable orbital regions. The 2009 collision between the U.S. Iridium-33 and Russian Cosmos-2251 satellites produced thousands of new fragments, significantly worsening the debris environment.

Despite non-binding guidelines (e.g., the UN Guidelines for the Long-Term Sustainability of Outer Space Activities, 2019), there is no enforceable global standard to prevent or penalize debris-creating activities. The guidelines encourage best practices, but they lack mechanisms to ensure compliance or to compensate for harm caused.

States should negotiate a binding Space Environmental Protection Protocol linked to the Outer Space Treaty or a new framework convention. This protocol could establish:

- Mandatory debris mitigation obligations (end-of-life disposal requirements)
- Liability rules for debris creation beyond the basic framework of the Liability Convention
- A mandatory reporting and transparency regime for all space objects

Such binding norms would make environmental responsibility a legal requirement rather than a voluntary policy, directly reinforcing the Open Skies regime by preserving safe access for all.

8.3. Expanding the Liability Framework Through Modern Precedents

The Convention on International Liability for Damage Caused by Space Objects (1972) remains a cornerstone of space liability law. However, its invocation has been rare. A canonical case is the Canada USSR Cosmos-954 incident (1978), where a Soviet satellite disintegrated over Canadian territory. Canada invoked the Liability Convention, resulting in diplomatic

settlement and compensation.³⁹

States should consider modernizing the Liability Convention to address nondestructive harms (e.g. conjunction avoidance costs, temporary operational disruptions) and clarify how liability applies to commercial and private actors. This could involve:

- Tiered compensation schemes
- Mandatory insurance requirements for operators
- Expanded definitions of “damage” to encompass economic harm

A revised liability regime would enhance accountability and help preserve the Open Skies ideal by discouraging reckless conduct that effectively restricts access.

8.4. Establishing Space Traffic Management (STM) as a Binding Regime

With thousands of satellites launched annually particularly with the rise of mega-constellations like SpaceX’s Starlink and OneWeb orbital congestion has become severe. Uncontrolled traffic increases collision risk and effectively limits access to orbital regimes, undermining the principle of openness. While there are discussions on Space Traffic Management (STM), most existing initiatives are voluntary or fragmented across national and commercial actors.

The international community should establish a binding STM regime under the United Nations or a specialized agency. Such a regime could:

- Assign orbital rights and responsibilities
- Mandate collision avoidance coordination
- Standardize de-orbiting and end-of-life requirements
- Provide a dispute resolution mechanism for traffic incidents

A robust STM regime would preserve the practical freedom of access that the Open Skies

³⁹ Cosmos 954 (Canada v Union of Soviet Socialist Republics) (1978) Canadian Yearbook of International Law 899.

regime seeks to protect.

8.5. Enhancing Transparency and Confidence-Building Measures (TCBMs)

Transparency and confidence-building are essential to mitigate misperceptions and strategic mistrust. In the nuclear context, the Treaty on Open Skies (1992) demonstrated how mutual aerial observation could build confidence through transparency.⁴⁰ Although the 1992 Treaty is separate from space law, its ethos applies to space governance.

Recent space incidents, including unplanned maneuvers and close approaches, have raised alarm among States. For example, in 2021, China lodged a diplomatic complaint concerning close proximity operations by OneWeb satellites near its Tiangong space station.⁴¹ Whether driven by caution or rivalry, such incidents reveal the need for clear norms on operations transparency.

Hence states should institutionalize Space TCBMs that require:

- Advance notification of risky maneuvers
- Shared orbital position data in real time
- Information sharing on debris and conjunction risk

Binding TCBMs would reduce strategic ambiguity, enhancing trust and reinforcing the normative foundations of openness.

8.6. Strengthening Dispute Resolution Mechanisms

The current space law framework lacks a dedicated, modern dispute settlement mechanism. The International Court of Justice (ICJ) has addressed space law only indirectly, as in its 1996 Advisory Opinion on the Legality of the Threat or Use of Nuclear Weapons, which recognized the application of international humanitarian law in space contexts.⁴² However, there is no specialized forum for space disputes, including those involving debris, military conduct, or

⁴⁰ Treaty on Open Skies (adopted 24 March 1992, entered into force 1 January 2002) 1358 UNTS 85.

⁴¹ Permanent Mission of the People's Republic of China to the United Nations, Note Verbale to the Secretary-General (3 December 2021).

⁴² Legality of the Threat or Use of Nuclear Weapons (Advisory Opinion) [1996] ICJ Rep 226.

commercial conflicts.

Creation of a Specialized Space Dispute Tribunal could provide authoritative interpretation and binding resolution of space law controversies. Such a tribunal could operate under the United Nations, similar to the International Tribunal for the Law of the Sea (ITLOS).

A dedicated dispute settlement mechanism would promote legal certainty, deter reckless behavior, and uphold the Open Skies principles through enforceable adjudication

9. CONCLUSION

The Open Skies regime is a foundational principle of international space law, ensuring that outer space remains free from national sovereignty and open to all States. In the modern era, however, this principle faces serious challenges due to rapid technological progress, increasing militarization, and large-scale commercial activities. While outer space remains legally open, recent developments show that practical access is increasingly at risk.

Incidents such as debris-generating anti-satellite tests and frequent near-collisions in low Earth orbit demonstrate how irresponsible actions by individual actors can endanger the entire space environment. Space debris has become a particularly critical concern, as it can render orbital regions unsafe without any formal breach of treaty obligations. This exposes the limitations of existing space law, which relies largely on broad principles and non-binding guidelines rather than enforceable rules.

Additionally, the growing role of private companies and technologically advanced States has raised concerns about unequal access and de facto control over orbital resources. The absence of a comprehensive space traffic management system and effective dispute resolution mechanisms further weakens governance in an increasingly congested and contested space domain.

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