

PPF (Past, Present, and Future) on Space Legal Grounds Legal Odyssey from the Constitution of Cosmos to Developments in Space

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ABSTRACT

Space headlines nowadays have been turning quite a variety of stones. Recently, India's crew pilot three has been celebrated on 23rd August, the Gaganyaan, and is to the ISS with another three crew members. Shubhanshu has been to the ISS on Space Day with the theme this year: Infinite Possibilities that Aryabhata: Ancient Wisdom to Bhartiya Antariksh Station (BAS). That being said, India is planning to build its own space station by 2035 and a manned mission to commence in the next few years. This shall be the first manned mission by Gaganyaan. Additionally, the NASA-ISRO Synthetic Aperture Radar (NISAR) was launched a few days ago. The satellite uses L-band frequency and consists of S-band radar (12 m) from NASA and ISRO. The main objectives of this research paper are to analyse the past, present, and future perspectives on space in terms of legal dimensions.

KEYWORDS: Space, Legal Grounds, Legal Odyssey, Constitution of Cosmos

INTRODUCTION

The word is advancing towards Space. Therefore, it has to be that the treaties have to be made and space laws have to be followed to avoid any specialized conflicts. Space law is a domain of national and international legal norms that govern human activities in outer space. It encompasses national legislation, treaties, conventions, and regulatory frameworks that address issues such as environmental protection and liability, ownership, and peaceful usage. Human engagement with outer space represents one of the most profound transformations in the history of law and governance. Once perceived as a boundless and unregulated realm—the “constitution of the cosmos”—outer space has gradually emerged as a domain governed by legal norms, political interests, and institutional frameworks. The evolution of space law reflects humanity's attempt to translate terrestrial legal principles into an extraterrestrial context, balancing exploration, security, equity, and sustainability. This paper employs a Past–Present–Future (PPF) framework to trace the legal odyssey of space governance, examining how early philosophical ideas matured into formal legal regimes and how these regimes must now adapt to unprecedented technological and commercial developments.

In the past, space was conceptualized as a global common beyond national appropriation, influenced by natural law traditions and principles such as *res communis*. The Cold War space race accelerated the need for legal regulation, culminating in the development of international space law under the auspices of the United Nations. Foundational treaties—including the Outer Space Treaty (1967), the Rescue Agreement (1968), the Liability Convention (1972), and the Registration Convention (1975)—collectively established the normative architecture of space governance. These instruments emphasized peaceful use, non-appropriation, state responsibility, and international cooperation, effectively forming a constitutional framework for outer space. The present phase of space law is characterized by both expansion and strain. Rapid commercialization, the rise of private space actors, mega-constellations of satellites, space debris, dual-use technologies, and increasing militarization have exposed significant gaps in existing legal frameworks. National space

legislations, unilateral resource utilization laws, and strategic competition among major powers challenge the universality and effectiveness of international space law. The current legal order struggles to reconcile state-centric treaty regimes with market-driven innovation and evolving security concerns, raising critical questions of jurisdiction, accountability, and environmental protection in outer space. Looking toward the future, space law stands at a normative crossroads. Emerging activities such as space mining, lunar habitation, space tourism, and artificial intelligence-driven space operations demand adaptive, forward-looking legal responses. The future of space governance will require strengthening international cooperation, developing binding norms for space traffic management and sustainability, and ensuring equitable access for developing countries. Reimagining the “constitution of the cosmos” through inclusive and dynamic legal principles is essential to prevent conflict, preserve outer space as a shared heritage of humankind, and ensure its peaceful use for generations to come.

Foundations of Space Law

In the mid 20th century, there coexisted technological advancements and geopolitical tensions. In order to cope with this, Space Law was established. Several nations began launching satellites, and thus, there emerged a need for a legal framework to govern activities beyond the Earth's surface. The foundations of space law are rooted in humanity's earliest philosophical reflections on the nature of the cosmos and the legal status of areas beyond territorial sovereignty. Long before the advent of space exploration, thinkers conceptualized outer space as a realm beyond ownership, governed by principles of natural law and universal access. The Roman law concept of *res communis*—denoting resources shared by all and incapable of private or national appropriation—played a crucial role in shaping early legal thinking about outer space. These philosophical underpinnings later evolved into normative legal principles as technological advancements made space exploration a practical reality.

The modern foundations of space law emerged in the mid-twentieth century, particularly in the aftermath of World War II and during the Cold War. The launch of *Sputnik 1* by the Soviet Union in 1957 marked a turning point, transforming outer space from a theoretical domain into an arena of strategic, scientific, and political significance. This development raised urgent legal questions concerning sovereignty, security, liability, and the peaceful use of outer space. In response, the international community, under the auspices of the United Nations, began formulating a legal framework to regulate space activities and prevent conflict beyond Earth. A defining feature of the foundational phase of space law was the adoption of a multilateral, treaty-based approach emphasizing collective interests over unilateral control. The establishment of the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) in 1959 laid the institutional groundwork for international cooperation in space governance. This effort culminated in the adoption of the Outer Space Treaty of 1967, which serves as the cornerstone of international space law. The Treaty articulated core principles such as the non-appropriation of outer space, the peaceful use of celestial bodies, freedom of exploration and scientific research, state responsibility for national space activities, and international liability for damage caused by space objects.

Complementing the Outer Space Treaty, subsequent agreements—including the Rescue Agreement (1968), the Liability Convention (1972), and the Registration Convention (1975)—further solidified the foundational legal structure of space law. Together, these instruments established a quasi-constitutional order for outer space, often described as the “constitution of the cosmos,” providing basic rules, rights, and obligations governing state behavior in space. While largely state-centric and reflective of Cold War realities, these foundational norms continue to inform contemporary space governance. Thus, the foundations of space law represent a convergence of philosophical ideals, geopolitical necessity, and legal innovation. They reflect an early attempt to balance national interests with the collective good of humanity, setting the stage for the evolving challenges and transformations that characterize present and future developments in outer space law.

1. India's Commitments

India's commitments in outer space governance reflect a consistent adherence to international legal principles, coupled with an evolving national framework aligned with technological advancement and strategic interests. As an early participant in the global space regime, India has historically emphasized the peaceful use of outer space, international cooperation, and the application of space technology for socio-economic development. These commitments are shaped by India's constitutional values, foreign policy objectives, and its active engagement with multilateral institutions governing space activities. At the international level, India is a party to the core United Nations space treaties, including the Outer Space Treaty (1967), the Rescue Agreement (1968), the Liability Convention (1972), and the Registration Convention (1975). Through these instruments, India has undertaken obligations relating to non-appropriation of outer space, state responsibility for national space activities, liability for damage caused by space objects, and the registration of space objects launched into outer space. India's treaty commitments underscore its support for the view of outer space as a global commons and its opposition to the weaponization and unilateral exploitation of celestial bodies.

Institutionally, India has demonstrated its commitment through active participation in the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) and its Legal and Scientific & Technical Subcommittees. India has consistently advocated for equitable access to outer space, capacity-building for developing countries, and the prevention of an arms race in outer space (PAROS). These positions align with India's broader foreign policy emphasis on multilateralism, rule-based international order, and South-South cooperation. At the national level, India's commitments are operationalized through its space governance architecture led by the Indian Space Research Organisation (ISRO) and supported by policy instruments such as the Satellite Communication Policy, Remote Sensing Data Policy, and the Indian Space Policy, 2023. These frameworks reflect India's intent to balance state responsibility with the growing role of private actors, while ensuring compliance with international obligations. India has also taken steps toward enacting comprehensive domestic space legislation to regulate private participation, authorize space activities, and address liability and insurance requirements. India's approach to space activities has consistently emphasized developmental and civilian objectives, using space technology for communication, navigation, disaster management, climate monitoring, and rural development. At the same time, India acknowledges emerging security concerns in outer space and supports transparency and confidence-building measures to prevent conflict and misuse. India's commitments thus represent a pragmatic blend of idealism and realism—upholding foundational principles of space law while adapting to contemporary technological, commercial, and geopolitical realities. India is a signatory to various treaties corresponding to space:

1.1 Outer Space Treaty (1967): Also called the "Magna Carta of Space Laws". It contains principles governing the activities of States in the Exploration and Use of outer space. India ratified it in 1967, committing to: peaceful use of outer space; non-appropriation of celestial bodies by any sovereign claims; freedom of exploration and scientific investigation; and liability for damage caused by space objects.

1.2 Rescue Agreement (1968): The agreement on the rescue of Astronauts, and return of Astronauts and objects launched into outer space. India signed it in the year 1981.

1.3 Liability Convention (1972): Ratified by India in the year 1982, it is the international convention on Liability for Damage caused by space objects. It is useful in assigning liability in accidents involving space objects.

1.4 Registration Convention (1976): Mandates nations to maintain a registry and report launches to the UN. India ratified and became a party to the Convention on Registration of Objects Launched in Outer Space in the year 1982.

2. History and Background of Space

The history and background of outer space are deeply intertwined with humanity's scientific curiosity, philosophical imagination, and technological progress. For centuries, space was perceived as a metaphysical and astronomical realm, studied primarily through observation and theoretical inquiry. Ancient civilizations, including those in India, Greece, and the Arab world, contributed significantly to early astronomical knowledge, viewing the cosmos as an ordered system governed by natural laws. However, outer space remained beyond the reach of direct human intervention, and consequently, beyond the scope of formal legal regulation. The modern history of space began in the twentieth century with rapid advancements in rocket technology and aeronautics, particularly during and after World War II. The development of ballistic missile technology laid the technical foundation for space exploration, transforming outer space from a distant scientific concept into an accessible domain. This shift culminated in 1957 with the launch of *Sputnik 1* by the Soviet Union, marking the beginning of the Space Age. The event not only revolutionized science and technology but also triggered strategic competition between major powers, raising urgent political and legal concerns regarding sovereignty, security, and the militarization of space.

As space activities expanded, the absence of clear legal boundaries between airspace and outer space and the lack of established rules governing activities beyond national jurisdiction created uncertainty. Unlike airspace, which is subject to complete and exclusive sovereignty of states, outer space was increasingly regarded as a domain requiring international regulation. This realization prompted the international community to engage in cooperative efforts to develop a legal framework that would prevent conflict and ensure the peaceful use of outer space. The establishment of the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) in 1959 marked a significant institutional response to these challenges. Through multilateral dialogue and consensus-building, UNCOPUOS played a central role in shaping the principles and norms that govern space activities. The adoption of the Outer Space Treaty in 1967 laid the groundwork for international space law by affirming key principles such as freedom of exploration, non-appropriation, peaceful use, and international responsibility.

Over time, the background of space activities evolved from state-led scientific exploration to a complex environment involving commercial enterprises, private actors, and emerging spacefaring nations. Advances in satellite technology, space stations, planetary exploration, and space-based services have transformed outer space into a critical component of global infrastructure. This historical evolution underscores the transition of outer space from an unregulated frontier to a legally significant domain, setting the stage for contemporary debates and future challenges in space governance. Apart from the international treaties, India has its own executive policies and mechanisms for domestic space governance.

2.1 Department of Space and ISRO: Established in 1969, the Indian Space Research Organisation became the agency for space exploration operating under the Department of Space.

2.2 Satellite Communication Policy (SATCOM), 1997: This policy allowed limited private participation in satellite communication services.

2.3 Remote Sensing Data Policy (RSDP), 2011 (amended 2016): RSDP governed the acquisition and distribution of remote sensing data.

3. India's New Space Law Landscape

India's space governance framework has undergone a significant transformation in recent years, reflecting the country's transition from a predominantly state-led space program to a more inclusive and commercially oriented space ecosystem. This evolving landscape is driven by technological advancements, the emergence of private space enterprises, and India's ambition to position itself as a major global space power. The new

space law landscape seeks to balance innovation and commercialization with international legal obligations, national security concerns, and public interest objectives. A major milestone in this transformation is the adoption of the Indian Space Policy, 2023, which provides a comprehensive framework for space activities in India. The Policy clearly delineates the roles of various stakeholders, including the Department of Space (DoS), the Indian Space Research Organisation (ISRO), NewSpace India Limited (NSIL), and the Indian National Space Promotion and Authorization Centre (IN-SPACe). IN-SPACe, in particular, serves as a regulatory and promotional body, authorizing private space activities while ensuring compliance with international treaty obligations undertaken by India. This institutional restructuring marks a shift toward a regulatory model that encourages private participation under state supervision.

The new space law landscape also reflects India's efforts to address gaps in domestic legislation. While India currently relies on policies, executive guidelines, and contractual mechanisms, there is increasing recognition of the need for a comprehensive national space law. Proposed legislation aims to regulate licensing, liability, insurance, registration of space objects, dispute resolution, and safety standards for space operations. Such a law would operationalize India's obligations under international space treaties and provide legal certainty to private actors operating within the Indian space sector. Commercialization and privatization are central features of India's emerging space law framework. Reforms have opened satellite manufacturing, launch services, remote sensing, and downstream space applications to private entities and startups. These developments raise important legal questions concerning intellectual property rights, data governance, export controls, and responsibility for damage caused by space activities. India's new legal approach seeks to foster a competitive space economy while retaining state responsibility, as mandated under international law. At the same time, India's evolving space law landscape is shaped by strategic and security considerations. The increasing militarization of outer space, dual-use technologies, and concerns over space debris and space situational awareness necessitate robust regulatory oversight. India's approach emphasizes transparency, confidence-building measures, and the sustainable use of outer space, aligning with its long-standing commitment to peaceful uses and multilateral governance.

3.1 Indian Space Policy, 2023: It marks a shift by encouraging private sector participation in satellite launches, ground stations, and space-based services. Various organisations were introduced, like IN-SPACe (Indian National Space Promotion and Authorization Center)—a single window agency for private space activities—and Project NETRA and IS4OM for space situational awareness and debris tracking initiatives.

3.2 Telecommunications Act, 2023: It replaces colonial era laws and introduces a modern legal framework for India's telecom sector, including satellite and internet-based services. It expanded the scope of telecommunication services, introduced new mechanisms for spectrum assignment, and strengthened national security and emergency security.

4. Landmark Judgements

Judicial interpretation has played a limited yet significant role in shaping the contours of space law, particularly in jurisdictions where comprehensive space legislation is still evolving. In India, while there is no exclusive body of space-specific case law comparable to some Western jurisdictions, courts have indirectly contributed to the development of space law principles through judgments concerning satellite communication, spectrum allocation, governmental responsibility, and public interest in space-based services. These decisions have helped clarify the legal framework governing space-related activities and reinforced constitutional and administrative law principles applicable to the space sector. One of the most significant judicial interventions impacting India's space governance is the *Centre for Public Interest Litigation v. Union of India (2G Spectrum Case, 2012)*. Although not directly a space law case, the Supreme Court's ruling that natural resources, including spectrum, are public property held in trust by the state has profound implications for satellite communication and space-based services. The judgment emphasized transparency, fairness, and public interest

in the allocation of spectrum, thereby influencing policy frameworks governing satellite communication and orbital resource utilization. This case reinforced the application of the public trust doctrine, which resonates with the international space law principle of outer space as the “province of all humankind.”

Another notable case is *Antrix Corporation Ltd. v. Devas Multimedia Pvt. Ltd.*, which arose from a commercial satellite agreement involving ISRO’s commercial arm. The dispute, adjudicated across Indian courts and international arbitration forums, highlighted critical issues related to contractual obligations, state responsibility, national security, and regulatory authority in space-related commercial transactions. Indian courts upheld the government’s decision to annul the agreement on grounds of public policy and national interest, underscoring the primacy of sovereign considerations in space activities. The case exposed legal gaps in India’s space governance framework and strengthened the case for a clear statutory space law to regulate public–private partnerships. Judicial decisions relating to telecommunication and broadcasting, such as those involving satellite television and direct-to-home (DTH) services, have also indirectly shaped India’s space law landscape. Courts have consistently recognized the strategic and public importance of satellite-based infrastructure, affirming the government’s regulatory authority while balancing private enterprise rights. These rulings contribute to the legal ecosystem within which space activities operate. At the international level, while not binding on India, advisory opinions and interpretations related to space law principles—such as state responsibility and liability for space objects—have influenced domestic legal thinking. Indian courts, when addressing space-related disputes, increasingly draw upon international law principles, reflecting India’s treaty commitments and its constitutional mandate under Article 51 to respect international law.

4.1 Cosmos 954 Incident (Canada v. USSR, 1978): On January 24, 1978, a Soviet satellite crashed in Canada, scattering radioactive material from its reactor. Canada invoked the Liability Convention and demanded compensation for environmental cleanup and damage. The USSR paid 3 million in settlement and acknowledged responsibility under international law.

4.2 Hughes Aircraft Company v. US Patent Status (1992): Hughes Aircraft sued the US government for unauthorized use of its patented satellite stabilization technology in government contracts. The court ruled in favour of Hughes, awarding substantial damages and affirming patent protection for space-related inventions.

4.3 United States v. Orbital Sciences Corporation (2014): Orbital Sciences faced scrutiny after its rocket exploded during launch. Investigations revealed reliance on outdated Soviet-era engines. The company was required to overhaul its engine sourcing and improve risk assessment.

4.4 SpaceX v. United States Air Force (2014): SpaceX challenged the USAF's exclusive contract with United Launch Alliance, arguing that it restricted fair competition. The case led to reforms in the USAF's procurement process, allowing SpaceX to compete for national security launches.

4.5 Google Lunar X Prize Disputes (2010 – 2018): Legal disputes arose over team eligibility, launch delays, and ownership rights. Several teams faced arbitration and contract renegotiations. The prize expired without a winner, but the disputes highlighted gaps in commercial space law.

CONCLUSION

The legal journey of outer space—from the abstract idea of a “constitution of the cosmos” to a complex, technology-driven domain of governance—reflects humanity’s evolving relationship with the extraterrestrial environment. Through a Past–Present–Future (PPF) framework, this study has traced the foundational principles of space law, examined contemporary challenges, and explored emerging legal responses, with particular emphasis on India’s role within the global space legal order. In the past, space law was shaped by philosophical ideals of common heritage, peaceful use, and international cooperation. Foundational treaties under the United Nations established a quasi-constitutional framework that sought to prevent conflict, prohibit

appropriation, and promote shared benefits. These principles laid a normative bedrock for space governance, even as they were framed in a predominantly state-centric and Cold War context. In the present, the rapid commercialization of space, increased private participation, strategic competition, and environmental concerns such as space debris have exposed limitations in existing legal frameworks. India's growing space capabilities and its adherence to international commitments highlight the tension between innovation and regulation. Judicial interventions, though indirect, have reinforced constitutional principles such as public trust, transparency, and state responsibility, shaping the legal environment in which space activities operate. Looking to the future, space law faces the urgent task of adaptation. Emerging activities such as space resource utilization, space tourism, and lunar exploration demand forward-looking legal norms that balance economic opportunity with sustainability, equity, and security. For India, the development of a comprehensive national space law is essential to provide legal certainty, regulate private actors, and fulfill global obligations. Strengthening multilateral cooperation and inclusive governance mechanisms will be crucial to preserving outer space as a shared domain for peaceful purposes. By and large, the evolution of space law is not merely a technical legal process but a reflection of broader constitutional, ethical, and geopolitical choices. As outer space becomes increasingly central to human development and security, the need for a robust, adaptive, and equitable legal framework becomes imperative. India, with its commitment to peaceful use, multilateralism, and developmental applications of space technology, is well-positioned to contribute meaningfully to the shaping of a sustainable and just space governance regime for future generations. With India advancing into space, we need to make sure that we keep in mind all the Space Laws. We require more legal reforms. With the Gaganyaan mission scheduled for 2027, India will send a crew of four people into space. The shortlisted names are: Group Captain Prasanth Balakrishnan Nair, Ajit Krishnan, Angad Pratap, and Wing Commander Shubhanshu Shukla. Shubhanshu Shukla has been to the International Space Station as he was a part of the Axiom-4 mission. India is aspiring to uncover the truths of the cosmos with utmost care for legal responsibilities.

REFERENCES

1. United Nations, Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Outer Space Treaty), 1967.
2. United Nations, Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, 1968.
3. United Nations, Convention on International Liability for Damage Caused by Space Objects, 1972.
4. United Nations, Convention on Registration of Objects Launched into Outer Space, 1975.
5. United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS), *Status of International Agreements Relating to Activities in Outer Space*, United Nations, New York.
6. Bin Cheng, *Studies in International Space Law*, Oxford University Press, 1997.
7. Frans G. von der Dunk, *Handbook of Space Law*, Edward Elgar Publishing, 2015.
8. Ram S. Jakhu, Paul Stephen Dempsey & Yaw Nyampong (eds.), *Space Traffic Management: Institutions, Regulations and Standards*, McGill University, Springer, 2018.
9. Lyall, Francis & Larsen, Paul B., *Space Law: A Treatise*, 2nd ed., Ashgate Publishing, 2018.
10. Government of India, *Indian Space Policy, 2023*, Department of Space, New Delhi.
11. Department of Space, Government of India, *Draft Space Activities Bill*, Government of India (latest version).

12. Indian Space Research Organisation (ISRO), *Vision, Objectives and Legal Framework*, ISRO Publications.
13. Centre for Public Interest Litigation v. Union of India, (2012) 3 SCC 1.
14. Antrix Corporation Ltd. v. Devas Multimedia Pvt. Ltd., (2022) 1 SCC 1.
15. Constitution of India, Article 51 (Promotion of International Peace and Security).
16. United Nations General Assembly, Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, 1963.
17. OECD, *The Space Economy in Figures: How Space Contributes to the Global Economy*, OECD Publishing.
18. Rajagopalan, Rajeswari Pillai, *India's Space Policy: Challenges and Opportunities*, Observer Research Foundation, New Delhi.
19. Hobe, Stephan, Schmidt-Tedd, Bernhard & Schrogl, Kai-Uwe (eds.), *Cologne Commentary on Space Law*, Vols. I–III, Carl Heymanns Verlag.
20. Malanczuk, Peter, *Akehurst's Modern Introduction to International Law*, Routledge, sections on global commons and outer space.



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