

Modern Challenges and Legal Innovations in Satellite Law

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From the battlefields of Earth to the dusty plains of Mars, the law follows humanity into new frontiers. This research blends Martian – Martial Convergence – the interplay between Martian Law and Martial Law – with the introduction of the neologism doryphorical, coined as a synonym of the adjective “satellite,” inspired by the Greek doryphorikos and connected to the concept of the “cosmos.” Against this backdrop, it examines the tightening of environmental safeguards in satellite licensing, the European Union’s bid for strategic autonomy in space, and the explosive growth of commercial satellite services. The legal spotlight falls on the rising role of dual-use satellites in armed conflict, where International Humanitarian Law, guided by the 2019 Woomera Manual, confronts the risks associated with targeting quasi-civilian space infrastructure. By coupling linguistic innovation with urgent legal dilemmas, the study charts fresh pathways for governing satellite activities in an era of technological ambition and intensifying geopolitical tension.

Keywords: doryphorical (“doryphorikos”/ “δορυφορικός”), International Humanitarian Law (IHL), Martian–Martial Convergence, Satellite Law, Space Law

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Introduction

The train, which was invented in the nineteenth century, had already become a very important means of transportation for the US economy by the end of that century (Wood, 1887). However, in the next century, new inventions emerged, which enabled humanity to conquer outer space, one of the most recent frontiers, not only in terms of technology and exploration but also regarding its economic potential.

It is noteworthy that a fundamental distinction exists between airspace and outer space, although the legal boundary between them remains unclear. Furthermore, this distinction is

reflected in the different regulatory regimes adopted for each domain. While there was an early idea to apply a unified legal framework to “space” as a whole, this notion was never realized in legal terms. So, it is important to underline that space developed organically as a *Utopia*, at least as far as the eventual unity of its legal regime is concerned.

This paper explores various modern challenges and legal innovations in the field of Satellite Law. It is notable that the term “Satellite Law” is not intended as a mere technical label, but rather as a conceptual framework delineating the regimes governing artificial satellites. While not yet a fully established or widely recognised expression within legal scholarship, it can be understood as a specialised subset of Space Law, focusing on the unique regulatory, operational, and commercial issues that arise in connection with the design, deployment, operation, and liability of satellites. Its scope encompasses both international treaties and national legislation, as well as contractual and customary norms that govern the activities of State and private actors in orbit. By framing the discussion in terms of Satellite Law, this study emphasises the distinctiveness of satellite-related legal questions, which, while intrinsically connected to the broader principles of Space Law, require specific terminological and analytical attention. The adoption of this expression thus serves a dual purpose: it recognises the growing complexity and importance of satellite activities in contemporary legal and economic contexts, and it provides a conceptual tool for scholars and practitioners to address the challenges posed by orbital technologies in a precise and coherent manner.

At first, the current research refers to the phenomenon of Space Law, in general.

Afterwards, it sheds light to the well-established term “satellite” and also proposes the introduction of a relevant novel technical label.

Besides, it refers to the commercial applications of satellite technology across industries and also takes a legal approach to the dual use of private satellites, in case of war.

Then, it proceeds to a global analysis, consisting in discussion of the findings already located.

Finally, it ends up to some critical remarks on the matter, *inter alia* on the profile of Space Law.

A General Approach to Space Law

Space Law gradually developed as a distinct field, independent from the older, more established body of Air Law, which according to a doctrinal approach is considered to include both Aviation Law and Telecommunications Law (Giokaris, 1996). For instance, in his relevant 1996 work Angelos Giokaris structures the subject matter into distinct yet related parts, devoting the first to the traditional field of Aviation Law and the second to the legal regime of radiocommunications and satellite television. Such an approach highlights the conceptual and functional intersections between Air Law and Telecommunications Law. This relationship is illustrated by “jamming,” because this phenomenon engages both the allocation/protection of radio spectrum and the safety/security imperatives of civil aviation.

Nevertheless, the assertion that Telecommunications Law constitutes a subfield of Air Law is a subject of scholarly debate. While both domains intersect in the context of satellite communications, they are distinct in their legal foundations and regulatory frameworks. Air Law primarily governs the operation of aircraft and the use of airspace, encompassing treaties such as the Chicago Convention and regulations set forth by the International Civil Aviation Organization (ICAO). In contrast, Telecommunications Law addresses the regulation of communication systems, including broadcasting, Internet services, and satellite communications, often under

the auspices of the International Telecommunication Union (ITU). While there are obvious intersections between Telecommunications Law and Air law, particularly in the realm of satellite communications, the prevailing view in legal scholarship is that Telecommunications Law is not merely a subfield of Air Law. Instead, it is a distinct area that intersects with various other legal domains, including Air and Space Law, but retains its own regulatory identity.

The use of constellations and celestial mapping to identify space locations is considered a form of legal custom in Space Law (Halunko, 2019). The earliest reference to Space Law appeared in a 1910 article published in Paris, though it remained an abstract idea without substance (Doyle, 2011). This theoretical stage ended in 1957, with the launch of *Sputnik 1*, the first artificial satellite, by the Soviet Union into a low-Earth elliptical orbit. Following this historic event, no official protest was raised by any State. It is about an indication that a new legal custom may have been born: that every State has the right to launch spacecraft into outer space (Halunko, 2019).

This customary right is often extended to include non-State actors, provided that they are licensed by a State with space capabilities (Halunko, 2019). This recognition of an ‘instant custom’, whereby the right to launch satellites emerged immediately after *Sputnik 1*, has been debated in doctrine (Maniatis, 2024b). On the one hand, Public International Law accepts that many treaties codify pre-existing customary norms, and a rule may exist in both treaty and customary form – binding even non-signatories. On the other hand, a custom generally is created through repeated State practice over time, not from a single isolated act. Therefore, whether an ‘instant’ custom meets the criteria of customary International Law remains questionable.

The main source of Space Law consists in the Outer Space Treaty (1967), which has been called “Magna Carta Libertatum” or simply “Magna Carta” (Eleftheriou, 2018), for the Outer Space Law (Argyrou, 2021). Although this expression is the most common, there is also in use the expression “constitution” of outer space (Stuart, 2017). This text does not identify outer space as “common heritage of mankind,” unlike the marginal 1979 Moon Agreement, whose provisions apply inter alia to Mars (Maniatis and Adamopoulos, 2025b). Despite its constitutional symbolism, the Outer Space Treaty lacks robust enforcement mechanisms.

Besides, Martian Law may also be referred to as “Arean Law” and is considered in contraposition to Martial Law, which was recently imposed in South Korea in a controversial manner (Maniatis and Adamopoulos, 2025b). This contraposition reflects the legal shift towards the human right to peace (Maniatis and Adamopoulos, 2025b). To describe this comparative approach to Martian Law and Martial Law which highlights common values, such as democracy and peace (Maniatis and Adamopoulos, 2025b), the present paper introduces the neologism *Martian–Martial Convergence*.

Artificial satellites today fall under the jurisdiction of several core legal instruments, such as the following UN treaties: the Outer Space Treaty, the Liability Convention (1972), and the Registration Convention (1975). The latter obliges States to maintain a national satellite registry and to provide the UN with orbital data, which is an important step towards mitigating space debris and preventing in-orbit collisions.

In parallel with the development of International Space Law, the European Union (EU) has progressively asserted a competence in space activities. Although space is not explicitly enumerated in the founding Treaties, Article 189 of the Treaty on the Functioning of the European Union (TFEU), introduced by the Lisbon Treaty in 2009, grants the EU a competence to carry out activities in the field of space policy. This competence is classified as a supporting and coordinating one, meaning the EU may support, coordinate or supplement the actions of

the Member States, but may not harmonize national legislation in this field. Article 189 TFEU enables the EU to promote the scientific and technical progress of the space sector, industrial competitiveness, and the peaceful use of outer space, while expressly preserving the ability of Member States to develop their own national space policies. The European Union Space Programme Regulation (EU) 2021/696 provides the regulatory foundation for flagship programmes, such as Galileo, EGNOS, and Copernicus, while also introducing the new GOVSATCOM and IRIS secure connectivity initiatives. Although the EU is not a party to the core UN space treaties, such as the aforementioned ones, it supports their implementation through domestic regulation and international cooperation. Its increasing institutional role, both through the European Commission and the European Union Agency for the Space Programme (EUSPA), marks a significant evolution in the governance of European space activities.

The Term “Satellite” and the Proposed Neologism “Doryphorical”

The term “satellite” is not limited to a single phenomenon, but it is multifaceted. Natural satellites, such as moons, exist for many planets in the Earth’s solar system. Earth’s own Moon has long inspired scientific inquiry and cultural fascination. Astronomy, one of the oldest sciences, has focused heavily on the Moon since antiquity, particularly during the era of pre-telescopic observation and speculative cosmology. Lunar exploration constitutes a timeless, democratic phenomenon with big expectations (Maniatis & Adamopoulos, 2025a).

Even early science fiction explored the Moon. A notable example is “True History” by Lucian of Samosata, often regarded as the first science-fiction work. Writing in Greek, Lucian imagined lunar inhabitants, called “Selenites” (in ancient Greek “Σεληνῖται,” in modern Greek “Σεληνίτες”). His depiction of these beings, while imaginative, foreshadows later ideas, such as the ‘Martians’ in modern science fiction. In his 1901 novel “The First Men in the Moon,” Herbert George Wells describes two men traveling to the Moon using an anti-gravity system, where they encounter an alien, insect-like species called “Selenites,” and explore themes of colonialism and human nature (Maniatis & Adamopoulos, 2025a). Today, satellites occupy a unique space between science, fiction, and business. Films like the blockbuster “Gravity” do more than just succeed at the box office; they turn space exploration into a captivating theme for audiences worldwide.

Besides, the present study proposes the introduction of the English new word *doryphorical*, derived from the Greek adjective *doryphorikos* (δορυφορικός), as a precise and versatile term within the context of Satellite Law. The neologism is intended primarily to characterise entities or phenomena that function in a satellite-like manner, either literally or metaphorically, that is, those that orbit, accompany, or act in a secondary capacity relative to a central element. In this sense, *doryphorical* extends beyond its immediate literal meaning to encompass a broader conceptual range, including aspects of dependency, accompaniment, and relational positioning within hierarchical or networked structures.

This expression is correlated to the concept of the *cosmos*, which is inherently endowed with semantic richness. The term “cosmos” conveys not only the physical vastness of the universe but also the complex interrelations and structured order among its constituent elements. By analogy, *doryphorical* captures the legal and functional subtleties of artificial satellites as components of broader regulatory, technological, and economic frameworks. In legal discourse, precision of terminology is essential, and the adoption of an expression such as *doryphorical* allows for nuanced discussion of satellite-related entities without resorting to cumbersome circumlocutions.

Moreover, this neologism invites reflection on the relational dynamics inherent in satellite systems, emphasising the interconnectedness and orbiting dependencies that characterise both material objects and abstract legal constructs.

In this context, *doryphorical* offers a linguistic bridge between the technical domain of aerospace operations and the analytical frameworks of law, permitting a more elegant articulation of complex relationships. Its introduction underscores the value of careful terminological innovation in emerging fields of law, particularly those addressing rapidly evolving technological landscapes.

Commercial Satellite Applications and International Humanitarian Law

The satellite industry has evolved from a government-dominated field into a thriving commercial market, with private enterprises driving innovation across multiple sectors. Today, satellites serve as critical infrastructure for global business operations, enabling high-speed communications, precise navigation, real-time Earth observation, and enhanced security.

One of the most lucrative segments of the satellite business is telecommunications, where companies leverage geostationary (GEO) and low Earth orbit (LEO) satellites to provide global connectivity. Traditional satellite operators have long delivered television broadcasting and military communications, but recent advancements have spurred competition from NewSpace ventures. SpaceX's Starlink, Amazon's Project Kuiper, and OneWeb are deploying massive LEO constellations to offer high-speed Internet, particularly in underserved regions. These initiatives not only bridge the so-called "digital divide" but also create new revenue streams through subscription-based models and enterprise solutions. Furthermore, satellite-based 5G backhaul and Internet of Things (IoT) connectivity are emerging as growth areas, enabling seamless machine-to-machine communication in remote locations.

Satellites equipped with high-resolution cameras, multispectral sensors, and synthetic aperture radar (SAR) have revolutionized Earth observation, transforming data into a valuable commodity. Specialised Earth observation companies provide imagery for agriculture, urban planning, disaster management, and climate monitoring. Precision farming, for instance, relies on satellite data to optimize crop yields, reduce water usage, and monitor soil health, generating significant cost savings for agribusinesses. Similarly, insurance firms use satellite analytics to assess natural disasters, while oil and gas companies monitor pipeline infrastructure. The rise of artificial intelligence-powered analytics platforms has further enhanced the commercial viability of Earth observation, allowing businesses to derive actionable insights from vast datasets.

Satellites also play a crucial role in locating and assessing Earth's natural resources, such as oil, minerals, and groundwater. Equipped with advanced remote sensing technologies, including multispectral, hyperspectral, and synthetic aperture radar (SAR), satellites detect surface and subsurface features by analysing reflected or emitted electromagnetic radiation. For oil exploration, satellites identify geological formations, seepages, and hydrocarbon indicators, reducing the need for costly ground surveys. Similarly, mineral deposits are mapped using spectral signatures, while thermal and microwave sensors help locate water resources. Satellite data enable efficient, large-scale resource prospecting with minimal environmental disruption, supporting sustainable extraction and economic planning.

Furthermore, military and security activities are closely related to the use of satellites. The defence sector remains a major driver of satellite commerce, with governments and private firms investing in reconnaissance, surveillance, and secure communications. Military satellites

provide real-time intelligence, electronic warfare capabilities, and encrypted data transmission. The commercialization of synthetic aperture radar (SAR) satellites enables all-weather, day-night monitoring for both defence and civilian security applications. Private military and cybersecurity firms also utilize satellite data to track illicit activities, from illegal fishing to cross-border smuggling, creating a growing market for space-based security solutions.

It is to pay special attention to the fact that the case of the armed aggression of the Russian Federation against Ukraine, which began in 2014 and escalated from February 2022 and on, is pioneer, at least as far as the mission of satellites is concerned. More precisely, a lot of private companies deliver reports from their radar imagery to improve orientation on what happens on the ground, or on the surface of the sea, in the wider Ukrainian region. From this development, a novel approach has resulted, according to which indirect involvement of commercial infrastructure in space for military purposes makes it a quasi-civilian infrastructure that may constitute a legitimate target, in terms of retaliation. This conclusion comes from article 3 of the Outer Space Treaty, according to which “*States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the moon and other celestial bodies, in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international co-operation and understanding*” (Hurova, 2023). So, International Humanitarian Law (IHL) is fully applicable in the matter of the use of outer space.

The aforementioned conclusion on legitimate targets draws upon the *Martens Clause*, a general principle in the Law of Armed Conflict, which was introduced by Fyodor Fyodorovich Martens, a Russian diplomat and jurist, in 1899. This principle appeared in the Preamble to the 1899 Hague Convention II on the laws and customs of war on land (one of the early codifications of the laws of war). This Clause states that, when no specific legal provisions exist, civilians and combatants are still protected by the principles of International Law derived from established customs, principles of humanity, and the demands of public conscience. For example, if a new type of weapon or a new domain of warfare (such as outer space or cyberwarfare) is not yet fully regulated by international treaties, the Clause guarantees that combatants and civilians continue to be protected under universal humanitarian norms.

Furthermore, the relevant rules of IHL are applicable: Article 52 of Additional Protocol I to the Geneva Conventions defines what constitutes a military objective; Rule 14 of customary IHL establishes the principle of proportionality, citing that launching an attack that may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated, is prohibited; Article 51 of the same Protocol prohibits indiscriminate attacks; and Article 54, along with Rule 45 of customary IHL, prohibits attacks that cause widespread, long-term, and severe damage to the natural environment.

Findings Discussion

The present study leads to the following observations:

a. The Dynamic Development of Science Fiction Literature Related to Satellites

The presence of artificial satellites in science fiction reflects the genre’s broader engagement with themes of technology, power, and humanity’s future both on and beyond Earth. Far from being a peripheral concern, satellites occupy a central role in illustrating the human ascent into the space age and the ambivalent relationship with the tools it creates. Alongside, scientific

literature on artificial satellites represents a structured, albeit commercially marginal, segment within the publishing industry, holding nonetheless significant academic and professional value.

b. Space Science Inspired by Astronomy

The terminology used in satellite systems reflects deep-rooted connections with astronomical concepts, let alone classical and well-known ones. The term “constellation,” now a technical standard in aerospace engineering and satellite communications, is directly inspired by the astronomical idea of star groupings forming observable patterns. In the satellite context, *constellation* denotes a coordinated system of orbiting satellites, such as GPS, Galileo, or Starlink, working in synchrony to provide comprehensive coverage.

Despite their functional nature, satellite constellations retain the intuitive clarity of their astronomical roots. Building on this linguistic inspiration, the introduction of the English scholarly adjective “doryphorical” was proposed, as an alternative of the adjective “satellite.”

c. Satellites as Indispensable Business Tools

The diversification of satellite applications has transformed them into critical instruments of economic development. Satellites now underpin vast sectors, from telecommunications and logistics to agriculture, environmental monitoring, and defence. In the space age (from 1957 to date), for the entirety of the US administrations, space has been a decisive factor in achieving national security (Kolovos, 2019). Although the emphasis placed by individual Presidents may vary in intensity, depending on their specific characteristics, the integration of space technology and the pursuit of leadership in space constitute an indisputable finding of empirical research (Kolovos, 2019).

As technology evolves and costs decrease, the satellite industry continues to open new frontiers, embedding itself within the global commercial ecosystem. The coming decades will witness satellites at the heart of innovations in quantum communication, AI-based orbital systems, and climate observation. As orbital infrastructure expands, these devices will not only enhance connectivity and data transmission but also serve as platforms for cutting-edge experimentation. This positions space as the next arena for geopolitical influence and technological leadership.

d. The European Union's Shortcomings in Technological Leadership

The European Galileo programme, while strategically vital and technically mature, has been hampered by substantial delays due to funding gaps, private sector withdrawals, and political fragmentation among Member States. Since reaching operational status in 2016, Galileo has grown into a cornerstone of Europe's strategic space infrastructure, with the second generation of satellites (G2) expected to launch from 2026 onward. Nevertheless, GPS, being operational since 1995, continues to outperform Galileo in terms of maturity, accuracy, and reliability. Europe thus finds itself lagging in an area critical for digital sovereignty. According to Loesekrug-Pietri (2023), the EU must rekindle a level of urgency and ambition reminiscent of the 1960s U.S. Apollo program. That initiative, backed by substantial public investment and driven by geopolitical competition, not only culminated in the 1969 Moon landing but also catalysed lasting technological innovation. The metaphorical proposal for an “Apollo 2.0” calls on Europe to move beyond defensive posture and adopt a bold, pan-European R&D offensive to compete on equal terms with the U.S. and the People's Republic of China. In this light, Greece should also consider harnessing space technologies, both current and emerging, not only for the advancement of its economy but also for national defence (Kolovos, 2006).

e. The Legal Dualism of Satellite Operations in Times of Peace and Armed Conflict

An emerging legal challenge concerns the dual-use character of satellites, originally developed for civilian or commercial purposes but potentially employed for military ends

during armed conflict. This dualism complicates their classification under the Law of Armed Conflict, especially when such systems are operated by private entities. As observed during the armed aggression of the Russian Federation against Ukraine, the use of commercial satellite services, such as real-time imaging and communications, by Ukrainian defence forces raises legal questions under IHL.

The principle of distinction, a core tenet of IHL, requires that parties to a conflict always distinguish between civilian objects and military objectives. Article 52(2) of Additional Protocol I to the Geneva Conventions defines military objectives as those which, by their nature, location, purpose or use, effectively contribute to military action. Thus, a commercial satellite transmitting geospatial intelligence or battlefield data, even if not originally intended for military use, could be regarded as a legitimate target if such contribution is proven.

The legal risk of targeting dual-use satellites extends beyond proportionality and collateral damage to encompass the broader concern of orbital debris. The destruction of satellites in low Earth orbit may trigger a cascade effect, severely harming the global space environment. The IHL obligation to avoid methods of warfare that cause widespread, long-term and severe damage to the environment (Article 35(3) and 55, Protocol I) takes on heightened importance here. Attacks on space infrastructure, therefore, require careful assessment of proportionality and necessity, considering both the potential civilian impact and environmental consequences.

In this context, the Woomera Manual on the International Law of Military Space Operations, produced in 2019 by a consortium of legal scholars and practitioners under the auspices of the International Institute of Air and Space Law at Leiden University, as a non-binding soft-law instrument, provides authoritative guidance rather than legal obligations. It interprets systematically the application of IHL principles, consisting in distinction, proportionality, and precautions, in the domain of outer space, which is not yet fully codified in binding treaties. Here, the term “precautions” refers to the concrete measures that parties must take to minimize incidental harm to civilians and civilian objects, such as verifying that a target is genuinely military, choosing means and methods of attack that reduce collateral damage, and giving effective warnings where feasible. For example, the Manual specifies that a dual-use satellite should only be considered as a military objective if it makes a demonstrable, direct contribution to military operations. Similarly, it clarifies that incidental damage to purely civilian space infrastructure must be minimised, and that attacks likely to generate hazardous orbital debris are subject to additional scrutiny.

By referencing the Woomera Manual, it becomes clear that the mere provision of geospatial imagery by private satellites does not automatically justify targeting. Instead, evaluators must assess whether the military advantage gained outweighs the expected harm to civilians and the space environment, in line with contemporary customary law. Incorporating these standards strengthens the analytical rigor of discussions on space-target proportionality, ensuring that conclusions regarding the legality of targeting dual-use satellites are both well-founded and consistent with emerging legal practice.

Besides, it is notable that under the framework of the ITU the allocation and coordination of satellite frequencies and orbital slots are governed primarily by the ITU Constitution, the ITU Convention, and the Radio Regulations. While the ITU’s mandate is essentially technical and non-political, its procedures play a crucial role in preventing and resolving harmful interference between satellite systems, including in situations where commercial satellites may be repurposed for military objectives. The Radio Regulations contain provisions for the reporting, identification, and mitigation of interference, and empower the Radiocommunication Bureau to act as a neutral

intermediary between administrations. Although the ITU has no direct enforcement powers in armed conflict and does not adjudicate the legality of military actions, its mechanisms for frequency coordination, notification, and registration are designed to maintain the integrity of the global spectrum management regime and to facilitate the deconfliction of frequency use, even in circumstances where geopolitical tensions or hostilities threaten to disrupt communications.

f. Licensing Regimes and State Responsibility under International Law

Although commercial actors nowadays dominate satellite operations, States remain ultimately responsible under International Law. Article VI of the Outer Space Treaty holds States accountable for all national space activities, whether conducted by governmental or non-governmental entities. Consequently, any act of negligence or misconduct by a private operator may engage the authorising State's international responsibility, creating a clear duty to regulate, supervise, and licence private space actors.

Modern national licensing frameworks go beyond technical and safety requirements to incorporate environmental protection and broader sustainability measures, both in space and on Earth, including space debris mitigation and responsible operational practices. This evolution reflects a shift towards sustainable space governance, where States actively promote responsible and forward-looking management of satellite activities, aligning national oversight with international obligations and the long-term preservation of the space environment.

Furthermore, the concept of “due regard,” enshrined in Article IX of the Outer Space Treaty, imposes a legal obligation on States to ensure their activities do not interfere with the rights and interests of other States. When licensing satellite launches or operations with potential military applications, this principle becomes especially relevant, reinforcing a precautionary and cooperative approach.

g. The Interdisciplinary and Autonomous Character of Space Law

The landscape of satellite operations confirms the interdisciplinary nature and increasing autonomy of Space Law, as a legal domain of major importance. This branch has matured into a distinct body of rules, supported by multilateral treaties, UN resolutions, customary norms, soft-law instruments like the Artemis Accords (Maniatis, 2024a), and national regulations. Today it intersects with diverse legal areas: Environmental Law (space debris mitigation), Telecommunications Law (frequency allocation), Trade Law (commercial launches), and the Law of Armed Conflict (targeting of satellites). The synergy of these domains demonstrates that legal scholarship must adapt to space's inherently hybrid nature. The expansion of space activities (commercial, exploratory, scientific, and strategic) demands a coordinated juridical response. Space Law must continue to evolve with new principles for lunar mining, planetary defence, and private station operations. In doing so, it will contribute not only to regulatory clarity but also to the peaceful and sustainable development of humanity's space endeavours.

Conclusion

In closing, public engagement with artificial satellites must go beyond science fiction or cinematic fascination. Legal and policy frameworks should evolve to encompass Space Law, with new conceptualizations of space-related fundamental rights, such as *inter alia* the rights to observation, exploration, and even space tourism. The future of satellites is not solely technological but also legal, cultural, and economic.

Space Law, as demonstrated throughout this study, is an autonomous and dynamic field of International Law. It embodies a complex normative framework that combines binding treaties,

customary principles, and evolving practices responding to technological advances. Unlike classical branches limited to terrestrial jurisdiction, it addresses a unique legal environment, which is deprived of borders, sovereignty and permanent human presence.

This branch's dynamism lies in its capacity to accommodate commercial innovation, scientific cooperation, and geopolitical tensions simultaneously. It integrates concepts from multiple legal traditions, such as Public Law, private regulation, environmental protection, and human rights, making it inherently interdisciplinary. As such, Space Law not only governs current uses of outer space but also shapes the future legal landscape of emerging activities or projects for the future, such as lunar resource exploitation, planetary defence, and orbital habitation.

In sum, this branch has become indispensable to understanding and guiding human presence beyond Earth. It is a field not merely reacting to developments in science and business but actively constructing the legal infrastructure for the next great leap of mankind. Within this branch, Satellite Law plays an important role, as a dynamic and multifaceted subcategory. It is to underline that Space Law intrinsically constitutes a challenge not only for research but also for innovation. New trends and novel doctrinal tools have been recently developed or at least proposed on the matter, such as the Woomera Manual, 'Martian-Martial Convergence' and the neologism "doryphorical."

Ultimately, from the battlefields of Earth to the dusty plains of Mars, the law will continue to follow humanity into new frontiers...

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