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"A LEGAL ANALYSIS OF NATIONAL AND INTERNATIONAL ORGANIZATIONS: REGULATING OUTER SPACE ACTIVITIES"

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ABSTRACT

A growing number of activities occurring beyond Earth particularly those conducted by State actors and private sector entities has prompted a greater need for integrated, multi-layered regulatory frameworks. This article focuses on the structures of international and national organizations involved in regulating space activities and how they interact through their institutional mandates, legal instruments, and regulatory issues. The article begins by discussing the United Nations system, specifically the role of the Committee on the Peaceful Uses of Outer Space (COPUOS) and the United Nations Office for Outer Space Affairs (UNOOSA) and analyzing the five space treaties developed by the UN system and the associated principles. The analysis continues with a review of key intergovernmental organizations such as the European Space Agency (ESA) and the International Telecommunications Union (ITU), as well as an examination of the regulatory frameworks in the US, Europe and India. The article concludes that the existing environment provides a necessary starting point but there are gaps in the regulatory framework which requires regulatory cooperation or adaptability focused on commercial activities in space, the utilization of resources from space, and the problem of debris in orbit around earth.

Keywords: *Outer Space Treaty, COPUOS, UNOOSA, European Space Agency, International Telecommunication Union, Commercial Space Activities, National Legal Frameworks.*

1.INTRODUCTION

A comprehensive examination of the development of space-related activities demonstrates that what was once limited to superpowers during the Cold War has become a battleground for several entities, including satellites, space stations, businesses entering space, and proposals for extracting resources from other planets. The underlying legal framework for regulating mass-market space activities is comprised of a number of different international treaties; customary international law; soft law; and, increasingly, country-specific regulatory systems. Currently, at least 118 countries are signatory to the primary international treaty framework for space (the Outer Space Treaty), and it is predicted that global spending on space-related activity will exceed 600 billion U.S. dollars sometime within ten years. These factors indicate the importance of determining the institutions responsible for creating the rules for outer space activities and how the rules are enforced.

There are three levels of regulation of outer space: United Nations Universal International Law; Regional or Inter-Governmental Organizations (like ESA, ITU); National Domestic Legal Frameworks That Implement a Country's International Obligations. This paper will analyze systematically and in-depth each of these three levels of law by examining the institutional structure and legal instruments associated with them.

2. THE UNITED NATION FRAMEWORK FOR OUTER SPACE GOVERNANCE

The Committee on the Peaceful Uses of Outer Space (COPUOS)

the Committee on the Peaceful Uses of Outer Space (COPUOS) was established by the United Nations General Assembly in 1959 with the aim of governing the exploration and use of outer space for humankind. Initially, COPUOS had 18 members; now there are over 104 member countries which meet annually in Vienna, Austria.[1] The institutional mandate of COPUOS is threefold: To review international cooperation regarding peaceful uses of outer space, To develop programs under the auspices of the UN, and To examine the legal issues arising from the exploration of outer space.

COPUOS has two subsidiary bodies that meet regularly: the Scientific and Technical Subcommittee and the Legal Subcommittee. Each year in February, the Scientific and Technical Subcommittee addresses the scientific and technical aspects of outer space. Some of these topics include methods for mitigating space debris, near-Earth objects, and the use of nuclear power sources in outer space.[2] Each year in April, the Legal Subcommittee meets to discuss

the legal aspects of outer space, such as the legal framework governing outer space activities and five UN treaties that define outer space and applicable law.

One important characteristic of COPUOS is the way in which it makes decisions by requiring consensus among all member states. This means that all COPUOS decisions are made using soft law instruments, that is, guidelines and principles rather than legally binding instruments of law. According to one legal officer at UNOOSA, guidelines and technical standards issued by the COPUOS will become legally-binding within everyone's national jurisdictions, thereby eroding the hard-law and soft-law distinction.

The United Nations Office for Outer Space Affairs (UNOOSA)

The United Nations Office for Outer Space Affairs (UNOOSA) has operated from its Vienna headquarters since 1958 to serve as the secretariat for COPUOS.[3] The organization assists COPUOS through its diverse programs that cover scientific, technical, legal, and policy dimensions of space exploration activities. The organization operates the United Nations Register of Objects Launched into Outer Space, which serves as a public registry established by the 1976 Registration Convention, while it also manages the UN-SPIDER platform that utilizes space technology for disaster risk reduction purposes.

The United Nations Office for Outer Space Affairs or UNOOSA also takes care of the Space Law, for New Space Actors Project. This project is meant to help countries that're new to space activities. It helps them build their laws and regulations at home. In the year 2022 UNOOSA started the Accessing Space Treaty Resources Online database, which is also called ASTRO. The ASTRO database is a trusted place where people can find space agreements and see who has agreed to them.[4]

- **The Five UN Space Treaties: The Corpus Juris Spatialis**

The basic legal framework of international space law exists through five treaties which are known as corpus juris spatialis. The instruments function as the fundamental legal standards of the field because they were established through negotiations which COPUOS conducted during the initial decades of space exploration.

The Outer Space Treaty (1967)[5]: The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space including the Moon and Other Celestial Bodies became open for signing on 27 January 1967 and the treaty became effective on 10 October 1967. The treaty which people commonly refer to as the Magna Carta of Space Law establishes

fundamental principles which state that all nations should benefit from space exploration and usage while outer space remains open for all nations to explore and foreign powers cannot claim space as their territory.11 The Article VI section establishes State responsibility as its main legal principle by stating that all nations must control their international space operations which apply to both governmental and non-governmental space activities that require official permission to proceed.

The Rescue Agreement (1968)[6]: The Agreement on the Rescue of Astronauts the Return of Astronauts and the Return of Objects Launched into Outer Space which the United Nations adopted on 22 April 1968 explains Articles 5 and 8 of the Outer Space Treaty. States Parties must execute every available method to complete astronaut rescue operations who face emergency situations and return them to their original launching nation because astronauts serve as "envoys of mankind" according to international space law.

The Liability Convention (1972)[7]: The Convention on International Liability for Damage Caused by Space Objects, which became effective on 1 September 1972 establishes absolute liability of the launching State for damage caused by its space objects on Earth's surface or to aircraft in flight and fault-based liability for damage in outer space. The Convention was notably invoked in 1978 following the crash of the Soviet Cosmos 954 nuclear-powered satellite over Canadian territory which resulted in a diplomatic settlement.

The Registration Convention (1976)[8]: The Convention on Registration of Objects Launched into Outer Space, which entered into force on 15 September 1976,14 requires launching States to maintain national registries and furnish information on space objects to the UN Secretary-General. The main function of this instrument serves as the foundational element for orbital transparency which enables monitoring of potential liabilities according to the Liability Convention.

The Moon Agreement (1979)[9]: The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, which became effective on 11 July 1984,15 mandates the establishment of an international regime to govern resource exploitation because it classifies the Moon together with its natural resources as "the common heritage of mankind." The Agreement's effectiveness, however, remains severely constrained because only eighteen States are party to it as of 2025 and major spacefaring nations including the United States and Russia

and China have declined to ratify it which results in its common heritage provisions being mostly aspirational.

3. KEY INTERGOVERNMENTAL ORGANIZATIONS IN SPACE REGULATIONS

The European Space Agency (ESA)

The European Space Agency or ESA was set up in 1975. It is an organization that helps countries in Europe work together in space.[10] The ESA does two things: it builds and runs spacecraft, and it helps its member countries make their own space laws. ESA has 22 member countries that work together on space projects. Over the years ESA has become very good at working in space. It has helped European companies compete in the space industry by investing a lot of money in it. The European Space Agency coordinates space activities. Has a lot of technical knowledge. This knowledge helps ESA and its member countries like those in the space sector to advance in space exploration.

The European Space Agency (ESA) holds a special status as its institutional framework operates through specific governmental regulations. The European Space Agency (ESA) has officially recognized the Rescue Agreement and the Liability Convention and the Registration Convention which grants the organization international legal status according to space law. The European Space Agency (ESA) functions as an intergovernmental organization through which its Member States can work together and share information while developing common positions about international and national space law matters including COPUOS sessions.[11]

The European Space Agency provides its most significant legal impact through its international space law development work to member states. The European Space Agency provides essential support to Finland and other countries that developed their domestic space laws after 2018 by offering institutional knowledge and legal assistance for their legislative development. ESA acts as a “package deal” provider for Member States that lack the domestic capacity to assess the technical and legal dimensions of space regulation independently. The intergovernmental law-making process of this collaborative model works to achieve its main objective of protecting international space law from becoming fragmented while allowing different nations to maintain their distinct regulatory systems.

The International Telecommunication Union (ITU)

The International Telecommunication Union (ITU) functions as a United Nations specialized agency that controls essential radio-frequency spectrum and satellite orbital slot regulations.

ITU's Radio Regulations established an international legal framework that governs both radio-frequency spectrum usage and geostationary satellite orbit and other satellite orbit operations. The requirement for ITU coordination exists because orbital slots are limited and radio-frequency interference can create dangerous situations, which means that satellite operators must first obtain their ITU filing before they can receive domestic spectrum authorization from organizations like the FCC in the United States.

The ITU process requires applicants to file coordination requests up to three to five years before launch, making it the longest lead-time regulatory process in commercial spaceflight.[12] National telecommunications administrations file on behalf of their operators through processes governed by the Radio Regulations. The failure to initiate ITU coordination before national licensing can result in a domestic license with no international spectrum protection — a significant commercial and legal vulnerability for satellite operators.

International regulatory conflicts in satellite networks have emerged as the primary operational challenge for multiple countries because of their need to develop satellite networks over international regions. The increasing number of constellation filings has created challenges which include determining how many satellites can operate in space and how to distribute satellite access among countries and whether the existing "first come first served" method of spectrum distribution provides sufficient protection for developing countries with limited capabilities to submit their coordination requests.

1. **NATIONAL REGULATORY REGIMES**

The United States

The U.S. has the most advanced national framework for regulating its space program; therefore, the U.S. is still leading in the world for both government and commercial space use. This is also due to there being multiple regulatory authorities across agencies that govern separate areas of space operations provided by each agency.

The Commercial Space Launch Act of 1984 (Public Law 98-575) serves as the core legislation covering commercial space launches; it gives DOT authority to regulate and promote commercial space launches. FAA/AST is the agency within the DOT that is responsible for the regulation and promotion of the launch industry; it issues licenses to U.S. citizens for launching or re-entering (via launch) anywhere in the world or for anyone to operate as a licensee; therefore, any

commercial launch or re-entry must be licensed.[13] The FAA issued an important rulemaking in 2020 that created a new performance-based licensure system for all commercial launch and re-entry vehicles (including rockets and re-entering vehicles) as codified in Title 14, Part 450 of the Code of Federal Regulations, replacing the older licensing model which required separate licensing for each vehicle type.[14]

The Federal Communications Commission (FCC) grants operators of commercial satellite systems licenses for communication and uses spectrum allocation to manage the use of commercial space systems. The National Oceanic and Atmospheric Administration (NOAA) grants licenses for commercial Earth remote sensing satellites. Export controls over space technologies are jointly administered by the Department of Commerce and the Department of State, through the International Traffic in Arms Regulations (ITAR), which the State Department's Directorate of Defense Trade Controls administers.[15]

The FAA's licensing evaluation process consists of five components: safety review, policy review (provided by the Department of Defense and Department of State), payload review, financial responsibility requirements, and environmental review. The complexity and multi-agency nature of this framework has resulted in a lot of criticism from industry about regulatory fragmentation and processing times. There is no established mechanism for authorizing new space activities including on-orbit servicing, in-space manufacturing, and cislunar activities that would not be easily covered by any specific agency such as the FAA, the FCC, or NOAA. This creates concerns about how to comply with Article VI of the Outer Space Treaty.[16] On April 12, 2025, an Executive Order was issued directing the Department of Commerce to develop an authorization process for these types of new space activities to address this regulatory gap.

India: From State Monopoly to Liberalized Space Economy

The Indian Space Research Organization (ISRO), established in 1969 and taking over from the Indian National Committee for Space Research (INCOSPAR) created in 1962, has always been a fully public sector Indian space program. Since its inception ISRO has achieved many remarkable milestones including launching many commercial satellites for foreign customers (over 300) and sending the Chandrayaan-1 lunar spacecraft to orbit.[17]

India's governance structure for its space sector has changed dramatically through two major initiatives: the establishment of IN-SPACe (Indian National Space Promotion and Authorization Centre) and the recent formulation of an Indian Space Policy 2023. IN-SPACe acts as the regulatory and promotional agency established to carry out India's obligations under Article VI of the Outer Space Treaty by creating a system for licensing, permitting, and oversight of non-profit or non-governmental commercial operators.[18] IN-SPACe also provides a channel for the private sector to communicate with ISRO, make assessments of industrial requirements, and to help to provide all commercial operators with an equal opportunity in India's space market.

The Indian Space Policy 2023 specifies how the Department of Space (DOS), ISRO, IN-SPACe, and the New Space India Limited (NSIL) are each responsible within the framework of India's space program. Non-governmental entities (NGEs), which will require authorization to operate, will now be able to provide space transportation, satellite operations and remote sensing services significant changes from the previous State monopoly structure. Whilst India's national space experience is heading towards a fully integrated legislative system, the Draft Space Activities Bill, 2017 (which would have addressed many of the issues related to licensing, liability and intellectual property) has not been enacted as of 2026 and therefore the legislative framework is entirely dependent on executive policy and not parliamentary law.

1. EMERGING REGULATORY CHALLENGES

Commercial Space Activities and the Regulatory Gap

With the growing presence of private companies in the commercial space industry including SpaceX, Blue Origin, and many others there has been a huge lack of clarity within the current framework for International Space Law. The Outer Space Treaty was originally intended to regulate only government actors. As such, while the legal authority for controlling private space activities through Article VI of the Outer Space Treaty exists, the practical means of controlling those activities (i.e. state responsibility and national authorization and supervision) are too vague and result in differing levels of state control. The Outer Space Treaty provides no guidelines for how an authorized national government should issue their own authorization,

leading to numerous differences between countries with respect to how strict or lenient the authorization process will be.

In the case of the US experience there is currently no broader spectrum of government regulation that could cover all activities occurring above earth (in space) after launch to re-entry. The FAA's authority ends once the vehicle is separated from the rocket during the launch; so, there is not an authority to govern things like on-orbit servicing, manufacturing in space and clean-up of stationary debris that would normally take place in low earth orbit. There are many international organizations including COPUOS and some governments that have been trying to solve the problem of how to authorize “mission” or “novel space activity” (new types of mission/space activities) since at least 2026.[19]

Space Debris and the Common Governance Problem

The issue of managing debris in space presents a classic example of the challenge of managing the global commons. At present, there are over 27,000 tracked objects in orbit, plus millions more small but untracked pieces of debris that pose potential collision hazards to currently operating satellites. To address this problem, COPUOS adopted the Space Debris Mitigation Guidelines as the principal international basis for managing orbital debris back in 2007, and these guidelines received support from the UN General Assembly. The problem with the Space Debris Mitigation Guidelines is that they are not legally binding and, therefore, rely on each nation to voluntarily implement them.[20]

Growing numbers of large LEO constellations (with some being composed of thousands of satellites) have highlighted debris concerns and the 2022 FCC requirement to deorbit a satellite within five years after completion of its mission rather than the previously recommended twenty-five years is one of the most proactive national regulatory approaches to the debris issue. On the international level, there is not an existing binding treaty which covers either active debris removal or liability for debris-generating events with the needed level of specificity for today's environment. Additionally, as per the Liability Convention, the launching State is responsible for debris damage, but that is becoming increasingly problematic as multiple decommissioned satellites from multiple launching States collide and create additional debris.

Space Resource Exploitation

In terms of mining water ice, minerals and different materials from the Moon, asteroids and other celestial objects, the commercial exploitation of such resources is the most controversial . The Outer Space Treaty forbids countries from taking ownership of outer space and celestial objects, but it does not specifically mention taking ownership of resources extracted from celestial objects. This has resulted in different countries creating different laws with regards to which resources can be taken.

According to the U.S. SPACE Act of 2015 and Luxembourg's 20 July 2017 Law on the Exploration and Use of Space Resources, private persons may extract and possess space resources under international law, as if these resources were like fish in the open ocean, they are considered res nullius capable of being appropriated by taking possession of them, rather than res communis. However, if and when the Moon Agreement's common heritage principle was ratified more widely, then all countries would have to agree on an international framework for fair sharing of these resources. At present, the countries that belong to COPUOS are in negotiations through the Working Group on Space Resources of the Legal Subcommittee to create a framework, but they have not yet reached an agreement.

- **CONCLUSION**

There are increasing tensions in the current framework of space from three sources. First, commercial space activities have entered many markets with very little prior regulation or infrastructure; thus, the regulatory framework needs to adapt quickly to accommodate these new entrants into space. Second, the number of debris in orbit has risen to levels that threaten future operations and sustainability of near-Earth orbital activities; therefore, binding and flexible regulatory mechanisms must be developed to meet current problems that are not addressed by existing non-binding guidelines. Third, the increasing number of companies and activity related to extracting resources from space will require clear regulatory frameworks as neither the Outer Space Treaty nor the very few nations ratifying the Moon Agreement provide adequate clarity.

In order to solve the current challenges, there is need to find new ways of addressing them, not just keep improving old ones. A truly innovative response will involve an innovation in the regulatory framework that maintains multilateralism and promotes inclusive behaviour, as well as utilizing the technical expertise of organizations such as ESA and ITU. This new response should also allow for domestic regulatory experimentation, whilst preventing negative forms

of fragmentation through forum shopping and regulatory arbitrage. In decades to come, the main legal question concerning the governance of space will be whether or not the international community preserves the will to govern effectively.

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[5] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, opened for signature Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty] (118 State parties as of Oct. 2025).

[6] Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, opened for signature Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119 [hereinafter Rescue Agreement].

[7] Convention on International Liability for Damage Caused by Space Objects, opened for signature Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187 [hereinafter Liability Convention].

[8] Convention on Registration of Objects Launched into Outer Space, opened for signature Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15 [hereinafter Registration Convention].

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