

# Space Law

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**Required knowledge:** Link

**Learning objectives:**

- To get familiarized with the international norms (binding and voluntary) which govern and regulate the activities of states and other actors in outer space.
- To understand the core principles and concepts that shape decision-making and developments in international and national space law.
- To understand the challenges faced by countries and international organizations in the implementation of space laws.
- To understand the interface of space law with other domains namely human rights law, environmental law, etc.

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## A. Space Law

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### I. Introduction

International space law is a specialized branch and component<sup>[2]</sup> of general international law. In terms of scope, space law includes every legal or regulatory regime having a significant impact, even if implicitly or indirectly, on at least one type of space activity or major space application.<sup>[3]</sup> The definition qualifies as part of "space law", the standards formulated by international organizations, regional organizations, and national governments.<sup>[4]</sup> In terms of nature, space law is multidimensional, with its formation, development, and application being "shaped by concerns from "the public, private and technological, economic, security and political domains."<sup>[5]</sup>

Historically, the United Nations (UN), to establish an effective, fair, and transparent international legal regime and to respond to the "geopolitical considerations, particularly the competition between the superpowers, the United States and the Soviet Union,<sup>[6]</sup> constituted an international forum to codify rules for the regulation of activities in outer space.<sup>[7]</sup> The first step, under the aegis of the UN, was the constitution of the Committee on the Peaceful Uses of Outer Space (COPUOS). The mandate of the COPUOS included the (a) formulation and codification of international space law and, (b) guiding its development based on principles of cooperation and equality amongst states. The UNCOPUOS, along with its two sub-committees i.e. the Scientific and Technical Sub-Committee and the Legal Sub-Committee, was created to play a central role in the regulation of activities in outer space.<sup>[8]</sup> Since its inception, the contributions of the COPUOS can be viewed under three phases.<sup>[9]</sup>

**First** is the pre-treaty phase wherein the COPUOS "drafted a handful of UN Declarations, Resolutions with considerable political and moral force, but no binding legal character." This phase covers the adoption of the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space (1963), which incorporates the core principles of international space law (peaceful purposes, international cooperation, non-appropriation, etc.).

The **second** phase is the “golden age of space law treaty-making,” in which the Outer Space Treaty (OST) and other agreements i.e. the five core treaties on outer space law were created.<sup>[10]</sup> Of these, the first treaty i.e. Outer Space Treaty (OST) “functions like a constitution and it sets out the general principles that are the basis for all of space law”.<sup>[11]</sup>

**Third**, the COPUOS adopted non-binding Resolutions to address the new conditions concerning outer space. (e.g., the Guidelines for Long-Term Sustainability, 2019; the Declaration on International Co-operation in the Exploration and Use of Outer Space for the Benefit of all States, Taking into Particular Account the Needs of Developing Countries, 1996).<sup>[12]</sup>

In addition, COPUOS also makes way for “coordination and cooperative efforts in several areas within the space security portfolio”. This includes joint activities with the International Telecommunication Union (ITU) for managing radio frequencies, the Committee on Earth Observation Satellites (CEOS) for coordinating remote sensing satellites, and the World Meteorological Organization (WMO) the governance of weather satellites.<sup>[13]</sup> The COPUOS also plays a significant role in shaping the development of international space rules while coordinating with space actors including states, organizations, and private enterprises. The intensification of space activities has made two space-related activities particularly important. First, the extension of existing space rules to respond to the new conditions (technological advancements, geopolitical conditions, commercialization of space resources). Second, the proliferation of space rules of states forged individually and in collaboration with other actors.

## II. Sources

The regulatory framework for space activities is made up of treaties, international space resolutions, principles of international law, rules of organizations and national governments.

Under Article III of the Outer Space Treaty (OST), state parties to the Treaty are required to 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.<sup>[14]</sup> The reference to the UN Charter herein, brings within the scope of application the principles of international law (sovereign equality, the maintenance of international peace and security, etc.).<sup>[15]</sup> In addition to the space treaties, a part of the COPUOS created landscape, are instruments of a non-binding or voluntary nature<sup>[16]</sup>

At the national level, space activities are governed by the legal instruments of the states, adopted under their constitutions.<sup>[17]</sup> The compatibility between the two domains of law, namely international and national space rules, is integral to the overall working and application of international rules in outer space. While all domestic and international instruments are woven

together in terms of core principles and objectives, each instrument contributes and has an impact on outer space law.

## I. Space Treaties

In 1963, the UN General Assembly (UNGA) adopted the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, 1963 (Principles Declaration).<sup>[18]</sup> The Declaration is referred to as the first international instrument to incorporate a set of directives for the regulation of space activities being undertaken by states.<sup>[19]</sup> The Principles Declaration was followed by five treaties, referred to as the "heart of international space law".<sup>[20]</sup> These include the Outer Space Treaty, 1967 (OST); The Moon Agreement - Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1979 (Moon Agreement); the Rescue Agreement, 1968; the Liability Convention, 1972; and the Registration Convention, 1975.

### 1. The Outer Space Treaty (OST), 1967

The Outer Space Treaty (OST) i.e. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, *including the Moon and Other Celestial Bodies*, is the building block or the "main legal framework"<sup>[21]</sup> containing the key principles or the "foundational components"<sup>[22]</sup> concerning the use and exploration of outer space. The importance of the OST as an authoritative guide for space actors has been widely discussed.<sup>[23]</sup> First and foremost, the historical context of the OST matters. It is commonly understood that its provisions were shaped by the geopolitical considerations, competition, and possibly confrontation of the two superpowers of the day, the United States and Soviet Union.<sup>[24]</sup> **Secondly**, the OST covers *principles* that have been "recognized as customary law"<sup>[25]</sup>. Some view the obligations as provided under the OST (and other treaties) as "obligations *erga omnes*, i.e. obligations towards the international community as a whole".<sup>[26]</sup> **Thirdly**, the OST has proved to be an important guide for states and other actors in the field. The principles enshrined in the treaty have assisted in the development of international and domestic rules. The following are the key OST principles;

1. The exploration and use of outer space shall be carried out for the benefit and in the interests of all countries and shall be the province of all mankind
2. Outer space shall be free for exploration and use by all States;
3. Outer space is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means;
4. States shall not place nuclear weapons or other weapons of mass destruction in orbit or on celestial bodies or station them in outer space in any other manner;

5. The Moon and other celestial bodies shall be used exclusively for peaceful purposes;
6. Astronauts shall be regarded as the envoys of mankind;
7. States shall be responsible for national space activities whether carried out by governmental or non-governmental entities;
8. States shall be liable for damage caused by their space objects; and
9. States shall avoid harmful contamination of space and celestial bodies

## 2. The Moon Agreement , 1979

On the Moon Agreement, Jankowitsch writes, it was the fruit of an intensive international legislative effort, conceived and negotiated multilaterally by the COPUOS and later adopted unanimously by the UNGA. <sup>[27]</sup> In addition, the the essence of the Agreement is that it substantially reaffirms many of the "provisions of the Outer Space Treaty".<sup>[28]</sup> The notable provisions of the Moon Agreement are as follows;

1. Article 3 (1), which provides that the Moon shall be used by all State Parties exclusively for peaceful purposes.
2. Article 11: The moon and its natural resources are the common heritage of mankind.
3. Article 3 (4): The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres...shall be prohibited...The use of any equipment or facility necessary for peaceful exploration and use of the moon shall not be prohibited.
4. Article 4: The exploration and use of the moon shall be the province of all mankind and it shall be carried out for the benefit and in the interests of all countries...Due regard shall be paid to the interests of present and future generations as well as the need to promote higher standards of living...
5. Article 7: In exploring and using the moon, State parties shall take measures to prevent the disruption of the existing balance of its environment whether by introducing adverse changes in that environment...
6. Article 10: State parties shall adopt all practicable measures to safeguard the life and health of persons on the moon.
7. Article 14: State Parties shall bear international responsibility for national activities on the moon, whether such activities are carried on by governmental agencies or by non-governmental agencies.

The provisions incorporate principles concerning "use of outer space for peaceful purposes", "moon as heritage of mankind", "non-appropriation", "exploration" and use", "prohibitions", "permissible activities" "interests of future generations", "interests of all countries", "higher

standards of living", "economic and social progress", "information sharing", "freedom of scientific investigation", "prevention of contamination", "life and health of persons on the Moon", "persons in distress", "responsibility for activities on the moon", "responsibility of international inter-governmental organizations", etc.

In terms of participation and compliance, the Moon Agreement is often viewed as a failure or the "least popular" for its low ratifications in comparison to the other treaties. To some, this is because many of its provisions are in contrast to a more market-friendly world.<sup>[29]</sup> To others, the Moon Agreement is the least popular due to the treaty featuring several restrictive terms and provisions. For example, Article 11 declares the Moon and its natural resources to be the Common Heritage of Mankind and call for the establishment of an international regulatory regime to govern the exploitation of the natural resources of the Moon.<sup>[30]</sup> To Tronchetti, the failure of the Moon Agreement to gain general acceptance may be in large part attributed to the different interpretations of Article 11 by developed (example, United States) and developing States. Offered such discretion of interpretation as consequence of the vague and uncertain character of such provisions both developed and developing States advanced opposite views about the interpretation and application of the 'Common Heritage of Mankind' concept to the management and exploitation of lunar resources.<sup>[31]</sup> Further, the Moon agreement fails to meet the necessary geopolitical and economic realities of the current space environment and the priorities of those engaging in activities in the domain.<sup>[32]</sup> To Neto, the commercial exploitation of space resources can explain the reluctance of spacefaring nations to subscribe to the Moon Agreement.<sup>[33]</sup>

Despite low participation, the principles incorporated under the Moon Agreement have been cited time and again. To a few, the Moon Agreement is *valid international law*, containing several articles that tighten restrictions on state activities and powers.<sup>[34]</sup> To others, "the treaty aims to establish a number of best practices and guiding principles for the cooperative use and exploitation of the Moon and celestial bodies, which particularly from a Global South perspective emphasize on the distribution of benefits to developing countries who may otherwise lack access to such resources and the ability to benefit from them."<sup>[35]</sup> On the question of state liability for damage to the space environment, Tronchetti writes, although the Agreement has not been ratified by the major space powers, it gives a "preliminary indication that the use of the Moon must be carried out in a non-detrimental manner for the lunar environment."<sup>[36]</sup>

The principles and objectives of the Moon Agreement have also been endorsed under several instruments adopted by COPUOS, member states, and other agencies.<sup>[37]</sup> Take the example of the Moon Village Association (MVA) and its draft on the Best Practices for Sustainable Lunar Activities (released in 2020).<sup>[38]</sup> In its recent submission before the COPUOS, the MVA states, "there is a requirement for international rules to ensure sustainable lunar exploration and settlement in and around the Moon, benefits sharing, sharing of information, registration of

activities, mitigating the creation of debris in lunar orbit, and coordinating access to natural resources”<sup>[39]</sup> The need to emphasize on the importance of the Moon Agreement has been felt by many. <sup>[40]</sup> More so, in the light of increased involvement of companies<sup>[41]</sup> and the making of new instruments and agreements concerning space exploration. (example Artemis Accords).<sup>[42]</sup>

### 3. The Rescue Agreement, 1968

### 4. The Liability Convention, 1972

The question of state liability for damage caused to other States is an important one. Under the OST, Articles VI, VII and VIII relate to State liability. According to Sachdeva, the effect of the requirements for authorization, registration, and continued supervision, as provided under the OST, is that the state cannot wash its hands of the results of the activities of its nationals. If therefore, the activities cause damage, a nexus is constituted between them and the home state sufficient to impute liability on the part of the state.<sup>[43]</sup>

The Liability Convention, 1972<sup>[44]</sup> elaborates upon the provisions of the OST and is noted for several of its provisions for establishing a framework for claiming compensation for damage caused by space objects. In 1971, the UNGA underlined that the “Convention fulfills the need of the international community for a separate international instrument on the rights and obligations pertaining to liability for damage”.<sup>[45]</sup> In the text of its Preamble, the Liability Convention provides, “recognising the need to elaborate effective international rules and procedures concerning liability for damage caused by space objects and to ensure, in particular, the prompt payment under the terms of this Convention of a full and equitable measure of compensation to victims of such damage”.

The notable features of the Convention include Article I, which defines “damage” under the Convention. Article I provides, “the term damage means loss of life, personal injury or other impairments of health; or loss of or damage to property of States or of persons, natural or juridical, or property of intergovernmental organizations. Article XII of the Convention specifies that the compensation which the launching State shall be liable to pay for damage under this Convention shall be determined in accordance with international law and the principles of justice and equity.<sup>[46]</sup> The Convention also covers;<sup>[47]</sup>

1. The absolute liability of launching states for damage caused by their space objects to anything on the Earth’s surface or flying aircraft.
2. The process of establishing fault for damage done to other space objects; the responsibility and payment of compensation to third-party states if damage results from two launching states.
3. The joint responsibility and liability of launching states if they jointly launch a space object.

4. The exoneration of liability of launching states due to gross negligence or act or omission with intent to cause damage by the state claiming compensation.
5. The claims process for compensation; the statute of limitations of one year for a claim to be made following the date of occurrence of the damage or the identification of the liable launching state.
6. The provision of appropriate and rapid assistance to a damage-affected state in the case of larger-scale danger to human life or interference to living conditions or functioning of important centres.

About Joint Launches and Ownership of Spacecrafts, the Draft on the Legal Application of the Concept of Launching State provides that; (a) States consider, following common practice, the conclusion of agreements following the Liability Convention for each stage of a mission concerning joint launches or cooperation programmes, and (b) States consider harmonizing voluntary practices regarding the on-orbit transfer of ownership of spacecraft, to increase the consistency between national space laws and help avoid lacunae in the implementation of the international treaties.<sup>[48]</sup> In 2005, the GA Resolution on Application of the concept of the Launching State (2005)<sup>[49]</sup> re-affirmed, "a launching State shall register a space object under the Registration Convention and that the Liability Convention identifies those States which may be liable for damage caused by a space object and which would have to pay compensation in such a case."

## 5. The Registration Convention, 1975

## II. Non-binding Rules

As discussed previously, space law covers non-binding international rules or rules of a voluntary nature. The non-binding rules, although voluntary, have been found to have considerable influence on the development of outer space law. In the case of the Space Resolutions of the GA, for instance, they are "recommendatory and non-binding" and carry "notable political weight especially when adopted with the full support of the Assembly's members".<sup>[50]</sup> To Jankowitsch, the resolutions form a code of conduct and reflect a wide legal conviction of the present international space community on special categories of space activities. If followed, as is the case, by constant practice of states and international organizations, may play a significant role either in establishing customary rules of international law or serve as a basis for future international negotiations on treaties to regulate the same subjects but this time in a legally binding manner"<sup>[51]</sup> In addition, the documents by COPUOS "have been a constant driver for the development of space law and international cooperation of Member States in their space activities".<sup>[52]</sup>



One can look at the GA Principles Declaration (Declaration of Legal Principles Concerning the Activities of States in the Exploration and Use of Outer Space, 1962)<sup>[53]</sup>, which incorporates the fundamental principles of outer space law. These include;

1. The exploration and use of outer space shall be carried on for the benefit and in the interests of all mankind.
2. Outer space and celestial bodies are free for exploration and use by all States on a basis of equality and in accordance with international law.
3. Outer space and celestial bodies are not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.
4. The activities of States in the exploration and use of outer space shall be carried on 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.
5. States bear international responsibility for national activities in outer space, whether carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried on in conformity with the principles set forth in the present Declaration. The activities of non-governmental entities in outer space shall require authorization and continuing supervision by the State concerned. When activities are carried on in outer space by an international organization, responsibility for compliance with the principles set forth in this Declaration shall be borne by the international organization and by the States participating in it.
6. In the exploration and use of outer space, States shall be guided by the principle of co-operation and mutual assistance and shall conduct all their activities in outer space with due regard for the corresponding interests of other States.
7. The State on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and any personnel thereon, while in outer space.
8. Each State which launches or procures the launching of an object into outer space, and each State from whose territory or facility an object is launched, is internationally liable for damage to a foreign State or to its natural or juridical persons by such object or its component parts on the earth, in air space, or in outer space.
9. States shall regard astronauts as envoys of mankind in outer space, and shall render to them all possible assistance in the event of accident, distress, or emergency landing on the territory of a foreign State or on the high seas.

The Principles Declaration has been referred to as a breakthrough in the development of international space law. The Declaration informs the development of space law in treaties,

declarations, national policies, and other agreements. Other notable instruments include the Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries (the Benefits Declaration, 1996); Resolution on No First Placement of Weapons in Outer Space (2014);<sup>[54]</sup> Voluntary Guidelines on Long-Term Sustainability (LST Guidelines, 2019)<sup>[55]</sup> etc. All of the above-mentioned constitute an integral part of the full measure of standards for the governance of outer space activities. The instruments have been found to be either elaborating the principles incorporated in the space treaties or reflecting the urgent needs of member states and the international community.

Notable examples are the LST and the Space Debris Guidelines. On the LST Guidelines, Martinez writes, the importance of the guidelines is that they codify, for the first time, an internationally accepted set of best practices for space sustainability. These practices have been agreed upon by 92 States, which includes all spacefaring countries and the vast majority of other countries that rely on space. This is significant because space sustainability is essentially a global challenge that can only be addressed successfully if all countries act collectively. The challenges of space sustainability are inherently multilateral challenges that are most effectively addressed through multilateral space diplomacy in the forum of COPUOS, where the international community has the opportunity to work together to find ways to expand access to the benefits of space activities to more nations, but also to ensure that the space environment is preserved and protected for use by future generations.<sup>[56]</sup> Herein, the Space Debris Guidelines also deserve a mention. Drafted by the Inter-Agency Space Debris Coordination Committee (IADC),<sup>[57]</sup> the Guidelines were subsequently adopted into the COPUOS Space Debris Mitigation Guidelines.<sup>[58]</sup> According to Larsen, the IADC Space Debris Mitigation Guidelines are the only remedial scheme yet produced with a significant positive effect on space debris accumulation. The guidelines aim to mitigate the adverse consequence of space debris by identifying and publishing known ways to mitigate space debris. The guidelines have been influenced states, which are responsible under Article VI of the OST to authorize, supervise, and police their generation of space debris and to hold operators responsible for debris.<sup>[59]</sup>

In its Compendium on Mechanisms adopted by States and International Organizations in relation to non-legally binding United Nations instruments on outer space, COPUOS traces the impact of voluntary rules on state behavior.<sup>[60]</sup>

### III. National Laws

The legislative and policy instruments of states are an important source for regulating outer space activities. According to Lyall and Larsen, much practical space law develops within the varied municipal legal systems of the world, particularly those of space-active states.<sup>[61]</sup> As per the Working Group on National Legislation Relevant to the Peaceful Exploration and Use of

Outer Space<sup>[62]</sup>, national laws of States are backed by "the need to fulfill obligations under treaties to which a State had become a party, the need to achieve consistency and predictability in the conduct of space activities under the jurisdiction of the State, and the need to provide a practical regulatory system for private sector involvement."<sup>[63]</sup> By enacting national laws, States fulfill several objectives and obligations.

**First**, the enactment of national laws fulfills the responsibility of States to comply and adopt rules of international space law. In other words, national space law is seen as the primary vehicle for implementing international law, principles, and guidelines. And more and more states adopt regulatory measures as part of their international responsibility to license and oversee national space activities, including commercial actors.<sup>[64]</sup> **Second**, in terms of the responsibility to monitor, license, and regulate activities of the non-state actors (under OST, Liability Convention, Debris Guidelines, etc.), the national rules to that effect, fulfill a part of this responsibility of States. **Third**, States are required to report and publish national rules to ensure transparency in the conduct of their activities in outer space. The Space Security Index (SSI) counts national state policies, strategies, and laws under its core indicator on Outer Space Governance.<sup>[65]</sup> The SSI Report (2019) provides, the development and publication of national policies and the strategies to implement them are conducive to greater transparency and predictability of space activities. The exercise helps describe the principles and objectives of national space actors concerning access to and use of space.<sup>[66]</sup> **Fourth**, international treaties and resolutions, expressly or otherwise, require states to cooperate, contribute, respond, and comply by adopting national rules. Under the COPUOS Debris Guidelines for instance, states are required to implement the Guidelines at the national level through "short to medium-term policy solutions in space debris mitigation".<sup>[67]</sup> Similarly, under the Long-Term Sustainability Guidelines, states are required to formulate national rules in accordance with the objectives of space sustainability.<sup>[68]</sup> **Fifth**, the scope of the expression of *national strategies and laws of States* is of prime importance to all space actors. The expression would also cover the bilateral agreements between states and the cooperation measures adopted by states with International Organizations.<sup>[69]</sup>

Although individual States enact legislative frameworks per their constitutional processes and security considerations, the structure and content of these rules are modeled primarily on the international space treaties and other instruments of voluntary and non-binding nature. In some instances, national legislative frameworks cite the reasons for enactment. Take the example of the Space Affairs Act (South Africa, 1993). Under the Act, the general policy of the State is required to "meet all the international commitments and responsibilities of the Republic in respect of the peaceful utilization of outer space, to be recognized as a responsible and trustworthy user of outer space, for controlling and restricting the development, transfer, acquisition, and disposal of dual-purpose technologies, in terms of international conventions, treaties and agreements entered into or ratified by the Government of the Republic".<sup>[70]</sup>

The COPUOS, to guide the adoption of uniform national laws, has encouraged the formulation of model national laws/frameworks. Few notable ones are the Draft Model Law on the National Space Legislation of the International Law Association (NSL:2010),<sup>[71]</sup> the Project 2001 Plus “Building Blocks” for National Space Laws (2004),<sup>[72]</sup> the GA Recommendations on national legislation relevant to the peaceful exploration and use of outer space (2013),<sup>[73]</sup> and Building Blocks for the Development of an International Framework on Space Resource Activities, 2019 (Building Blocks).<sup>[74]</sup> The GA Recommendations include the core elements for consideration by States in the enactment of regulatory frameworks for national space activities. These include;

- The scope of space activities to be targeted by national regulatory frameworks (example, the launch of objects into and their return from outer space, the operation of a launch or re-entry site and the operation and control of space objects in orbit; design and manufacture of spacecraft, the application of space science and technology, and exploration activities and research);
- The responsibilities of States, as a launching State, as a State responsible for national activities in outer space, for the continuous supervision of space activities by non-governmental entities in the event of the transfer of ownership or control of a space object in orbit, etc.; and
- The constitution of competent *national authority* for granting authorization for space activities with conditions for authorization be consistent with the international obligations of States (treaties on outer space, and other relevant instruments, the national security, and foreign policy interests of States, Space Debris Guidelines, etc.).<sup>[75]</sup>

As mentioned above, national laws and strategies are integral to the working of international space rules. The enactment of space laws enables States to set foot as partners or contributors towards many of the space activities, including research, collaboration, and development. On several occasions, these laws also stand challenged, with their provisions contested on incompatibility, vagueness, or ineffectiveness.<sup>[76]</sup> Few studies aim to measure the progress levels in the area of legislative and policy interventions. Lindgren for instance, makes a compliance assessment based on the criteria of advanced, intermediate, and emerging space nations. Advanced states including those that have historically been active in space and which have significant space programs (United States, Russia, European Union). The intermediate states include those that may have not been active historically and are in the process involved in expanding their investments and activities in space (South Korea, Brazil). The emerging spacefaring states are those building the foundations of their space activities for future growth (this classification does not cover all states in relation to space law and activities).<sup>[77]</sup>

## B. Core Principles and Concepts

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The above-mentioned sources of outer space law speak of the cardinal principles of space governance. The OST and the *Principles Declaration* for instance, have gained universality. The OST, in particular, is advanced as a binding instrument of international law for all states, including those that were originally not a party to it or have not yet acceded to it. As mentioned previously, the OST principles are advanced as the *jus cogens* of space law.

In this regard, Sachdeva refers to the five precepts that have attained universal validity and are like *jus cogens* norms. According to Sachdeva, the first precept treats "outer space as the province of mankind which is neither open to appropriation by sovereignty, etc., nor divisible by borders." The second precept relates to "freedom of access to any and every part of the Outer Space, to all states without discrimination, let or hindrance, for exploration and peaceful uses of Outer Space and celestial bodies." The third precept relates to the "international responsibility of states *erga omnes* for the consequences of its activities, whether by governmental agencies or non-governmental entities or juridical nationals, and liability for any damage caused as a result of the conduct of such activities." The fourth precept relates to "prohibition on placement of nuclear weapons or weapons of mass destruction in orbit around the earth." The last is the principle of "Rescue and Return of Astronauts and Return of space objects to the state of registry."<sup>[78]</sup> The developments in international and national space laws, over the years, have largely been shaped by principles and concepts which can be referred to as the core principles including "space security," "use of space for peaceful purposes," "space as the province of mankind," "non-appropriation," "long-term sustainability," "liability for damage caused in outer space", "peaceful settlement of space disputes", "international cooperation", etc. A recent report of the Hague International Space Resources Governance Working Group referred to the following as the Building Blocks of International Space Law,<sup>[79]</sup>

1. Promoting compatibility and predictability of domestic frameworks of States and internal frameworks of international organizations.
2. Preventing disputes arising out of space resource activities
3. Promoting the use of sustainable technology
4. Taking into account the needs of developing countries.

Each of the above-mentioned principles and concepts requires elaboration, particularly the following six;

## I. Space Security

Outer space constitutes a major concern in terms of security and long-term sustainability.<sup>[80]</sup> Security in the context of outer space, is a matter of concern for states and the international community.<sup>[81]</sup> The Handbook of Space Security lists the following as part of the "outer space

security" agenda; (a) Maintaining outer space for peaceful purposes (b) Space and sustainable development (c) Space and climate change (d) Disaster risk reduction, (e) Use of nuclear power sources (f) Threats from near-Earth objects (g) Space weather (h) Long-term sustainability of outer space activities (i) Definition and delimitation of outer space (j) Space debris mitigation measures (k) National legislations related to outer space.<sup>[82]</sup>

Space security, in the Space Security Index Report (2019)<sup>[83]</sup>, is defined as the secure and sustainable access to and use of space and freedom from space-based threats. This means, space security is not the interests of particular national or commercial entities, but the security and sustainability of outer space as an environment that can be used safely and responsibly by all. This definition covers as part of the agenda (a) sustainability of the unique outer-space environment, (b) the physical and operational integrity of human-made objects in space and their ground stations, and (c) security on Earth from threats and natural hazards originating in space.

According to Sheehan, space security is an *international security* concept and relates to effective international governance of the space environment. Traditionally, the term "space security" was associated with the military security of states (still the predominant understanding of the term). Today, the scope of "space security" is wider, bringing other crucial issues to the front.<sup>[84]</sup> To Gandhi, the safety and security of space assets assume paramount importance today, considering the exercise of unlimited freedom by States.<sup>[85]</sup>

Under the theme "space security" as mentioned above, national policies,<sup>[86]</sup> guidelines, and resolutions like the No First Placement of Weapons in Outer Space,<sup>[87]</sup> Practical Measures For The Prevention of An Arms Race In Outer Space (2019)<sup>[88]</sup>, Space 2030 Agenda<sup>[89]</sup>, Guidelines for the Long-term Sustainability of Outer Space Activities (LST Guidelines)<sup>[90]</sup>, Best Practices For Sustainable Lunar Activities<sup>[91]</sup>, assume great importance. International deliberation is focused on addressing the technical issues related to the international governance of outer space security, including questions about the placement of conventional weapons or use of force in outer space, means of international cooperation and universal access, the long-term sustainability of the space environment, space traffic management, and such emerging issues as the utilization of space-based mineral resources( Space Security Index Report, 2019). Other concerns include the placement of large constellations and mega-constellations in outer space, including the serious congestion of the low Earth orbit, which is preventing developing countries from having equitable access to that orbit, the over-occupation of frequencies assigned by the ITU, and the risks of impinging on national sovereignty and other regulatory inconsistencies.<sup>[92]</sup>

## II. Peaceful Purposes

The principle use of space for peaceful purposes is a central feature of international space law. To put it differently, maintenance of space for peaceful purposes is the leading challenge of international space law.<sup>[93]</sup> In *Threats to Peaceful purposes of Outer Space: Politics and Law*, the authors underline the historic and contemporary relevance of the principle. The principle, speaks of the horrors of World War II and the appearance on the world stage of nuclear and other weapons with significantly higher potential for destruction. Second, it represents the political will of the two superpowers, among all others, to prefer international diplomacy and not to extend the then-existing rivalries to a new field. Third, it represents the voice of the newly independent countries and other non-spacefaring powers to protect their future interests in outer space. Fourth, it speaks of the value of multilateralism as the better option for peace, security, and prosperity of all.<sup>[94]</sup> To many others, the principle is fundamental in addressing the growing risk of an arms race in outer space, including the advancement in anti-satellite (ASAT) technology and the growing dependence on satellites from a civil and military perspective.<sup>[95]</sup>

The Principles Declaration, on the "use of outer space for peaceful purposes" provides, "recognizing the common interest of all mankind in the progress of the exploration and use of outer space for peaceful purposes...The activities of States in the exploration and use of outer space shall be carried on in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding".<sup>[96]</sup> Also, Article IV of the OST expressly outlaws "the establishment of military bases, installations, and fortifications, the testing of any weapons and the conduct of military manoeuvres on celestial bodies."<sup>[97]</sup> Article IV provides, "State Parties to the Treaty undertake not to place in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner". Further, under Article 3, the Moon Agreement provides, "the Moon shall be used by all States Parties exclusively for peaceful purposes...Any threat or use of force or any other hostile act or threat of hostile act on the Moon is prohibited. It is likewise prohibited to use the Moon to commit any such act or engage in any such threat about the earth, the Moon, spacecraft, the personnel of spacecraft or man-made space objects".<sup>[98]</sup> The GA Resolution No First Placement of Weapons in Outer Space reaffirms the importance and urgency of the objective to prevent an arms race in outer space and the willingness of States to contribute to reaching this common goal.<sup>[99]</sup> On the subject matter of the Resolution, Liu and Tronchetti write, "it is the first time that the General Assembly has passed a resolution addressing a specific Prevention of an Arms Race in Outer Space (PAROS) issue, namely the (prohibition of) placement of weapons in space. It indicates that PAROS remains a central topic in the agenda of States and its controversial adoption demonstrates that States maintain substantial differences in the approach to enhance the security of space objects." Other additions include the emphasis on transparency and confidence-building measures (CBM) in outer space activities and the encouragement to all States to uphold as appropriate a political commitment not to be the first to place weapons in outer space.<sup>[100]</sup> The Resolution on Practical

Measures For The Prevention of An Arms Race In Outer Space (2019) reaffirms that an arms race in outer space would be a grave threat to international peace and security. The Resolution urges Member States, particularly those with major space capabilities, to contribute actively to the prevention of an arms race in outer space to promote and strengthen international cooperation in the exploration and use of outer space for peaceful purposes. The Resolution further supports the agenda for a binding legal regime to prevent the weaponization of outer space.<sup>[101]</sup>

### III. Province *of mankind* and Benefits

The OST explicitly confirms the equality of all States under international law, regardless of their degree of economic or scientific development. According to Trombly, the notion of outer space as a resource for all has been memorialized in several international agreements.<sup>[102]</sup> Article IX of the OST provides, "in the exploration and use of outer space, including the Moon and other celestial bodies, State Parties to the treaty shall be guided by the principle of co-operation and mutual assistance and shall conduct all their activities in outer space, including the Moon and other celestial bodies, with due regard to the corresponding interests of all other State Parties to the treaty". Article IX of the OST "stands as a broad obligation of States and necessitates good faith on the part of all parties in space activities with due regard to the corresponding interests" of other States.<sup>[103]</sup> According to Hobe and Man, all States, in light of the OST, must be presumed to have an equal interest in regulating the regime of natural resources in outer space for exploitation by their citizens or through space objects launched on their registry.<sup>[104]</sup>

### IV. Non-appropriation

The principle of non-appropriation is a corollary to outer space as the province of mankind. The principle has been emphasized in several binding and non-binding rules on outer space. Article II of the OST provides, "outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use of occupation, or any other means". The scope of Article II of the OST has been subject to two divergent opinions. On the one hand, it prohibits any exclusive rights over space and celestial bodies. This view designates outer space as the province of all mankind or international commons. The other view suggests that the provision, i.e., Article II, is open-ended. This view means that the provision is unclear - and consequently, it could not be considered an explicit prohibition as it does not, in a clear way, formulate a ban on specific uses.<sup>[105]</sup> According to Neto, outer space is an example of global commons i.e. a resource domain to which all nations have access, but none has the right to claim sovereignty. Further, outer space is an international territory, where activities should be conducted for the benefit and interest of all nations, irrespective of their degree of economic and scientific development.<sup>[106]</sup> The OECD Sustainability Report (2020) emphasizes the geographic,



social, and intergenerational dimensions of equitable access as being integral to the principle of non-appropriation. <sup>[107]</sup>

In addition to the OST, the Moon Agreement, the principle of non-appropriation applies to celestial bodies. Article 11 of the Agreement provides, "the Moon and its natural resources are the common heritage of mankind...The Moon is not subject to national appropriation by any claim of sovereignty, by means of use or occupation, or by any other means". In essence, the principle "prohibits claims to ownership in outer space ."<sup>[108]</sup> The principle is also emphasized in the Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, taking the Needs of Developing Countries, 1997 (i.e., the Benefits Declaration)<sup>[109]</sup>, and the Guidelines On National Systems<sup>[110]</sup>. On the future of international space law, a proposal comes from Doo Hwan Kim, who speaks for the establishment of a New International Space Agency for Mining the Natural Resources on the Moon, Mars, and Other Celestial Bodies. According to Kim, a new International Space Agency must be established to develop efficiently and effectively the minerals and precious natural resources buried in the Moon, Mars, Asteroid, Saturn, Jupiter, Titan, and other celestial bodies.<sup>[111]</sup>

## V. Long Term Sustainability

Long term sustainability means "the ability to maintain the conduct of space activities indefinitely into the future in a manner that realizes the objectives of equitable access to the benefits of the exploration and use of outer space for peaceful purposes, in order to meet the needs of the present generations while preserving the outer space environment for future generations".<sup>[112]</sup> The responsibility for the sustainable use of outer space rests on all space actors, including state and non-state. In the words of Brachet, it is the responsibility of national governments, regional and international organizations, and commercial operators to find a common approach to the sustainable use of outer space.<sup>[113]</sup> To Martinez, space sustainability is a global challenge that can be addressed if all countries act collectively.<sup>[114]</sup>

On the part of the COPUOS, the Space 2030 Agenda invests in a comprehensive understanding of space sustainability. The Agenda includes the commitment of States and other actors around four pillars of space economy, space society, space accessibility, and space diplomacy .The core objectives, as outlined in the Agenda are;<sup>[115]</sup>

1. Enhancing space-derived economic benefits and strengthening the role of the space sector as a major driver of sustainable development
2. Harnessing the potential of space to solve everyday challenges and leverage space-related innovation to improve the quality of life

3. Improving access to space for all and ensuring that all countries can benefit socioeconomically from space science and technology applications and space-based data, information, and products, thereby supporting the achievement of the Sustainable Development Goals.

In 2019, the COPUOS Working Group on the Long-Term Sustainability of Outer Space Activities adopted 21 Voluntary Guidelines on the sustainable use of Outer Space. The LST Guidelines include sub-agendas including the sustainable space utilization and sustainable development on Earth, Space Situational Awareness (SSA), weather, and regulatory regime and guidance for actors in space.<sup>[116]</sup> According to Martinez, the LST guidelines address the policy, regulatory, operational, safety, scientific, technical, international cooperation, and capacity-building aspects of space activities. Further, they are based on a substantial body of knowledge and the experiences of States, international intergovernmental organizations, and relevant national and international non-governmental entities.<sup>[117]</sup> The LTS guidelines support international organizations and countries to develop policies that “avoid causing harm to the outer space environment and the safety of space operations.”<sup>[118]</sup> The LST Guidelines have been referred as “**foundational for the safe and responsible use of outer space**”.<sup>[119]</sup>

The LST agenda and the 2019 Guidelines are shaping the adoption of specific standards by space actors. The Finland Act on Space Activities (2018) for instance, under Section 10 provides “space activities shall be carried out in an environmentally sustainable manner and promotes the sustainable use of outer space. In its application for authorization, the operator shall assess the environmental impacts of the activity on the Earth, in the airspace and in outer space and present a plan for measures to counter or reduce any possible adverse environmental impacts”. Similarly, other governments have adopted legislative frameworks addressing the sustainability agenda.<sup>[120]</sup> Contributions are also being made by non-state actors. The Space Safety Coalition<sup>[121]</sup> for instance, adopted the document containing the Best Practices for the Sustainability of Space Operations. The document is defined as a living set of best practices to address gaps in current space governance and promote better spacecraft design, operations, and disposal practices aligned with long-term space operations sustainability. The document lists the following, namely;

1. Spacecraft owners, operators, and stakeholders should exchange information relevant to safety-of-flight and collision avoidance;
2. In selecting launch service providers, space operators should consider the sustainability of the space environment;
3. Mission and constellation designers and spacecraft operators should prioritize space safety when designing architectures and operations concepts for individual spacecraft, constellations and/or fleets of spacecraft; and

4. Spacecraft operators should adopt space operations concepts that enhance the sustainability of the space environment.

In short, the sustainability agenda is contributing towards extensive research and development of international and national standards on the aforementioned concerns.

## VI. International Responsibility and Cooperation

International responsibility *vis-à-vis* outer space brings the focus on;

1. The rule-making authority of states (including the making and content of national space law frameworks and strategies)
2. The responsibility of states for the activities conducted in outer space (including regulation of activities of non-states)
3. The responsibility to cooperate towards the formation of rules concerning outer space (including collaboration with other space actors)
4. The responsibility to comply and coordinate.

On the rule-making powers of states, Hobe and Man write, "no single state has at all jurisdiction on this question as outer space, celestial bodies and thereby also space resources are not subject to national jurisdiction". Further, the role of municipal legislation in this context should be limited to ensuring that State nationals adhere to the international framework."<sup>[122]</sup>

On international responsibility for activities in outer space, Article VI of the OST provides, "States Parties to the treaty shall bear international responsibility for national activities in outer space, including the Moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions as outlined in the present Treaty".<sup>[123]</sup> Article VI of the OST is interpreted as being distinct from the traditional concept of state responsibility, which attributes responsibility on states for the acts committed by them. Under the OST, the responsibility of a State can arise for space activities undertaken by non-governmental entities, as long as they qualify as national activities in outer space. <sup>[124]</sup>

The responsibility to comply, coordinate, and cooperate includes the general responsibility to abide by rules of international law. The OST, under Article III provides, "State 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". Article III can be listed as a more general kind of provision. Article I of the OST, on the other hand, speaks of a specific context. It states, "there shall be freedom of scientific investigation in outer space...and States shall facilitate and

encourage international cooperation in such investigation". Another example is the Resolution No First Placement of Weapons in Outer Space. Under the international space law framework, the requirement for compliance, cooperation, and coordination also applies to non-state entities.<sup>[125]</sup>

The above-mentioned developments and discussions explain how the six principles constitute an integral part of international space law, shaping not just the way space rules are made, but also how they are perceived and applied.

## C. Interface

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A fascinating area of study is the intersection of space rules with other legal rules including those under environmental law,<sup>[126]</sup> human rights law, disaster management law, climate change law,<sup>[127]</sup> etc. These intersections are leading to the creating of new concepts, strategies and institutional mechanisms. At the same time, they uncover the gaps in the international rules.

In the case of sustainable development for instance, efforts have been made to extend the use of space technology and resources towards attainment of various development goals.<sup>[128]</sup> In the Resolution on International cooperation in the peaceful uses of outer space (2021),<sup>[129]</sup> the GA emphasized on the need "to contribute to an orderly growth of space activities favorable to sustained economic growth and sustainable development in all countries, including strengthening sustainable spatial data infrastructure at the regional and national levels and building resilience to reduce the consequences of disasters, in particular in developing countries".

In the case of human rights and space law, a strong case has been advanced for the application of existing international human rights standards to outer space and the utilization of space technology and other benefits for the fulfillment of human rights objectives. Many have spoken of the need to extend international human rights instruments including the Universal Declaration on Human Rights (UDHR) to outer space. According to Tjandra , the proliferation of government and commercial activities raises important legal questions about the duties of States to observe and protect human rights in outer space. First, do human rights obligations apply extraterritorially to outer space? Second, if the answer to the former is yes, then what are those rights and to what extent are the rights modified in their application to space? To what extent are human rights universal? More specifically, does the right to life apply extraterritorially to impose obligations on States in their activities in outer space?<sup>[130]</sup> According to Bonilla, in the advent of private-funded settlements on Mars, human rights under the UDHR will have to be protected. These include the right against arbitrary detention (Article 9), the right to privacy (Article 12), the right to nationality (Article 15), the right to marriage and family (Article 16), and the right to freedom of assembly and association (Article 20).<sup>[131]</sup> Others proposals emphasize the need for a

resolution to recognize outer space as "conflict-free for the enjoyment of fundamental rights and freedoms as enumerated in the Universal Declaration of Human Rights".<sup>[132]</sup>

On the application of space benefits for human rights, the authors of *Slavery from Space*<sup>[133]</sup> advocate for the use of high-resolution satellite remote sensing for the investigation of human rights abuses, particularly slavery. As expressed, "by using remotely sensed data, and associated geospatial science and technology, the lack of reliable and timely, spatially explicit and scalable data on slavery activity that has been a major barrier could be overcome. Indeed this is just one of many examples of how crucial remotely sensed data are to achieving a more sustainable world".

## Conclusion

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### Summary I: Space Law

Outer space law is a unique framework of international law. Its strength is its reliance on a set of *higher principles* and *consensus-based* development of rules. However, in its bid to regulate the challenges concerning outer space, it requires innovative reforms. In this regard, the following are some of the commonly advanced views on space law and related reforms;

1. **Treaty Reforms:** There should be reforms in the existing treaty frameworks, either through amendments to existing treaties or through the adoption of new ones. (to incorporate provisions for dispute resolution, human rights, commercialization, disarmament, space habitat, land and property rights, etc.)
2. **Responsibility of States:** There should be more clarity on the responsibility of States towards the treaties they are not a party to (example, Moon Agreement)
3. **Non-binding Instruments:** There is a need to determine the influence of the non-binding instruments/resolutions on state behavior. Also, to determine the benefits or efficacy of employing soft law instruments for the regulation of space activities.
4. **National Laws:** With national laws as an active field of reform and evolution of space rules, there is a need to establish uniformity in national laws and activities concerning certain objectives of international space law.
5. **Borrowed concepts:** More work is needed to determine the relevance of borrowing concepts and meanings from other fields of law like human rights law, environmental law, intellectual property law, disaster management, etc.
6. **Validity of Agreements:** Need for clear standards to assess the validity and compatibility of the newly forged agreements and instruments.

## Summary II: Space and Concepts

In the chapter, emphasis is on the fundamental principles and concepts in space law. The future of space law, to a great extent, depends on the determination of more such ethical and legal considerations. Consider the following;

1. Is outer space a living space?
2. What is the sanctity of space to human life? What is it a source of, resources, knowledge?
3. How to use space resources for Earth Sustainability?
4. What is the moral and legal responsibility for harm to outer space including planets?
5. What are equality and justice in terms of outer space?

## Further Readings

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## Footnotes

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