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## **GROWTH OF SPACE LAW AND ITS IMPLICATIONS: OUTER SPACE AND INTERNATIONAL LAW**

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### **ABSTRACT**

Space law encompasses both international and domestic agreements, laws, and principles governing space-related activity. Space exploration, accountability for damage, weapon usage, rescue missions, environmental protection, information sharing, new technologies, and ethics are all aspects of space law. Administrative law, intellectual property law, arms control law, insurance law, environmental law, criminal law, and commercial law are all intertwined with space law. This paper aims to discuss in detail the developing Space Law. The basic questions of research would be that what is the relation between International Law and Outer Space Law; how is the commercialisation of space activities regulated; and the trends in case laws. Numerous International Covenants and Treaties would be analysed to answer these Research Questions. This paper will aim at finding the voids to be filled in by the legislations currently in operation. When Sputnik I was successfully orbited on October 4, 1957, it was widely assumed that humanity had entered a new era, the Age of Space. Both of these faces of space, as a battleground for national goals and as a nation-spanning test of humanity's talents and knowledge, represent reality. Satellite science is teaching men more about the nature of space, solar weather, conditions on planet surfaces, and the true face of the planet Earth than they ever imagined. New spacecrafts are being launched, bringing new technology to bear on the world's ever-present and everemerging issues. Previous space activity was conducted in accordance with universally agreed-upon standards enshrined in UN resolutions and treaties. Space activities should be carried out in a peaceful manner and for the benefit of all people. The new space systems' behaviour is studied in light of these and other concepts as a backdrop for judging their current and future potential. The importance of peace and the undesirability of war, as well as any conditions and developments that weaken peace and international cooperation, are the fundamental foundation for exploring the functions of outer space law and its technology in the globe.

## I. INTRODUCTION

Outer Space is the void that exists between celestial bodies, including Earth. Although there is no clear boundary between Earth's atmosphere and space, the Fédération Aéronautique Internationale established a boundary between aeronautics and astronautics, at an altitude of 100 km, called Kármán Line.<sup>1</sup> The United States designates people who travel above an altitude of 80 km as astronauts.

Space Law is the body of law governing space related activities.<sup>2</sup> It is a collection of those legal instruments, comprising both national and international laws and customs that govern human conduct in the Space. During the years preceding World War II, significant progress in space technology was made in countries such as USSR, Germany and USA. The great breakthrough of 1957, when Sputnik became the first satellite to orbit the Earth was followed by a series of further successful experiments, aimed at exploring this new dimension.<sup>3</sup> Since Sputnik was launched by the Soviet, the United States perceived it as a threat to the national security and technological leadership. It immediately passed the National Aeronautics and Space Act in the year 1958 and established National Aeronautics and Space Administration (NASA).<sup>4</sup> In April, 1961, Yuri Gagarin completed the first manned space flight, and in 1969, Neil Armstrong became the first human being to step foot on Moon. It had, by then, become apparent that legal rules were indispensable if confusion and undesirable practices in the use of outer space were to be avoided. In the wake of burgeoning space technology, space law soon became a reality.<sup>5</sup>

Since the launch of Sputnik 1 by the USSR in October, 1957, the development of Space Law has been remarkably rapid. On 12<sup>th</sup> December 1959, UN adopted Resolution 1472 (XIV), establishing a Committee on Peaceful Uses of Outer Space (COPUOS).<sup>6</sup> On

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<sup>1</sup> S. Sanz Fernández de Córdoba, 100 km Altitude Boundary for Aeronautics, Records, (July 31, 2017), <http://www.fai.org/icare-records/100km-altitude-boundary-for-astronautics>.

<sup>2</sup> Space Law Resources, Information for Students, (July 31, 2017), <http://www.unoosa.org/oosa/en/informationfor/students.html>.

<sup>3</sup> I. H. Ph. Diederiks-Verschoor & V. Kopal, *An Introduction to Space Law 2* (3<sup>rd</sup> ed. 2008).

<sup>4</sup> Roger D. Launius, *NASA history and the challenge of keeping the contemporary past*, (3<sup>rd</sup> ed. 1999).

<sup>5</sup> *Id.*

<sup>6</sup> History, About us, (July 31, 2017), <http://www.unoosa.org/oosa/en/aboutus/history/index.html>.

20<sup>th</sup> December 1961, the UN passed Resolution 1721, setting forth the two major legal principles applicable to outer space:

- a) International law, including the UN Charter, applies to outer space and celestial bodies;
- b) Outer Space and celestial bodies are free for exploration and use by all States in conformity with international law and are not subject to national appropriation.<sup>7</sup>

## II. THE SPACE LAW TREATIES

The resolutions laid down the rights and responsibilities of the States in the exploration of Outer Space. Subsequently, treaties and conventions were adopted by the Member States of the United Nations. Five international treaties were negotiated and drafted by the UNCOPUOS, the principle international body involved in the development of international space law<sup>8</sup>.

### 1. The 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (The Outer Space Treaty).

Spoken of as the Magna Carta of Space, this treaty gave shape to all human aspirations that brought mankind into space.<sup>9</sup> The preamble of the Treaty refers to the common interests of all mankind, use of outer space for the benefit of all mankind, use of outer space for the benefit of all peoples, broad international cooperation in the scientific and legal aspects of space exploration, and also the development of mutual understanding and friendly relations through cooperation. The parties to this are under an obligation to not place any weapon of mass destruction into orbit around any celestial object in outer space. Outer Space is only meant for 'peaceful purposes'. Party whose vehicle is launched and the party from whose territory the object is launched

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<sup>7</sup> Resolution Adopted by the General Assembly, Space Law, (July 31, 2017), [http://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/resolutions/res\\_16\\_1721.html](http://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/resolutions/res_16_1721.html).

<sup>8</sup> Official Website: [http://www.unoosa.org/pdf/publications/st\\_space\\_11rev2E.pdf](http://www.unoosa.org/pdf/publications/st_space_11rev2E.pdf) (last visited on July 31, 2017) (UN Treaties and Principles on Outer Space is the Text of treaties and principles governing the activities of States in the exploration and use of outer space and related resolutions adopted by the General Assembly)

<sup>9</sup> S. Bhatt, Legal Controls of Outer Space 7 (1973, S. Chand and Comapny).

are both liable for the damage caused by the object on Earth. It also provides that outer space shall not be subject to national appropriation by claim of sovereignty, or means of use or occupation, or by any other means.

Space Treaty is, therefore, a world charter for exploration of Outer Space. As of March, 2017, 105 countries have been ratified the treaty.<sup>10</sup>

## **2. The 1968 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (The Rescue Agreement).**

The agreement is basically an elaboration of Article V of the Outer Space Treaty.<sup>11</sup> It calls for rendering all possible assistance to astronauts in the event of distress, accident or emergency, and prompt return of astronauts and space objects to the launching state. It proclaims that the state on whose registry an object launched into outer space has been entered, retains jurisdiction and control over that object and all its personnel while they are in outer space. The parties' whose space objects are discovered in the territory of another state or high seas or any other place which is not subject to any territorial sovereignty will have the right to be notified about their objects.<sup>12</sup> The personals of such objects shall also be returned safely to their states. The expenses of such work shall be borne by the launching State.<sup>13</sup> As of March, 2017, 95 countries have ratified the treaty.

## **3. The 1972 Convention on International Liability for Damage Caused by Space Objects (The Liability Convention).**

The provisions of Article VII and partly of Article VI of the Space Treaty have been elaborated. It makes the States liable for damage caused in space or on Earth by space objects. Under the regime of absolute liability, the states will be liable even under circumstances of *force majeure*.<sup>14</sup> When damage is caused to a third state by two independently launching states, they would be jointly liable.<sup>15</sup> Exoneration from

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<sup>10</sup> [http://www.unoosa.org/documents/pdf/spacelaw/treatystatus/AC105\\_C2\\_2017\\_CRP07E.pdf](http://www.unoosa.org/documents/pdf/spacelaw/treatystatus/AC105_C2_2017_CRP07E.pdf)

<sup>11</sup> Supra Note 9.

<sup>12</sup> Article 4 of the Rescue Agreement, 1968.

<sup>13</sup> Article 5.5 of the Rescue Agreement, 1968.

<sup>14</sup> Francis Lyall & Paul B. Larsen, *Space Law- A Treatise* 37 (2009, Routledge).

<sup>15</sup> Article 4 of the Liability Convention, 1972.

liability is possible, provided launch has been carried out in accordance with international law, the UN Charter and the Outer Space Treaty.

The Liability Convention, thus, provides a just mode of compensation in case of damage caused. There is no requirement for exhaustion of local remedies. The Claims Commission ensures that damage is paid for.<sup>16</sup> As of March, 2017, 94 countries have ratified the treaty.

#### **4. The 1975 Convention on Registration of Objects Launched into Outer Space (The Registration Convention).**

The convention, like others, traces back its roots to the Outer Space Treaty, enlarging Article VIII. It is not possible to identify a spacecraft that has caused damage without a system of registration. Moreover, a well-ordered, complete and informative system of registration would minimize the likelihood and suspicion of weapons of mass destruction, being secretly put into orbit. All the parties are required to maintain a register which contains the details of their space activities and even UN maintains a consolidated register. As of March, 2017, 63 countries have ratified the treaty.

#### **5. The 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (The Moon Treaty).**

The Preamble recognises that Moon, as a natural satellite of Earth, has an important role to play in the exploration of outer space. This agreement purports to promote, equally, the further development of cooperation among states in the exploration of Moon and other celestial bodies, and desires to prevent Moon from becoming an area of international conflict, bearing in mind its potential benefits which may be derived from the exploitation of natural resources of the Moon and other celestial bodies. The Moon Agreement is a major contribution towards a peaceful and just international order in space. As on March, 2017, 17 countries have ratified the treaty.

Four more declarations had been adopted by the General Assembly for which the COPUOS for a long time. These relate to Direct Television Broadcasting (1982),

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<sup>16</sup> Article 18 of the Liability Convention, 1972.

Remote Sensing of Earth Resources (1986), Use of Nuclear Power Sources in Space (1992) and Cooperation for the Benefit of all States (1999).<sup>17</sup>

Despite all the treaties and conventions in place, there are still many unanswered questions which needs to be addressed.

### III. MATTERS IN ISSUE IN RELATION TO OUTER SPACE

Space law has brought forth a vision for harmony in universe and unity of knowledge. It also encompasses several challenges ahead. They need to be addressed at the earliest.

Some of them have been dealt here.

#### 1. Space Tourism

Space tourism can be defined as any commercial activity offering customers direct or indirect experience with space travel. Space tourist is defined as someone who tours or travels into, to, or through space; or to a celestial body for pleasure or recreation.<sup>18</sup> Suborbital spaceflight are ones in which orbital velocities are not achieved. They are basically straight up and down rocket flights which attain at altitude of 100 to 200 kilometres. In Orbital spaceflight, orbital velocity is achieved to keep the vehicle flying along the curvature of the Earth, and not to fall back to the atmosphere. Because of the high speed, orbital spaceflight is technically much complex and therefore, expensive.<sup>19</sup> International law does not refer anywhere to tourists, but does consider space travel by 'astronauts' and 'personnel of spacecraft'. Probably, space tourists would then fall under spacecraft personnel. It is important to define them, as the rights and obligations depend on their recognition.

Dennis Tito, former California millionaire became the world's first space tourist to visit the ISS, when the Russian space agency launched him on 28<sup>th</sup> April, 2001.<sup>20</sup> He reportedly plunked down \$20 million for this flight.<sup>21</sup> Virgin Galactic is the world's

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<sup>17</sup> *Id.*

<sup>18</sup> Zeldine Niamh O'Brien, Liability for Inquiry, Loss or Damage to the Space Tourist, 47<sup>th</sup> Colloquium for the International Institute of Space Law, 2004

<sup>19</sup> Steven Freeland, Space Tourism and International Law of Outer Space, *Chi. J. Int'l IL* (2005).

<sup>20</sup> World's First 'Space Tourist' Lifts Off, ABC News, (September 4, 2017), <http://abcnews.go.com/Technology/story?id=98612&page=1>.

<sup>21</sup> Mike Wall, First Space Tourist: How a U.S. Millionaire Bought a Ticket to Orbit, Private Spaceflight, (September 4, 2017), <https://www.space.com/11492-space-tourism-pioneer-dennistito.html>.

first commercial space line.<sup>22</sup> It has been granted the license to take tourists for space travel, and has carried out the 'dry run' for upcoming powered test flights.<sup>23</sup> In another news, the CEO of SpaceX, Elon Musk, has revealed an ambitious plan to fly two private space tourists around the Moon in 2018. The launch will be using company's Dragon crew capsule and Falcon Heavy Rocket for the same.<sup>24</sup>

## 2. Space Mining

With the advancement of commercial activities in space, new prospects are emerging. Lately, asteroid mining has gained much hype. The local space resources will enable economic growth similarly how resource frontiers of Earth had been explored. Near Earth asteroids are the targets, as their orbits are quite similar to us. They also have little mass, and therefore less gravity, making it easier to extract.<sup>25</sup> Different type of asteroids have been discovered and classified. C-type asteroids can be used to mine water, X-type for Platinum, and S-type are a source of chondrite meteorites. Multiple companies are trying to initiate space mining activity, like Deep Space Mining and Planetary Resources. The operative treaty provisions mandate that although nations are free to use and explore outer space, it is for the benefit of all mankind, and nations cannot appropriate space by claiming sovereignty.<sup>26</sup> But in 2015, United States passed the SPACE Act, allowing citizens to engage in commercial exploration and exploitation of space resources.<sup>26</sup> Recently, in July, 2017, Luxembourg's parliament has passed a law, making it the first European Union country, offering legal certainty that asteroid mining companies get to keep what they find in space.<sup>27</sup>

## 3. Militarization of Space

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<sup>22</sup> Official website of Virgin Galactic: <http://www.virgingalactic.com/who-we-are/>

<sup>23</sup> Jeff Foust, Virgin Galactic Carries Out "Dry Run" for Powered SpaceShipTwo Flights, Spaceflight, (September 4, 2017), <https://www.space.com/37723-virgin-galactic-carries-out-dry-run-for-powered-spaceshiptwoflights.html>.

<sup>24</sup> Matt McFarland, SpaceX to fly two space tourists around the moon in 2018, Future Tense, (September 4, 2017), <http://money.cnn.com/2017/02/27/technology/spacex-moontourism/index.html>.

<sup>25</sup> Official website of Deep Space Mining: <http://deepspaceindustries.com/mining/> <sup>26</sup>

Philip R. Harris, Space Law and Space Resources, (September 4, 2017), <http://www.nss.org/settlement/nasa/spaceresvol4/spacelaw.html>.

<sup>26</sup> Title IV- Space Resource Exploration and Utilization, (September 4, 2017), <https://www.congress.gov/bill/114th-congress/house-bill/2262/text>.

<sup>27</sup> Andrew Silver, Luxembourg passes first EU space mining law, Science, (September 4, 2017), [https://www.theregister.co.uk/2017/07/14/luxembourg\\_passes\\_space\\_mining\\_law/](https://www.theregister.co.uk/2017/07/14/luxembourg_passes_space_mining_law/). <sup>29</sup> Francis Lyall & Paul B. Larsen, Space Law- A Treatise 499 (2009, Routledge).

Unimpeded access and unrestricted freedom to use outer space and celestial bodies provides a tempting opportunity for a technologically advanced country to seize control of outer space and deny freedom of use to other countries that stand in its way. A country in possession of unique advanced space technology and with the will and means to use it for military purpose might achieve dominance over nonspace-faring countries.<sup>29</sup> A number of arms control treaties have been concluded which significantly inhibit the militarization of Outer Space. The Partial Test-Ban Treaty, 1963, bans any nuclear explosion in outer space. The Outer Space Treaty in Article IV requires the Moon and other celestial bodies to be used exclusively for peaceful purposes. The SALT BAM Treaty, 1972 and the Protocol of 1976 limit the permissible deployment of anti-ballistic missile systems to one site, each for the Soviet Union and the U.S. The Charter of the U.N. forbids the threat or use of force of any kind, but also retains the right of individual or collective self defence.<sup>28</sup> Although each of the relevant provisions of the above mentioned treaties has been conscientiously observed by the all the parties concerned, the treaties are no longer adequate to prevent an arms race in Outer Space. Launched in May 2016, the Manual on International Law Applicable to Military Uses of Outer Space (MILAMOS) Project aims to develop a widely accepted manual clarifying the fundamental rules applicable to the military use of outer space. It will clarify the limitations imposed by the international law on the threat or use of force in Outer Space. In the scenario of rapidly developing technologies and applications, it aims to look at what use and object is lawful, and what is prohibited. Hopefully, this will pave way for a better law enforcement mechanism and for a defined law on this topic.

#### **4. Global Navigation Satellite System**

The Global Navigation Satellite System (GNSS) was identified as a potential benefit of space quite early in the space age. Accurate knowledge as to the location and velocity of spacecraft is essential. GNSS are space based positioning and navigation systems designed to provide worldwide, all weather, passive, three dimensional position, velocity and timing data.<sup>29</sup> Both the internet and the GNSS are dual use; that is both have military and civilian uses, and the military has a

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<sup>28</sup> Julie Dahlitz, Arms Control in Outer Space 155 (Vol. 38, 1982).

<sup>29</sup> E.D. Kaplan & C. Hegarty, Understanding GPS: Principles and Applications, (2<sup>nd</sup> ed. 2005).<sup>32</sup> Global Navigation Satellite Systems (GNSS), Areas of work, (September 4, 2017), <http://www.unoosa.org/oosa/en/ourwork/psa/gnss/gnss.html>.



significant role in their creation. At present GNSS include two fully operational global systems, the United States' Global Positioning System (GPS) and the Russian Federation's GLObal NAVigation Satellite System (GLONASS), as well as the developing global and regional systems, namely Europe's European Satellite Navigation System (GALILEO) and China's COMPASS/Bei-Dou, India's Regional Navigation Satellite System (IRNSS) and Japan's Quasi-Zenith Satellite System (QZSS).<sup>32</sup> Once all these regional and global systems become fully operational, the user will have access to positioning, navigation and time signals from over 100 satellites. The successful completion of the work of the International Committee on Global Navigation Systems (ICG), particularly in establishing interoperability among the global systems, will allow a GNSS user to utilize one instrument to receive signals from multiple systems of satellites.

#### IV. SUGGESTIONS

Keeping in mind the above listed issues, and many which are not discussed here, a lot needs to be developed in Space Law. Firstly, there is a lot of ambiguity regarding the definition of important terminologies. Some of them being space tourist, launching state, space object, etc. Secondly, the issue of sovereignty needs to be addressed at the earliest. The Outer Space treaty bars any kind of national appropriation. But, with the advancement of commercialization, there may be private entities who wish to buy property in space. Or, with the growth of space tourism, there may emerge a need for construction of celestial hotels. Naturally, the owner will demand a legal protection of his right over it. Even with space mining, the State which does not have the means to extract resources will be left behind in terms of development, if the technologically advanced states deplete the present resources. Thus, new rules regarding sovereignty and jurisdiction are a must. Thirdly, with space exploration comes the emerging issue of environmental degradation. Space debris is a major threat to not only space activities, but also to human life. China's intentional destruction of Fengyun-1C weather satellite in 2007 and collision of Russian and American communication satellites in 2009 contributes to around 1/3<sup>rd</sup> of orbital debris.<sup>33</sup> Lastly, the issue of privacy comes into picture, with each country setting up its own geo-positioning satellite. There needs to be a law governing it as well. Need of the hour is that all the

countries should come together at the platform and recondition the existing treaties and conventions.

Peng-Wang, Tragedy of Commons in Outer Space : the Case of Space Debris, (64<sup>th</sup> ed. 2013).

## V. CONCLUSION

Space age and space exploration have had an impact on all aspects of global society. We share a common vast frontier of space. Thus, space has united mankind. It has promoted a creative world order with unity in diversity of international life.<sup>30</sup>

Space law is maturing as well as bifurcating. Fifty years after the Outer Space Treaty, there is much to satisfy in what has been accomplished. Many issues are taken to be settled. It is many a times suggested that outer space treaties should be revised and codified.<sup>35</sup> There are several challenges ahead, such as, commercial human spaceflight, space debris, export control reform and flags of convenience, etc.<sup>31</sup> Maintaining ecological balance is another predominant concern of mankind.<sup>32</sup> The most likely way to progress in many fields is international cooperation, given the huge investments that space activities require.

Lately, a Congressional committee is proposing that the US armed forces add a new military branch that would, quite literally, send soldiers out of this world. Congress members have laid the groundwork to establish new military branch called Space Corps, by the end of 2019.<sup>33</sup> The authors of the idea say a separate and dedicated force devoted to space is required to keep the US ahead of adversaries like Russia and China in the still-emerging domain of space-war.

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<sup>30</sup> Sandeepa Bhat B., *Space Law in the Era of Commercialization* 12 (2010, Eastern Book Company)

<sup>35</sup> I.M. Kolosov & V.I. Tituskin, *Is it time to develop a universal comprehensive Convention on the law of Outer Space* (85 ed. 2002).

<sup>31</sup> Matthew J. Kleiman, *Space Law 101: An Introduction to Space Law*, (July 31, 2017), [https://www.americanbar.org/groups/young\\_lawyers/publications/the\\_101\\_201\\_practice\\_series/space\\_law\\_101\\_an\\_introduction\\_to\\_space\\_law.html](https://www.americanbar.org/groups/young_lawyers/publications/the_101_201_practice_series/space_law_101_an_introduction_to_space_law.html).

<sup>32</sup> *Supra* Note 9.

<sup>33</sup> Jason Kopp, *Space Warfare: America could soon have a new branch of the military protecting outer space*, Military, (September 4, 2017), <http://www.foxnews.com/us/2017/06/23/space-warfare-america-could-soon-have-new-branch-military-protecting-outer-space.html>.

In the race, India has launched many successful missions, making it at par with U.S. and Russia. The Indian Space Research Organisation came into existence in 1969. Aryabhata was the first India satellite.<sup>34</sup> The launch of Chandrayan I and II, and Mangalyaan in the last decade, paved India's capability in Space technology. As of now, the only evident step in the space arena is the draft Geospatial Information Regulation Bill, 2016. According to this, it becomes mandatory to take government's permission before acquiring, disseminating, publishing or distributing any geospatial

It is vitally important for the corporations to understand the outer space law and its basic principles. Sharing the benefits of Outer Space does not simply imply giving a slice of the pie to each country. Rather, its proceeds are to be used to increase the quality of life on Earth. A unique opportunity exists out there, and a unique body of law must exist to make sure that the opportunity becomes a reality.<sup>40</sup>

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<sup>34</sup> Senjuti Mallick, Why India needs a Space Law?, Opinion, (September 4, 2017), <http://www.thehindu.com/opinion/open-page/why-india-needs-a-space-law/article19094453.ece>.

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