

## EXPLORING SPACE THROUGH LEGAL PERSPECTIVE

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### Abstract

*“We choose to go to the moon in this decade and do the other things, not because they are easy, but because they are hard, because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one which we intend to win.”*

- John F. Kennedy

*John F Kennedy could not summarise the proposition for space exploration in better words. Space exploration activities enable a country to test its limits and to put its resources in research and development for a better future. From the time that human beings realised the possibilities of outer space exploration, the conjecture of human ethics, inter-cooperation, legal rules, notions of liability expanded. The existing legal framework does provide the answers to various legal implications that are corollary of increased space activities, yet there are many aspects which remain unanswered due to prevailing ambiguities, which surely proves an obstacle for future generations. Mankind's thirst for having the best in fastest possible time, without having to think of long term consequences, may prove fatal for space exploration. There exist various legal issues that need to be resolved for proper regulation of space activities. The Outer Space treaty of 1967 provides that the space is common heritage of all. It belongs to all of us. Undoubtedly, its use should be reflective of values of international cooperation. This article focuses on the various legal issues that emerge due to commercial activities and the liability of States.*

**Keywords:** Space Law, Space Tourism, Space Insurance, Space law and intellectual property rights

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## Introduction

It is all across the news of how SpaceX has recently and successfully launched Falcon Heavy, and the everyday news is covered with recent satellite launches. With advancements in technology and science, space exploration no longer remains a dream. In the year 1957 when Soviet Union launched earth's first artificial satellite Sputnik 1. Not a single country knew what legal implications it could pose for the international community.

Obviously, the likelihood of applying air-space laws to outer earth was much higher not giving importance to the fact that had it been the case, then sputnik's launch would have violated all the air-space laws<sup>1</sup>. Also, the questions of liability, damages, commercial activities would have not been answered if outer space was governed by air-space laws. Space law refers to a body of treaties and conventions agreed to by member countries across the globe, conceding to be governed by provisions of such treaties.

However, the fact that the technology and scientific developments are vigorously dynamic; the treaties that were formulated in 1960's are they enough to answer the future implications of space activities? With research being done on existence of life on mars, and mining of outer space celestial bodies, can the international treaties deal with

the complex legal implications that the future will unfold? Space laws are dynamic and need to be strengthened from time to time in order to be at pace with the robust space activity market. Space laws are also criticised in their approach to applying restrictions on the private entities exploring space activities.

The intellectual property rights involved in space inventions have raised the inefficiency of existing international legal framework. With nations grappling these questions, the existing space laws do ensure the development of space exploration activities. Nevertheless, the need of the hour is to analyse and remove the roadblocks in the way of implementing the international space treaties. Space laws require that there exists international cooperation among different countries. With every recent development that happens, the need to have a strong space law regime and strong international cooperation will ensure that the outer space exploration is balanced without causing environmental damage and protecting interests of every stakeholder.

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<sup>1</sup>See [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).

## The Five Space Law Treaties

Space law is considered as a creature of international law<sup>2</sup>, which is a synthesis of treaties and customs.<sup>3</sup> The Legal Sub Committee of the UN Committee for the Peaceful Use of Outer Space (UNCOPUS), laid down the fundamentals of the international space law which stated that no nation is in any authority to make territorial claims to outer space and celestial bodies within it; all the nations have a free access to space; scientific investigation can be conducted by any nation in space; that national rights to space objects launched by them are preserved; and that nations will cooperate in rendering assistance to crew of spaceships in emergencies. These principles also lay down the foundation for the five treaties that are the framework of international space law.<sup>4</sup> The treaties are as follows:

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<sup>2</sup> The body of space law also includes law enacted by Congress. A recent example is H.R. 3237 enacted by the 103rd Congress dealing with Space Commercialization.

<sup>3</sup> Michael J. Listner, *The Ownership and Exploitation of Outer Space: A Look at Foundational Law and Future Legal Challenges to Current Claims*, 1 Regent J. Int'l Law 75, 76.

<sup>4</sup> Certain principles were also adopted concerning the use of satellites for remote sensing, television broadcasting and intelligence gathering, the use of nuclear power sources in outer space, and the exploration and use of outer space for the benefit of all States, in particular the needs of developing countries.

<sup>5</sup> The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan.

## The Outer Space Treaty of 1967

This treaty is commonly known as The Treaty on the Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies.<sup>5</sup> This treaty was created shortly after UNCOPUS, and its fundamentals served as the parent for the subject matter of the remaining four space law treaties. The main principle of the Outer Space Treaty is that space is the common heritage of all mankind and all nations have equal access to space and the resources contained within it,<sup>6</sup> and the territory in outer space, on the moon or other celestial bodies cannot be claimed by any nation.<sup>7</sup>

Private individuals or legal entities are free from this prohibition. The treaty emphasized on the use of space for peaceful purposes. The establishment of military installations, fortifications, placement of nuclear weapons or any other weapon of mass destruction in

27, 1967, 610 U.N.T.S. 205 [hereinafter the Outer Space Treaty] (ratified in 1967, the Outer Space Treaty was the first international space law treaty); Michael J. Listner, *The Ownership and Exploitation of Outer Space: A Look at Foundational Law and Future Legal Challenges to Current Claims*, 1 Regent J. Int'l Law 75, 76.

<sup>6</sup> The "common heritage" language or *res communis* of the Treaty comes from the phrase "...the province of all mankind" located in paragraph 1 of Article 1. The Outer Space Treaty leaves this phrase undefined and unexplained, but it has been interpreted to mean "for the benefit of all mankind." It is this principle that the undeveloped countries are relying on to ensure them equal access to space; Outer Space Treaty, art. 1, para 1.

<sup>7</sup> Outer Space Treaty, art. 1, para 2.

the orbit of the Earth or any celestial bodies is strictly forbidden.<sup>8</sup>

The treaty also requires nations to render assistance to astronauts in distress whether in space, the high seas or within the territory of another nations. Obligations are laid upon the nations to inform others of conditions that may prove hazardous to astronauts.<sup>9</sup> Nations are required to take responsibilities of the activities in outer space of non-governmental entities that are under its jurisdiction, as well as detailing the natures of objects launched into space and the natures of any activities performed in space, and to furthermore impose liabilities for any damages caused by a space object on Earth or to another nation's property on the course of any space activity.<sup>10</sup>

The treaty mentions that any space object launched continues to be the property of the nation who launched it regardless of whether it lands in sovereign less territory or the territory of another nation.<sup>11</sup> Nations are obligated to preserve the environment of

outer space in the course of their activities,<sup>12</sup> as well to allow other states to observe its space activities<sup>13</sup> and the duty to disclose the nature of its space activities.<sup>14</sup>

### **Rescue Agreement of 1968**

It is the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space. This treaty expands on the duties introduced in the Outer Space Treaty to render assistance to astronauts in distress.<sup>15</sup> The Rescue Agreement delineates the requirements of a nation to come to the aid of astronauts in distress.<sup>16</sup>

It reinforces the principle that a spacecraft will continue to belong to the nation that launched it and requires that it must be returned in the event of a rescue.<sup>17</sup> This agreement has been signed by two international inter-governmental organizations – the ESA and the European Organization for the Exploitation of Meteorological Satellites.

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<sup>8</sup> Michael J. Listner, *The Ownership and Exploitation of Outer Space: A Look at Foundational Law and Future Legal Challenges to Current Claims*, 1 Regent J. Int'l Law 75, 79.

<sup>9</sup> Outer Space Treaty at art. 5, para 1-3.

<sup>10</sup> Michael J. Listner, *The Ownership and Exploitation of Outer Space: A Look at Foundational Law and Future Legal Challenges to Current Claims*, 1 Regent J. Int'l Law 75, 80.

<sup>11</sup> Outer Space Treaty art. 8, para 1.

<sup>12</sup> Outer Space Treaty art 9, para 1.

<sup>13</sup> Outer Space Treaty art. 10, para 1.

<sup>14</sup> Outer Space Treaty art. 11, para 1.

<sup>15</sup> Outer Space Treaty, *supra* note 13, art. 5; The Agreement on the Rescue of Astronauts, the Return

of Astronauts and the Return of Objects Launched into Outer Space, Apr. 22, 1968, 672 U.N.T.S.119.

<sup>16</sup> Rescue Agreement, art. 2-4.

<sup>17</sup> Rescue Agreement, art. 5; Michael J. Listner, *The Ownership and Exploitation of Outer Space: A Look at Foundational Law and Future Legal Challenges to Current Claims*, 1 Regent J. Int'l Law 75, 83. Canada's Department of External Affairs referred to Article V of the Rescue Agreement in its first formal communiqué with the Embassy of the USSR on February 8, 1978 concerning the crash of Cosmos 954 in Canadian territory. Canada fulfilled its duties under Article V of the Rescue Agreement to inform the USSR that it had identified the debris as coming from Cosmos 954; 18 I.L.M 899, 910; Rescue Agreement, art. 5, para.1

## Liability Convention of 1972

It is the Convention on International Liability for Damage Caused by Space Objects. It states the liability rules for damages caused by space objects created in the Outer Space Treaty.<sup>18</sup> This convention constitutes the provision for the settlement of disputes.<sup>19</sup> The Liability Convention envisions two scenarios.

In the first scenario, a space object causes damage to the surface of the earth or an aircraft in flight. The state is strictly liable for any damage caused by a space object launched even in the face of circumstances that are outside its control (strict liability). In a case where more than one nation are responsible for the launch of the space object, then both states will be held jointly and severally liable for any damage caused.<sup>20</sup> The strict liability of a nation can be absolved in the case where it can prove that a claimant was grossly negligent or had the intent to cause the damage sustained.<sup>21</sup> A nation will not be exonerated in cases where its activities do not conform with the international law.

The second scenario holds a nation liable only if it can be shown that it was due to the fault of the nation or nations as the case maybe.<sup>22</sup> A nation that has been damaged under either of the above-mentioned scenarios can seek compensation under the Liability Convention without exhausting remedies locally available; however, if a claimant is in the process of pursuing remedies outside of the Liability Convention, it cannot pursue a claim under the Liability Convention until it completes that process.<sup>23</sup>

The Liability Convention does not specify a method or formula to determine what compensation is due to a claimant, but it does require that compensation be determined according to international law and the principles of justice and equity.<sup>24</sup>

## Registration Convention of 1975

This convention is on the Registration of Objects Launched into Outer Space, which is based on the principle of the Outer Space Treaty concerning the registration of objects

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<sup>18</sup> Outer Space Treaty, *supra* note 25, art 7; Convention on International Liability for Damage Caused by Space Objects, Nov. 29, 1971, 961 U.N.T.S. 187.

<sup>19</sup> Goh M. G., *Dispute settlement in international space law*, 2007, p. 23.

<sup>20</sup> Michael J. Listner, *The Ownership and Exploitation of Outer Space: A Look at Foundational Law and Future Legal Challenges to Current Claims*, 1 Regent J. Int'l Law 75, 83.

<sup>21</sup> Similar scenario carried out when Cosmos 954 (USSR) fell from orbit on January 24 1978, and

contaminated Canadian territory with its nuclear reactor debris.

<sup>22</sup> Liability Convention art 2-4; Michael J. Listner, *The Ownership and Exploitation of Outer Space: A Look at Foundational Law and Future Legal Challenges to Current Claims*, 1 Regent J. Int'l Law 75, 83.

<sup>23</sup> Liability Convention art 11 para. 1; Michael J. Listner, *The Ownership and Exploitation of Outer Space: A Look at Foundational Law and Future Legal Challenges to Current Claims*, 1 Regent J. Int'l Law 75, 84.

<sup>24</sup> Liability Convention art. 12.

launched by a nation.<sup>25</sup> The rationale of this conversation is the preservation of outer space for peaceful purposes which could be overseen by a complete registry of spacecraft, and that registry should be available for public inspection.<sup>26</sup> The registry would help to minimize the possibility of weapons of mass destruction being furtively put into orbit. With an efficient system of registration, the spacecraft can be identified which would convey the nation liable for the damages. A comprehensive searchable database containing this information is publicly available.

### **The “Moon Treaty” of 1979**

It is the Agreement Governing the Activities on the Moon and Other Celestial Bodies, which is the final and most controversial child of the Outer Space Treaty.<sup>27</sup> This treaty has not been ratified by the United States, the Russian Federation (USSR) and the People’s Republic of China.<sup>28</sup>

Main principles included in the Moon Agreement are: -

- i. It prohibits the use of force and all hostile acts and the requirement that

the Moon and other celestial bodies are used exclusively for peaceful purposes.<sup>29</sup>

- ii. The exploration and use of the Moon and other celestial bodies are to be conducted without discrimination of any kind, irrespective of the degree of economic or scientific development.<sup>30</sup>
- iii. The prevention of disruptions to the lunar environment and those of other celestial bodies by adverse changes or harmful contamination.<sup>31</sup>
- iv. The establishment of an international regime to govern the exploration and exploitation of natural mineral resources on the moon and other celestial bodies.

### **Liability for private space activities**

As space, exploration activities are increasing, commercialization of space activities is on the rise. The intervention of private enterprises in the realm of outer space activities has increased multifariously and has made space market a multi-billion-dollar market. With heavy investments from both

<sup>25</sup> Outer Space Treaty, supra note 26, art. 8; Michael J. Listner, *The Ownership and Exploitation of Outer Space: A Look at Foundational Law and Future Legal Challenges to Current Claims*, 1 *Regent J. Int’l Law* 75, 84-85.

<sup>26</sup> Michael J. Listner, *The Ownership and Exploitation of Outer Space: A Look at Foundational Law and Future Legal Challenges to Current Claims*, 1 *Regent J. Int’l Law* 75, 84.

<sup>27</sup> Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 18, 1979, 1363

U.N.T.S. 3 [hereinafter the Moon Treaty] (governs the use of the moon and other celestial bodies).

<sup>28</sup> Michael J. Listner, *The Ownership and Exploitation of Outer Space: A Look at Foundational Law and Future Legal Challenges to Current Claims*, 1 *Regent J. Int’l Law* 75, 85.

<sup>29</sup> Moon Agreement, art. 3.

<sup>30</sup> Moon Agreement, art. 4.

<sup>31</sup> Moon Agreement, art. 7.

the government and private enterprises, a dark cloud looms over the fact that who will be held liable for any damage caused in the course of such activities.

The answers to such questions have to be balanced in the sense they should protect the interests of the governments, as well as the public and also the private enterprises. A general rule the various International space treaties hold is that, the responsibility and liability for damages has to be borne by the State concerned. The treaties also provide that the liability for private space activities has to be shouldered by the State.

The rationale behind this is that, it is reflective of State's failure to control activities of its private individuals. Therefore, it means that the private individuals accrue the benefits while the State bears the burden of liability. Is it entirely fair to hold states liable? The notion of State responsibility stems from a well-established notion that a breach of international obligation must result in reparation. As per the Space protocol, the question of state responsibility arises under three circumstances:

- a. The existence of an international legal obligation between the states concerned
- b. Occurrence of an act or omission, which violates that obligation and which is imputable to the state responsible.

- c. The unlawful act or omission must have resulted in loss or damage. The word "imputable" has raised enough questions because it means that the actions or omissions of individuals are assimilated to the state itself.

However, doubt exists over the fact does the State have strict responsibility for the acts done by private individuals? This has been answered by Articles 6 and 7 of International Law Commission's articles on State responsibility. Article 6 "the conduct of a person or group of persons shall be considered as an act of the state under international law if the person or group of persons was in fact acting on the instructions of, or under the direction or control of, that state in carrying out the conduct.

Article 7 laid down that, "the conduct of a person or group of persons shall be considered an act of the state under international law if the person or group of persons was in fact exercising elements of governmental authority in absence of default of official authorities and in circumstances such as to call for the exercise of those elements of authority.

The state cannot practically prevent all injurious acts, which a private person might commit, even though the international law imposes a duty upon every state to be diligent so as to prevent any damage. If such acts are committed the State is not directly liable, and

are obliged to extend reparation as far as possible by punishing the offenders and compelling them to pay damages where required.

The next aspect that raises sufficient debate is over the distinction between international liability and international responsibility. Under international law, both are taken to mean separate things. By virtue of this distinction the International Law Commission was able to draft two separate sets of rules on State responsibility and State liability. A state is said to have incurred a liability when it does any act prohibited by international law resulting in serious injury. So, liability of the state is based on the damage caused.

The concept of State liability warrants compensation to the victims at behest of lawful activities causing injuries. The states after paying off the compensation can carry on with the activity. The concept of State responsibility does not impose a duty to compensate. An example of State liability in outer space is liability of States for the damages caused to the environment of other states due to unintentional falling of their space objects. For instance, when Cosmos954, an erstwhile Soviet Union satellite fell over Canada, Soviet Union was only asked to pay compensation. Neither Canada or Soviet Union stopped any of its space activities.

The risk involved in space activities was recognised early by the scholars. That's why the concept of state responsibility and liability has become a subject matter of discussion for debate. Article 6 of Outer Space Treaty and Article 14 of the Moon Agreement state that the State Parties to the treaty must bear international responsibility for all national activities in outer space. Both the provisions include private space activities.

However, these activities require authorisation and constant State supervision. Imposition of liability on States negates the element of negligence on the part of States in space activities. Also, the magnitude of loss involved case of space mishaps could be the probable reason behind making state responsible for private space activities, as the private enterprises may not be able to compensate so, the states are held liable for injury. The treaties relating to outer space also contain separate provisions on State liability.

Article Seven of Outer Space Treaty, imposes liability for damage on each state party that launches or procures launching of an object into outer space. The reason behind this imposition of liability on states is that the states should not only benefit from space activities but also bear the burden. Such a provision was said to be insufficient on the ground that it failed to distinguish damage caused on earth, in air space or in outer space. That's why the liability convention came into

picture. Nevertheless, the provisions of liability convention do not explicitly deal with liability of private entities for outer space activities as it only deals with the liability of Launching States.

The fallacy with the existing legal framework determining the State liability for private activities is that the liability convention and outer space treaty do not distinguish between state responsibility and state liability in the proper sense. The Outer Space Treaty also does not define the term appropriate state in context of state's duty to authorise and supervise the private space activities, so it could include more than one states.

The applicability of Outer Space Treaty and Liability convention has created more confusion because outer space treaty does not talk make distinction between liability for damage on earth, in air space and outer space, while the liability convention imposes different liabilities for on earth damage, in airspace and outer space. The state liability and responsibility as dealt with under provisions of Outer Space Treaty and Liability convention are ambiguous, and the need is to develop an international framework for determining State liability and responsibility for outer space activities.

Even the Moon Agreement has rightly recognised that the Outer Space Treaty and Liability convention are not sufficient in answering to question of State liability. But the problem is that the developed states do not ratify the moon agreement.<sup>32</sup> With private activities growing tremendously, a legal framework for State responsibility is indispensable.

### **Convergence of intellectual property rights and space law.**

The whole technological spectrum of outer space has robustly evolved from 1957 the first time that a satellite was launched by Russia, giving birth to the conundrum of outer space rules and laws. Space laws have come really far from treaties ranging to Outer space treaty of 1967, Rescue agreement of 1968 etc. but one conjecture, which has not been a top priority for lawmakers, is the fact that intellectual property rights extend to outer space as well.

Since the advent of space technology, most of the research and development regarding exploration of outer space and related activities has been largely carried out by governments across the world. However, the private actors are coming to forefront more quickly than ever. Given the modern time commercialization, it would be safe to say

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<sup>32</sup> Sandeepa Bhat B., *Space Law: In the Era of Commercialisation* (1st edn, Eastern Book Company 2010)

that private sector space activities will increase multifariously given their proactive investments.

However, how can these private sector actors be entitled to certain returns on the investments made by them? Here comes the role of intellectual property rights. The rationale behind convergence of these two aspects is that, satellites, technologies, spatial data, software, are all creation of one's mind and hence constitute intellectual property<sup>33</sup>.

The main purpose for protection of intellectual property rights is to promote the progress and development of science, technology, literary work, arts and other creative works and to encourage creativity. It is a sine qua non for the nations to give statutory expression to economic and moral rights of the creator and to give the public a right to access those works. The nebulous aspect pertaining to space laws and intellectual property rights is the fact that space laws are emerging because technology is emerging and dynamic, space law in itself is developing with time so that makes intellectual property related to space activities a not so well-versed domain.

Another problem that lies before the experts is that space law is based on United Nations Treaties, and these treaties do not specifically

define or mention intellectual property protection. But nevertheless, the private enterprises in space activities are not barred and also the impediments of intellectual protection for space activities pertains to software, design, manufacturing, use and licensing of copyrighted data.<sup>34</sup>

Space patents are granted for inventions, which have been divided into the following distinct categories: inventions made on earth for space application, inventions made in outer space for terrestrial application, inventions made in outer space for spatial applications, inventions patented on earth for spatial applications used in outer space. One such example is remote sensing satellites which take images of the earth from outer space and send it to satellite stations for various purposes.

Patents are usually granted for the different techniques used for purposes of remote satellite sensing. For instance, if the techniques used for obtaining information by remote sensing satellites are unique, then such techniques can be patentable. If we consider the case of copyrights, then the data obtained by such satellites is not subject to protection but if there has been any value

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<sup>33</sup> Pooja Shree, 'Outer Space and Intellectual Property Rights' 2016 <<https://selvams.com/blog/outer-space-and-intellectual-property-rights/>> accessed 9 February 2018.

<sup>34</sup> Dr. Yun Zhao, 'Protection of Intellectual Property Rights in Outer Space' 2006 <<https://iislweb.org/docs/Diederiks.pdf>> accessed on 8 February 2018

added to such a data then it surely becomes copyrightable<sup>35</sup>.

For instance, The European Space Agency is one of the most important agencies on space activities, and its general provision and the Resolution on Information, data and intellectual property, follow a position which has been encapsulated in the following words, “the contractor shall be the owner of any invention made in the course of or resulting from the work, undertaken for the purpose of contract, and shall be entitled to protect such invention by patent or other form of industrial property rights in accordance with the applicable laws.

The question as to utilisation of patents and copyrights in outer space is perplexed as the answer to this has not been clearly spelled out in any space law even the Inter-Governmental Agreement or commonly referred to as the IGA does not specify the utilization of patents and infringement activities. As a rule, the respective states, in which the patents are applied for, will govern the entire process of utilization and infringement activities of the patent. While the articles of Inter-Governmental Agreement govern the intellectual property at international level, the national laws of various nations, govern the detailed process

of patents and copyrights. The desire to have a coordinated regime for protection of intellectual property in space activities has increased over time as the governments are decreasing their monopoly over space exploration, paving way for private enterprises to broaden their prospective in outer space.

A debate exists over the fact is there a need a for separate patent regime or can the category of space patents be created under the general rules and laws, it has been argued that while a separate regime would be beneficial but all the patents in their essence are same and as such all the patents are governed by two important treaties, the Paris Convention and Patent Cooperation treaty<sup>36</sup>. So, both these treaties should have a separate category of space patents. On the other hand, an independent space patent regime would facilitate an easy application process and would mean proper regulation without the existence of overlapping laws.

### **Licensing of commercial space activities by private enterprises**

Commercial space activities are a boon. It is evident from the fact that the global space economy in 2016 was \$329 billion as published by Space Foundation in the Space Report 2017. This report tracks the

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<sup>35</sup> Pooja Shree, ‘Outer Space and Intellectual Property Rights’ 2016 < <https://selvams.com/blog/outer-space-and-intellectual-property-rights/> > accessed 9 February 2018

<sup>36</sup> Dr. Yun Zhao, ‘Protection of Intellectual Property Rights in Outer Space’ 2006 <<https://iislweb.org/docs/Diederiks>>.pdf accessed on 8 February 2018

worldwide spending of government, private enterprises. The definition of commercial space activities varies and there exists no single definition, but generally it is considered to be the one in which private sector entity. Some consider a commercial activity to be one in which a private sector entity puts its own capital at risk and provides goods or services primarily to other private sector entities or consumers rather than to the government.

Some examples of these activities would be direct-to-home satellite television (e.g. DirecTV and DishTV), satellite radio, and commercial communications satellites that transmit voice, data and Internet services (such as Intelsat Ltd., SES Global, and Eutelsat)<sup>37</sup>. Commercial activities also include within its ambit, the sale of consumer equipment by companies by relying on the government owned satellites, the prime example of this is Global Positioning system.

However, the regulation of commercial activities is a tough question for governments across the world. All the countries that are signatories to the space treaties have been given full freedom to determine the system of regularising the commercial activities, it could be through a specific authority or a

centralised government authority is all a matter of the country's choice.

Like in United Kingdom, UK nationals and companies intending to launch or procuring the launch of an object in outer space need to comply with the provisions of Outer Space Act 1986. An application for a license has to be submitted six months prior to launching of the licensable activity. The act exempts persons acting as an employee or agent of an organisation from applying for licences. The Secretary of State is authorised to grant licenses after ensuring that all the compliances of the act are met and he can at any time revoke or cancel the licence, with the consent of the licensee if any provisions of the act are not complied with, or it goes against the national security or public health<sup>38</sup>.

In Russia, The Russian Space Agency is the only agency authorised for issuing licenses for all types of space activities recognised by the Russian Federation, and such licensing is mandatory for citizens, institutions and enterprises performing all kinds of activities for exploration and use of outer space. Temporary regulations also provide that the license application can be rejected if the documents provided by the licensee are found to be incorrect or incomplete, if the

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<https://spacepolicyonline.com/topics/commercial-space-activities/>> accessed on 8<sup>th</sup> February 2018

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<[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/295760/outer-space-act-1986](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/295760/outer-space-act-1986). > accessed on 8<sup>th</sup> February 2018

applicant does not have facilities to carry out declared activities, if legitimate interests of consumers are not ensured etc.<sup>39</sup>

In USA, Department of Transportation plays the role of lead agency and tries to ensure that the licensing process is speedy and that the restrictions imposed by various federal agencies involved are not duplicate, at the same time ensuring that there is not an excessive federal intrusion in private commercial space transaction<sup>40</sup>. In India, the Department of Space has designated the Department of Telecommunications as the licensing authority for satellite and terrestrial telecommunications, while Ministry of Information and Broadcasting is the licensing authority for satellite and terrestrial broadcasting.<sup>41</sup>

Thus, every country has its own procedural norms regulating commercial activities which are in conformity with the International Space treaties.

## Space Tourism

Space Law has been defined as “any commercial activity offering customers an indirect or direct experience with the space travel”<sup>42</sup> and a space tourist as “someone who tours or travels into, to, or through space or to a celestial body for pleasure and/or recreation”.<sup>43</sup> Since the 1960s, only around 500 persons have gone to space of which only handful of those were tourists. NASA currently has the largest astronaut corps worldwide and has 88 active astronauts.<sup>44</sup>

With the advancement in the field of space tourism, the number of humans in space will increase dramatically. However, it is a risky and costly trip considering that one has to be in a good physical condition, which is necessary. Numerous health problems are reported among the professional astronauts related to their stay in outer space, more or less serious depending on the distance and length of the mission. Moreover, the long-term effects of space travel are still unknown.

<sup>39</sup> Sandeepa Bhat B., *Space Law: In the Era of Commercialisation* (1st edn, Eastern Book Company 2010)

<sup>40</sup> E. Jason Steptoe, ‘United States Government Licensing of Commercial Space Activities by Private Enterprise’ 1985 <<https://digitalcommons.unl.edu/cgi/viewcontent.cgi?referer=https://www.google.co.in/&httpsredir=1&article=1006&context=spacelawdocs>> accessed 9 February 2018.

<sup>41</sup> Sandeepa Bhat B., *Space Law: In the Era of Commercialisation* (1st edn, Eastern Book Company 2010)

<sup>42</sup> Stephen Hobe and Jurgen Cloppenburg, “Towards a New Aerospace Convention? – Selected legal issues of ‘Space Tourism’” (paper presented at 47<sup>th</sup> colloquium of the International Institute of Space Law, 2004).

<sup>43</sup> Zeldine Niamh O’Brien, “Liability for Injury, Loss or Damage to the Space Tourist” (paper presented at 47<sup>th</sup> colloquium of the International Institute of Space Law, 2004).

<sup>44</sup> Jeff Foust, ‘So you want to be a Rocket Pilot’ 2008 <<http://www.thespacereview.com/article/1099/1>> accessed 9 February 2018.

### **Space Tourism as a Boon**

1. Proliferation in the commercial activity in the time of poor state of world economy. Space tourism is on a path of becoming a commercial endeavor and provide employment to thousands of people. Skilled employment will be generated with the manufacturing of new and better spacecrafts.
2. With the advancement in space exploration, the discovery of precious minerals and other materials in space and other planets will become a possibility. This will be a helping aid for Earth where natural resources are depleting fast.
3. Exploring space helps us to understand our own planet and how we can preserve it better.
4. Space travel will further increase the need for better technology such as digital equipments and new forms of fuels.
5. Ameliorating of global communication and cooperation (for instance, the International Space Station).
6. Space tourism will make space tourists aware of the fragility of our planet. When people observe Earth in dark outer space, covered in a thin layer of atmosphere, they are forced to think of the smallness of Earth, and it may induce us to respect our planet and preserve our natural resources.

7. Space tourism will open a new avenue for tourists who love adventure and thrill.

### **Space Tourism as a Bane**

1. A huge investment is needed for developing space programs and aircrafts. That money can easily be utilized for the alleviation of poverty.
2. Natural resources are depleted in flying the fuel guzzling rockets. The space programs are bad for our environment as it pollutes the atmosphere.
3. Space Junk is created by these space missions and as there is no decomposition process in outer space, this stuff stays and floats around forever.
4. The dangers of this junk are endless as it may fall out of space and may not totally burn up in the atmosphere. This can cause some serious damage when it lands on earth and the radioactive parts can also contaminate earth.
5. Manned missions to space entail huge risk to the life of persons going in spacecrafts. Apart from the accidents, the travellers have to face hard conditions and adapt themselves to the unfriendly environment.
6. A serious debate on the problems of the right to claim on resources found in space can be put on motion.
7. It is totally fine to crave for thrill, but the whole human race may land into

trouble, if we find something lethal to life on Earth during some exploration. We may unwittingly introduce some harmful microorganism from space into the atmosphere of Earth.

Thus, Space Tourism is more of an opportunity for the happy few who are so eager to go up there that they are willing to accept the risks associated with it. Furthermore, the international law of outer space must be considered by the space tourism industry. From a practical viewpoint, it is evident that the existing legal regime must be expanded and amended to meet the requirements of this burgeoning industry. The advent of space tourism activities represents a positive, almost inevitable direction for mankind, then these legal changes must provide for appropriate protections and incentives in order to encourage the development and advancement of the industry. Space activities will inevitably result in greater pressures on space environment. The previously pristine areas will be affected. In contrast, however, to the imposition of rules relating to space debris, the control of human activities like littering would cost relatively little in dollar terms to regulate. It is imperative that certain regulations be laid down in order to minimize as much as possible any additional disruption to the space environment.

Space tourism also contains aspects of manned space flights, space transportation and commercialization of outer space. There resides an immediate need for regulation due to the existing loopholes in the existing laws, be it a treaty, to deal and cover conflicts and disputes that may arise. Certain efforts have been taken in the past such as the Draft Convention on Manned Space Flight. Moreover, the approach of international space law needs to be properly reconsidered and re-defined to enable private enterprises to directly perform such commercial activities.

The growth of “Space Tourism Movement” is going to have a huge beneficial cultural effect, which will widen human horizons as appropriate for the 21<sup>st</sup> century. Under its influence, “Space Development” is going to resume its original meaning of economic development in space, instead of its present meaning of “development of government select technology for use in space”, generally without economic benefit. In addition, the “Space Age” will revive its original meaning of the period when people go to space – as customers, passengers, employees, operators, tenants and managers but for government employees. As such, it will become a small component of future space activity, which will be made even smaller by government space agencies.

## Space Insurance

Without space insurance being in existence, the development and success of space activities could not have been possible. Insuring the space vehicles and satellites from any kind of physical damage mitigates the losses that could be suffered. For instance, in the Russian Federation, insurance is compulsory for space carriers as per the Space Activities Act. Satellite operators sought insurance as early as 1965 for the first time. The first policy covered third party liability and damages to the satellite during pre-launch phase. Space insurance was limited as most of the satellites projects were carried on by government who would self-insure their risks.

However, space insurance market surely bounces its way back from falling weak. Incidents of launch failures and loss of payloads can even lead to collapsing of insurance markets as experienced during 1980's when loss of four satellites eroded the insurer's confidence. Space insurance is never free from the volatility and fragility and fluctuations that happen in the aviation liability market as these two are closely related. Pre-launch insurance covers the transit of satellite, satellite storage and pre-ignition phase.

Transit of satellite means transportation of the satellite from the manufacturer's premises to the storage facility. Pre-ignition

moment beings with the commencement of procedure to launch the spacecraft. Launch is a risky phase and most of the accidents or damages have been suffered during this phase only. Launch insurance covers any damage or malfunctions that happens during launch.

The most important question to be determined is whether the satellite will be able to perform commercial functions during its life. The post-separation insurance policy does not necessarily cover the entire life-span of the satellite in some instances it's only for limited time periods, like a year after its launch and commencement of commercial activities. Satellite life insurance policy provides coverage for most part of the satellite life. Such an insurance generally covers the entire satellite but can also cover individual transponders. As a general provision of insurance policies, the insurance premium is generally fixed or subject to a return provision. A fixed premium as in any policy, is a determined consideration for the assured risks stated in a capital sum. The return premium provision is one by which in the event of absence of any loss the underwriter agrees to pay a "no claims bonus" which represents a percentage of the premium. Many launch insurance providers usually include a replacement launch provision in the launch services agreement. This clause typically prescribes that the only remedy against a failed launch consists of a

replacement launch. Failure of second launch, however may not generate any responsibility for the space carrier. In these cases, the amount insured during the launch phase will be less than the one insured during in-orbit phase as the cost of the launch will be considered to have been covered under insurance amount. Satellite insurance also covers liability for damages caused to third parties during launch of satellite. It is commonly believed by the European and US participants of commercial space activities that the likelihood of third party damage is highly remote due to the excellent safety record of launch companies and that is why the insurance premiums for such policies is quite less than what is paid for space vehicle insurance.<sup>45</sup>

### Space Debris

It is one of the biggest concerns regarding future space programs as it is going to affect both extra-terrestrial and terrestrial environment. Major treaties dealing with this problem are: -

- i. Outer Space Treaty, 1967
- ii. The Environment Modification Convention, 1977
- iii. Space Liability Convention, 1972
- iv. Moon Treaty, 1979
- v. The Rescue Agreement, 1968

- vi. The Space Registration Convention, 1975

With the presence of manmade objects in space, advancements have been made, but a hazardous threat is also aggravating to the environment due to principles of some countries, which are responsible for the Space Debris in outer space. This is posing a very evident threat to the future of space exploration and launching programs. Moreover, it is impossible to keep track and to keep record of all the data of Debris due to its vast size.

The universal definition of Space Debris is not provided or mentioned in any of the treaties. According to Carl Q. Christol, “Debris” is something that possesses tangible, physical characteristics, that can be touched, weighed and processed in the factories or can be analyzed in the laboratories. He further emphasizes on that as a physical substance, ‘debris’ may consist of space objects, including its component parts, or may be composed of fragments located in space or which endure the tests of atmosphere and ultimately come to rest on the surface of Earth.<sup>46</sup>

Space Debris is further defined or explained in the Report of Second U.N. Conference on Exploration and Peaceful Uses of Outer

<sup>45</sup> Sandeepa Bhat B., *Space Law: In the Era of Commercialisation* (1st edn, Eastern Book Company 2010)

<sup>46</sup> Carl Q. Christol, “Protection of Space from Environmental Harms”, *Annals of Air and Space Law*, Vol IV (1979), p. 434.

Space, 1982, space debris may consist of non-functionable satellites, spent rocket motors, nuts and bolts etc.

“Space Debris” is:<sup>47</sup>

- i. A space object as defined by Article I(d) of the Liability Convention and Article I(b) of the Registration Convention;
- ii. That no longer performs its original function or has no tangible function;
- iii. Is either created intentionally or through the actions or inactions of a launching state;
- iv. That either re-enters the atmosphere, remains in Earth orbit, in outer space or on the Moon or another celestial body;
- v. May have economic value to a launching state;
- vi. May have historical value to a launching state;
- vii. And/or may have continued national security value to a launching state.

### Space Debris Mitigation and Removal

There are two ways in which the problem of Space Debris can be resolved: -

- i. Mitigation
- ii. Active Removal

### Mitigation

In Resolution 62/217, “International cooperation in the peaceful uses of outer space”, the General Assembly endorses the Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space and agrees that the voluntary guidelines for the mitigation of space debris reflect the existing practices as developed by a number of national and international organizations, and invites Member States to implement those guidelines through relevant national mechanisms.<sup>48</sup>

UN-Space Debris Mitigation Guidelines:<sup>49</sup>

- i. Minimize break-up potential during operations;
- ii. Limit accidental in-orbit collision probability;
- iii. Limit debris release during nominal operations;
- iv. Avoid intentional destruction and harmful activities;
- v. Limit the probability of post-mission break-up;
- vi. Limit the long-term presence of spacecraft and launcher orbital stages in the LEO protected region re-entry objects resulting from this

<sup>47</sup> <[http:// www. thespacereview. com/ article / 2130/ 1](http://www.thespacereview.com/article/2130/1)> accessed 9 February 2018.

<sup>48</sup> <[http:// www. unoosa. org/pdf/bst/COPOUS\\_SPACE\\_DEBRIS\\_MITIGATION\\_GUIDELINES](http://www.unoosa.org/pdf/bst/COPOUS_SPACE_DEBRIS_MITIGATION_GUIDELINES)> accessed 8 February 2018.

<sup>49</sup> Sergio Marchisio, “Space Debris Mitigation and Space Law”, Session 10: Space Technology and Space Law, Mombasa, Kenya, (2011), p.8.

- recommendation must not pose an undue risk to the ground population;
- vii. Limit the long-term interference of spacecraft and launcher orbital stages with the GEO protected region.

### Active Removal

Human made machines are used in this method to remove the space debris. Private companies have collaborated with space agencies in order to help in removing space debris.

Essential prerequisites for active removal of debris and on-orbit satellite servicing:<sup>50</sup>

- i. A proper legal and policy framework to protect the parties involved;
- ii. A “cost effective” technique.
- iii. Available and willing target for removal or customer for servicing;
- iv. Someone to pay;
- v. Capability to locate, approach, connect deorbit/servicing device, control orientation and to move the target object to desired destination; and
- vi. Safety of the public on ground, at sea and travelling by air.

### Space Weapons

The dramatic advancement can not only be traced in the scientific and astronomic field in exploring and investigating outer space,

but also a remarkable growth in utilization for a wide range of civilian and military purposes. In the present times, there are some 1,000 satellites in operation owned and controlled by over 60 countries.

Exploitation of space is not only preserved to a small group of advanced industrialized countries, a dozen more countries now have the forte to place an object and even larger number own/or operate satellites. The developing countries are also in the race of possessing and operating satellites, and practically every other country in the world is a patron of space-based services in some form or the other.

Space-based assets perform an array of functions namely, remote sensing of ecological weather activity, communication and navigation services, etc. These assets have not been threatened till now from space or the ground and have been able to operate freely. This condition reflects how the space is for the global use and is the “province of all mankind”, the use of which shall be for “peaceful purposes” and “carried out for the benefit and interests of all the nations”.

Space has been explored extensively for commercial and peaceful purposes for the benefit of all the nations, but, the military planners, on the other hand, are focused on

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<sup>50</sup> <<http://ploughshares.ca/wp-content/uploads/2013/02/Jakhu.pdf>, p.8> accessed by 9 February 2018.

the weaponization and militarization of space to establish their supremacy over the other military users of space. Military advancements are at their peak as the missiles not only can traverse outer space or satellites that can spot targets and guide missiles, but weapons could be permanently placed outside the Earth's atmosphere. The two applications for outer space coexist together, one for the peaceful purpose of benefit for humans and the other as a venue for synchronized killings and war.

The paradox of today's world, where peace comes from deterrence and weaponization; and even outer space, God's sole preserve, has not been left out.

The international space law faces a dilemma related to the subject of space weapons. The placement and use of nuclear weapons or other weapons of mass destruction is strictly prohibited by the Outer Space Treaty. The treaty does not address the presence and use of devices and weapons that are non-nuclear or do not reach the level of a weapon of mass

destruction.<sup>51</sup> Certain measures are being taken up to make up for this shortcoming.

A proposal was presented to the United Nation's Conference on Disarmament on June 27, 2002 by the People's Republic of China and the Russian Declaration. It was a treaty proposal called the Possible Elements for a Future International Legal Agreement on the Prevention of the Deployment of Weapons in Outer Space, the Threat or Use of Force Against Outer Space Objects or PAROS.<sup>52</sup> There were some shortcomings of PAROS as it only prohibited weapons placed in the orbit around the earth and on celestial bodies, the weapons that are positioned on the surface of the earth were not addressed which could be directed against space objects.<sup>53</sup> This distinction is critical for direct-ascent anti-satellite weapons (ASATs).<sup>54</sup>

Domestic space laws also address the space weapons. Rep. Dennis Kucinich (D-Ohio) introduced the Space Preservation Act of 2005 into the House of Representatives on May 18, 2005 in order to deal with the issue of space weapons.<sup>55</sup> The purpose of the act

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<sup>51</sup> Outer Space Treaty supra note 15, art. 4, para 1.

<sup>52</sup> U.N. Conference on Disarmament, Possible Elements for a Future International Legal Agreement on the Prevention of the Deployment of Weapons in Outer Space, the Threat or Use of Force Against Outer Space Objects, (CD/1649), 28 June 2002, (for the language of PAROS).

<sup>53</sup> The Russian Federation and the People's Republic of China proposed another treaty after PAROS to ban weapons in space. The Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force Against Outer Space Objects (PPWT) was presented to the United Nations Conference on Disarmament on February 28, 2008. The PPWT does

not prohibit the development and deployment of direct-ascent ASATs such as the one used by China in 2007, and it does not prohibit the development and use of ground-based lasers to blind or disable satellites. It also fails to address the issue of dual-use technologies. The United States continues to oppose both the PAROS and the PPWT.

<sup>54</sup> Anti-satellite weapons or ASATs are designed to destroy or cripple in-orbit satellites. [http://en.wikipedia.org/wiki/Anti-satellite\\_weapon](http://en.wikipedia.org/wiki/Anti-satellite_weapon) (for the definition and description of anti-satellite weapons).

<sup>55</sup> H. R. 2420, 109th Congress <<http://thomas.loc.gov/cgi-bin/query/z?c109:h2420>> accessed 9 February 2018.

was to prevent the United States from acquiring space base weapons by mandating the President to cease and otherwise ban the deployment or development of space-based weapons or the technology that could be used to develop them.<sup>56</sup> The President of United States was also mandated to negotiate and sign an international treaty banning space weapons under the Space Preservation Act.<sup>57</sup> Unlike PAROS, the Space Preservation Act took into consideration the weapons launched from the surface of the Earth; however, the situations where dual-use technologies are involved were not addressed by the act.<sup>58</sup>

Another approach to dealing with the issue of space weapons lies in the governing conduct and application of technology in outer space, rather than the nature of the technology. A draft proposal for such an

instrument has been proposed by Council of the European Union.<sup>59</sup> The Code of Conduct for Outer Space Activities is a series of statements designed to establish a non-legally binding, normative framework defining responsible behaviour in outer space.<sup>60</sup>

For some part, it's non-controversial and many of its principles and ideologies are shared by the National Space Policy of the United States.<sup>61</sup> The policy dictates measures to minimize the possibility of collision on orbit, to avoid purposefully creating space debris and to agree to registration criteria for space launches and satellites manoeuvres. Earlier, the administration under Obama considered signing the Code, but no developments were traced towards the end.<sup>62</sup>

Bilateral Treaties and agreements that are legally binding is another approach for maintaining relations between space-faring

<sup>56</sup> H. R. 2420, 109th Congr., § 3 (2005)

<sup>57</sup> H. R. 2420, 109th Congr., § 4 (2005).

<sup>58</sup> H. R. 2420, 109th Congr., § 7 (2005), (for the Space Preservation Act's definitions of "space weapons").

<sup>59</sup> The Code of Conduct can be classified as a transparency and confidence-building measure (TCBM). TCBMs have been recognized by the United Nations as mechanisms that offer transparency, assurances and mutual understanding amongst parties and reduce misunderstandings and tensions. TCBMs have been used extensively in the realm of arms control and specifically in the arena of nuclear weapons. TCBMs do not have the legal force of treaties and states entering into them are bound only by a code of honor to abide by the terms of the instrument. TCBMs are not intended to supplant disarmament accords. See generally Andrey Makarov, *Transparency and Confidence-Building Measures: Their Place and Role in Space Security*, Security in Space: The Next Generation-Conference Report, 31, March-1 April 2008, United Nations Institute for Disarmament Research (UNIDIR), 2008 (for a general discussion of TCBMs).

<sup>60</sup> The Code of Conduct presented by the Council of the European Union is not meant to be signed. It is an internal memorandum for the Council of the European Union that was shared with the United States and other countries to facilitate discussion. See generally, Council Common Position (EC) No. 14455/10 of 11 October 2010 available at <http://register.consilium.europa.eu/pdf/en/08/st17/st17175.en08.pdf> (for the October 11, 2010 draft of the Code of Conduct for Outer Space Activities).

<sup>61</sup> The George Marshall Institute, *Codes of Conduct in Space: Considering the Impact of the EU Code of Conduct on U.S. Security in Space*, February 4, 2011, available at <http://www.marshall.org/pdf/materials/927.pdf>.

<sup>62</sup> The George Marshall Institute, *Codes of Conduct in Space: Considering the Impact of the EU Code of Conduct on U.S. Security in Space*, February 4, 2011, available at <http://www.marshall.org/pdf/materials/927.pdf> (for a panel discussion of the EU Code of Conduct and its potential implications to the United States' security in space).

nations. Incidents on the High Seas Agreement between the USSR and the United States which came into force on May 25, 1972 is one of the instances of bilateral agreements.<sup>63</sup> The rules were laid down in this agreement regarding the road between two nations concerning naval operations when in the vicinity of each other so as to prevent any mishap due to misunderstandings which could lead to an international incident. The Agreement is still enforced and has shown its capability in preventing incidents between the two countries.<sup>64</sup> Such bilateral agreement would also define conduct during space activities.<sup>65</sup> There is a special need for an agreement, so as to minimize the likelihood of any event occurring or escalating through the enhancement of mutual knowledge and understanding of each other's space endeavours and operations.

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<sup>63</sup> Agreement between the United States and the Union of Soviet Socialist Republics on the prevention of incidents on and over the high seas, 852 UNTS 151.

<sup>64</sup> The Agreement on the prevention of incidents on the high seas was the diplomatic result of several incidents that occurred between naval surface vessels and aircraft of the United States and the USSR. These incidents prompted the United States to propose talks to the USSR to prevent incidents from happening in the future and to prevent any future incidents from escalating into serious confrontation. The USSR accepted the proposal made by the United States, and after two rounds of talks on October 1, 1971 and on May 17, 1972 the Agreement was entered into force on May 25, 1972. The Agreement incorporates

## Conclusion

Precision and Law go hand in hand. However, when it comes to Space law there is no precision concerning provisions. There are multiple treaties that govern space law, which means there exists many loopholes and gaps that should be answered in a precise manner. However, in spite of even a law, space is not free from problems. As it can be seen that the space laws are entirely diverse and susceptible to volatility also there is urgent need to address various legal issues pertaining to space debris, space weapons, intellectual property, liability and damage arising out of space exploration. The focus should be on strengthening the laws and guidelines, and formulating specific laws dealing with specific space exploration problems.

international maritime law, including the International Regulations for Preventing Collisions at Sea and the 1958 Geneva Convention on the High Seas. The Agreement stipulates a code of conduct for specific circumstances that might occur between naval vessels of both countries as well as protocols should an incident occur. Agreement between the United States and the Union of Soviet Socialist Republics on the prevention of incidents on and over the high seas, 852 UNTS 151.).

<sup>65</sup>Michael J. Listner, "A bilateral approach from maritime law to prevent incidents in space", *The Space Review*, 2009 <[http:// www.thespacereview. com/ article/1309/1](http://www.thespacereview.com/article/1309/1)> accessed 10 February 2018.