

Faculty of Law
Course of International Law

Outer Space: Inevitable War Domain
or a Peaceful Matter of Choice?
How the Space Treaties are Dated

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Introduction

Since the beginning of the Cold War era, countries began to develop technologies capable of exploring outer void space. Countries such as the US and USSR started what is commonly known today as the “space race.” With space representing a new frontier for military activities and dominance, countries soon realized that a legal framework should be laid to avoid the economic and military exploitation of such a domain.

Through international discourse and cooperation, the member states of the UN began laying the legal framework for what is today known as “International Space Law.” The result of these discussions comes in the form of the 5 UN space treaties. With the foundation of the UN Committee on the Peaceful Uses of Outer Space (UNCOPUOS), treaties such as the Outer Space Treaty (OST 1967), the Rescue Agreement (RA 1968), the Liability Convention (LC 1972), the Registration Convention (RC 1976) and the Moon Agreement (MA 1986) provide the guiding principles of international Space law¹.

The main sentiment derived from UNCOPUOS is that the exploration of space should be held in accordance with international law. Space activities shall be conducted in the spirit of cooperation, for the benefit of all countries and, most importantly, for peaceful purposes. While these treaties have been in force for almost 60 years, the development of space technologies has developed exponentially.

This thesis aims to provide an analysis of the current international space law regime in light of technological advancements. In the last two decades, scholars and legal experts have, in fact, started to question the application and interpretation of the 5 UN Space Treaties. While these treaties provide for a vast array of legal principles in space, this thesis's main focus will be to argue how current space activities greatly contrast with the UN framework.

Space technology, in fact, has grown and developed in the shadow of the ambiguous and dated wording used in the Space treaties. Provisions such as “exclusively for peaceful purposes” contained in Art. IV OST have lead to different interpretations regarding its application. In this light, some scholars seem to marry a “non-aggressive” approach while others prefer a more general “non-militarisation” theory². While these may seem like simple synonyms, they actually lead to two completely different implications.

With the development of new threats in the realm of cybersecurity, the launch of new satellites with both military and civil capabilities, and the foundation of new

¹ see Chapter I

² see Chapter II

military branches such as the United States Space Force (USSF)³, the provisions contained in the OST have clearly been disregarded in favor of a more permissive “non-aggressive” approach. Recent instances of international legal discourse, such as the WOOMERA and MILAMOS manuals⁴, will result as fundamental instruments to dispel the ambiguities resulting from the interpretation of the UN Space treaties.

Another major topic of discussion of this thesis is liability questions in space. As space becomes more and more “polluted” by space objects, collision among these becomes more likely. Instances such as these will inevitably create debris, constituting liability problems. While the Liability Convention provides the framework for liability issues in space, its full application is up for discussion. Instances such as the Iridium-Cosmos incident of 2009 demonstrate fallacies in providing specific proof of fault and, thus, compensation for liability.

The general structure of this thesis aims to provide a broad critique of the “peaceful purposes” principle of the OST and the liability regime of the LC. Each of these arguments is presented in the structure of three chapters. Before diving into developing the specific arguments, it is important to provide an analysis of the UN Space treaties. Chapter I of this thesis is, in fact, dedicated to this objective. Starting with the description of UNCOPUOS and the 5 UN Space Treaties, it is possible to provide a general background of the principles and the legal ambiguities/fallacies contained within. These pages are the result of studies conducted on the legal documents provided by the UN online archives.

With this in mind, it is possible to enter into specific problems of such treaties. By discussing the different interpretations and practical applications that states conduct in space, Chapter II is dedicated to the analysis of the “peaceful purposes” Principle provided by the OST. This treaty, in particular, is the primary body of discussion regarding military applications in space. While the primary objective of the OST, at the time of ratification, was to avoid any type of conflict in space, current space activities seem to be in contrast to such sentiment. It is important to note that the exploration of space has generated many peaceful uses on Earth, such as telecommunications provided by satellites, GPS systems, and Scientific research. The problem derives from the fact that space technologies generate what is commonly known as the “dual-use” dilemma. Satellites, in fact, have both military and civil capabilities. At the same time, the information gathered from commercial satellites has been used by countries for military operations on Earth. The dual-use dilemma and the military use of commercial satellites by countries connote a breach of the OST.

³ see Chapter 2.3.1

⁴ see Chapter 2.4

The development of ASAT⁵ technologies is also problematic in the light of the OST. While countries have so far only performed ASAT tests on their own space object, they may also be easily used as weapons in order to disrupt intelligence gathered by satellites owned by other countries. Some scholars seem to justify the actions performed so far, claiming that the “peaceful purposes” principle of Art. IV OST prescribes a “non-aggressive” approach, in accordance with the UN Charter. This thesis, on the other hand, marries the more general “non-militarisation” approach, which is in line with the original purposes envisioned while drafting the UN Space Treaties. In accordance with such interpretation, the foundation of military branches such as the USSF is in breach of the OST. The discussion of such topics in this second chapter is important in order to underline the ambiguities and problems deriving from the interpretation of the OST.

Chapter II also covers the importance of the WOOMERA and MILAMOS manuals. With the development of such manuals, it is possible to fill in the gaps of the OST and provide concrete guidelines as to what and how current military activities may be conducted without breaching the treaty law. In the absence of such clarifications, this chapter also delves into how the application of the Law of Armed Conflict may have some common ground for its application in space.

Contrary to the unsuccessful “peaceful” application of the OST, Chapter III of this Thesis dives into the Liability Convention. This treaty provides the basic principles regarding liability for space activities. By starting with a general description of the rules on liability in space, it is possible to understand how the LC has had a more successful turnover and what ambiguities remain.

In particular, issues arise in regard to the resolution of liability conflicts in space. Instances such as the Iridium-Kosmos incident of 2009 demonstrate how the procedure set out in the LC is inadequate to properly resolve disputes. By describing alternative modes of conflict resolution, such as the specific procedure provided by the Permanent Court of Arbitration, this chapter provides a comprehensive description of how arbitration may be essential to resolve the issues in space liability.

The arguments laid down in this thesis are the result of extensive desktop and manual research of qualitative documents. The UN online archive, in particular, has been consulted in order to study the intricacies of the space treaties. Scholar publications have also been consulted in order to provide distinctive contributions and interpretations of the current state of affairs in space. While many scholars have briefly discussed the arguments contained in this thesis, none so far have provided such a broad and comprehensive analysis as in this thesis. Other works in literature stop short describing very generally the ambiguities of space law.

⁵ see Chapter 2.3.3

For the purposes of this thesis, the research of substantial discussions has been unsuccessful. This may be due to the fact that no military conflicts have risen in space currently. It may be argued, as a result, that it is difficult to provide for solutions to what has not yet happened. This thesis, contrary to other works in legal literature, is the work of extensive research and development on the legal intricacies contained in the UN space treaties. By providing an extensive analysis of the legal space framework and arguing how current affairs jeopardize the system, this thesis provides a distinctive contribution to the legal literature.

Essentially, the legal regime provided by UN space treaties is outdated. Although the current state of international politics is fragmented, current and future activities in space will require new strong instruments of international cooperation. This may be a difficult result to come to but new regulations, new bodies of law, and manuals, such as the WOOMERA Manual, are essential to provide the necessary developments in the International Space Law regime.

Chapter I: UN Space Framework

1.1 Introduction

Before delving into the specific applications of International Space Law (ISL) in current space activities, it is important to present the legal framework being discussed. Starting with the presentation of the UN actors involved in the development of the Space treaties, this paragraph analyses international bodies such as UNCOPUOS⁶ and UNOOSA⁷. These committees are the first international bodies to discuss space regulation and represent great examples of intentional cooperation in the making of ISL.

Throughout the 1960/70's the UN state parties drew the 5 Outer Space Treaties. These international agreements are the foundation of ISL and provide for general principles to be applied in space activities. The main objective of this chapter is in fact that of analysing the principles enshrined in the article of the UN space treaties. By understating this overall framework, it will then be possible to fully comprehend the ambiguities that have resulted in their application in current space activities.

1.2 Global Space Governance

With the advancement of technological development in space, Global Space Governance (GSG) is a sub-system of the more general concept of global governance. No concrete/constant definition is given of Global Space Governance. Often open to multiple interpretations and meanings, for the purposes of this thesis, Global Space Governance refers to a comprehensive collection of International, regional, or national regulatory Institutions, actions, and manners/processes of governing or regulating space-related affairs and activities⁸. This sub-system of global governance includes a wide range of instruments, mechanisms, and institutions; national laws and regulations; technical standards and procedures; codes of conduct; guidelines; and measures.

Most often, Global Space governance is the product of the International community coming together⁹ through International organizations to provide for rules in space. The most important organization involved in the space field is the

⁶ see Chapter 1.3.1

⁷ see Chapter 1.3.2

⁸ Olga Stelmakh-Drescher, 'Global Space Governance for Sustainable Development', (2016).

⁹ Ram S. Jakhu and Joseph N. Pelton, *Global Space Governance: An International Study* (1st ed., 2017) 16

United Nations. With the participation of nearly all the countries in the world, the resolutions of the UN General Assembly have successfully adopted numerous treaties and principles providing for basic rules in the pursuit of space activities¹⁰.

Actors involved in Global Governance are not, however, restricted to International organisations. Intergovernmental gatherings (G7, World Economic Forum), NGOs, and private associations also participate in forming space rules. All these actors, whether global, regional, national, or local, often cooperate in the complex work of governing and micro-managing specific areas of human activities.

It is, however, important to remember that global space law is still established and practised on earth. Furthermore, not all space activities that fall under space governance are physically located in outer space. Given that space law is still terrestrially contextualized, scholars often tend not to recognize the existence of Global Space Governance as its own body of law.

Other than providing for rules and norms in space, Global Space Governance has also enhanced opportunities and benefits afforded to States. Satellite communication and meteorological services have all been made possible by the institution of organisations such as INTELSAT, EUTELSAT and INTERSPUTNIK. The UN established UN-SPIDER as a platform for providing specialised information for disaster management and energy response. The production of such beneficial services would be impossible to achieve at the national and state levels.

Although the will and desire marked the 20th century for International institutional cooperation in space, recent developments have shown the opposite. Currently, more than 70 Nations claim to own space agencies, 15 of which have orbital launching capabilities. This means that most countries are underdeveloped, space-wise, and hence probably not involved in the decision-making process. On the other hand, technology has evolved so much that private commercial activities in space have started to become a common occurrence. At least three private space companies (SpaceX, VirginGalactic, and Blue Origin) actively launch individuals and objects into space. As a result, countries have either started to adopt more and more national pieces of legislation or have begun to conclude bilateral space agreements. These developments have started to fragment the Global Space Governance, and only time will tell what will come as a result.

¹⁰ see Chapter 1.5-10

1.3 U.N. General Assembly

The General Assembly (GA) is the only universally representative body of the United Nations; all members take part (Art. 9 UN Charter). Other organs are the Security Council, economic and social council, the Secretariat, and ICJ. The Charter states that the function of the body is that of discussion, debate, and recommendations on subjects pertaining to peace and security, including development, disarmament, human rights, international law, and the peaceful arbitration of disputes between nations.

All 193 members of the GA have voting rights. The President is elected annually by the assembly body. Issues relating to Membership in the GA are sometimes contentious. It has often been the locus of heavy arguments: Taiwan has always been trying to apply for membership, but China, as a permanent member of the Security Council, has always been in opposition; Palestine's 2011 bid to enter was stalled in the Security Council because the US vowed to veto the resolution¹¹.

Even though general Assembly resolutions are non-binding instruments, they clearly show the global position on specific issues. Establishing UNCOPUOS¹², the 5 UN Space Treaties, and the UN Space Principles indicate the firm intention to cooperate in space. However, recent space-activity developments have brought the GA to establish resolutions that have seen less participation. After the development of the Moon Treaty¹³, with very few state signatories, the trend seems to have started. Together with the cooperation of the Conference on Disarmament, UNGA has repeatedly tried to adopt multiple resolutions¹⁴ titled as PAROS, or “preventions of arms race in outer space”, with no particular success in terms of ratification. More recently, in 2015, the GA passed res 70/27¹⁵ calling for the “no first placement of weapons in space”. The scope is to call for all states to not be the first Country to place weapons in space. Unfortunately, only 12 States have made such declarations, and Russia is the only active space-faring nation.

1.3.1 UNCOPUOS

UNCOPUOS was adopted in 1958 by the UNGA with Res.1348 (XIII)¹⁶. The resolution established what is known today as the ad hoc Committee on the Peaceful Uses of Outer Space (COPUOS). UNCOPUOS's mission at the time

¹¹ in 2012 Palestine was upgraded from a non-member observer entity to non-member observer State (like Vatican)

¹² see chapter 1.3.1

¹³ see chapter 1.9

¹⁴ see UN A/RES/75/35; UN A/RES/72/250; UN A/RES/36/97; UN A/RES/36/99

¹⁵ see UN A/RES/70/27

¹⁶ see UN A/RES/1348 (XIII)

was to manage two main activities: the supervision of activities and resources of the UN, its specialised agencies and other international bodies relating to the peaceful use of outer space; facilitate the conclusion of international agreements for the cooperation in Space.

In 1959, with GA Res. 1472(XIV)¹⁷, COPUOS was confirmed as a permanent body of the UN, and its mandate was reaffirmed. Starting with the participation of only 24 state representatives, the number has since grown to 95 members, making it one of the most significant Committees in the UN¹⁸. In addition, various intergovernmental organisations have assumed the title of “observers”¹⁹.

Three subcommittees assist COPUOS:

- The Scientific and Technical Subcommittee (STSC) discusses questions relating to scientific and technical aspects of space activities;
- The Legal Subcommittee: debating legal questions relating to the exploration and use of outer space;
- The Bureau of the Committee: in charge of leading the work of COPUOS and its subcommittees.

Since its confirmation, UNCOUOS has enjoyed a central role in developing international cooperation in space. Remaining in close contact with both governmental and non-governmental organisations in Space, the Committee constantly provides information relating to Space activities and continuously studies measures to develop and promote cooperation in space.

The most notable product of COPUOS is the 5 Space Treaties. They have been adopted according to the primary decision-making process of the Committee: Consensus. This supplied them with a strong base for international acceptance. The problem with consensus is that, by definition, it doesn't involve a formal vote. When something is adopted without a vote, compromise is usually involved. With more Countries' participation and commercial entities' endeavors in space, compromise has been hard to come by. Some States often fail to send their representatives to participate in committee proceedings, and even worse, representatives who take part are often unequipped with the necessary experience and knowledge. Due to these circumstances, States have slowly shifted to preferring the adoption of their own bilateral agreements. Currently, COPUOS has mostly taken part in promoting long-term sustainability issues relating to space activities: space debris, access and use of orbital slots, and prevention of the use of arms in space.

¹⁷ see UN A/RES/1472

¹⁸ *Members of the Committee on the Peaceful Uses of Outer Space*, available at <https://www.unoosa.org/oosa/en/members/index.html>.

¹⁹ *COPUOS Membership Evolution*, available at <https://www.unoosa.org/oosa/en/ourwork/copuos/members/evolution.html>.

All in all, COPUOS has slowly lost its charm, and some have even started to consider it a failure in moving forward with Space Cooperation²⁰. COPUOS is currently taking part in promoting long-term sustainability issues.

1.3.2 UNOOSA

Located at the United Nations Office in Vienna, it was founded in 1958 as a small expert unit within the United Nations secretariat to assist UNCOPUOS. Like the committee it assists, it was established with GA Res. 1348 (XIII) 13 December 1958. In 1962, it became a unit under the Department of Political and Security Council Affairs, where it enjoyed the title of Space Affairs Division of the Department. In 1992, the Division was finally incorporated within the Department for Political Affairs as the Office for Outer Space Affairs as we know it today.

Acting as the secretariat of the UNCOPUOS, it also implements the latter's decisions and those of the General Assembly. The office is in charge of maintaining the UN Register of Space Objects²¹, other documents and compilations that aid the UN in its space activities, and providing specific space-related information. Registry keeping utterly depends on the information and cooperation provided by States, limiting its proactiveness in global space governance. On the other hand, UNOOSA supports the UNCOPUOS and its two subcommittees with discussions on the intergovernmental level. The office contributes to the capacity development of countries in using space technology by providing resources such as training, workshops, and knowledge-sharing portals, offering fellowships and competitive programs for specific developing countries in expanding their space capabilities.

1.4 General Treaty Law

The Vienna Convention on the Law of Treaties (VLCT 1969)²² provides the rules relating to State Treaties. Nomenclature is not essential: when two or more States reach an agreement in written form and governed by international law, it is considered a Treaty (Art II VLCT)²³. This is why the Outer Space Treaty, Rescue Agreement, Liability Convention, Registration Convention, and Moon Agreement are all considered to be the five UN Space Treaties.

²⁰ Tare Brisibe, 'Parliamentary Diplomacy in the United Nations and Progressive Development of Space Law', 18 *European Journal of Law Reform* (2016) 6, available at <https://heinonline.org/HOL/P?h=hein.journals/ejlr18&i=8>.

²¹ see Chapter 1.8

²² 'Vienna Convention on the Law of Treaties (1969)', .

²³ see Art. II Ibid 22

Treaties become binding when States express their consent and demonstrate their intention by signature. Depending on the Treaty, for it to have legal effect, ratification by the state parties is required. Usually, enactment into national law is also required. Nevertheless, as soon as a State signs a Treaty, even without ratification, obligations remain in refraining from peracts that would defeat the object and purpose of the Treaty (Art. XVIII VCLT)²⁴. In the case of the UN Space Treaties, the procedure is always the same: the treaties are open for signature by all States, and ratification is required for its entry into force (Art. XIV OST; Art. VII RA; Art. XXIV LC; Art. VIII RC; Art. XIX MA)²⁵.

The Interpretation of Treaty provisions often brings different results and applications. According to Art. XXXI VLCT²⁶ Treaties shall be interpreted in accordance with the ordinary meaning to be given to the words in their context and in light of the treaty's object and purpose (textual and teleological interpretation). This given interpretation is still, unfortunately, often left to political interest. The interpretation of the UN Space Treaties is especially problematic given the broad and open wording of the provisions. Technology has vastly advanced since then, while the terms in the provision have remained unchanged. Given the wide range of countries that participated in the drafting of the Treaties, the interests involved were also widely different, possibly also explaining the openness of the wording. These evolutions of technology and interests may require revisions, and some of the space treaties explicitly provide such a chance (Art. XXVI LC; Art. X RC; Art. XVIII MA).

With regard to acts in Breach of a Treaty Provision, claimant States usually start by demanding the cessation of such activities. Parties may call for the termination of the treaty. The UN mainly offers the possibility to recur to the ICJ in certain situations (Art. XXXVI ICJ Statute). Notably, the UN Space Treaties provide very few, and often weak, enforcement mechanisms (Art. IX and XIV LC). So far, very few contentious situations have happened in space, and they've all been solved through diplomatic channels. The million-dollar question is, what would happen if a State breached a significant provision of a Space Treaty? Would the international community turn to the ICJ? What would happen if a State ignored an ICJ ruling besides sanctions or political pressure?

1.5 The Outer Space Treaty

²⁴ see Art. XVIII Ibid 22

²⁵ see Ibid

²⁶ see Art. XXXI Ibid 22

The OST is the first space treaty concluded by the UN, and as such, it provides the framework for international space law and lays the groundwork for future developments. Development started at the height of 1957 as the USSR was testing its first Intercontinental Ballistic Missiles (ICBM). ICBMs are both capable of flying above the Earth's atmosphere and carrying Nuclear weapons. Both the Soviet Union and the US were space-faring countries with ICBM capabilities. In the depths of the Cold War, the competition for the title of number one "Super-Power" of the world sparked fear in the international community that space could become a new and ulterior frontier for conflict. Most countries like the US and USSR were not technologically advanced enough to have space capabilities.

The OST is the result of states realising that space could be both a danger and a resource. Even though the USSR and the USA remained rivals, they collaborated by creating a visionary legal framework for space. With the participation of 89 signatory countries, the UN General Assembly adopted Resolution 2222 (XXI)²⁷ in 1966, known today as the Outer Space Treaty. The OST sought to prevent another arms race and a new era of colonial aspirations. The treaty entered into force in October 1967 and currently boasts the participation of 112 State Parties and 89 Signatories. Thus, the OST is considered a landmark in the development of Space Law and Space Cooperation.

1.5.1 Structure

Built on 27 articles, the OST provides the base framework for International Space Law. First of all, fearing Space and its resources may become the property of few, the drafting states decided to set rules in the interest of all. "Outer Space, including the Moon and other celestial bodies" (OS/M/CB) are considered the "Province of all Mankind": it shall be explored and used solely if conducted for the benefit and interest of all countries (Art. I)²⁸. The treaty requires all State activities to be held in accordance with International Law and the Principle of Equality. Non-Space Faring Countries clearly played a significant part in the OST as Article I also prohibits discrimination according to Economic or Scientific development. In particular, States also decided to specifically prevent Countries from claiming Space as their own. In particular, Outer Space, the Moon, and other Celestial Bodies are not subject to any form of national appropriation, via a claim of sovereignty, use, or occupation (Art. II)²⁹.

The OST was first and foremost envisioned as a binding instrument for peace and safety in Space. As such the States are required to follow the Charter of the United Nations in order to maintain international peace and security and, once again,

²⁷ UNGA, A/RES/2222 (XXI).

²⁸ see Art. I Ibid 27

²⁹ see Art. II Ibid 27

International Space Law (Art. III)³⁰. States forbade also the placement in Space of objects carrying Nuclear Weapons or any Weapon of mass destruction. Prohibitions, more in general, are also provided with regard to the placement of any kind of military base, facility, installation, military manoeuvre, or test. Countries however decided to permit the use of military personnel for the establishment of scientific research or any other peaceful purpose (Art. IV)³¹.

The drafting States also realised provisions should also cover the placement of Astronauts in Space. In particular, States prescribed for the designation of Astronauts as “envoys of mankind”. As such, all Parties to the Treaty are required to render all possible assistance to astronauts who are in need. In the event of accidents, distress, or emergency landings happening in the territory of another State party or on the High seas, Countries are required to intervene in assistance. Of course, after the help is provided, States shall safely and promptly return Astronauts to the State registry of their vehicle. Representing all mankind, astronauts also give assistance to each other when in Space: independently from the State Party of origin. In a further sign of cooperation, Countries are also required to inform the Secretary General of the United Nations if discoveries are made regarding phenomena that represent a danger to the life and health of astronauts (Art. V)³².

State Parties also decided to provide basic rules on responsibility in Space. Countries, their governmental agencies, and non-governmental agencies bear International Responsibility for their actions in Space. The latter, in particular, also requires the constant supervision and authorisation of their appropriate State Party. International responsibility for compliance to the OST shall also be applied in the case of International Organisations and their State Members (Art. VI)³³. States that launch, provide the launch, or Countries from which an object or its components were launched are also internationally liable for the damage they may have caused (Art. VII)³⁴.

Rules were also provided to prevent States from dismissing responsibility or liability obligations regarding their launched objects. Objects launched in OS/M/CB remain in the jurisdiction of the State Party which has it in its registry. Their presence in space or return to Earth does not affect ownership rights (Art. VIII)³⁵.

³⁰ see Art. III Ibid 27

³¹ see Art. IV Ibid 27

³² see Art. V Ibid 27

³³ see Art. VI Ibid 27

³⁴ see Art. VII Ibid 27

³⁵ see Art. VIII Ibid 27

Keeping in mind that most drafting countries were, developing, not space-faring at the time³⁶, Cooperation and Mutual Assistance in Space are deeply rooted and set in the OST. All States are required to conduct their activities in Space in the spirit of cooperation and mutual assistance. As such, studies and conducts of exploration in space shall be held so long as they do not harm Planet Earth's environment (Art. IX)³⁷. The OST also calls upon States to consider requests, of other States, to be given the chance of observing the flight of Space objects that they launched. In such regard, countries are free to conclude special agreements (Art. X)³⁸.

Parties to the OST are also required to furnish any information on the activities they may have conducted in Space to the Secretary-General of the UN, the public, and the International Scientific Community (Art. XI)³⁹. On the basis of reciprocity, Facilities, equipment and vehicles of States shall be open to representatives of other State Parties to the Treaty (Art. XII)⁴⁰.

The OST also underlines that the provisions from which it is built apply to States conducting activities independently, Multiple States acting jointly, or States acting via the framework of Intergovernmental Organisations (Art. XIII)⁴¹.

The final provisions of the OST, like all other future UN Treaties, provide procedural rules about the Treaty. First of all, to permit a high participation count, all States may sign and accede at any time. In particular, the Treaty shall first enter into force when 5 Countries deposit of instruments of ratification, including those designated as “Depository Governments” (USSR, UK+Northern Ireland, and the USA). After this step, all other Governments may participate by becoming signatories and depositing their instrument of ratification and accession with the Depository Governments. In the case of Subsequent joining countries, by depositing their instruments of ratification/accesion, then they shall become binding upon the debate of the deposition of such instruments(Art. XIV)⁴². State Parties may propose amendments to the Treaty: they shall enter into force for each and only for the accepting state parties, only after a majority acceptance (Art. XV)⁴³. Withdrawal is also possible after one year of notification is given to the Depository Countries (Art. XVI)⁴⁴.

³⁶ Ram S. Jakhu, *Developing Countries and the Fundamental Principles of International Space Law*, 1982.

³⁷ see Art. IX Ibid 27

³⁸ see Art. X Ibid 27

³⁹ see Art. XI Ibid 27

⁴⁰ see Art. XII Ibid 27

⁴¹ see Art. XIII Ibid 27

⁴² see Art. XIV Ibid 27

⁴³ see Art. XV Ibid 27

⁴⁴ see Art. XVI Ibid 27

The treaty concludes with the list of authentic languages deposited among the Depository Countries: Chinese, English, French, Russian, and Spanish (Art. XVII)⁴⁵.

1.5.2 Considerations

Overall, the Outer Space Treaty may be considered a landmark and a great success for the time it was adopted. It must be stated, however, that the treaty was concluded in a remarkably short time. At the time, President Lyndon B. Johnson stated:

“The “very fact of cooperation” in the evolution of this treaty is to be taken as a “substantial contribution towards perfecting peace”...

The climate in which such accord has been reached is clearly an encouraging omen for continuing in other realms our constant quest for understandings that will strengthen the chances for peace.

In the diplomacy of space, as in the technology of space, it is essential always that interim achievements not be mistake for final success. This treaty I transmit to the Senate today is such an interim achievement- a significant, but not final step forward.

It carries forward the trust of the past decade to enlarge the perimeters of peace by shrinking the arenas of potential conflict.’⁴⁶

Clearly, the president of the US already understood what problems might occur with the treaty application. In fact, since 1967, the number of instruments of ratification deposited has risen to 112 with an additional 89 States as mere signatories. However in time, as membership has grown, so have technological advancements.

Provisions of the OST have come under scrutiny due to the current development of technologies and activities conducted in Space. For example, not all states use Satellite orbital slots for telecommunications, commercial, and broadcasting services. Future mining expeditions will be used only by certain States or commercial entities. In these cases, to what extent can the exploration and use of space be considered “for the benefit and interest of all countries” as is required in Art. I OST.

States must also conduct their activities in space “with due regard to the corresponding interests of all other State Parties” and “according to the principle

⁴⁵ see Art. XVII Ibid 27

⁴⁶ Lyndon B. Johnson, Special Message to the Senate on Transmitting the Treaty on Outer Space | The American Presidency Project. <https://www.presidency.ucsb.edu/documents/special-message-the-senate-transmitting-the-treaty-outer-space>

of cooperation and mutual assistance,” according to Art. IX OST. The obligations under Artt. I and IX OST are obligations of conduct, not of result. As such, obligations of conduct do not guarantee any particular outcome, they are weak by definition⁴⁷. Thus arguing that such an obligation was breached would be difficult, if not impossible, given that no enforcing mechanism has been envisioned for the OST.

The main objective of the OST, being peaceful uses of Space, is also under debate. Nowadays, most satellites launched in low earth orbit are used for both civil and military activities⁴⁸, such as intelligence gathering. The direct consequence would be that, according to most countries, Art. IV OST doesn't necessarily prohibit “all” military activity in space. The question, in turn, would refer to the meaning of “peaceful purposes” of Art. IV. Whether it should be for “non-military purposes” or only “non-aggressive purposes” is not clear⁴⁹.

Furthermore, while openly placing weapons in space would be considered a direct breach of the OST, and possibly a declaration of war, the OST's lack of specificity is particularly problematic. The ambiguity in the use of terminology raises additional issues. Many definitions were given even before space technologies fully developed. With the proliferation of commercial entities in space, to which the Treaty does not apply, definitions such as “space weapon”, “peaceful purpose”, and “astronauts” have all evolved and changed since 1967. The result is that States have been taking advantage of Outer Space Treaty: current space activities go far beyond what is allowed⁵⁰.

1.6 The Rescue Agreement

In the 1960s both the USSR and the USA were heavily involved in the space race, launching numerous Astronauts⁵¹ and objects into Space. Already in 1959, UNCOPUOS referred to issues that would give rise to the rescue agreement. The Rescue Agreement⁵² (RA) elaborates elements of Art V and VIII of the OST providing for the obligations of assistance and rescue of Astronauts and the recovery of space objects. The Agreement was adopted by consensus in 1967 by

⁴⁷ Crawford James, 'Brownlie's Principles of Public International Law', in *Brownlie's Principles of Public International Law* 8th ed. (2019).

⁴⁸ see Chapter 2.3.3

⁴⁹ see *Ibid.* 9

⁵⁰ see Chapter 2

⁵¹ Some notable mentions are Yuri Gagarin, the first Astronaut (Cosmonaut) to reach space in 1961; Alan Shepard in the same year, the first American in space; John Glenn in 1962 was the first American in Earth orbit; in 1963 Valentina Tereshkova was the first woman in space; 1969 was the year of Neil Armstrong, the first human on the Moon.

⁵² UNGA, Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, A/RES/2345 (XXII), 1968.

the UN General Assembly under Resolution 2345 (XXII). The RA entered into force in December 1968 and, since then, it has enjoyed the ratification of 94 States and 20 signatories. The ESA and EUMETSAT have also made declarations accepting the terms of the agreement.

1.6.1 Structure

The structure of the agreement is concise and straightforward. Built of 10 articles, provisions cover the rescue and return of “personnel of spacecraft” and space objects.

In the spirit of cooperation, States are required to notify the Secretary General of the UN, and the appropriate Launching Authority, of the discovery of information about accidents, distress signals or emergency landings of the “personnel of spacecraft” (Art. I)⁵³. Furthermore, states must render all possible assistance in rescuing astronauts who have landed in the territory under their jurisdiction. In such situations, the rescuing state shall inform the UN Secretary General and launching authority of all information regarding the assistance furnished to the space personnel (Art. II)⁵⁴.

On the other hand, if the landing has occurred on the high seas or, more in general, the territory under no jurisdiction, any State within reach, given the possibility, shall give the required assistance. Even in such situations, the rescuing state shall render all the required information to the two competent authorities (Art. III)⁵⁵. On all the occasions in which rescue missions are furnished, the rescuing State shall also promptly and safely return the personnel of spacecraft to representatives of the competent launching authority (Art. IV)⁵⁶.

State parties to the RA are also obliged to furnish information, render recovery operations and, upon request, return space objects or their components to the competent launching authority. Expenses incurred in recovery and return operations of space objects or their components shall be borne by the launching authority (Art. V)⁵⁷. The definition of “Launching Authority” is also provided as the State responsible for launching or the International Intergovernmental Organisation responsible for the launch (Art. VI)⁵⁸.

⁵³ see Art. I Ibid 52

⁵⁴ see Art. II Ibid 52

⁵⁵ see Art. III Ibid 52

⁵⁶ see Art. IV Ibid 52

⁵⁷ see Art. V Ibid 52

⁵⁸ see Art. VI Ibid 52

The final provisions of the Treaty cover procedure similarly to the OST: signature, ratification and entry to force (Art. VII)⁵⁹; Amendments (Art. VIII)⁶⁰; notice of withdrawal (Art. IX)⁶¹; Authenticated languages (Art. X)⁶².

1.6.2 Considerations

The Rescue Agreement lacks in definitions and applications. The agreement's title refers to “astronauts” yet the provisions speak of “personnel of Spacecraft”. The first to assign a name to people in space was the USSR with the word “Cosmonauts”, deriving from greek, “Cosmos” meaning “space” and “Nautes” meaning “sailor”. The word was later anglicised and we still commonly refer to the term “Astronaut”, “Astron” is “star” in greek. Given the ambiguity, a broader definition of “personnel of spacecraft” would have been more helpful. No indication is also given to the meaning of “space objects”. The only definition provided is “launching authority” which only refers to States. With the development of commercial entities sending people into space, the RA is limited in its applications.

The agreement has also been mostly dormant since it entered into force⁶³. So far, astronauts have always landed safely with rescue operations immediately provided by their launching state or unfortunately, in few cases (Apollo 1, Apollo 13, Soyuz 11...), operations have led to inevitable fatality. Hence, no application of the RA has been required in such a respect.

With regard to Space objects instead, the picture is slightly different. On two occasions⁶⁴ states cooperated with the UN in retrieving and restituting space fragments even before the RA entered into force. Since then, the RA has been called upon and put in action only on four occasions: in 1999-2000, Japan found fragments of US Pegasus, notified the UN and USA following Art. V RA; the USA, in 2000, found fragments of a French space object and followed the provisions in the RA; South Africa found a US object in 2000 and took the appropriate measures according to the RA; Saudia Arabia, the most notable occasion, was not a part of the RA yet decided to acton upon its provision in 2001 in regards to a US Space object.

⁵⁹ see Art. VII Ibid 52

⁶⁰ see Art. VIII Ibid 52

⁶¹ see Art. IX Ibid 52

⁶² see Art. X Ibid 52

⁶³ Frans G. von der Dunk, 'A Sleeping Beauty Awakens: The 1968 Rescue Agreement after Forty Years', 34 *Space, Cyber, and Telecommunications Law Programm Faculty Publications* (2008).

⁶⁴ see Sputnik 4 incident of 1962 and the case of unidentified fragments in Nepal of 1968

Recent questions have also been raised regarding the “Space Tourism” phenomenon. Private commercial space companies, such as Virgin Galactic and Blue Origin, have been launching private paying citizens into low earth orbits. The RA does not apply to private entities, but does “Spacecraft personnel” refer just to military or even not military persons? The ISS in 2002 defined “spaceflight participants” as “individuals sponsored by one or more partners” including tourists, allowing them on board the ISS.

The Rescue Agreement, in short, has found limited application since its definitions are not all-encompassing.

1.7 The Liability Convention

The Liability Convention⁶⁵ (LC) is the third space-related agreement adopted within the UN framework. The OST was concluded when rules on state responsibility and liability were not yet fully developed. Thus in 1971, with GA Res. 2777 (XXVI), states decided to further develop the concept mentioned in Art. VIII OST.

The RA entered into force in September of 1972 with the deposit of the 5th instrument of ratification. Currently, 92 States are parties to the Convention; 20 States have signed but are still waiting for ratification and 3 international organisations have made declarations accepting its provisions⁶⁶.

1.7.1 Structure

The LC is structured of 28 Articles ranging from Liability issues, Claims for Compensation and procedures for resolving conflict.

First of all, definitions are given, some of which would have been useful to the RA, for the interpretation of the provisions of the Convention. “Damage” is defined as the “loss of life, personal injury or other impairment of health or loss of or damage to property” for States and Intergovernmental organisations. While “launching authority” recalls the definition given in Art. VI RA, the term “Launching”, more specifically, also refers to cases where the launching was attempted. The definition of “space objects”, in particular, referring to

⁶⁵ UNGA, Convention on International Liability for Damage Caused by Space Objects, A/RES/2777 (XXVI), 1972.

⁶⁶ the European Space Agency (ESA), the European Telecommunications Satellite Organisation (EUTELSAT) and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT)

“components and launching vehicles, and parts thereof” (Art. I)⁶⁷, should have probably been, more appropriately, included already in the RA.

The RA provides for the application of Liability depending on the location of the occurrence and, in certain situations, requires a fault check. In the case that damage is caused on the surface of Earth or to aircraft in flight, the launching State of a space object shall be Absolutely Liable for the compensation of damage (Art. II)⁶⁸. If damages occur amongst space objects in flight, ergo not on the surface of Earth, liability shall be attributed only in the case that the launching state was at fault (Art. III)⁶⁹.

Often multiple states launch objects together in the spirit of cooperation. In such situations, liability may be attributed both jointly or severally. Depending on the location, liability shall be absolute or fault-based as provided in Artt. II-III LC. The compensation for damages is apportioned according to the extent to which each state is at fault, otherwise equally (Art. IV)⁷⁰.

States are also granted the freedom to conclude agreements amongst themselves in order to provide rules for the burden of compensation of damages (Art. V)⁷¹. In cases where states provide proof that damages have occurred due to gross negligence, absolute liability shall be exonerated (Art. VI)⁷².

The drafting states also provided general rules regarding the procedure to adopt in cases where damages have occurred. First of all, the right to present compensation for damages, in accordance with this Treaty, is not reserved for the nationals of the launching state, or foreign nationals taking part in space operations organised by the launching state (Art. VII)⁷³. Claims for Compensation may only be presented by States, who may also act on behalf of a natural or juridical person who suffered the damage, to the damaging state (Art. VIII)⁷⁴.

The appropriate channels to pursue compensation claims are diplomatic ones. Almost as an autograph of the Cold War era relations, if states are “not maintaining diplomatic relations” among themselves, other states who are may bring the claim on their behalf (Art. IX)⁷⁵. Temporal limits are specifically prescribed for the presentation of claims for compensation. State parties are required to present a claim for compensation within one year from the discovery

⁶⁷ see Art. I Ibid 65

⁶⁸ see Art. II Ibid 65

⁶⁹ see Art. III Ibid 65

⁷⁰ see Art. IV Ibid 65

⁷¹ see Art. V Ibid 65

⁷² see Art VI Ibid 65

⁷³ see Art VII Ibid 65

⁷⁴ see Art. VIII Ibid 65

⁷⁵ see Art. IX Ibid 65

of the damage. The occurrence of damages may not always be immediately discoverable, the launching authority may also not be identified. In such situations, claims may be presented one year after the discovery of the facts mentioned above, only if due diligence was exercised (Art. X)⁷⁶. States can also present compensation claims via the local national tribunals. The claim under this convention is not a claim of last instance (Art. XI)⁷⁷.

Damages are determined in accordance with international law, and the principles of justice and equity. Compensation aims to provide reparation to restore the condition that would have existed if the damage had not occurred (Art. XII)⁷⁸. States are free to conclude prior agreements to determine the currency of compensation; otherwise, the currency shall be of the claimant state (Art. XIII)⁷⁹.

In case diplomatic relations are unsuccessful, the RA also allows the establishment of an ad hoc Claims Commission. Such Commission shall be established if so called for by States (Art. XIV)⁸⁰. The commission shall be structured of 3 members: one appointed by the claimant, one by the launching state, while the third shall be appointed via the joint decision of the parties (Art. XV)⁸¹. If one of the parties fails to appoint its commissioner, the Chairman shall, at the request of the other party, constitute a single chair commission. The procedure shall be determined by the commission's own accord. The commission shall also determine the place or places where it shall sit and all the other administrative matters. Decisions and awards require a vote by majority (Art. XVI)⁸². The award determines the amount of compensation to be paid and is decided based on the merits of the claim (Art. XVIII)⁸³. The claims commission shall act according to International law and its decisions are final and binding if the parties have agreed (Art. XIX)⁸⁴. Unless otherwise agreed upon, the expenses for the operation of the claims commission shall be borne equally upon the parties (Art. XX)⁸⁵.

If an International Intergovernmental Organisation declares to accept the rights and obligations provided under the RA and the OST, it shall fall under the definition of “State” (Art. XXII)⁸⁶.

⁷⁶ see Art X Ibid 65

⁷⁷ see Art. XI Ibid 65

⁷⁸ see Art. XII Ibid 65

⁷⁹ see Art. XIII Ibid 65

⁸⁰ see Art. XIV Ibid 65

⁸¹ see Art. XV Ibid 65

⁸² see Art. XVI Ibid 65

⁸³ see Art XVIII Ibid 65

⁸⁴ see Art. XIX Ibid 65

⁸⁵ see Art. XX Ibid 65

⁸⁶ see Art. XXII Ibid 65

As always the final revisions relate to procedure: signature, ratification and entry into force (Art. XXIV)⁸⁷; Amendments (Art. XXV)⁸⁸; Notice of withdrawal (Art. XXVII)⁸⁹; Authenticated languages (Art. XXVIII)⁹⁰.

The Drafting States even foresaw the possibility that one day revision would be needed, providing the chance to do so after 10 years from the entry into force of the convention (Art. XXVI)⁹¹.

1.7.2 Considerations

The liability convention has seen few instances of application. The main criticism arguments relate to the scope of the definitions provided in the treaty. Providing for both absolute and fault-based liability, no clear definition is provided for “fault.” Generally speaking, fault is asserted when an act constitutes a violation of the general duty of care, and no such duty can be said to be found in the treaty. Fault is also attributed based on violating general obligations to act or abstain; the LC fails even to provide such rules.

Such a lack of prescriptions complicates the required furnishing of proof of fault. The 2009 Iridium-Cosmos is a clear example of such: when the two satellites collided, liability was not attributed as no specific proof of fault was provided by either country involved. Requiring gross negligence for the exoneration from absolute liability, no such definition or standard of care is provided. With no standard of care, questions about whether acts of third parties or force major constitute valid defenses to liability remain unanswered. In essence, failing to provide substantive rules for the interpretation of damage of fault or negligence constitutes major loopholes that will cause serious problems.⁹²

Adding insult to injury, the LC also provides a very controversial exception to liability in Art. VII. According to such provision, individuals in space facilities, such as the ISS, can't resort to the convention for protection from damages caused by intentional or negligent wrongdoings. Such an article, other than being highly inconsistent with the provisions of the RA, only four years its senior, is also inconsiderate as the individuals taking part in such operations are the ones bearing the highest risks.

With regard to compensation of damages, no contentious court or arbitration case has ever called for the application of the Liability Convention. The claim

⁸⁷ see Art. XXIV Ibid 65

⁸⁸ see Art. XXV Ibid 65

⁸⁹ see Art. XXVII Ibid 65

⁹⁰ see Art. XVIII Ibid 65

⁹¹ see Art. XXVI Ibid 65

⁹² Yun Zhao, 'The 1972 Liability Convention: Time for Revision?', 20(2) *Space Policy* (2004) 117.

commission has never seen the light of day. In 1981 the Cosmos 954 case⁹³ was resolved via diplomatic negotiation between the USSR and Canada. The USSR in particular claimed that the RC was not applicable as no damage was produced to any person or object of Canada.

As with its predecessors, the Liability Convention failed to predict the change that would come in the space environment. Not considering that it doesn't apply to private commercial entities, the lack of specific procedural and substantive guidelines leaves too much discretion to the current political decision-makers.

1.8 The Registration Convention

The Registration Convention⁹⁴ (RC) provides the means to assist in identifying Space objects launched by States. The adoption came with UN General Assembly Res. 3235 (XXIX) in 1974 while entry into force came in September 1976. The RC boasts 63 State Parties and 3 International Organisations⁹⁵ declaring the acceptance of its terms. In terms of application, it is considered the most successful UN Space Treaty to date.

1.8.1 Structure

The Registration Convention of 1976 is built of XII articles relating to the registration of space objects.

The definitions of “launching state”, which has so far survived criticism, and “space objects”, maybe purposefully ambiguous, have been reconfirmed in the Liability Convention. The novelty definition is the term “State of Registry” referring to the launching state who carries a space object in its state registry (Art. I)⁹⁶.

The main prescription of the RC is the required establishment of two sets of registries for space objects. First of all, Launching States are required to establish National State Registries. With the list of launched space objects, states must inform the Secretary General of establishing such a document. In the case that multiple States are to jointly launch an object in space, they are required to agree on who shall enlist the object in their National Registry. The content of the

⁹³ Settlement of Claim between Canada and the Union of Soviet Socialist Republics for Damage Caused by ‘Cosmos 954’, 1981, available at https://www.jaxa.jp/library/space_law/chapter_3/3-2-2-1_e.html

⁹⁴ UNGA, Convention on Registration of Objects Launched into Outer Space, A/RES/3235 (XXIX), 1976.

⁹⁵ ESA, EUTELSAT and EUMETSAT

⁹⁶ see Art. I Ibid 94

national Registers is freely decided by the States (Art. II)⁹⁷. The Secretary General of the UN keeps the second prescribed registry: full and open access to information is guaranteed (Art. III)⁹⁸. However, the content of such “UN Registry” is not open to discretion. Each State must furnish the following information regarding objects recorded in its registry: Name of the launching States/s; Appropriate designator of the Space object or registration number; basic orbital parameters; general function of the object. Further information may be provided at any subsequent moment. If space objects are no longer in Earth orbit, the State of registry shall notify the UN as soon as practicable (Art. IV)⁹⁹. If a space object launched into orbit or beyond is marked with an appropriate designator or registration number, such fact shall be notified to the UN Secretary General, who will promptly record it on the registry (Art. V)¹⁰⁰.

Like in the previous space treaties, the spirit of Cooperation is reiterated but may be conditioned. In particular, if a State Party cannot identify a space object that has caused damage to it, other State parties shall assist under equitable and reasonable conditions in identifying the damaging object (Art. VI)¹⁰¹.

Declarations accepting the obligations and principles contained in the OST and RC means when referring to “States” in this convention, it shall also apply to Intergovernmental Organisations (Art. VII)¹⁰².

The final provisions relate to procedure: Signature, ratification and entry into force (Art. VIII)¹⁰³; Amendments (Art. IX)¹⁰⁴; the possibility of revision after ten years from entry into force (Art. X)¹⁰⁵; one year notice of withdrawal (Art. XI)¹⁰⁶; Authenticated languages, with the new addition of Arabic (Art. XII)¹⁰⁷.

1.8.2 Considerations

The registration convention is considered a moderate success in providing an atmosphere of international transparency in registering launched objects. On paper, so far, all state parties have registered objects launched under their jurisdiction. Most spacecraft orbiting near and far are often used for intelligence

⁹⁷ see Art. II Ibid 94

⁹⁸ see Art. III Ibid 94

⁹⁹ see Art. IV Ibid 94

¹⁰⁰ see Art. V Ibid 94

¹⁰¹ see Art. VI Ibid 94

¹⁰² see Art. VII Ibid 94

¹⁰³ see Art. VIII Ibid 94

¹⁰⁴ see Art. IX Ibid 94

¹⁰⁵ see Art. X Ibid 94

¹⁰⁶ see Art XI Ibid 94

¹⁰⁷ see Art. XII Ibid 94

gathering, communications, navigation, and weather forecasting. These often constitute military activities contrary to OST's "peaceful use" provisions¹⁰⁸.

Specific capabilities of satellites are usually secreted. The convention does not provide provisions for the verification of state-party compliance. The Union of Concerned Scientists in the US has been publishing a satellite database containing information regarding tracked satellites in earth orbits¹⁰⁹. Such information seems to confirm that not all that is tracked is actually contained in National or UN registries. Situations have arisen where States have performed ASAT tests and not informed the UN, not even regarding the "reentry" to earth of the spacecraft/debris. North Korea has also registered objects according to the RC. These satellite launches have been considered as the beginning of missile programs prohibited under the UN treaties¹¹⁰.

With the lack of provisions requiring the specific function of satellites and space objects, states have taken advantage of the loophole. Sanctions are not provided in the convention. Time will tell if public opinion will be enough to make states comply with specific standards.

1.9 The Moon Agreement

In 1969, the US was the first country to successfully land and temporarily place men on the moon. During the famous landing, scientific investigations were concluded, and before leaving, the captain, Neil Armstrong, planted an American Flag on the Moon's surface. The Moon Agreement¹¹¹ (MA) is the consequence of such an event. The MA reaffirms most provisions of the 1967 OST while at the same time extending to new applications on the moon. It was adopted by the UN General Assembly with resolution 34/68 but entered into force only in 1984 with the 5th ratification by Austria. It is also listed within the UN list of Treaties on Disarmament.

¹⁰⁸ see Chapter 2

¹⁰⁹ *UCS Satellite Database*, Union of Concerned Scientists, available at <https://www.ucsusa.org/resources/satellite-database>.

¹¹⁰ *Statement by Simonetta Di Pippo, Director, UNOOSA*, June 2016, UNITED NATIONS Office for Outer Space Affairs, available at <https://www.unoosa.org/oosa/en/aboutus/director/director-statements/2016/director-statement-copuos-2016.html>.

¹¹¹ UNGA, Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, A/RES/34/68, 1984.

1.9.1 Structure

Built of 21 articles, the Moon Agreement expands on the provisions provided in the 1967 OST, such as the non-appropriation principle, peaceful uses, and information sharing.

First of all, the provisions of the agreement provide for rules relating to the activities conducted on the Moon and other Celestial Bodies (M/CB) within the Solar System. References to the “moon” apply also to orbits or trajectories around Earth's natural satellite. Extraterrestrial material that may reach planet Earth by natural causes does not apply to the MA (Art. I)¹¹².

Activities on the M/CB must be conducted under International law and the provision provided for in the Charter of the United Nations (Art. II)¹¹³.

With the upcoming technological advancements, drafting states decided to elaborate on the OST provisions of peaceful uses of space. Parties to the Moon Agreement are again required to use the M/CB exclusively for peaceful purposes. The novelty of the MA is the prohibition of “any form of threat, use of force or hostile act” on the Moon. Once again, the placement of objects carrying nuclear weapons or WMDs, facilities, and installations, military in nature, is prohibited (Art. III)¹¹⁴.

The “province of mankind” is once again recalled, requiring that states, when exploring and using the moon, consider the benefit and interests of all countries. Discrimination based on economic or scientific development is prohibited. Echoing the foundation of the Sustainable Development Principle, drafting states prescribed that activities on the moon shall be conducted while keeping in consideration future and present generations. In general, all activities on M/CB shall be done in the spirit of international cooperation and the principle of mutual assistance (Art IV)¹¹⁵.

The general requirement of cooperation is now extended to all Moon activities. In this spirit, when states exercise lunar activities, they are required to furnish relevant information to the Secretary General of the UN when activities are performed on the moon. Specific information, in particular, shall be given regarding each mission as soon as possible after launch; each mission's results shall be given upon completion. If multiple countries are performing missions in the same portion of space, states are required to cooperate and give notice to one another. Suppose discoveries of phenomena are made which could endanger human life and health. In that case, States are again required to promptly inform

¹¹² see Art. I Ibid 111

¹¹³ see Art. II Ibid 111

¹¹⁴ see Art. III Ibid 111

¹¹⁵ see Art. IV Ibid 111

the UN Secretary-General, the public, and the international scientific community (Art. V)¹¹⁶.

Recalling the OST, the Convention requires states to perform scientific activities following international law, the principle of non-discrimination, and equality. Most importantly, states felt the necessity to provide rules of cooperation in the extraction of space materials. States are provided with the right to extract “samples of minerals and other substances” if done so for scientific investigations. For the same purposes, States must provide portions of the extracted samples of the moon when it is of interest to other states or the International scientific community (Art. VI)¹¹⁷.

The MA also provides for the protection of the integrity of the lunar environment. In the Exploration and Usage of the Moon, Parties are required to make sure no disruption of the Moon's environment is to take place: adverse changes or contamination via the introduction of extra-environmental matter. If states place radioactive material, they shall notify the secretary general before their placement and the reasons for it (Art. VII)¹¹⁸.

Any territorial limit does not bind exploration of the Moon: activities may be held both below and on the surface of the Moon. Landing and launching objects to and from the Moon is admissible; placing and moving personnel, vehicles, equipment, facilities, stations and installations are all possible. The only limitation is not interfering with other State Parties' activities on the Moon (Art. VIII)¹¹⁹. As such, parties are afforded the right to establish manned or unmanned stations on the moon as long as they only use the portion of areas required for the needs of the stations (Art. IX)¹²⁰.

General protection is also offered to Astronauts on the Moon: Member States must adopt all measures necessary to protect the life and health of persons on the Moon. These individuals on the Moon are considered “Astronauts” within the meaning envisioned in art. V OST. Furthermore, States shall guarantee shelter in their facilities to individuals in distress on the Moon (Art. X)¹²¹.

In apparent defiance of the US's planting of a flag on the surface, the drafting states sentenced the moon to no form of ownership. In order not to provide any doubts, the surface, subsurface, or natural resources of the Moon shall not become the property of any “State, international intergovernmental organization or non-governmental organization, national organization or non-governmental

¹¹⁶ see Art. V Ibid 111

¹¹⁷ see Art. VI Ibid 111

¹¹⁸ see Art. VII Ibid 111

¹¹⁹ see Art. VIII Ibid 111

¹²⁰ see Art. IX Ibid 111

¹²¹ see Art. X Ibid 111

entity or of any natural person.” Furthermore, the placement of “personnel, space vehicles, equipment, facilities, stations and installations” also does not provide for rights to ownership. In summary, all provisions relating to moon activities are condensed in one formula “The Moon and its natural resources are the common heritage of mankind”. Almost in self-recognition of its loose provision, the moon agreement calls for states to establish an “international regime” to govern the exploitation of the moon's natural resources(Art. XI)¹²².

Jurisdiction and control of personnel, vehicles, equipment, and installation are not affected by their presence on the moon. If such property is found in places other than its intended location, states must respond per the measures contained in art. V RA. State parties are granted the right to use the property of other countries on the moon in the event of an “emergency to human life” (Art. XII)¹²³. In the discovery of any unintended landing on the Moon, the discovering Party must promptly inform the launching State and the Secretary General of the UN (Art. XIII)¹²⁴.

States bear international responsibility on the moon for their activities and the activity of non-governmental entities under their jurisdiction. Liability clauses are provided. Instead, the treaty recognises the necessity of “detailed arrangement,” in addition to OST and LC, concerning liability for damage caused on the moon (Art. XIV)¹²⁵.

The convention provides for the right of member states to expect other Parties to enact Moon activities under the Moon Agreement. If that may not be the case, States may require consultations which shall come to an agreeable resolution. If the consultations do not come to a mutually acceptable settlement, the parties concerned shall take other peaceful measures to settle the dispute (Art. XV)¹²⁶.

The convention also refers to international organisations when mentioning “states”, except for art XVII and XXI, if such entities publicly declare the acceptance of the provisions contained in the OST and MA (Art. XVI)¹²⁷.

The final provisions are in charge of providing the procedural rules of the MA. Just like every UN space treaty so far: amendments may be proposed (Art. XVII)¹²⁸; the agreement may be up for renewal after ten years from its entry into

¹²² see Art. XI Ibid 111

¹²³ see Art. XII Ibid 111

¹²⁴ see Art. XIII Ibid 111

¹²⁵ see Art. XIV Ibid 111

¹²⁶ see Art. XV Ibid 111

¹²⁷ see Art. XVI Ibid 111

¹²⁸ see Art. XVII Ibid 111

force (Art. XVIII)¹²⁹; signature is open to all States (Art. XIX)¹³⁰; withdrawal is possible after the presentation of a one year notice (Art. XX)¹³¹.

1.9.2 Considerations

The main problem of the Moon Agreement is not its own fault: only eighteen states are parties, while just eleven are signatories. Of these, the only genuinely active spacefaring countries are the Netherlands, the only state party, and France and India, as mere signatories. The treaty remains mostly unused, with no significant developments since its entry into force. This may indicate that states do not perceive the MA as a necessary instrument of space law. It is possible that states simply do not wish to comply with the provisions contained in the Moon Treaty.

The US and Luxembourg have, in fact, recently enacted national legislation encouraging private commercial mining of the moon and its resources. The attempt to extend the common heritage of mankind¹³² to the Moon was quite courageous¹³³. At the time, the UN had not even come to the full establishment of UNCLOS, which took over 20 years and 60 instruments of ratification.

More in general, the provisions and definitions of the MA are also highly imprecise like its predecessors. When requiring the furnishing of information relating to space missions/activities to the UN SG, no instruction is given as to what the contents of such figures may be. In art. VIII, no description of conduct is given when prohibiting the “interference” in other state activities. Shall it be interpreted in accordance with the non-intervention principle? If so wouldn't that imply sovereign rights? On the same line, does the “international regime” of art XI call for the conclusion of a further treaty on the exploitation of moon resources?

On the other hand, the Moon Agreement provided a critical provision relating to prohibiting hostilities in space. Art. III prohibits “ANY form of threat, use of force or hostile act”. This represents an essential evolution of the “peaceful uses” of the OST, which nowadays leaves wide options for interpretation. In short, until a more significant number of states decide to participate, wishful thinking, the concrete results of the MA application will remain a mystery.

¹²⁹ see Art. XVIII Ibid 111

¹³⁰ see Art. XIX Ibid 111

¹³¹ see Art. XX Ibid 111

¹³² UNGA, 'Declaration of Principles Governing the Sea-Bed and the Ocean Floor, and the Subsoil Thereof, beyond the Limits of National Jurisdiction.', (1971) , available at <https://digitallibrary.un.org/record/201718>.

¹³³ Ram S. Jakhu and Joseph N. Pelton, *Global Space Governance: An International Study* (2017).

1.10 The UN General Principles

Following the ratifications of the five United Nations space treaties, a significant shift occurred in the approach of the international community toward space law. Rather than continuing to formulate binding treaties, states began to develop voluntary consensus principles and guidelines. These non-binding instruments focused on practical aspects of space operations, debris mitigation, and space sustainability. Alongside the general multilateral treaties, the United Nations General Assembly played a pivotal role in overseeing the drafting and formulation of these principles, marking a notable transition in space governance.

One of the foundational steps in this transition was the 1963 Declaration of Legal Principles¹³⁴, embodied in General Assembly Resolution 1962 (XVIII). This declaration laid the groundwork for what would later become the Outer Space Treaty of 1967. Its provisions, largely incorporated into the Space Treaty, are considered by many as binding customary international law, demonstrating the declaration's enduring influence on the legal framework governing space activities.

The establishment of the 1982 Broadcasting Principles¹³⁵, through General Assembly Resolution 37/92, marked a contentious departure from the usual consensus-driven decision-making process. This resolution, which saw 103 states voting in favor and 13 abstaining, was born out of a complex interplay of technological capabilities and divergent views on the freedom of satellite broadcasting. The resolution's significance lies in its direct reference to the OST as binding law, emphasizing that satellite activities must conform to international law, including the principles set forth in the OST.

Adopted by consensus in General Assembly Resolution 41/65, the Remote Sensing Principles of 1986¹³⁶ define 'remote sensing' as the sensing of Earth's surface from space using electromagnetic waves. The resolution aimed to enhance the management of natural resources and environmental protection for all countries' benefit. It underscored that remote sensing activities should align with international law, including the OST and Registration Convention (RC), ensuring

¹³⁴ UNGA, 'Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space.', (1964) , available at <https://digitallibrary.un.org/record/203965>.

¹³⁵ UNGA, Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting, A/RES/37/92, 1982. Available at https://www.unoosa.org/oosa/oosadoc/data/resolutions/1982/general_assembly_37th_session/res_3792.html

¹³⁶ UNGA, Principles Relating to Remote Sensing of the Earth from Outer Space, A/RES/41/65, 1986. Available at https://www.unoosa.org/oosa/oosadoc/data/resolutions/1986/general_assembly_41st_session/res_4165.html

equitable benefits and responsibilities among states, irrespective of their developmental stage.

A notable instrument in this evolution is the 1992 Nuclear Power Sources Principles¹³⁷, part of General Assembly Resolution 47/68. This resolution, for the first time, provided conditions under which nuclear power sources could be placed in space. It stipulated that activities involving nuclear power sources in outer space should adhere to International Law, the UN Charter, and the OST. This resolution highlights the increasing complexity and specificity of space operations, necessitating guidelines that address contemporary technological advancements.

The trajectory of space law, as guided by these resolutions and principles, reflects an adaptive approach to the evolving challenges and opportunities in space. While these instruments are not legally binding, they offer critical guidance and normative frameworks that complement the foundational treaties. The international community's pivot towards consensus-based principles and guidelines signifies a pragmatic response to the need for flexible and dynamic governance mechanisms in space, acknowledging the diverse interests and technological capabilities of states engaged in space activities. This approach, while distinct from the formulation of binding treaties, continues to shape the norms and practices governing the use and exploration of outer space.

1.11 Closing Arguments

In concluding this chapter, it is evident that the existing framework of United Nations space treaties, while pioneering in their inception, now reveals significant inefficiencies and limitations in addressing the complexities of contemporary space activities. Originally crafted in an era dominated by a few space-faring nations, these treaties were pivotal in establishing a baseline for the peaceful exploration and use of outer space. However, as the domain of space activities has evolved, encompassing an array of diverse actors and advanced technologies, the need for a reinvigorated and adaptive legal framework becomes increasingly urgent.

The Outer Space Treaty (OST), the bedrock of space law, alongside other key treaties such as the Rescue Agreement, the Liability Convention, the Registration Convention, and the Moon Agreement, have laid down fundamental principles. However, their broad and often ambiguous provisions have led to varied

¹³⁷ UNGA, Principles Relevant to the Use of Nuclear Power Sources in Outer Space, A/RES/47/68, 1992. Available at https://www.unoosa.org/oosa/oosadoc/data/resolutions/1992/general_assembly_47th_session/res_4768.html

interpretations and applications, failing to keep pace with rapid advancements in space technology and the growing commercialization of space. These treaties, while visionary at their inception, lack the specificity and enforcement mechanisms necessary to address current challenges such as space debris management, the exploitation of space resources, and the increasing involvement of private entities in space activities.

The limitations of these treaties underscore the need for a more dynamic approach by UNCOPUOS in shaping the future of space governance. There is a pressing requirement for UNCOPUOS to adapt its agenda and methods to the realities of modern space activities, fostering an environment conducive to the development of more detailed and specific guidelines. Such an approach would not only reinforce the existing legal framework but also accommodate the diverse interests and technological capabilities of the expanding array of space actors.

Moreover, the chapter highlights the importance of international cooperation in space governance. The challenges and opportunities presented by space activities are inherently global and necessitate collaborative solutions. The role of UNCOPUOS, in conjunction with other international and regional organizations, in facilitating international dialogue, consensus-building, and cooperative approaches to space governance remains crucial.

As this chapter concludes, it sets the stage for the forthcoming discussion in the next chapter, which will delve deeper into critical issues such as the use of force in space, the implications of Anti-Satellite (ASAT) technology, and the application of the Law of Armed Conflict (LOAC) in the unique context of outer space. This exploration will further illustrate the complexities and nuances of space law, highlighting the pressing need for an evolving legal framework that effectively addresses the realities of contemporary and future space activities.

Chapter II: Peaceful Purposes

2.1 Introduction

The exploration and utilisation of outer space stand as one of the most remarkable achievements of the 20th century, necessitating a framework for international governance. The United Nations Space Treaties, crafted during the height of the space race, provided this essential legal structure. However, as we venture further into the 21st century, the adequacy of these treaties in addressing the complexities of modern space activities becomes increasingly questionable.

This chapter aims to critically analyse the UN Space Treaties, particularly focusing on their relevance and efficacy in the face of contemporary challenges. The treaties were undoubtedly pioneering in their time, laying down the foundational principle of peaceful use, which became the cornerstone of international space law. However, the rapid advancements in space technology, coupled with the evolving fragmented geopolitical landscape, have exposed significant limitations in these treaties.

The principle of peaceful use, while noble in its intent, has been subjected to varying interpretations by states and international organisations, often to suit their strategic interests. This chapter delves into the practical applications of this principle, highlighting instances where the line between peaceful and military uses of space has been blurred. The emergence of cybersecurity as a new frontier of concern, the dual-use dilemma of satellite technology, and the strategic implications of Anti-Satellite (ASAT) weaponry are critical areas that will be explored in-depth. These areas not only challenge the existing legal framework but also raise pressing questions about the future of space governance.

Furthermore, this chapter will describe and analyse specific cases where ASAT weaponry has been deployed, scrutinising the reactions and responses of the international community. These instances serve as pivotal examples of how the existing treaties are ill-equipped to handle contemporary forms of space conflict and competition. Through a detailed critique of the UN Space Treaties, this chapter aims to contribute to the ongoing scholarly discourse on reforming international space law, advocating for a framework that is responsive to the dynamic and complex nature of modern space activities.

2.2 Peaceful Purposes in Space

Through the myriad of activities conducted in space before adventuring in legal discourse regarding possible ambiguities, peace is the cornerstone of all.

The Outer Space Treaty of 1967¹³⁸, formally known as the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, serves as the foundational legal framework for international space law; some say it represents the “constitution” for space activities¹³⁹. Article IV¹⁴⁰ of this treaty is particularly significant as it encapsulates the principle of peaceful purposes. The norm provides a very general and ambiguous guideline of what is permitted and what is not permitted in pursuit of peace. In particular, this article explicitly prohibits the placement of nuclear weapons and other weapons of mass destruction in orbit or on celestial bodies. While this establishes a strong norm against the militarisation of outer space, its interpretation has been a subject of debate, especially regarding what constitutes “peaceful purposes”¹⁴¹. The treaty does not prohibit the use of military personnel for scientific research or any other peaceful purposes, nor does it ban conventional weapons in space. This ambiguity has led to differing interpretations by space-faring nations, potentially allowing for military activities in space that do not involve weapons of mass destruction.

Furthermore, Art III OST elaborates that activities shall be carried out in accordance with international law, particularly the Charter of the United Nations, with the aim of maintaining international peace and security. Additionally, the treaty's provision for the non-appropriation of outer space by any one country (Article II, OST)¹⁴² is crucial for maintaining space as a province of all mankind.

However, this raises questions about the exploitation of space resources, especially with the growing interest in asteroid mining and lunar exploration. The lack of clear legal definitions and guidelines for the exploitation of resources in outer space leaves a grey area in space law, which could become a source of international contention.

¹³⁸ see *Ibid* 111

¹³⁹ S. Hobe, 'Outer Space as the Province of Mankind: an Assessment of 40 Years of Development', 50 *International Institute of Space Law* (2007) 3, available at https://www.elevenjournals.com/tijdschrift/iisl/2007/5%20The%2040th%20Anniversary%20of%20the%20Outer%20Space%20Treaty%20and%20Other%20Legal%20Matters/IISL_2007_050_005_003. p.49; Stephan Hobe et al., *Cologne Commentary on Space Law. Vol. 1, Outer Space Treaty* (2009).

¹⁴⁰ see art IV OST

¹⁴¹ different interpretations of “peaceful uses” by countries, “dual-use” principle of civil-military equipment, see Chapter 2.3.3

¹⁴² see art II OST

Even though the UN treaties may be disregarded and military activities may be enacted by countries, which will be discussed in a later paragraph¹⁴³, it is important to underline that peaceful activities are, in fact, carried out in space. In accordance with the principle of cooperation enshrined in the UN space treaties, countries carry out various activities in space that help us on a day-to-day basis on earth. From the dawn of the first space missions, technology has evolved and space has become an important asset for what happens on earth. With the launch of satellites, telescopes, and many more instruments, earth has benefitted from great scientific knowledge. Thanks to different spacecraft sent into space during the decades, scientific research and exploration have enriched our knowledge on Earth. From fundamental disease research to the development of new drugs and new water purification systems¹⁴⁴, science has greatly benefited from space research.

The emphasis on scientific research and exploration in outer space is prominently featured in the Outer Space Treaty and the Moon Agreement¹⁴⁵. Article I of the Outer Space Treaty articulates the freedom of exploration and use of outer space by all countries without discrimination and that space shall be free for exploration and use by all states. This provision underpins international collaboration, as seen in initiatives like the International Space Station. However, the treaty does not explicitly address the sharing of scientific data, leading to potential disparities in benefits derived from space exploration.

The Moon Agreement, which attempted to build upon the principles of the Outer Space Treaty, has been ratified by a relatively small number of countries, limiting its effectiveness. Article IV of the Moon Agreement emphasises that the Moon and its natural resources are the common heritage of mankind, which implies that these resources should be shared equitably. This principle, while noble in its intention, faces practical challenges, as major space-faring nations have not ratified the agreement, questioning its applicability in regulating lunar activities.

Furthermore, Article XI of the Moon Agreement states that the Moon's environment should not be disrupted, raising questions about the environmental impact of increased human activity in space. As space exploration intensifies, there is a need for more comprehensive legal provisions to mitigate the potential environmental impacts, a subject that current treaties only touch upon superficially.

¹⁴³ see Chapter 2.3.3

¹⁴⁴ Erin Winick, *20 Breakthroughs from 20 Years of Science Aboard the International Space Station*, October 2020, available at <https://www.nasa.gov/missions/station/20-breakthroughs-from-20-years-of-science-aboard-the-international-space-station/>.

¹⁴⁵ see MA *ibid*

The commercial and economic activities in outer space have rapidly become a large part of the equation in space. With the endeavors of commercial companies such as Space X¹⁴⁶, commercial use of satellite technology has become a prime example of peaceful uses as outlined in the UN space treaties. The Registration Convention and the Liability Convention provide the legal backdrop for these activities, but the rapid expansion in satellite technology poses new challenges and opportunities¹⁴⁷. One of the most significant peaceful uses of satellites is in global communications. Communication satellites have revolutionised the way information is shared globally, making instant global communication a reality. They are essential for broadcasting television and radio signals, providing internet access in remote areas, and enabling global telephone services. This aligns with Article I of the Outer Space Treaty, which emphasises the exploration and use of outer space for the benefit of all countries. The global reach of communication satellites exemplifies this principle, though it raises questions about equitable access and the digital divide between developed and developing nations.

The Global Positioning System (GPS), which was initially developed for military purposes, has become a critical component of civilian life, demonstrating a successful transition from military to peaceful use¹⁴⁸. GPS satellites, which provide location and time information globally, are indispensable for navigation in air, sea, and land transport. They also support emergency response and search and rescue operations and have myriad applications in industries like agriculture, mining, and construction. The peaceful application of GPS technology is a testament to the spirit of the Outer Space Treaty, though it also highlights the need for international cooperation to prevent disruptions in GPS services, which could have widespread societal impacts¹⁴⁹.

Satellites play a fundamental role in weather forecasting and environmental monitoring, providing data essential for predicting weather patterns, tracking climate change, and monitoring natural disasters. This contributes to disaster preparedness and mitigation, resource management, and environmental protection efforts globally.

Weather and environmental monitoring satellites embody the principles of cooperation in the Outer Space Treaty and the Moon Agreement¹⁵⁰ by contributing to the protection of the Earth's environment and aiding in the sustainable use of natural resources.

¹⁴⁶ space X currently operates the largest fleet of satellites, representing about 50% of operating systems in orbit

¹⁴⁷ Ram S. Jakhu, Paul Stephen Dempsey and Taylor & Francis (eds.), *Routledge Handbook of Space Law* (First edition, 2017), available at <https://libproxy.berkeley.edu/login?url=https%3A%2F%2Fwww.taylorfrancis.com%2Fbooks%2F9781315750965>.

¹⁴⁸ see Chapter 2.3.3

¹⁴⁹ see *Ibid*

¹⁵⁰ see Art IX, X, XI OST- Art IV, V, VI, VII MA

Satellites are also pivotal for astronomical observations, Earth science research, and educational purposes. They enable scientists to study celestial phenomena, monitor Earth's climate and geology, and provide educational resources that enhance global understanding of space and Earth sciences. This fosters international scientific collaboration, as envisioned in the UN space treaties, though it also underscores the need for equitable access to scientific data and resources.

Despite these beneficial uses, the increasing number of satellites, especially with the advent of large satellite constellations, raises concerns about space debris and orbital crowding. With the advent of commercial companies launching satellites into orbit, space has become a highly valuable domain for private interest and investments. The existing legal framework, primarily the Registration and Liability Conventions, offers some guidance but is inadequate for addressing these contemporary challenges¹⁵¹. There is a pressing need for new regulations and international agreements to ensure sustainable and responsible use of outer space, especially considering the potential for interference, collision risks, and long-term sustainability of the orbital environment.

In conclusion, while satellite technology demonstrates the vast potential for peaceful uses of outer space in accordance with UN space treaties, it also highlights the need for evolving legal frameworks to address emerging challenges and ensure equitable and sustainable benefits for all nations.

2.3 Law and Military Uses of Outer Space

History speaks. Not soon after WW2 ended, the two superpowers of the time (the US and USSR) began their own race to launch military satellites into outer space¹⁵². During the Cold War era, approximately 75% of satellites launched were for military purposes. Since then, as of 2015¹⁵³, the ratio has decreased by about 20%, but at the same time, it must be underlined that military uses of space have not decreased. Military operations have, in fact, started using commercial space systems for more than three decades. For exemplary purposes, during the 2001 Afghanistan War¹⁵⁴, both the US National Reconnaissance Office (NRO) and National Imagery and Mapping Agency (NIMA) made extensive purchases in commercial-based images such as IKONOS¹⁵⁵ and SPOT¹⁵⁶. Furthermore, from

¹⁵¹ see Chapter 3

¹⁵² Paul B. Stares, *The Militarization of Space: U.S. Policy, 1945-1984* (1985). pag. 22-29.

¹⁵³ see *Ibid* 109

¹⁵⁴ Loring Wirbel, *Star Wars: US Tools of Space Supremacy* (2004). p 114-115

¹⁵⁵ IKONOS was a commercial Earth observation satellite, it was the first to collect publicly available high-resolution imagery

¹⁵⁶ SPOT is a commercial high-resolution optical Earth imaging satellite system

1959 to 2014¹⁵⁷, more than 50 anti-satellite (ASAT) tests were conducted which resulted in the production of 4500 pieces of space debris in low earth orbit. These tests represent an offensive capability for possible armed conflicts in space.

Keeping in mind the peaceful purposes principle enshrined within the UN Space treaties, it is clear that such provisions seem to be somewhat disregarded by countries. More specifically, the interpretation of the treaties has left vast ambiguities in their application. In general, the UN space treaties are considered the cornerstone of Space Law, but probably due to the time and technological advancement in which they were drafted, their relevance and efficacy in the context of modern space endeavors have been increasingly questioned due to their ambiguous wording and the evolving nature of space activities.

The foundation of international space law, embodied in the series of UN Space Treaties formulated during the Cold War era, reflects the geopolitical dynamics and technological aspirations of that period. These treaties include the pivotal Outer Space Treaty (1967), the Rescue Agreement (1968), the Liability Convention (1972), the Registration Convention (1976), and the Moon Agreement (1979).

The Outer Space Treaty, formally titled "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies," sets the fundamental principles for space activities. With regard to peaceful uses, and hence military use of force in space, article IV OST is central to our argument.

Art IV OST states:

“States 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.

The Moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes. The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military maneuvers on celestial bodies shall be forbidden. The use of military personnel for scientific research or for any other peaceful purposes shall not be prohibited. The use of any equipment or facility necessary for peaceful exploration of the Moon and other celestial bodies shall also not be prohibited.”¹⁵⁸

¹⁵⁷ Brian Weeden, Through a Glass, Darkly: Chinese, American, and Russian Anti-Satellite Testing in Space, March 2014, The Space Review, available at <https://thespacereview.com/article/2473/1>.

¹⁵⁸ see Art. IV OST Ibid

Art IV.1 OST, in particular, is clear in stating that weapons of mass destruction (WMD)¹⁵⁹ are prohibited from being placed in Earth Orbit, on celestial bodies, and in outer space in general. This provision is one of the least contentious. First of all, at the time and still today, the identity of what are WMDs is clear. Second of all, the provision expressly prohibits their placement from any location: Earth Orbit, Celestial Bodies, and general outer space; to date, and to current scientific knowledge, no other “place/location” exists.

Questions of contention, on the other hand, arise in relation to Art IV.2 OST as views differ in relation to what kind of activities are specifically prohibited in the absence of a definition of “exclusively peaceful purposes”. In this regard, according to different scholars and governmental officials, there are different interpretations possible.

Before such interpretations, though, it is important to clarify some points, both clarified and remaining vague. Certain types of weapons, in fact, were not considered banned (ICBM and FOBS¹⁶⁰) in accordance with this provision. It was agreed that these weapons should not be banned as they would not orbit Earth or would not complete a full orbit around the planet once¹⁶¹. Attempts were also made by countries such as India¹⁶² during the drafting of the OST to include the phrase “exclusively for peaceful purposes” in Art IV.1 OST. This still would not have resolved the interpretative differences regarding the “peaceful purposes” clause in void space¹⁶³.

Finally, ambiguities remained in regard to what actions constituted “exclusively peaceful purposes” on the moon and other celestial bodies, according to Art IV.2 OST. Should these represent a definitive or merely exemplary list? On the one

¹⁵⁹ WMD's, according to UN Doc. S/C.3/32/Rev.1 (18 August 1948), are considered as “*atomic explosive weapons, radioactive material weapons, lethal chemical and biological weapons, and any weapons developed in the future which have comparable in destructive effect to such existent weapons*”

¹⁶⁰ Intercontinental Ballistic Missile (IBM) and Fractional Orbital Bombardment Systems (FOBS)

¹⁶¹ with regards to ICBM see US Senate Committee on Aeronautical and Space Sciences [US Senate], *Outer Space Treaty Analysis and Background Data Staff Report* (1967) at pag 26; for FOBS see Eric Stein, 'Legal Restraints in Modern Arms Control Agreements', 66 *The American Journal of International Law* (1972) 255 , available at <https://www.jstor.org/stable/2199030>.

¹⁶² Setsuko Aoki, Law and Military Uses Of Space, in Ram S. Jakhu, Paul Stephen Dempsey and Taylor & Francis (eds.), *Routledge Handbook of Space Law* (First edition, 2017), available at <https://libproxy.berkeley.edu/login?url=https%3A%2F%2Fwww.taylorfrancis.com%2Fbooks%2F9781315750965>. p202

¹⁶³ “outer void space” is a term made by prof. Bin Cheng, meaning the vast empty void space between celestial bodies beyond terrestrial national space. See Bin Cheng, *Part V Military Use of Outer Space, 20 The Military Use of Outer Space and International Law*, December 1997, Oxford Public International Law, available at <https://opil.ouplaw.com/display/10.1093/law/9780198257301.001.0001/law-9780198257301-chapter-21?prd=OPIL>.

hand, countries such as the US seemed to have pushed for it to be an exemplary list, similar to Art 1 of the Antarctic Treaty¹⁶⁴, in order to fully demilitarise the moon and other celestial bodies. In the end, though, the Soviet text prevailed, considering the provision an exemplary list and leaving vast interpretative problems in the wording of Art IV.2 OST.

So what are these different interpretations in question mentioned above in regard to “peaceful Purposes”? Some commentators¹⁶⁵ seem to interpret “peaceful” as “non-military,” meaning an obligation of non-military use of the moon, celestial bodies, and outer void space. The reason for extending this obligation to void space is that any military activity in space would benefit only one or a group of states, thus in contradiction of Art I OST, which requires “for the benefit and interest of all countries”. This is clearly a broad and wide-ranging interpretation that is unfortunately not shared by the major space-faring nations. If there were a general obligation of non-military use in space, weapons such as ICBM would not be permitted under such definition. In particular, states would not be founding Space forces such as the United States Space Force¹⁶⁶ (USSF) or the Japanese Space Operation Group, part of the Japan Air-Self Defence Force (JASDF).

Other Western experts¹⁶⁷ refer to “peaceful” as “non-aggressive” in outer space, celestial bodies, and the moon. According to this interpretation, military activities that don’t constitute an aggressive act are permissible as they are not specifically prohibited in Art. IV.2 OST. This interpretation legitimises, contrary to the “non-military” interpretation, the foundation of military organisations such as the USSF. Other interpretations, on the other hand, fall in the middle of the two former ones. While outer void space may be under the obligation of “non-aggressive” use, thus permitting military activities, the Moon and other celestial bodies are subject to a “non-military” use clause. This interpretation is based on the fact that Art. IV.2 OST is modeled after Art. I of the Antarctic Treaty, which provided for the demilitarisation of Antarctica.

In essence, considering the implications of the different interpretations that can arise from Art. IV.2 OST, it is clear that the OST is in dire need of an amendment. Countries like Italy¹⁶⁸, Venezuela, and Peru have, in fact, made proposals in order to amend the OST by providing an Additional Protocol with a view to Preventing Arms Races in Outer Space. Other proposals¹⁶⁹ have been made providing for the

¹⁶⁴ the Antarctic treaty, 1 December 1959, 402 UNTS 71

¹⁶⁵ see, e.g., Marko G. Markov, “Against the So-Called ‘Broader’ Interpretation of the term ‘Peaceful’” in 11th IISL Proceedings

¹⁶⁶ see Chapter 2.3.1

¹⁶⁷ Martin Menter, 'Peaceful Uses of Outer Space and National Security', Volume 17 *International Lawyer* (1983). Available at <https://scholar.smu.edu/cgi/viewcontent.cgi?article=3641&context=til>

¹⁶⁸ CD/9 (26 March 1979)

¹⁶⁹ CD/274 (7 April 1982)

drafting of an all-in-all new treaty on the Prohibition of the Stationing of Weapons of any Kind in Outer Space. With regard to the use of force in space, in fact, countries seem to mostly rely on Art. III OST, which requires that all space activities be conducted in accordance with international law. Thus permissible action in outer space is mostly regulated in accordance with the prohibition of “threat or use of force” contained in Art. II.4 of the UN Charter which mostly equates to “non-aggressive” use.

The Moon Agreement, seeking to govern the activities of states on the Moon and other celestial bodies, provides an ulterior provision relevant to our discussion. This particular treaty is the last of the legally binding instruments to come out from UNCOPUOS in 1979. Relevant to the peaceful purposes discourse, is Art III.2¹⁷⁰ of the MA as it reiterates the principle contained in Art. IV.2 OST. However the MA only “de-militarizes” part of Outer space as the treaty references only to the Moon and “orbits around or other trajectories to or around it” (Art. I.2 MA).

Other than the more strict scope of application of the MA, the main problem is that only a limited number of countries have ratified it, and major space-faring nations do not recognize it.

In summary, the UN Space Treaties, while laying a foundational framework for space law, exhibit significant limitations in addressing contemporary space activities. Their ambiguous language, especially regarding the definitions of key terms and the scope of prohibited activities, combined with the evolving nature of space technology and exploration, has led to legal and practical challenges. The development of ASAT weapons, the foundation of the USSF, and the advent of private space companies are prominent examples that underscore the need to revisit and update these treaties to ensure sustainable and responsible use of outer space.

2.3.1 The Foundation of the USSF and its Implications on the UN Space Treaties

Already in 2001, the newly nominated Secretary of Defence of the United States, Donald H. Rumsfeld, hinted that the US Air Force was unequipped in space. In his report, he expressed the sentiment that the Pentagon should consider establishing a new “Space Corps”. Not soon after, the Air Force’s Space Warfare Center staged the first military war game with space being the primary center of

¹⁷⁰ “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 in order to commit any such act or to engage in any such threat in relation to the earth, the moon, spacecraft, the personnel of spacecraft or man- made space objects.” See MA Ibid

operations. According to the participants, the scenario represented growing tension between the US and China in 2017. According to Maj. Gen. William R. Looney III:

“ The purpose of this game was to focus on how we really would act in space¹⁷¹”.

This war game, conducted in 2001, and the sentiment expressed by Rumsfeld, represents how the US already was preparing, more than twenty years ago, for a conflict in space between major space faring countries.

In 2019, President Donald Trump followed in Rumsfeld's footsteps and decided to go one step further: the establishment of the United States Space Force (USSF). This marked a significant development in the realm of space activities and has profound implications for the interpretation of the framework established by the United Nations Space Treaties.

The USSF was instituted as the sixth branch of the U.S. Armed Forces, with a primary mission to organize, train, and equip space forces to protect U.S. and allied interests in space and to provide space capabilities to the joint force. Its creation was driven by the recognition that space has become a vital domain for national defense, akin to land, sea, and air. The strategic objectives of the USSF include gaining and maintaining space superiority, providing space support to national and joint operations, and ensuring the freedom of operation in space for the United States and its allies.

The rationale for establishing the USSF rests on several considerations. Firstly, the growing dependence on space-based assets for both civilian and military purposes has made space a critical area for national security. Secondly, the increasing capabilities of potential adversaries in space technologies necessitated a dedicated focus on protecting U.S. assets in space. Lastly, the USSF aims to enhance the United States' ability to respond to emerging threats and challenges in space, particularly in the areas of satellite communication, navigation, and missile warning systems.

More specifically, the main focus of the USSF nowadays is China and its civil and military capabilities, which are advancing and slowly transitioning into war-fighting systems. The USSF, in fact, has started partnerships with commercial entities such as SpaceX and ULA, launching satellites with military application capabilities¹⁷².

¹⁷¹ Larry Greenemeier, *GPS and the World's First 'Space War'*, Scientific American, available at <https://www.scientificamerican.com/article/gps-and-the-world-s-first-space-war/>.

¹⁷² Sandra Erwin, *Space Force Assigns 21 National Security Missions to ULA and SpaceX*, 31 October 2023, SpaceNews, available at <https://spacenews.com/space-force-assigns-21-national-security-missions-to-ula-and-spacex/>.

So, how does the USSF fit into the framework provided by the OST? As mentioned above¹⁷³, Art. IV.2 OST is prone to different interpretations regarding the meaning of “peaceful purposes”. In this particular case, it is clear that America has gone with the “non-aggressive” interpretation. Under this provision, it would be possible for countries to exercise military activities in space, as long as they do not conflict with the UN Charter. Art 51¹⁷⁴, in fact, allows for “self-defence” in case an armed attack occurs against a number of member states. Thus, this principle does not prohibit the constitution of military branches, such as the USSF, so long as they do not constitute an armed conflict. Furthermore, another argument in favour of the USSF may be derived from Art. III OST. This provision states that activities in outer space shall be carried out in accordance with international law and the UN Charter in “the interest of maintaining peace and security”.

One of the major perspectives of the USSF is national security, which could be argued as coinciding with international security. On the other hand, a closer inspection of Art. IV.2 OST will result in another provision that is not in favor of the constitution of the USSF. The article states that the “establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies shall be prohibited”¹⁷⁵.

While, so far, no military bases and/or installations have been created in space, satellites with military capabilities have been launched. This would seem to be completely contrary to the provision of Art. IV.2, which prohibits weapon tests and military manoeuvres.

So an important question is: what is a “space weapon” and constitutes as the “weaponisation of space”? Both terms are difficult to define. The scientific community¹⁷⁶ seems to define “space weapons” as kinetic, electronic, thermodynamic, laser, and so on. On the other hand, the “weaponization of space” generally refers to the deployment of weapons in outer space that are capable of attacking, destroying, or otherwise damaging objects that are placed in space or any other object on Earth, including human beings¹⁷⁷. According to such

¹⁷³ see paragraph 3

¹⁷⁴ Article 51 UN Charter “Nothing in the present Charter shall impair the inherent right of individual or collective self-defence if an armed attack occurs against a Member of the United Nations, until the Security Council has taken measures necessary to maintain international peace and security. Measures taken by Members in the exercise of this right of self-defence shall be immediately reported to the Security Council and shall not in any way affect the authority and responsibility of the Security Council under the present Charter to take at any time such action as it deems necessary in order to maintain or restore international peace and security.”

¹⁷⁵ Article IV.2 OST Ibid

¹⁷⁶ Robert Preston et al., *Space Weapons Earth Wars* (2002), available at https://www.rand.org/pubs/monograph_reports/MR1209.html.

¹⁷⁷ Satuko Aoki, Law and Military uses of space, in Ram S. Jakhu, Paul Stephen Dempsey and Taylor & Francis (eds.), *Routledge Handbook of Space Law* (First edition, 2017), available at <https://libproxy.berkeley.edu/login?url=https%3A%2F%2Fwww.taylorfrancis.com%2Fbooks%2F9781315750965>.

interpretations, ASAT weaponry has been tested by countries such as the US, China, and the USSR, which have conducted ASAT tests in space. The USSF in particular, has already launched or programmed to launch, in association with private commercial entities, satellites with military capabilities¹⁷⁸

In essence, I would argue that the foundation of the USSF, considering its objectives and its future space programs, does constitute a “weaponization of space.” Thus, the provisions of the OST lose relevance in space activities in favour of the broader permissions of the UN Charter.

2.3.2 Cybersecurity in Space

In the contemporary era of space exploration, cybersecurity emerges as a critical facet, extending the traditional domain of information security into the vast expanse of outer space. This extension necessitates a nuanced understanding of cybersecurity within the context of space activities and its intersection with the legal principles enshrined in the United Nations Space Treaties.

The world population has quickly developed a strict dependence on the Internet. The internet is very much vulnerable to cyber attacks. Cybersecurity, in the terrestrial context, involves protecting information systems, networks, and data from digital attacks. When transposed into the space sector, it encompasses the safeguarding of space-based assets, such as satellites and space stations, from similar threats.

These assets, integral to a plethora of essential services, including global communications, navigation, and observation, face unique vulnerabilities in space. The threats range from unauthorized access to control systems, and interference with data transmission to more severe forms of cyberattacks that could potentially cripple critical space infrastructure. Ransomware typically spreads through ground-based networks, but the risk of cyberattacks targeting satellite systems is escalating. A notable instance occurred with SpaceX's Starlink terminals, which were delivered to Ukraine in March 2022. Following incidents of signal jamming, SpaceX significantly heightened its cybersecurity measures to counteract these threats¹⁷⁹.

¹⁷⁸ USSF-95 will be the first launch of a missile-tracking prototype satellite in medium Earth orbit, see *Ibid* 172

¹⁷⁹ Jeff Foust Berger Brian, *SpaceX Shifts Resources to Cybersecurity to Address Starlink Jamming*, 5 March 2022, SpaceNews, available at <https://spacenews.com/spacex-shifts-resources-to-cybersecurity-to-address-starlink-jamming/>.

Just as space technologies, the internet is ever evolving, and so are cyber developments. New solutions are invented, and threats and problems soon after follow. The internet is in constant need of updates in terms of security.

The general consideration is that cyber activities are regulated by international law, but how is precisely up to debate. What military cyber activities are accepted or peaceful, and what are strictly prohibited or considered acts of war? The difference in the moment in which such activities are conducted is considered very much relevant. In particular, for example, during peacetime, international law does not regulate espionage, and cyber espionage, in particular, is thus permitted, as long as general obligations towards countries are not violated. The problem arises when you stop and ask yourself what actually is considered a permissible cyber operation and what cyber act may actually constitute an aggressive attack, thus creating a more disruptive operation.

Cyber attacks are subject to questions relating to sovereignty. The OST, in particular, states in Art. II:

“Outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.”¹⁸⁰

While this provision clearly protects the moon, celestial bodies, and outer space from sovereignty claims, it does not give any indication to man-made space objects.

In regards to cyber attacks in general, France and Iran are two countries, for example, that consider any type of unauthorised cyber hacking in their systems to be considered a direct violation of their sovereignty. On the other hand, the UK and New Zealand are more “forgiving” and require that the cyber operation must be sufficiently destructive to constitute a violation of their sovereignty. These different perceptions of cyber activities by countries are relevant on a legal level in order to calculate how a country may retaliate. An unauthorized cyber attack may, in fact, be considered an aggressive act in violation of a country's sovereignty.

The application of cybersecurity measures in space is therefore crucial, aiming to secure communication links between satellites and ground stations, protect data integrity, and ensure the operational continuity of space systems. However, the implementation of these measures must be carefully balanced with the legal norms governing space activities.

¹⁸⁰ see Art. II OST Ibid

2.3.3 The Dual-Use Dilemma: Satellites and ASAT

Since the advent of space exploration, satellites have evolved from mere tools of scientific discovery to versatile instruments with wide-ranging applications. This evolution has seen satellites become integral to not only civil and commercial activities but also military operations. The dual-use nature of these technologies – where the same satellite can serve both civilian and military objectives – brings into question the adherence to the principle of peaceful use of outer space as enshrined in the Outer Space Treaty (OST) of 1967.

Currently, the most commercialised sector of space is represented by satellite communications. As of 2024, 8337 active satellites are located in different earth orbits¹⁸¹. More than half of such satellites are used for communications purposes. The major commercial private entity dominating the sector is SpaceX with its Starlink satellite program.

The Global Navigation Satellite Systems represent another sector. The GNSS is a system of space-based satellites designed to transmit signals in order to provide three main coordinates: Position, Navigation, and Timing¹⁸². These satellites are placed in Medium Earth Orbit and constantly provide positioning information. The majority of such satellite systems have both military and civil uses. Systems such as the U.S. NAVSTAR provide services that we commonly know nowadays as the Global Positioning System (GPS).

GPS was initially developed for military purposes. In 1991 a force led by a US Coalition conducted an operation considered by some¹⁸³ as the first “space war”. During the Persian Gulf War, in fact, GPS was used in order to dismantle Saddam Hussein’s military. With the help of such a system, troops managed to navigate and communicate in the hostile deserts of Kuwait and Iraq.

In essence, the deployment of satellites for military purposes can be seen as a potential contradiction to the OST. Article IV of the OST explicitly prohibits the placement of nuclear weapons or other weapons of mass destruction in orbit around Earth. While this does not encompass conventional military satellites, the spirit of the article suggests an intention to prevent space from becoming an arena of conflict. Military satellites, used for reconnaissance, surveillance, and communication, have become indispensable tools for national defense. However,

¹⁸¹ Ieva, *How Many Satellites Are in Space?*, 4 May 2023, NanoAvionics, available at <https://nanoavionics.com/blog/how-many-satellites-are-in-space/>.

¹⁸² Royal Academy of Engineering, *Global Navigation Space Systems: Reliance and Vulnerabilities* (2011). Available at <https://raeng.org.uk/media/5shgtv4t/global-navigation-space-systems.pdf>

¹⁸³ Larry Greenemeier, *GPS and the World’s First ‘Space War’*, *Scientific American*, available at <https://www.scientificamerican.com/article/gps-and-the-world-s-first-space-war/>.

their presence and use in outer space could be construed as a militarization of space, seemingly at odds with the principle of peaceful use.

The ambiguity in the OST's language regarding what constitutes "peaceful use" leaves room for varying interpretations, allowing states to justify the military use of satellites under the guise of self-defense or national security. The broad and open-ended language of the OST and other space treaties creates interpretative challenges. Without clear guidelines, states can exploit this ambiguity to advance their military interests in space, potentially leading to an arms race in orbit.

The development and operationalization of Anti-Satellite (ASAT) weaponry pose a profound challenge to the principles enshrined in the Outer Space Treaty. ASAT weapons, designed to impair or destroy satellites, have emerged as pivotal elements in the strategic arsenals of certain nations. This development marks a significant shift in the perception of outer space.

No longer seen solely as a frontier for exploration and scientific endeavor, space is increasingly viewed as a potential theater of military operations. This paradigm shift brings into sharp relief the foundational principles of the OST, which advocates for the peaceful use of outer space. The strategic significance of ASAT weapons lies in their ability to neutralize the space-based assets that are integral to contemporary military operations, including communications and reconnaissance, thereby altering the balance of power in space.

These types of offensive space capabilities for possible armed conflict in space have been used between 1959 and 2014 by three major space powers: the US, the USSR/Russia, and China. According to a study¹⁸⁴, more than 4500 pieces of debris were generated as a result of more than 50 ASAT tests.

The discussions within the ad hoc Committee on Prevention of an Arms Race in Outer Space (PAROS) and the Conference on Disarmament (CD) have historically revolved around two primary strategies for space arms control. These strategies have focused on the broader concept of space de-weaponization and more targeted measures like Anti-Satellite (ASAT) weapon bans. The first approach, which can be termed as a "comprehensive approach," seeks to address the issue of space weaponization in its entirety. This method aims to establish a framework that would prevent the deployment of any form of weaponry in space, thus maintaining space as a non-militarized zone. However, defining what constitutes a "comprehensive space weapon" has been a challenging task, leading to impediments in advancing this approach.

¹⁸⁴ Brian Weeden, Through a Glass, Darkly: Chinese, American, and Russian Anti-Satellite Testing in Space, March 2014, The Space Review, available at <https://thespacereview.com/article/2473/1>.

The second strategy, known as the "partial approach," specifically focuses on the prohibition of ASAT weapons. Under this approach, proposals have been divided mainly into two categories: one advocating for a total ban on ASAT weapons and the other suggesting a partial ban. The former faced similar obstacles in defining "space weapons" and ensuring their verifiability, which hindered progress¹⁸⁵.

Consequently, attention shifted to a more restricted ban on ASAT weapons. Proposals under this category included the idea of banning only high-altitude ASAT weapons, considering low-altitude ones were already tested¹⁸⁶, and another proposal aimed to prohibit exclusively "dedicated" ASAT weapons while allowing "ancillary" ones¹⁸⁷. Nevertheless, even this narrowed focus did not resolve the disagreements among nations regarding definitions and verification issues.

In the 1990s, the focus of these discussions shifted from treaty negotiations to the development of "confidence-building measures" (CBM) due to these complexities. However, in the early 21st century, there was a renewed interest in pursuing a de-weaponization treaty, primarily led by joint initiatives from Russia and China. This resurgence reflected a continuing commitment among some international actors to address the militarization of space, albeit with ongoing challenges in terms of treaty formulation and consensus-building.

2.4 The Woomera and MILAMOS Manuals

The evolution of space law, amidst the rapidly changing landscape of space activities, calls for contemporary interpretations and frameworks that can address emerging challenges. In this context, the Woomera Manual on the International Law of Military Space Operations (Woomera Manual) and the Manual on International Law Applicable to Military Uses of Outer Space (MILAMOS) emerge as significant contributions.

The Woomera Manual, an initiative led by a consortium of academic institutions¹⁸⁸, aims to articulate and consolidate the applicable international law relating to military space operations. This manual is particularly significant in the current era, where the distinction between military and non-military uses of space is increasingly blurred, and new forms of space capabilities are being developed.

¹⁸⁵ Total ban of the ASAT weapons is supported: CD/726 (19 August 1986)

¹⁸⁶ CD/642 (4 September 1985)

¹⁸⁷ CD/870 (12 September 1988)

¹⁸⁸ University of Adelaide, the University of Exeter, the University of Nebraska College of Law, and the University of New South Wales in Canberra.

One of the critical contributions of the Woomera Manual is its potential to clarify legal ambiguities regarding military uses of space. The Outer Space Treaty (OST) and other related space treaties provide a foundational legal framework but leave several questions open, particularly regarding the deployment of conventional military technologies in space.

The Woomera Manual, through its comprehensive examination of existing international laws and their application to space, offers much-needed clarity and interpretation. It delineates the boundaries of permissible military activities in space, thus contributing to a more structured and predictable legal environment¹⁸⁹. As space becomes an increasingly contested domain, with various states and non-state actors developing their space capabilities, the guidance provided by the Woomera Manual becomes indispensable. By offering a detailed interpretation of international law as it applies to military space operations, the manual serves as a valuable resource for states in formulating their space policies and strategies. It also assists non-state actors, including commercial enterprises involved in space activities, in understanding the legal implications of their operations in the context of military uses of space.

Parallel to the Woomera Manual, the MILAMOS¹⁹⁰ project also aims to develop a comprehensive manual on the international law applicable to military uses of outer space. This initiative, involving experts from various disciplines, focuses specifically on the legal aspects of military activities in space, addressing a crucial gap in the existing legal framework.

MILAMOS comes at a time when the potential for space to become a theater for military conflict is increasingly recognized. The manual seeks to address contemporary military challenges in space, such as the deployment of anti-satellite (ASAT) weapons, cyber operations targeting space systems, and the use of space-based assets for military communications and surveillance.

By providing clear legal perspectives on these issues, MILAMOS contributes to a deeper understanding of how international law regulates military activities in space. The development of MILAMOS is expected to have a significant effect on the stability and security of space. By articulating the legal principles governing military uses of outer space, the manual could play a role in preventing the escalation of conflicts and ensuring that space remains a domain for peaceful activities. It promotes transparency and mutual understanding among states

¹⁸⁹ see WOOMERA Manual Abstract, available at <https://law.adelaide.edu.au/woomera/ua/media/7/Woomera%20Manual.pdf>

¹⁹⁰ Dale Stephens and Melissa de Zwart, *The Manual of International Law Applicable to Military Uses of Outer Space (MILAMOS)*, 2017. Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3065704

regarding military operations in space, which are essential for maintaining strategic stability.

It becomes increasingly clear that these documents are pivotal in shaping the trajectory of space law, especially in addressing the complexities of military uses of outer space. Their role in complementing and enhancing the existing legal framework offers a path forward in managing emerging challenges in space governance. The Woomera Manual and MILAMOS may provide an essential complement to the existing space law treaties. While treaties like the Outer Space Treaty (OST) lay the foundational principles, they often lack the specificity required to address the nuances of contemporary space operations, particularly those of a military nature.

The Woomera Manual and MILAMOS step into this breach, offering a more nuanced interpretation of how international law, including the laws of armed conflict, applies to military activities in space. These manuals delve into areas not explicitly covered by existing treaties, such as the use of satellites for intelligence, surveillance, and reconnaissance (ISR) operations, and the deployment of cyber capabilities in space. By doing so, they help bridge the gap between the broad principles set forth in treaties and the practical realities of modern military operations in space.

2.4.1 What are Manuals in International Law

In international law, manuals have emerged as significant instruments in elucidating, interpreting, and sometimes shaping the understanding and application of legal principles. These documents, often developed by experts in the field, aim to clarify complex legal issues, particularly in areas where formal treaties or customary international law may be silent, ambiguous, or evolving¹⁹¹. The introduction of the Woomera and MILAMOS Manuals into the discourse of space law serves as a pertinent example of how such documents can contribute significantly to the understanding and development of legal norms in specialized domains.

Manuals in international law are scholarly works that interpret and articulate the application of legal principles to specific areas or issues. They are typically not legally binding in the same way as treaties or conventions. Instead, their influence stems from their ability to clarify and expound upon existing legal norms and principles, making them accessible and applicable to practical situations. These manuals often emerge from collaborative efforts involving legal scholars,

¹⁹¹ William H. Boothby, 'International Manuals and International Law', in William H. Boothby (ed.), *Conflict Law: The Influence of New Weapons Technology, Human Rights and Emerging Actors* (2014) 65.

practitioners, and sometimes state representatives, bringing together a wealth of expertise to address complex legal challenges.

In domains like space law, where technological advancements often outpace the development of formal legal instruments, manuals play a crucial role. They offer guidance on how existing international law might be applied to novel situations and propose frameworks for addressing future challenges. Manuals, therefore, serve as bridges between established legal principles and contemporary practical realities, providing clarity and direction for states, international organizations, and other actors.

The concepts of *lex lata* and *lex ferenda* are integral to understanding the nature and significance of manuals in international law. *Lex lata*, Latin for "the law as it exists," refers to the body of laws that are currently in force – the established, binding legal norms derived from treaties, customary international law, and general principles of law. *Lex lata* represents the current legal reality, the rules that states and other actors are obligated to follow. *Lex ferenda*, meaning "the law as it should be," is a forward-looking concept. It pertains to the potential development and evolution of legal norms, proposing changes or advancements to the existing legal framework. *Lex ferenda* is about shaping the future of the law, anticipating changes in the social, political, or technological landscape that necessitate new rules or the reinterpretation of existing ones.

The Woomera and MILAMOS Manuals exemplify how manuals can navigate the realms of *lex lata* and *lex ferenda* in international law. These manuals do not create new law; rather, they interpret how existing legal principles under *lex lata*, particularly those pertaining to space law and military operations, apply to contemporary and emerging scenarios in space. They clarify the application of existing laws to situations that the drafters of those laws might not have envisaged, such as the use of novel space technologies for military purposes.

Simultaneously, these manuals venture into the realm of *lex ferenda*. They not only interpret existing laws but also suggest how international law might evolve to address ongoing and future challenges in space. Through their analysis and recommendations, the Woomera and MILAMOS Manuals contribute to the discourse on the development of space law, offering insights and proposals that could shape its future trajectory. They identify areas where current laws may be insufficient or ambiguous and propose ways to fill these gaps, thus playing a pivotal role in the evolution of legal norms governing space activities.

2.4.2 The Impact of International Law Manuals: The Tallinn Manual and the San Remo Manual

In the landscape of international law, specialized manuals such as the Tallinn Manual on the International Law Applicable to Cyber Warfare and the San Remo Manual on International Law Applicable to Armed Conflicts at Sea have played a significant role in shaping the understanding and application of legal principles.

The Tallinn Manual (TM), developed by an international group of legal scholars and practitioners, addresses the application of international law to cyber warfare. It emerged in response to the growing need for clarity regarding how existing legal norms apply to cyber operations, especially those conducted by states.

The TM has been influential in clarifying how international law, particularly the law of armed conflict, applies to cyber operations. It provides detailed analyses of how principles such as sovereignty, neutrality, and the prohibition of the use of force apply in the context of cyber activities. By doing so, the manual offers guidance to states and military planners on the legal considerations relevant to conducting and responding to cyber operations.

One of the significant impacts of the Tallinn Manual has been its influence on state policies and military strategies concerning cyber warfare. Many countries have used the manual as a reference point in developing their cyber warfare doctrines and legal frameworks. It has served as a foundational document for military lawyers and policymakers, informing their decisions in both the strategic and operational aspects of cyber operations.

In particular, the Tallinn manual 2.0. has updated its provisions and has included some that provide for a broader application in space law. The difficulty in applying such provision to space is due to “spatial” differences. There is no general definition of where Outer Space starts with respect to Areal space¹⁹². Thus the legal regime applied could be considered different and distinct.

Art. 58 of the Tallinn Manual (TM) states:

¹⁹² The Karman Line is a boundary 100Km above sea level indicating the ending of earth’s atmosphere and the beginning of space. This “100KM” boundary is not, however, unanimously recognised universally. This is because the earth’s atmosphere does not end abruptly, but rather becomes thinner and thinner at higher altitudes. see Andrew May and Daisy Dobrijevic, *The Kármán Line: Where Does Space Begin?*, 13 November 2022, Space.Com, available at <https://www.space.com/karman-line-where-does-space-begin>.

*“(a) [c]yber operations on the moon and other celestial bodies may be conducted only for peaceful purposes. (b) Cyber operations in outer space are subject to international law limitations on the use of force.”*¹⁹³

Thus, the application of international law to cyber capabilities in outer space has led to some noteworthy conclusions, particularly in the context of the Moon.

A key outcome of this provision is the determination that offensive cyber capabilities are prohibited from being placed on the Moon. This specific prohibition is unique to the Moon and does not extend to outer space in its entirety. In regards to outer void space, the focus shifts from the placement of cyber capabilities to their utilization.

The use of cyber capabilities in outer space is governed by the same legal standards that apply to Earth, including the principles enshrined in the United Nations Charter. This means that any deployment of cyber capabilities in outer space must adhere to the international norms and rules of engagement that govern state behavior in cyberspace. This adherence includes compliance with the principles of sovereignty, non-intervention, and the prohibition of the use of force, except in self-defense or as authorized by the U.N. Security Council. States deploying cyber capabilities in outer space are expected to ensure that their actions are consistent with international law, including the laws of armed conflict and international humanitarian law, where applicable.

The San Remo Manual on International Law Applicable to Armed Conflicts at Sea, developed by international legal experts, addresses the complex legal issues related to naval warfare. It provides a comprehensive analysis of the law of armed conflict at sea, covering a wide range of issues from naval blockades to the protection of neutral vessels. The manual clarifies the rights and obligations of belligerents and neutrals in various naval warfare scenarios, thus providing a clear framework for conduct during maritime conflicts.

The San Remo Manual's detailed guidelines on naval warfare have had a profound impact on the conduct of naval operations¹⁹⁴. Navies and coast guards around the world refer to the manual for guidance on the lawful conduct of hostilities at sea. Its influence extends to the formulation of rules of engagement and the training of naval personnel, ensuring that operations are conducted in compliance with international law. Furthermore, the manual has contributed to the development of international maritime law. By addressing gaps and ambiguities in existing legal frameworks, it has informed the ongoing discourse on maritime security, the law of the sea, and the protection of maritime environments during armed conflicts.

¹⁹³ Eric Talbot Jensen, 'The Tallinn Manual 2.0: Highlights and Insights', available at <https://www.law.georgetown.edu/international-law-journal/wp-content/uploads/sites/21/2018/05/48-3-The-Tallinn-Manual-2.0.pdf> p.769

¹⁹⁴ see *ibid* 190

Both the Tallinn Manual and the San Remo Manual have played critical roles in enhancing the understanding and compliance with international law in their respective domains. These manuals have provided clarity on complex legal issues, guided state and non-state actors in their operations, and contributed to the broader legal and academic discourse. Their development and continued relevance underscore the dynamic nature of international law and its capacity to adapt to new challenges and technological advancements. It is clear then how manuals such as MILAMOS and WOOMERA may have similar guiding relevance in international law, specifically International Space Law.

2.5 The Application of the Law of Armed Conflict in Space

Considering how the OSTs provisions are open to interpretation, the applicability of the Law of Armed Conflict (LOAC), also known as International Humanitarian Law (IHL), in outer space scenarios may be considered a possible solution. After all, Art. III OST provides for the application of International law when conducting activities in space.

This extension to LOAC, though, does come with its own set of difficulties. One fundamental issue is that LOAC was developed at a time in which warfare was not universally prohibited as a method of resolving interstate conflicts. This historical context renders some aspects of LOAC potentially outdated in the post-World War II era¹⁹⁵. Furthermore, the general participation clause present in LOAC treaties before World War I limits their applicability only to conflicts involving all signatory parties¹⁹⁶. This potentially impacts the enforcement of LOAC in space unless these rules are established as customary international space law.

Another issue concerns the traditional scope of LOAC, which was primarily focused on land, sea, and air conflicts¹⁹⁷. This focus is evident in many LOAC treaties, including the 1977 Additional Protocol I to the 1949 Geneva Convention (AP 1)¹⁹⁸, which explicitly references conflicts "on land, at sea or in the air." While AP 1 does not specifically mention outer space, there is no clear indication from its drafting history that conflicts in space were intentionally excluded. It is generally understood that AP 1 could encompass space-based attacks on Earth, as

¹⁹⁵ Aoki, Setsuko. "Law and Military Uses of Outer Space." 2016,

¹⁹⁶ Art. 2 of the Convention (IV) respecting the Laws and Customs of War on Land, 18 October 1907 [Hague IV Convention]

¹⁹⁷ Hague Convention IV and Hague IX Convention

¹⁹⁸ Protocol Additional to the Geneva Convention of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts, 12 December 1977 [AP 1]

well as attacks involving space objects, especially if these conflicts impact civilians on earth, such as disrupting emergency communication during disasters¹⁹⁹. Addressing the relevant scope of LOAC's applicability in outer space is thus complicated. This involves reconciling outdated legal terminology with contemporary technological advancements.

Moreover, the unique aspects of space law must be considered. Unlike space law, where states are internationally responsible for non-governmental activities in space (Art. VI OST)²⁰⁰, the law of neutrality distinctly separates the responsibilities of states and private individuals. This distinction is exemplified by the 1907 Hague Convention (V)²⁰¹, which does not obligate neutral states to restrict private entities from supplying arms to belligerents.

In the framework of the Law of Armed Conflict, a key tenet is the restriction of attacks - defined as acts of violence against an adversary (Art. 49.1 AP I) - to strictly military objectives. These objectives are identified in Art. 52.2 AP I as entities that, due to their nature, location, purpose, or use, contribute effectively to military action and whose destruction, capture, or neutralization provides a clear military advantage under current circumstances. Military satellites, by virtue of their inherent nature, are classified as military objectives, even if they have civilian applications, such as the U.S. GPS system. Similarly, civilian satellites used for military operations fall under the category of military objectives due to their usage. Often, these dual-purpose satellites are owned by private entities outside the conflict zone but are used for intelligence gathering by belligerent countries at the same time.

The application of the 'location' and 'purpose' criteria for defining military objectives in space is more complex and uncertain. When targeting military objectives, AP I mandates the use of all practicable precautions in selecting attack methods to minimize collateral damage²⁰². Additionally, attacks that may lead to disproportionate civilian harm or damage relative to the expected military gain are prohibited under the principle of proportionality²⁰³. Therefore, attacks using ASAT towards military satellites could generate substantial space debris, damaging commercial satellites. This could be considered a forbidden method of warfare under Article 35.3 AP I. Furthermore, such attacks might contravene the obligation to respect the interests of other nations as stipulated in Article IX OST.

To further safeguard civilian satellites, states planning an attack could consult the Register maintained by the United Nations Secretary-General under the

¹⁹⁹ Art. 20 of the Convention (V) respecting the Rights and Duties of Neutral Powers and Persons in Case of War on Land, 18 October 1907 [Hague V Convention]

²⁰⁰ See OST Ibid

²⁰¹ see Art. 7 Ibid 196

²⁰² see Art. 57 Ibid 196

²⁰³ see Art. 51.5.b, 57.2.a.iii, 57.2.b Ibid 196

Registration Convention Art. II²⁰⁴, which details the general function of each registered space object (Art. IV.1.e). However, more precise and detailed information is essential due to current registration practices being often inadequate or misleading²⁰⁵.

Significantly, AP I mandates that states that develop, procure, or adopt new weapons or methods of warfare have the responsibility to assess whether their use would be in violation of international law (Art. 36). This places the onus of proof on the state intending to utilize a novel weapon, method, or means of armed conflict. This provision not only has substantial implications in the context of the LOAC but also plays a crucial role in the effective control and disarmament of space arms. History shows, however, that, unfortunately, states are often in contradiction in defining novel technologies in space as weapons.

The application of the Law of Armed Conflict (LOAC), particularly the law of neutrality, to space warfare remains a complex and uncertain area. Although a neutral state is expected to remain impartial in conflicts, it is not obligated "to forbid or restrict the use on behalf of the belligerents of telegraph or telephone cables or of wireless telegraphy apparatus belonging to it or to companies or private individuals" (Art. 8 Hague V Convention)²⁰⁶.

Considering modern technological advancements, this could extend to civilian communication, navigation, and weather satellites. The principle behind Art. 8 is to prevent a neutral state from becoming a conduit for intelligence between belligerents. However, supplying high-resolution imagery, akin to intelligence information, could compromise a State's neutral status. In such a case, if a company of a neutral state provides detailed imagery to belligerent states, the country of the company providing such information risks losing its neutrality.

Given the ambiguities in applying LOAC and neutrality laws to space conflicts, there is a clear need for an international effort to update and clarify international law as it pertains to armed conflicts in outer space.

2.6 Closing Arguments

In conclusion, this chapter has critically examined the application of the Law of Armed Conflict (LOAC) and the principles of neutrality in the increasingly

²⁰⁴ see RC Ibid

²⁰⁵ The function of US satellites is often described as "*spacecraft engaged in practical applications and uses of space technology such as weather communications*". See ST/SG/SER.E/725 (12 August 2014)

²⁰⁶ see Art. 8 Ibid 196

complex domain of outer space. The exploration of these principles in the context of space warfare, particularly with regard to Anti-Satellite (ASAT) weapons and the dual-use nature of satellites, underscores the challenges and ambiguities inherent in the current legal framework.

The United Nations Space Treaties, while providing a foundational legal structure, exhibit limitations in their applicability to modern space activities. These treaties, primarily shaped during the Cold War era, struggle to address the nuanced and evolving realities of space technology and geopolitical interests in the 21st century. This is particularly evident in the treatment of military objectives in space, the distinction between military and non-military uses, and the interpretation of neutrality in the face of dual-use technology.

Moreover, the existing legal framework, including the principles laid out in the Outer Space Treaty (OST) and Additional Protocol I (AP I) to the Geneva Conventions, requires careful interpretation and potential revision to remain relevant. The necessity for states to assess the legality of new weapons or methods of warfare, as mandated by AP I, highlights the proactive role that nations must play in ensuring compliance with international law.

The complexities surrounding the application of the LOAC in space, especially in terms of neutrality and the use of force, illustrate the urgent need for an international dialogue aimed at clarifying and updating legal norms. This dialogue should involve a wide range of stakeholders, including space-faring nations, private entities, and international organizations, to foster a comprehensive understanding of the challenges and to collaboratively develop effective solutions.

As we advance in this discourse, the upcoming chapters of this thesis will delve deeper into specific aspects of space law, particularly focusing on the issues of liability and responsibility in space. These topics are crucial for understanding the full spectrum of legal considerations pertinent to space activities and for ensuring that the exploration and use of outer space continue to benefit all humankind, conducted in a manner that is sustainable, responsible, and aligned with the principles of international peace and security.

Chapter III: Liability

3.1 Introduction

This chapter delves into the complexities of liability within the realm of international space law, focusing on the pivotal role of the Liability Convention in establishing a framework for addressing damages caused by space activities. It scrutinizes the historical context and the contentious deliberations that led to the LC's formation, highlighting the divergent views among UNCOPUOS members and the eventual consensus on the necessity of a specialized legal regime. The chapter explores the definitions and distinctions between public and private international arbitration, underscoring their significance in resolving disputes involving state entities, individuals, and corporations in the increasingly commercialized and contested domain of outer space.

A critical examination of the LC's provisions reveals the nuanced approach to liability, distinguishing between absolute and fault-based liabilities, and outlines the mechanisms for compensation and dispute resolution. It also addresses the challenges and limitations inherent in the LC, particularly in the context of emerging issues such as space debris and the Kessler Syndrome, which complicate liability determinations and the effective application of the convention's principles.

Furthermore, the chapter evaluates alternative dispute resolution mechanisms, including the role of the International Court of Justice (ICJ) and the innovative contribution of the Permanent Court of Arbitration (PCA) Rules on Outer Space Disputes. It argues for the necessity of evolving legal frameworks to accommodate the dynamic nature of space activities and the intricate web of stakeholders involved in outer space exploration and exploitation.

Through a scholarly analysis of precedents, the chapter assesses the effectiveness of diplomatic negotiations, the potential of international arbitration, and the challenges of ensuring binding and equitable resolutions in space law disputes. This exploration not only illuminates the complexities inherent in the governance of outer space but also contributes to the broader discourse on enhancing legal mechanisms for dispute resolution in an era of unprecedented space exploration and commercialization.

3.2. The Liability Framework within the Liability Convention

The deliberations leading to the Liability Convention (LC) formation were marked by significant contention among the members of the United Nations

Committee on the Peaceful Uses of Outer Space (UNCOPUOS). The divergence in viewpoints was starkly evident in the early 1960s when the United States, recognizing the complexities of liability in the nascent field of space exploration, put forth an initial proposal in 1962²⁰⁷ advocating for establishing guidelines to address liability concerns. Contrarily, the Soviet Union prioritized the safety and recovery of astronauts, positing that compensation mechanisms, grounded in existing case law²⁰⁸, would suffice²⁰⁹ for addressing damages arising from space activities. This stance underscored a fundamental disagreement within the international community regarding the adequacy of general compensation obligations for incidents in space, given the inherently high-risk nature of space exploration.

The prevailing opinion prior to the establishment of the LC underscored the necessity of applying general international law and the principles of the UN Charter to activities conducted in outer space, which is considered a domain beyond national jurisdiction. This perspective began to evolve as the international community grappled with the unique challenges posed by space exploration, leading to the adoption of specialized legal frameworks to address these challenges. A pivotal moment in this evolution was the adoption of the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space²¹⁰, which, for the first time, articulated the principle that states launching objects into space bear international liability for any resulting damages. However, this declaration fell short of detailing the mechanics of such liability, leaving significant ambiguity in its application.

The Outer Space Treaty²¹¹ of 1967 further cemented the principle of state liability for space objects within Art. VII, but did not elaborate on the specifics of liability, perpetuating the need for a more detailed legal framework. The drafting of the Liability Convention²¹², which spanned a decade, culminated in 1972 with the establishment of a comprehensive legal regime specifically designed to address the liability of states for damage caused by their space activities. The LC unequivocally asserts that any party suffering damage due to space activities has the right to seek full compensation from the responsible states.

²⁰⁷ UN, Committee on the Peaceful Uses of Outer Space, legal sub-committee, United States Proposal: Liability for Space Vehicle Accidents, UNGAOR, 1962, UN Doc A/AC.105/C.2/L.4

²⁰⁸ The Corfu Channel Case, [1949] ICJ Rep 4; Trail Smelter Arbitration (US v Canada) (1938), 3 RIAA 1905, reprinted in 33 AJIL 182 (Arbitrators: Charles Warren, Robert AE Greenshields, Jan Frans Hostie)

²⁰⁹ UN, Committee on the Peaceful Uses of Outer Space, Legal Sub-Committee, Summary Record of the Fourteenth Meeting, UNGAOR, 1st Sess, UN Doc A/AC.105/C.2/SR.14 (1962)

²¹⁰ see Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, GA Res 1962 (XVIII), UNGAOR, 18th Sess, UN Doc A/RES/18/1962 (1963)

²¹¹ see OST Ibid

²¹² see LC Ibid

The LC's significance lies in establishing a liability framework and its role in shaping the legal landscape of space exploration. By providing a general mechanism for compensation, the LC addresses a critical concern for states and other entities involved in space activities, thereby facilitating international cooperation and the peaceful use of outer space. However, the practical application and effectiveness of the LC in resolving disputes and its adaptability to the evolving nature of space activities remain subjects of ongoing debate and analysis. To fully grasp the implications and operational dynamics of the LC, it is imperative to examine its key provisions thoroughly, the context of its adoption, and its impact on the conduct of space activities by states and private entities alike. This exploration will not only illuminate the complexities inherent in space law but also contribute to the broader discourse on the governance of outer space.

3.2.1 Who is Liable

The Liability Convention establishes a comprehensive framework for addressing liability arising from damages caused by space objects, centering on the concept of the "launching state" as the principal liable entity. Article I of the LC delineates the criteria for identifying a launching state, encompassing the state that undertakes the launch, procures the launching service, operates the territory from which the launch occurs, or utilizes its facilities for the launch. This broad definition ensures that all parties directly involved in the launching process are encapsulated within the scope of potential liability, reflecting the collaborative and often international nature of space endeavors.

As space exploration and utilization have evolved, the involvement of multiple parties in a single launch has become commonplace, introducing complexities in determining liability. The LC, in Article V, addresses this by stipulating that in instances of joint launches, the involved states are jointly and severally liable. This provision enables a claimant to seek full compensation from any one of the launching states, simplifying the process for victims to obtain redress. However, the LC also acknowledges the practical need for these states to delineate their respective liabilities through inter-state agreements²¹³. Despite the encouragement from the United Nations General Assembly²¹⁴ and the logical appeal of such agreements for clarifying financial responsibilities and risk-sharing, their adoption has been limited. This reluctance underscores a significant challenge in the practical application of the LC's provisions, highlighting the need for a more robust mechanism to facilitate the division of liability among multiple launching states.

²¹³ see Art. IV.2 LC Ibid

²¹⁴ see Application of the Concept of the "Launching State", GA Res 59/115, UNGAOR, 59th Sess, UN Doc A/RES/59/115 (2005)

The importance of inter-state agreements becomes particularly evident in scenarios involving joint launches, where control over the space object may transition between parties at different stages of the space activity²¹⁵. Such contracts could specify liability based on the phase of operation, allocating responsibility for launch-phase incidents to the launching state and in-orbit damages to the state of registration. Article IV of the LC further extends liability considerations to collisions between space objects, proposing a fault-based allocation or an equitable split of liability in the absence of determinable fault, adding another layer of complexity to liability assessments.

The role of private entities in space activities introduces additional considerations for liability under the LC. Contrary to some academic perspectives suggesting that launching states may be exempt from liability for purely private commercial space activities²¹⁶, Article VI of the LC clarifies that states bear responsibility for all national space activities, encompassing governmental and private operations. This provision reflects the reality that spacefaring nations often accept liability for private sector activities, reinforcing the principle of state responsibility in commercial space endeavors.

Notably, the LC's provisions extend to international organizations through Article XIII²¹⁷, contingent upon their acceptance of the treaty's obligations and rights. While this inclusion broadens the scope of entities subject to the LC, the practical impact remains limited, as liability ultimately may revert to the member states. This aspect of the LC points to the broader challenges of applying the convention's principles in a rapidly evolving space sector, where the roles of private companies and international collaborations continue to grow.

The option for victims to seek recourse through domestic courts, as an alternative to invoking the LC's mechanisms, presents a divergent path with its own set of challenges. Pursuing claims domestically requires victims to navigate the complexities of proving fault, a daunting task given the technical intricacies of space operations. This contrast underscores the LC's significance in providing a streamlined international framework for liability claims while also highlighting the limitations and areas for potential enhancement in addressing the nuances of space liability.

In summary, the LC's approach to liability for space activities embodies a delicate balance between international legal principles and the practical realities of space

²¹⁵ Arnel Kerrest and Caroline Thro, Liability for Damage, in Ram S. Jakhu, Paul Stephen Dempsey and Taylor & Francis (eds.), *Routledge Handbook of Space Law* (First edition, 2017), available at <https://libproxy.berkeley.edu/login?url=https%3A%2F%2Fwww.taylorfrancis.com%2Fbooks%2F9781315750965>.

²¹⁶ see Peter van Fenema, Legal Aspects of launch Services and Space Transportation in Frans G von der Dunk & Fabio Tronchetti, eds, *Handbook of Space Law* (Cheltenham, UK: Edward Elgar Publishing, 2015)

²¹⁷ see Art XIII LC Ibid

exploration. The convention's mechanisms for attributing liability to launching states, facilitating inter-state agreements, and encompassing a wide range of entities, including private companies and international organizations, reflect an ambitious attempt to govern the frontier of space. However, the challenges in implementing these provisions, coupled with the dynamic nature of space activities, call for ongoing dialogue, legal refinement, and international cooperation to ensure the LC remains effective and equitable in the face of future advancements in space exploration.

3.2.2 What is subject to Liability

The Liability Convention establishes a legal framework that addresses explicitly liability for damages involving space objects. Yet, the term "space object" necessitates a precise understanding to effectively navigate the ambit of liability in outer space. The European Parliament has clarified this terminology to encompass both the components and launch vehicles (or their parts) associated with space objects²¹⁸. Notably, Article I of the LC explicitly mentions "component parts of a space object,"²¹⁹ thereby broadening the scope of what constitutes a space object within legal discussions. This inclusive definition is critical as it captures the diverse elements involved in space operations, from satellites to fragments of launch vehicles.

The European Union, in anticipation of the deployment of its Galileo Navigation Space System, has proactively expanded the concept of responsibility beyond the traditional confines set by the LC. Recognizing the complexities and nuances of modern space services, the EU has instituted a regime that encompasses liability for service interruptions between the service provider and the consumer. This approach, facilitated by a contractual receipt system employed by Galileo, wherein users incur charges for accessing the satellite signal, ventures into territory not explicitly covered by the LC. The original drafting of the LC conceptualized space objects as entities with tangible, physical properties²²⁰, thereby excluding non-material phenomena such as signals or electronic interferences from its scope²²¹.

²¹⁸ see EC, Regulation (EC) No. 683/2008 of the European Parliament and Council of 9 July 2008 on the further implementation of the European satellite navigation programmes (EGNOS and Galileo) [2008]

²¹⁹ see Art. I LC Ibid

²²⁰ Carl Q. Christol, 'International Liability for Damage Caused by Space Objects', 74 *The American Journal of International Law* (1980) 346, available at <https://www.jstor.org/stable/2201505>; Armel Kerrest & Lesley J Smith, "Article VII" in Stephen Home et al., *Des, Cologne Commentary on Space Law* (Koln: Heymanns, 2009) vol 1

²²¹ see Tare Brisibe, *Aeronautical Public Correspondance by Satellite*, in Marietta Benko, ed, *Essential Air and Space Law*, vol 3 (Utrecht: Eleventh International Publishing, 2006); Lotta Viikari, *The Environmental Element in Space Law: Assessing the Present and Charting the Future* (2008), available at <http://catdir.loc.gov/catdir/toc/ecip0816/2008017590.html>.

The evolution of space activities, which now extensively involve the transmission of signals and the potential for harmful interference, underscores the necessity for an updated liability regime. While the International Telecommunications Union (ITU) Convention and its Radio Regulations firmly prohibit harmful interferences²²², the ITU framework is limited by its lack of an enforcement mechanism against states responsible for such interferences. This gap in the regulatory environment highlights a significant challenge: the existing legal instruments, including the LC, may not fully address the contemporary landscape of space activities, which increasingly intersects with the domain of telecommunications and signal transmissions.

The case of the Galileo system illustrates a forward-looking approach to liability that considers the operational realities of modern space services. However, this approach also diverges from the traditional frameworks encapsulated by the LC and ITU regulations, revealing an area ripe for scholarly debate and legal innovation.

This discourse invites a deeper examination of space law principles and the need for adaptability in its legal instruments to accommodate advancements in space technology and operations. The expansion of liability to include service interruptions represents a pivotal step toward addressing the multifaceted nature of space activities. Nonetheless, integrating such considerations into the broader framework of international space law requires a collaborative effort among states, international organizations, and stakeholders in the space industry.

Furthermore, the challenge posed by the absence of enforcement mechanisms within the ITU's regime for addressing harmful interferences calls for a concerted international response. It emphasizes the need for a robust legal and regulatory infrastructure to ensure compliance and facilitate dispute resolution in the increasingly complex and interconnected realm of space activities.

While the LC laid the foundational principles for liability in space, the advent of technologies like Galileo necessitates a reevaluation and expansion of these legal frameworks to include the dynamic and evolving aspects of space operations. The discussion surrounding the definition of space objects, the inclusion of service interruptions in liability considerations, and the enforcement of regulations against harmful interferences all serve as critical points for further exploration and development within the field of international space law.

²²² Convention of the International Telecommunications Union, 22 December 1992, 1825 UNTS 390, art 45; World Radiocommunication Conference, Radio Regulations, 2012 ed, art 15.

3.2.3 What kind of Liability

In the realm of international law, the Liability Convention stands out for its detailed articulation of liability regimes concerning space activities, explicitly distinguishing between absolute and fault liability. These distinctions are crucial for addressing the nuances of liability in the context of space exploration and use, reflecting a comprehensive approach to ensuring victims of space-related activities are justly compensated.

As Article II of the LC outlines, absolute liability mandates that the launching state is unconditionally responsible for compensating any damage inflicted by its space object on the Earth's surface or to aircraft in flight. This regime is adopted to address the inherent challenges in attributing fault for damages resulting from space activities, acknowledging the technical complexities and the difficulty of establishing negligence or misconduct in the vastness of space. Under this framework, the launching state's liability is incontestable, except in instances where the damage results from gross negligence or willful misconduct of the victim²²³. This provision underscores the convention's intent to prioritize victim compensation without the burdensome necessity of proving fault, effectively streamlining the process for addressing damages incurred on Earth or to aircraft by space objects.

Contrastingly, the principle of fault liability, encapsulated in Article III of the LC, emerges from an Italian proposal²²⁴ during the convention's drafting phase, which advocated for a presumption of fault in cases of collisions in space. This form of liability applies exclusively to damages that occur in outer space, diverging from the absolute liability principle by requiring a demonstration of fault. The adoption of fault liability for incidents in space reflects a nuanced understanding of the distinct challenges posed by activities conducted beyond the Earth's atmosphere, where the dynamics of causation and responsibility can be exceedingly complex. Given the intrinsic difficulties in establishing fault for damages in space, the LC allows for the possibility that a state's liability may be mitigated or possibly negated if fault cannot be conclusively determined.

The dichotomy between absolute and fault liability within the LC is a testament to the meticulous consideration given to the unique aspects of space activities by the international community. This bifurcated approach ensures that victims of space-related damages have a pathway to compensation while also acknowledging the practical challenges of proving fault for incidents occurring beyond the terrestrial environment.

²²³ see Art. VI LC Ibid

²²⁴ see UNCOPUOS, Legal Sub-Committee, Working Paper submitted by the Italian delegation - Draft Convention concerning liability for damage caused by the launching of objects into outer space, UNGAOR i, 1968, UN Doc A/AC.105/C.2/L.40, art4(2)

The adoption of absolute liability for terrestrial damages and fault liability for space-to-space incidents embodies a balanced response to the complexities of space law. It recognizes the technological intricacies and the unprecedented nature of space exploration, setting a precedent for how liability is approached in an environment where the realities of outer space often challenge traditional legal concepts.

3.2.4 Damage and Liability

Article I of the Liability Convention provides a comprehensive definition of damage, encompassing loss of life, personal injury, and health impairment, as well as the loss of or damage to the property of states, individuals, both natural and juridical, or intergovernmental organizations²²⁵. This definition intentionally omits direct mention of indirect damages, a decision ratified during the Sixth Session of the Legal Sub-Commission of the United Nations Committee on the Peaceful Uses of Outer Space²²⁶ in 1967. The adoption of an "adequate causality"²²⁷ link was pivotal in establishing a framework within which the LC could be applied to damages occurring in space, anchoring liability to a direct causal relationship between the space activity and the incurred damage.

A critical discourse among contemporary scholars revolves around the LC's applicability to environmental damages, particularly those affecting the outer space environment. The challenge in these instances lies in identifying a claimant with legal standing, as environmental damage often impacts the global community collectively rather than individual entities possessing legal personality. This raises a complex legal problem: if the entire human race is affected yet cannot be considered a legal person in this context, there arises a potential for exoneration based not on the absence of damage but on the legal characterization of the victim. Nonetheless, the convention allows for the possibility that a state or a legal entity could be deemed responsible for compensating environmental damages, provided there is a tangible link to the harm caused.

The burgeoning issue of space debris presents a formidable challenge to the future applicability of the LC. The escalation of both commercial and governmental space activities has precipitated a significant increase in space debris, raising concerns over the Kessler Syndrome (this theory claims that the density of objects in low Earth orbit is high enough to cause collisions between objects, potentially

²²⁵ see Art I LC Ibid

²²⁶ UN, Committee on the Peaceful Uses of Outer Space, Report of the Legal Sub-Committee on the work of its Sixth Session, UNGAOR, 1967, UN Doc A/AC.105/37

²²⁷ UN, Committee on the Peaceful Uses of Outer Space, Legal Sub-Committee, Summary Record of the One Hundred and Third Meeting, UNGAOR, 7th Sess, UN Doc A/AC.105/C.2/SR.103 (1968)

leading to a cascade of further collisions). The obligation to avoid such collisions falls to the owners of space assets, who may need to undertake costly orbital adjustments to mitigate the impact risk. This scenario not only incurs substantial financial burdens but also amplifies the risk of collisions, posing a direct threat to the operational integrity of space objects.

The potential for collisions induced by space debris to be interpreted as damage under the LC's principles has sparked debate among legal scholars²²⁸. If such collisions are deemed consistent with the definition of damage outlined in the convention, it could necessitate a reevaluation of liability principles to address the unique challenges posed by space debris. This reevaluation would have to consider the intricacies of attributing responsibility for debris-related damages, especially in an environment where ownership and control of space objects can be diffuse, and the causality of collisions can be complex to establish.

In conclusion, the LC's current framework for addressing liability in space must evolve to address the nuanced challenges posed by environmental damages and the proliferation of space debris. This evolution requires a sophisticated legal analysis that balances the need for accountability with the practicalities of space operations. As space activities continue to expand, the legal community must engage in proactive discourse to refine and adapt the LC, ensuring it remains relevant and effective in safeguarding against the emerging risks of the final frontier. Resolving these issues will be critical in fostering a sustainable and responsible future for space exploration and utilization.

3.2.5 Compensation Mechanisms in the Liability Convention

The regime provided by the LC distinguishes between two compensation mechanisms for the settlement of damage disputes. While the problem with this mechanism will be discussed later²²⁹, it is essential to first of all present and discuss what the LC provided for in 1972.

First of all, Art. IX LC calls for the diplomatic resolution of claims of compensation for damages. Thus, when one state causes space-related damages to another country, these disputes shall be resolved via diplomatic channels. The problem in such a procedure relies precisely on the relationship between states. While the LC states that a 3rd country may present the claim for compensation between two countries that do not have friendly diplomatic relations, this system

²²⁸ see Frans Von der Dunk, "The 1972 Liability Convention, Enhancing Adherence and Effective Application" in American Institute of Aeronautics and Astronautics & International Institute of Space Law, eds, Proceedings of the Forty-First Colloquium on the Law of Outer Space: 28 September-2 October 1998, Melbourne Australia (Reston, VA: American Institute of Aeronautics and Astronautics, 1999)

²²⁹ see Chapter 3.3

is time-consuming. The victim of the damage is, in fact, in charge of contacting their local ministry of foreign affairs, who then, in turn, is responsible for forwarding the demands to the ministry of the launching state.

Furthermore, for political reasons, a country may simply decide not to act on such a claim. As if “diplomatic channels” weren’t complicated enough, Art. X LC even provides a time limit in which the claim may be presented. The state is, in fact, required to act within one year of being aware of the damage. The problem with such a time limit is when the victim decides to proceed via the domestic court system. Internal courts are, in fact, not often quick in their proceeding, especially considering the complexity of such space activities. Consequently, if a victim goes through the domestic court first, by the time the decision is pronounced, the one-year time limit provided by the LC may have expired.

Should such diplomatic channels be unsuccessful, Art. XIV LC provides for the establishment of a “claims Commission.” This commission is generally structured as an Arbitration tribunal with three “arbitrators” nominated by the feuding states. The problem with relying on this commission is that its decisions are binding only if the parties have so agreed²³⁰.

As mentioned before, a state may also decide to resolve the dispute within a launching state's local and national courts. In this case, it is up to the victim to choose whether to opt for this method of dispute resolution. Furthermore, the victim may also decide in which court to proceed, thus deciding which law will apply to the dispute settlement. While the most advantageous applicable law may be used, at the same time, the full compensation provided by the LC may not be respected.

3.2.6 Consequences of Liability

Concretely, while the LC has provided a more solid framework for liability in space, compared to the applicability of the OST “peaceful uses” principle, the convention still has limitations to its application. The primary issue arising from the rapid commercialization of space is related to the growing number of space debris being generated. As these problems become more frequent, under the UN space treaties' principles, it remains challenging to determine which state may be liable for such damages.

The critical need for regulation concerning the oversight of space objects by potential launching states is underscored by Article VI of the Outer Space Treaty (OST), which holds states internationally accountable for space activities, even those executed by non-governmental entities²³¹. This article further mandates that

²³⁰ see Art. XIX LC Ibid

²³¹ see Art. VI OST Ibid

such activities must receive authorization and undergo continuous supervision by the relevant state party to the treaty. The importance of effective state control lies in the potential liability states face for private space ventures. Consequently, various national laws have been enacted to manage the authorization process for launching space objects, aiming to evaluate and mitigate the risks associated with space operations. While countries like the United States and France have established detailed national regulations for this authorization process, several space-capable nations have yet to implement comparable legislative frameworks.

The allocation of risk between launching states and private entities is a delicate issue requiring drafting intricate domestic laws without specific principles defined in the LC. States typically assume the financial burden beyond a certain ceiling to prevent private operators from bankruptcy, requiring these entities to carry insurance up to a legally defined limit. This approach balances the financial relationship between states and their commercial space operators, with countries like France and the US establishing specific regulations to limit operator liability and thus bolster their space industries. These national laws aim to support the space sector by providing warranties for damages and enforcing insurance coverage requirements for operators, acknowledging the impracticality of unlimited liability for private entities due to the high-risk nature of space activities.

Ownership and liability issues become complex with the potential transfer of space objects in orbit, as outlined in the Outer Space Treaty and the Registration Convention. The RC, in particular, in cases of joint launches, provides that only one state may register as the Registration State²³². The reasoning behind this provision is clear. First, mandatory registration of only one state creates a clear connecting relationship between a state and a space object. Furthermore, this requirement simplifies the identification of the liable state for a potential victim of damages. The problem arises when the transfer of ownership occurs towards a country not originally the launching state. In this case, in fact, this new state will have control over the space object and thus be internationally responsible, according to Art. VI OST. While this transfer of control occurs, no change in registration will occur, as the RC cannot have multiple objects registered under two states simultaneously²³³. The complete transfer of international obligations to the new owner's state suggests a delicate balance between enabling commercial transactions and maintaining regulatory oversight.

²³² see Art II RC Ibid

²³³ see Armel Kerrest and Caroline Thro, Liability for Damage, in Ram S. Jakhu, Paul Stephen Dempsey and Taylor & Francis (eds.), *Routledge Handbook of Space Law* (First edition, 2017), available at <https://libproxy.berkeley.edu/login?url=https%3A%2F%2Fwww.taylorfrancis.com%2Fbooks%2F9781315750965>.

In conclusion, while the Liability Convention and the Outer Space Treaty provide a foundational legal framework for space activities, the burgeoning issue of space debris and the rapid commercialization of space pose significant challenges in addressing the complexities of modern space operations. The existing international treaties need help with the precise attribution of liability, especially in scenarios involving space debris and the transfer of space object ownership. This is compounded by the varying degrees of national legislation across space-faring nations, creating a patchwork of regulatory approaches.

The critical need for adequate state oversight, the intricate balance of liability between launching states and private operators, and the challenges posed by the transfer of space object ownership underscore the limitations of the current legal regime in keeping pace with technological advancements and the commercial imperatives of space activities. As this thesis progresses, it will further explore the intricacies of dispute settlement mechanisms within the context of space activities.

3.3 Settlement of disputes and resolution of conflicts

A dispute, as articulated by the Permanent Court of International Justice (PCIJ)²³⁴, the precursor of the ICJ, is fundamentally a disagreement on matters of law or fact, manifesting as a conflict between legal viewpoints or interests, which, in the context of international relations, typically occurs between two sovereign states²³⁵. This definition encapsulates the essence of disputes in international law, highlighting the variances in interpretation and interests that may arise between parties.

The landscape of dispute settlement mechanisms within the realm of space law, particularly under the Liability Convention, reveals a framework that, while pioneering, has been underutilized and perceived as weak due to its lack of binding dispute resolution processes. Early efforts to establish a robust mechanism for solving space disputes were adopted via initiatives of the International Law Association (ILA)²³⁶. The result of such efforts culminated in the inclusion of non-governmental organizations in the application of these procedures²³⁷. The most recent result culminated in the Permanent Court of Arbitration (PCA)

²³⁴ Mavrommattis Palestine Concessions, Greece V United Kingdom, Objection to the jurisdiction of the court, Judgement No. 2, PCIJ Series A No.2, ICGJ 236 (PCIJ 1924), 30 August 1924

²³⁵ Ian Brownlie, 'The Peaceful Settlement of International Disputes', 8 *Pace International Law Review* (2009).

²³⁶ see Convention on the Settlement of Space Law Disputes, ILA Report of the Sixty-First Conference, Paris, 1984

²³⁷ see Art 10, *ibid*, "1.all the dispute settlement procedures specified in this Convention shall be open to Contracting Parties; 2. The dispute settlement procedures specified in this convention shall be open to entities other than state and international intergovernmental organisations..."

adoption of rules in 2011²³⁸, marking a significant yet incremental step towards addressing disputes in outer space activities.

The Outer Space Treaty (OST) itself incorporates provisions for dispute settlement in Articles III and IX, reflecting divergent views during its drafting, notably between the USSR and the USA. In particular, the US and other parties to the convention intended to provide the ICJ with obligatory jurisdiction. However, the USSR prevailed, and no such binding power to dispute resolution decisions was provided²³⁹. To this day, some scholars seem to call for the ICJ jurisdiction regarding the LC. Considering the sentiment during the drafting phase, this is impossible.

Article III OST advocates for the application of international law and the UN Charter, suggesting conventional modes of dispute resolution like negotiation and arbitration as outlined in Article 33 of the UN Charter. Conversely, Article IX, which addresses potential environmental damages from space activities, stops short of establishing a firm dispute resolution mechanism, leading to debates over the interpretation of terms like “harmful contamination” and the adequacy of measures deemed “necessary” for preventing such harm²⁴⁰.

Particular mention should be given to the Vienna Convention on the Law of Treaties and its procedural mechanisms. Art 66 and its Annex V, in particular, regarding the procedures of judicial settlement, arbitration, and conciliation, states that when disputes arise, parties shall submit their request to the UN Secretary-General. In turn, upon request by the disputing countries, the secretary general shall refer the dispute to a Conciliation Commission. The problem with such a mechanism is due to the fact that both the report and the conclusion of the commission are not binding to the parties, but it only has a recommendatory nature. Generally, in fact, international tribunals do not exercise compulsory jurisdiction unless states specifically agree to such. The Eastern Carelia case represents exemplary case law²⁴¹. The court, in fact, on such occasion stated, “no state can, without consent, be compelled to submit its disputes with other States either to mediation or to arbitration.” It is thus clear how the recommendatory nature of the Conciliation Commission's decisions is of little use.

The LC represented a forward leap by recognizing the legal personality of international organizations and establishing principles for integral compensation

²³⁸ see paragraph 3.3.2

²³⁹ see Art. 36, Statute of the International Court of Justice, San Francisco, 1945. According to this, the ICJ can only entertain disputes between states which have accepted its jurisdiction.

²⁴⁰ see F. Vallat, *The Outer Space Treaties*, 73 *Journal of the Royal Aeronautical Society* (1969), available at https://www.cambridge.org/core/services/aop-cambridge-core/content/view/1E226FB0CEF090B04173A8CC7323DEE9/S0001924000051563a.pdf/aer_volume_73_issue_705_cover_and_front_matter.pdf

²⁴¹ see *Status of Eastern Carelia (USSR v Finland) Advisory Opinion* (1923) Series B no. 5

for damages²⁴². However, its critical limitation lies in its dispute settlement mechanism, shaped significantly by the political context of its time. Article VI of the OST reinforces state responsibility for national space activities, demanding state authorization and supervision, primarily for non-governmental entities, thus indirectly holding states accountable. The LC, under Article XIV, proposes first a system for diplomatic negotiation and then the establishment of Claims Commissions in case diplomatic ventures are unsuccessful, but with the caveat in Article XIX that decisions and awards are not binding unless expressly agreed upon by the states involved, rendering the mechanism recommendatory rather than obligatory.

The absence of a binding decision-making system within the LC's framework reflects the political compromises of its era despite initial support for a more decisive approach. At the time of drafting the convention, most parties presumed it would be amended, given the fact they provided for revision mechanisms. As of today, 50 years after its entry into force, the practical application of the LC's dispute mechanism was notably tested only on one occasion. With the Soviet Cosmos-954 incident causing damages in Canadian territory, the parties provided to resolve their dispute via diplomatic negotiations. In the end, the USSR argued that the LC did not apply, given that no personal injuries or property damages had occurred. Thus, the claims commission has yet to see the light of day.

In recognizing these challenges, more dynamic procedures have been sought, exemplified by the PCA's introduction of Optional Rules for the Arbitration of Disputes Relating to Outer Space Activities in 2011²⁴³, aiming to provide a more agile and practical framework for resolving space-related disputes. The subsequent sections of this thesis will delve deeper into the intricacies of dispute resolution, exploring potential avenues for enhancing the efficacy and applicability of legal mechanisms in the evolving domain of space law.

3.3.1 Precedents of Dispute Settlement

Diplomatic negotiation is the most prevalent method for resolving disputes among states, a practice that is extensively reflected within the provisions of international space law²⁴⁴. This approach to dispute resolution has historically been the mechanism of choice for addressing incidents arising from space activities. A

²⁴² Art XII LC : “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, in order to provide such reparation in respect of the damage as will restore the person, natural or juridical, State or international organization on whose behalf the claim is presented to the condition which would have existed if the damage had not occurred”

²⁴³ see 3.3.2

²⁴⁴ see Moon Agreement Art XV; Principle 10 UNGA Res 47/68; Annex E UNGA Res 37/92; Principle XV UNGA Res 41/65

notable instance occurred in 1978 when Canada lodged a claim against the USSR due to the debris from the Soviet Cosmos 954 nuclear-powered satellite, which resulted in a settlement reached through negotiation²⁴⁵.

The case of Project West Ford, initiated by the USA between 1961 and 1963, further exemplifies the effectiveness of diplomatic negotiations in space activities. The project aimed to create an artificial ring of dipole antennas in orbit to enhance Earth's communication capabilities. However, due to the rapid development of modern satellite technology and international concern over the potential for space debris, the project was largely abandoned after only three launch attempts, most of which failed. The international community's reaction played a pivotal role in curtailing the extent of these experiments, showcasing the impact of diplomatic pressure in guiding space operations.

Recently, disputes concerning access to orbital slots and frequency allocations have also been amicably resolved through negotiation and consultation processes. A case in point involves the dispute between France and Iran over alleged harmful interferences with the EUTELSAT transmission satellites. Such incidents underscore the continued reliance on diplomatic negotiations as an effective means for resolving space-related disputes, emphasizing the importance of dialogue and consultation in maintaining peaceful relations between states.

Negotiation and consultations, thus, remain the favored avenues for dispute settlement in the international arena, especially concerning space law. This method proves advantageous as long as the parties involved can reach a successful diplomatic resolution. However, in instances where diplomatic efforts falter, the Liability Convention outlines the establishment of a claims commission as an alternative recourse. Despite this provision, a claims commission has yet to be convened, highlighting a gap in the practical application of the LC's dispute resolution mechanisms. The primary concern with such a commission lies in the binding nature of its decisions. Without a mutual agreement between the disputing states, the outcomes of the commission's deliberations hold no obligatory force, casting doubts on this mechanism's effectiveness as a dispute resolution tool.

While historically influential, the reliance on diplomatic negotiation underscores the need for more structured and legally binding dispute resolution mechanisms within the framework of international space law. As space activities continue to evolve and expand, developing such mechanisms will be crucial in ensuring equitable and enforceable resolutions to disputes, thereby contributing to the sustainable and peaceful use of outer space.

²⁴⁵ see Communiqué No.27 on Settlement of Claim Between Canada and the USSR for Damages Caused by “Cosmos 954”, 2 April 1981; Protocol between Canada and the USSR, 2 April 1981

3.3.2 International Arbitration and Space

The object of International arbitration is the settlement of disputes between states, decided by judges appointed by the parties themselves. Arbitration has become the primary mechanism to resolve disputes between states, individuals, and corporations in nearly all aspects of international trade, commerce, and investment²⁴⁶. More broadly, the sentiment is that even activities associated with peaceful uses of outer space are included. This, though, is when private individuals and or corporations have fixed binding settlement mechanisms for the resolution of their disputes. For exemplary purposes, arbitration panels have been pursued in order to resolve the disputes between Antrix, which is part of the Indian Space Research Organisation (ISRO), and Devas Corporation, a private company, regarding leases of two ISRO satellites. One of the panels, in this case, was founded following the International Chamber of Commerce (ICC) rules. The other panel followed the UNCITRAL Arbitration Rules. More recently in 2011 Avanti Communications won an award against the company SpaceX for the termination of a contract²⁴⁷ via the American Arbitration Association (AAA) of New York.

These cases represent the great success arbitration has had in commercial activities, regulated mostly by private commercial international law. This success is due to the foundation of all commercial activities: contractual agreements. Contractual law is, in fact, based on the agreement of the participating parties. While commercial negotiations may be complex, on the other hand, it may be said that they are easily concluded. The conclusion of such agreements is based on the fact that the contracting parties have an underlying interest in such. If there is no interest, no agreement will be found, and no contract shall be concluded. Contracts between private entities are, in fact, concluded regularly on a daily basis, and this is because activities are most often required to be conducted by different parties. Especially in international contracts, parties often insert clauses in their agreement in which they agree to settle their possible disputes via arbitration. This arbitration clause is highly desirable to private parties as it represents a more quick and effective means of conflict resolution compared to the system provided by national legal court systems.

On the other hand, dispute resolution becomes more complicated when the parties involved are States. Countries are granted, in fact, the right of sovereignty. Each state, according to established international law, has sovereignty over its territory, activities, and persons. Consequently, states are hardly willing to limit their sovereignty in favor of another country. This is why, in the ambit of space

²⁴⁶ see Nigel Blackaby et al. (eds.), *Redfern and Hunter on International Arbitration* (5. ed, 2009). <https://www.international-arbitration-attorney.com/wp-content/uploads/Prelim-Pages-from-Redfern-and-Hunter-5th-Edn.pdf>

²⁴⁷ SpaceNews Staff, *Avanti Wins Arbitration Award Against SpaceX*, 20 April 2011, SpaceNews, available at <https://spacenews.com/avanti-wins-arbitration-award-against-spacex/>.

activities, countries have so far stayed far from establishing firm binding mechanisms of dispute resolution. According to art XIX.2 LC in fact:

*“The decision of the Commission shall be final and binding if the parties have so agreed; otherwise the Commission shall render a final and recommendatory award...”*²⁴⁸

Via the analysis of this article, it is easy to see the fear of furnishing an international commission with binding decision powers in relation to state space activities.

The ICJ is a good example of how countries have come together in order to settle questions of established international law. This is, however, only valid for countries that have agreed to such jurisdiction. So far, no agreement between countries has been concluded in order to provide the ICJ with jurisdiction over space activities. On the contrary, states, such as the former USSR, have expressly disapproved of such a conclusion.

The question, in turn, arises: in the case where international negotiations between states are to fail, how would a dispute be resolved?

The most “simple” solution, as was presumed during the drafting of the LC, is a revision of Art. XIX.2 of the Convention. The result could come in the form of redacting part of the article and stating that “the decisions of the commission shall be final and binding”, full stop. The problem with such a solution is, of course, reuniting the member states to the convention and bringing them to agree to such amendment. Thus the problem of “acceptance” by states still remains.

Another solution, backed by some scholars, is that of providing the ICJ with jurisdiction over disputes over state space activities. The problem is state space activities fall within the dual-usage dilemma²⁴⁹: civil and military functions. This problem is yet to be discussed and fixed by the international community. It is not clear what actions constitute civil, thus peaceful, or military uses of space. Therefore, it is not possible to furnish the ICJ with jurisdiction over such activities when the full extent of such actions is not clear on the international law level. Furthermore, the ICJ is, in fact, an international criminal court dealing with criminal/tourt law. Relying upon the ICJ for the resolution of space disputes could be seen as implying that space activities could constitute criminal activity. Countries are, of course, not keen on being labeled as criminals. On the same line, with the current international situation, countries have seemed to consider the ICJ decisions as mere “opinions,” thus not caring about the results of their proceedings.

²⁴⁸ see Art XIX LC Ibid

²⁴⁹ see Chapter 2.3.3

The introduction of the Permanent Court of Arbitration (PCA) Rules on Outer Space Disputes²⁵⁰ represents a significant advancement in the resolution of space law disputes. These Rules were presented to the United Nations at the Legal Sub-Committee of COPUOS in 2012²⁵¹ by the Chair of the PCA Advisory Group. These rules have been specifically lauded for their suitability in the nuanced field of space law, particularly highlighting the aspect of confidentiality, which is crucial in such disputes.

The PCA Rules on Outer Space Disputes are distinguished by their accessibility to a broad spectrum of parties involved in space endeavors, encompassing both state and non-state actors. This inclusive approach is grounded in the principle of voluntary participation, where the consent of all parties is a prerequisite for arbitration. This consent is typically formalized through an arbitration clause within the legal documents that define the relationships between the parties²⁵².

A pivotal advantage of the PCA Rules is their capacity to produce final and binding decisions, providing a stark contrast to the recommendatory nature of decisions emanating from frameworks like the 1972 Liability Convention. Such definitive outcomes are not only recognized but also enforceable across the 146 signatory states of the New York Convention²⁵³, thereby ensuring a wide-reaching impact.

The flexibility of the arbitral process under the PCA Rules is another key feature, allowing parties to tailor the proceedings to suit their specific needs. Furthermore, the Rules are designed to protect the confidentiality of sensitive information, a critical consideration in space law disputes. This is achieved by provisions that allow for private hearings and non-publication of awards, ensuring that sensitive data remains protected throughout the arbitration process.

Following their formal introduction to the UN, the PCA Rules on Outer Space Disputes have been presented and discussed at various international forums, including conferences and workshops sponsored by both public and private institutions around the globe. This widespread dissemination underscores the international legal community's recognition of the PCA Rules as a vital tool for resolving disputes in the increasingly complex and dynamic field of outer space activities, marking a pivotal development in the pursuit of efficient and confidential dispute resolution mechanisms within space law.

²⁵⁰ see Optional Rules for Arbitration of Disputes Relating to Outer Space Activities, the Hague, 6 December 2011, available at <https://docs.pca-cpa.org/2016/01/Permanent-Court-of-Arbitration-Optional-Rules-for-Arbitration-of-Disputes-Relating-to-Outer-Space-Activities.pdf>

²⁵¹ Fifty-first Session of the Legal Sub-Committee of COPUOS on March 29, 2012 *A/AC.105/1003*, available at https://www.unoosa.org/oosa/oosadoc/data/documents/2012/aac.105/aac.1051003_0.html.

²⁵² see Article 1(1) of the Optional Rules Ibid

²⁵³ see United Nations Convention on the Recognition and Enforcement, New York Convention, available at <https://www.newyorkconvention.org/english>.

3.4 Closing Arguments

In conclusion, this chapter has illuminated the intricate tapestry of liability within international space law, dissecting the Liability Convention's vital role in delineating a structured framework for addressing damages resulting from space endeavors. The historical underpinnings and the nuanced debates that prefaced the LC's inception underscore the complexity of achieving consensus within the international community, particularly against the backdrop of burgeoning space exploration and commercialization. This exploration into the distinctions between public and private international arbitration has further accentuated their significance in the adjudication of disputes involving a diverse array of actors within the outer space domain.

The PCA Rules on Outer Space Disputes emerge as a particularly innovative advancement, offering a model for future international cooperation in the realm of space law. The Rules' emphasis on confidentiality is paramount, acknowledging the sensitive nature of space operations and the proprietary interests of involved parties. This aspect not only facilitates a more willing participation in the arbitration process but also underscores the critical need for trust and security in the resolution of space-related disputes.

This chapter's discourse underscores the imperative for ongoing international collaboration and legal innovation to address the multifaceted challenges presented by the outer space environment. The PCA Rules on Outer Space Disputes serve as a testament to the potential of arbitration in this unique context, providing a viable pathway for binding, confidential, and equitable dispute resolution. As space activities continue to expand and evolve, the importance of adapting legal mechanisms to this dynamic landscape cannot be overstated. The fostering of international cooperation, underpinned by a commitment to confidentiality and the equitable resolution of disputes, will be crucial in ensuring the sustainable and peaceful use of outer space for future generations.

Conclusion

As this thesis ends, it is essential to underline the significant problems in the current international space law regime.

While the 5 UN space treaties, drawn in the sixties/seventies of the past decade, laid the basic framework for space law, they are also to be considered as the groundwork for starting future discussions. The principles of “cooperation” and the concept of space being “for the benefit of all mankind” are to be kept as crucial foundations for future regulations. At the same time, though, these principles are to be discussed on an international level in order to dispel any ambiguities deriving from their interpretation.

A particular focus of this thesis has been on the “peaceful purposes” clause of the Outer Space Treaty. While the aim is clear: to conduct activities and research for the benefit of everyone on earth, the application is dubious in current developments. With countries running activities in space that fall in the dual-use dilemma, a satellite with both civil and military applications may be in breach of the OST. State practice so far seems to have adopted the “non-aggressive” interpretation of the “peaceful purposes” clause. So far, non-major “aggressive” actions have been enacted in space between States. While the US, USSR, China, and India have conducted ASAT tests, these have been done with their space technology. Problems may arise in the future when ASAT weaponry is used on another state's satellite. For the moment, this has fortunately not occurred. The destruction of another state satellite will constitute a breach of the OST principle of peaceful purposes.

The major problem for the moment arises with the placement of weapons in space. With satellites having a dual-nature use, it could constitute a militarisation of space. The full extent of satellites in space is not in the public domain; most information is secreted. It is, however, easy to presume that some space objects used for “peaceful” practices on Earth could already be mounted with concealed weapons capable of procuring damage both on Earth and in space. More simply, avoiding presumptions/conspiracies, a simple maneuver, with the consequential change of orbit, of a nationally controlled object could be enacted very easily in order to collide with another State object, thus destroying it or even just damaging it. This action, if proven, would constitute an act of aggression and, therefore, a breach of the “peaceful purposes” principle of the OST.

Art IV OST more generally prohibits the placement of any weapons of mass destruction in space, on the moon, and other celestial bodies. While this general prohibition exists, its full extent needs to be clarified. As stated many times in this thesis, satellites are both civil and military in nature and thus could represent a weapon. It is difficult, then, to fully understand what is and is not expressly prohibited in space.

Significant international discussions are being held on the military use of space. Most notably, the WOOMERA manual and the MILAMOS represent an exemplary instance of cooperation to interpret the UN space treaties and provide, as LEX FORENDA, interpretations of what will be militarily permissible in space in the advent of modern space technologies. These instruments will result in essential manuals providing significant developments in the intentional space law regime. As these manuals have yet to be seen by the public at the time of drafting this thesis, the full extent and the result that will come from their publication are unclear.

New bodies of law will be necessary to fill the gaps the UN Space treaties left. International cooperation will be essential. As of writing the final remarks to this thesis, intelligence has been gathered and made public that Russia intends to launch Satellites with nuclear weapons on board to destroy enemy satellite systems. Russia has so far denied the allegations, but the simple idea underlines the importance of new regulations about the militarisation of space.

Another point made in this thesis is the weakness found within the Liability Convention of 1972. The LC provides a solid basis to apply liability upon parties in space for the damage occurring from their activities. On the other hand, the enforcement mechanism provided by the LC could be stronger. In the crash of Cosmos-954, a USSR nuclear satellite, its debris fell upon Canadian soil. On such occasion, the parties did, in fact, proceed via diplomatic negotiations to solve their disputes. Notably, the USSR claimed that the “Claims Commission” provided by the LC would not be applicable as damages had not occurred upon persons or objects of Canadian property.

So far, just as no full-on wars in space have occurred, no major dispute has arisen due to space activities. On most occasions, when space debris fell back on Earth, this was done calculatedly on international seas or domestic territories. It is clear how, in such occasions, no claims for compensation have been needed to be established. On the occasion that State A is held liable for compensating the damages caused to State B, there is currently no formal binding decision-making mechanism capable of solving disputes.

While there have been peaceful negotiations to settle disputes, the LC falls short in providing binding decision powers to conflicting parties. An important step forward may be the Outer Space Optional Rules of Arbitration created by the Permanent Court of Arbitration. Such rules have, in fact, provided a detailed mechanism to resolve space disputes. Notably, the problem with finding a mechanism with binding decision-making powers is that states must accept such power. If no agreement is found, decisions by possible arbitration cases may only be considered recommendatory.

The Optional Rules of the PCA are relevant in their possible discretionary nature. The Rules foresee that if disputing parties so decide, the arbitration process and result may be held entirely confidentially. The “confidentiality” clause may be helpful to circumvent the state's “acceptance” problem. With current international situations, states may be, in fact, worried about the perceived image generated by losing a case. If any actions conducted in space were to cause damage to another state, the confidentiality of the Optional Rules could preserve the integrity of the state, thus making it more willing to accept binding liability decisions. Considering this “confidentiality” clause, it may very well be possible that there have already been cases in which states have decided to resolve their disputes through arbitration, but this information is unknown to the public.

In essence, this thesis has analysed the UN's space rules system. This system is the product of outdated technology and knowledge. Particularly with the emerging use of force in space, the UN space framework has resulted in a very fragile state. The dispute settlement mechanisms have also mainly resulted inefficient. New international rules will be essential to surpass such problems in the UN space framework. To do so, cooperation and willingness to comply will be necessary.

Considering the current state of international affairs, cooperation may take time to come by. However, it is essential to note that at the time of the drafting of the UN space treaties, tensions were high in the Cold War era between the US and USSR, yet they still managed to come to agree on an essential body of rules pertaining to space.

To quote Neil Armstrong, “One small step for man, one giant leap for mankind.” the current space legal framework, the acceptance of the WOOMERA and MILAMOS manuals as binding customary law, and the recognition of the PCA rules for space are only “one small step for man.” Future international regulation and cooperation in space will be the necessary “giant leap for mankind.”

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