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COLLIDING RESPONSIBILITIES: AN ANALYSIS OF LIABILITY IN INTERNATIONAL SPACE LAW

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ABSTRACT

The exploration and use of outer space have necessitated a robust legal framework to ensure peaceful and responsible activities. This paper explores the evolution of international space law, focusing on the key treaties governing liability issues. The paper aims to analyse the current state of space law, particularly regarding liability for damage caused by space activities, and identify potential areas for improvement. The paper examines relevant treaties, conventions, and legal principles, including the Outer Space Treaty, the Liability Convention, and various UN declarations. The paper highlights the key concepts of space objects, launching states, and collisions, emphasizing the importance of clear definitions for accountability. It delves into the concept of liability in international law, focusing on state responsibility and fault-based liability, and analyses the provisions of the Liability Convention. While the convention provides a valuable framework, limitations exist, such as the need to address the role of private actors and the growing problem of space debris. International space law has made significant strides in establishing a framework for peaceful space exploration, but continuous adaptation is crucial to keep pace with the evolving space industry.

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INTRODUCTION

The emergence of international space law marks a pivotal development in regulating activities beyond Earth, ensuring that space exploration and utilisation are conducted in a manner that promotes global peace, security, and equitable access. Central to this legal framework are treaties and principles that address the liability of states for their space activities, reflecting the need for accountability in the face of potential harm caused by space operations. This paper explores the historical evolution and key treaties governing space law, focusing on liability issues arising from space activities.

We begin with an overview of the foundational treaties, including the *Outer Space Treaty* and the *Liability Convention*, which establish the legal responsibilities of states for damages caused by space objects. The discussion then delves into the definitions of crucial terms such as *"space objects," "launching state," and "space debris,"* which are essential for understanding liability in space law. We examine the concept of liability in international law, highlighting how it is addressed in treaties dealing with space collisions and damage.

Further, this paper analyses the application of state responsibility theory and the concept of fault in space law alongside the specific provisions of Article VII of the Outer Space Treaty and the Liability Convention. The principles governing various aspects of space activities, such as remote sensing and the use of nuclear power sources, are also scrutinized. Finally, the paper identifies shortcomings in the current liability framework and proposes solutions to enhance international space law's effectiveness.

EMERGENCE OF INTERNATIONAL SPACE LAW

Developed over the past six decades, space law is a relatively new field of law. Its history can be traced back to the space race to explore outer space between the Soviet Union and the United States during the Cold War. This era marked a significant shift in the global perspective on space, from a mere scientific curiosity to a potential arena for political and military competition. The foundation of the existing space law is built upon five international treaties, which were a direct response to the need for legal frameworks to govern space activities. As a means to establish space law regulations, it is further supported by relevant UN General

Assembly resolutions, bilateral or regional treaties, customary international law, and State and intergovernmental organisation laws and practices. Space law typically operates on two distinct layers of rules and regulations. [2]

Space law operates on two layers. The first layer is international law, which governs the rights and responsibilities of states and intergovernmental organisations in space. The second layer, national law, is pivotal in space law. It encompasses laws crafted to fulfil a nation's commitments under international treaties and laws governing extraterrestrial activities not covered by such treaties. This dual-layered approach ensures that all aspects of space activities are regulated, with national law stepping in to address the gaps left by international law.[3]

TREATIES GOVERNING SPACE LAW

The 1967 Outer Space Treaty, a groundbreaking agreement that addressed space issues, was signed by the United States, the Soviet Union, and the United Kingdom.[4] This landmark treaty, a cornerstone in developing international space law, established several key principles. It affirmed the freedom of exploration, prohibited the placement of nuclear weapons in space, and promoted the peaceful uses of space. The treaty also introduced the concept of *state responsibility* for the actions of their citizens in space, laying the groundwork for future space law.[5]

Several additional treaties were signed during the next years to strengthen the legal foundation for space exploration. The responsibility regime for damage caused by space objects was established in 1972 with the signing of the Convention on International Liability for Damage Caused by Space Objects. Subsequently, states were mandated to record all items launched into space by the 1975 Convention on Registration of Objects Launched into Outer Space.[6]

[2] Dempsey, P.S., *The emergence of national space law,* SSRN 2692639 (2015).
[3] Rathore E. and Gupta, B., *Emergence of Jus Cogens principles in outer space law,* 18(1) Astropolitics 1, 1-21 (2020).
[4] Blount, P.J., *Renovating space: The future of international space law,* 40 Denv. J. Int'l L. & Pol'y, 515 (2011).
[5] Carns, M.G., *Orbital Debris Prevention and Mitigation Efforts among Major Space Actors,* International Law and the Formal Space Treaties, 31-68 (2023).
[6] Wessel, B., *The Rule of Law in Outer Space: The Effects of Treaties and Nonbinding Agreements on International Space Law*, 35 Hastings Int'l & Comp. L. Rev., 289 (2012).

Addressing Liability Issues in Space Activities

1. History

The history of space exploration began in 1957 with the Soviet Union's launch of the first artificial satellite, Sputnik, from the Baikonur Cosmodrome in Kazakhstan. The United Nations responded by establishing the ***Committee on the Peaceful Uses of Outer Space (COPUOS)*** in 1958, which led to significant milestones such as human spaceflight in 1961 and the first moon landing in 1969. Initially, space exploration was dominated by national governments due to high costs and concerns over military applications, particularly during the Cold War era. However, launching the first commercial satellite in 1984 marked a shift towards increasing private sector involvement in space activities.[7]

2. Latest Trends

The late 20th century saw rapid advancements in space technology and exploration, with governments laying the groundwork for future endeavours. Over the past fifty years, private companies have taken a leading role, though existing legal frameworks have struggled to keep pace with these developments. NASA's transition to private sector collaborations, such as the 2012 contract with SpaceX for International Space Station (ISS) support, exemplifies this shift.

3. Conventions on Liability

Despite the benefits, the rise in space activities has heightened concerns about the risks of space debris and collisions. The need for a comprehensive legal framework addressing liability for damages caused by space objects became evident. The United Nations addressed these concerns early on, with COPUOS establishing a working group in 1963 to study liability issues, leading to the 1972 Liability Convention. As of 2021, the convention has been ratified by 98 states and accepted by several international organizations, aiming to ensure victims are compensated and to deter harmful activities.[8]

The Liability Convention distinguishes between *absolute liability* for damages on Earth or to aircraft (Article II) and conditional liability for damages in space (Article III), requiring proof

[7] Siddiqi, A.A., *Competing technologies, national (ist) narratives, and universal claims: Toward a global history of space exploration*, 51(2) Technology and Culture 420, 425-443 (2010).
[8] Reis, H., *Some reflections on the liability convention for outer space*, 6 J. Space L.125, (1978).

of fault for the latter. This distinction, however, often leads to confusion over the concept of *"fault"* in international space law. The ambiguous language necessitates reliance on customary international law and the Vienna Convention on the Law of Treaties for interpretation.[9]

The 1978 Cosmos 954 incident, where a Soviet satellite caused damage upon re-entry, highlighted the complexities of adjudicating liability claims under different jurisdictions. In such cases, international customary laws and precedents like the Trail Smelter and Corfu Channel cases play crucial roles, which will be further discussed in the article. Courts tend to apply strict liability in adjudicating these cases, often without considering causation, leading to criticisms of the convention's effectiveness and calls for more robust due diligence standards.[10]

DEFINING IMPORTANT SPACE LAW TERMS

1. Space Objects

Several technical and legal terms and phrases will be used in this article. The terms *"space object"* and *"space debris,"* which both define the limits of this article, are particularly pertinent. Space objects do not have a universal definition, but they include the components of a space object and its launch vehicle. The term "Space Object" is used throughout various space treaties and conventions. It usually means objects or vehicles launched and made by man into outer space.[11] States cannot choose what components of a space object form or do not constitute an object for this legal definition; rather, any piece of hardware employed in a launch is considered a space object collectively.

Digging out from the United Nation's registry of objects launched into space, the database supports that space objects include man-made items such as satellites,[12] that are sent into space after being utilised in a wide range of space-related activities for various purposes. They also

[9] Sinclair, I.M., *The Vienna Convention on the law of treaties*, Manchester University Press, (1984).
[10] Trepczynski, S., *The Effect of the Liability Convention on National Space Legislation*, 33 J. Space L. 221, (2007).
[11] V. Kopal, *Some Remarks on Issues Relating to Legal Definitions of 'Space Objects,' 'Space Debris' and 'Astronaut,'* Indonesian Journal of International Law, 99–108 (2021).
[12] Kerrest and Smith, 'Article I (Definitions)', in Hobe, Schmidt-Tedd and Schrogl, at 115.

include rockets,[13] as well as 'all parts used in a launch, even those not intended to reach outer space,' such as boosters.[14]

1. Launching State

Space Objects, as previously defined, when launched into space by a particular country or nation, the nation becomes the 'launching state.' The Liability Convention defines this as '(i) [A] State which launches or procures the launching of a space object; (ii) a State from whose territory or facility a space object is launched.'[15]

The concept of a launching state is necessary to impose state culpability for damage caused by space objects. This is so because states that meet the criteria for being considered launching states are the only ones subject to international liability.[16]

2. Collision

There is no precise legal definition for the term "collision" in the context of space law. Generally speaking, it alludes to the uncontrollably returning of a space object to Earth or the "violent striking" of two or more space objects against one other.[17] In addition to the 2009 collision between the US Iridium 33 and the Russian Cosmos 2251 satellite, there were major space object collisions in 2011 and 2012 involving a dormant NASA satellite, an inactive German satellite, and an inactive Russian probe.[18] These instances help to highlight the actual dangers and risks connected to space travel.

3. Space Debris

Space debris, consisting of non-functioning, man-made objects in Earth's orbit or those that have re-entered the atmosphere, poses significant environmental challenges in outer space. Unlike "space object," "space debris" lacks a legal definition but is generally considered man-made, non-functioning fragments. Despite this, space debris falls under the broader category of space objects, as its functionality or lack thereof is irrelevant to its classification. This is

[13] UNCOPUOS, Information Furnished in Conformity with General Assembly Resolution 1721 B (XVI) by States Launching Objects into Orbit or Beyond, UN Doc. A/AC.105/INF.372, 4 May 1978.
[14] *Id.* at 11
[15] Liability Convention, Art. I(C).
[16] *Id.* at 11.
[17] Oxford Dictionaries, 27 February 2015, available at www.oxforddictionaries.com/definition/english/collision.
[18] Hertzfeld and Baseley-Walker, *A Legal Note on Space Accidents*, 59 Zeitschrift für Luft- und Weltraumrecht 230, 231–232 (2010).

supported by the fact that fragments and parts that constitute space debris are considered space objects under international treaties. Including space debris in registration data by countries, such as the US, further supports this view. Consequently, space law applies to space debris, as no separate legal framework governs it. Thus, space debris is treated as a space object within the existing legal regime.

SPACE LAW AND LIABILITY

1. The Concept of Liability in International Law

The legal obligation created to pay compensation when an event that causes injury occurs is called liability.[19] In international law, liability often arises from non-prohibited ultra-hazardous activities, such as space activities, which can cause harm despite not being inherently illegal.[20] Liability in these contexts typically requires proof of causation and damage. The mention of fault in Article III of the Liability Convention can be confusing, as it introduces complexity into an area where *no-fault liability* is often expected. No-fault or strict liability focuses solely on causation and damage without considering fault.[21] This contrasts with fault liability, which requires causation and damage and an element of blameworthiness, such as intention or negligence, in the defendant's conduct.

However, in international law, 'fault' is more commonly linked with state responsibility for wrongful acts. In this framework, the fault is not part of state responsibility but is connected to the primary rules of international law. These primary rules impose substantive obligations on states, and their breach triggers the secondary rules of state responsibility.

This article explores the concept of fault in the context of liability for space object collisions and debris falling on the earth's surface. It indicates that understanding fault in Article III might suggest a connection to state responsibility. Under modern views of state responsibility, fault

[19] Office for Outer Space Affairs United Nations Office at Vienna, Proceedings United Nations/International Institute of Air and Space Law Workshop on Capacity Building in Space Law (2003), at 29.
[20] Bedjaoui, *Responsibility for States: Fault and Strict Liability*, 10 Encyclopedia of Public International Law 361, (1987).
[21] Goldie, *Concepts of Strict and Absolute Liability and the Ranking of Liability in Terms of Relative Exposure to Risk*, 16 Netherlands Yearbook of International Law 175, 194 (1985).

pertains to the primary rules of international law rather than the secondary rules governing state responsibility for wrongful acts.[22] This distinction is crucial for interpreting liability in cases involving space-object collisions. In further sections, the discussion extends to fault about the law of state responsibility for wrongful acts, further clarifying these complex legal concepts.

2. Liability in Treaties dealing with Space collisions

Fault in general international law is understood as a "blameworthy psychological attitude of the author of an act or omission."[23] However, its interpretation within the context of the Liability Convention remains ambiguous. To clarify this, the rules on treaty interpretation in Articles 31 and 32 of the 1969 Vienna Convention on the Law of Treaties (VCLT) are relevant.[24] According to the VCLT, the interpretation should be based on the "ordinary meaning of the term." Therefore, fault under the Liability Convention does not need to align with the general meaning of international law but should be interpreted based on the Convention's text. Nonetheless, the Liability Convention does not explicitly define this critical term, adding to the complexity.[25]

(i) Article III of the Liability Convention

This lack of a clear definition calls for a careful interpretation based on the treaty's context and the intent of its drafters. Without a precise definition in the Convention, the understanding of fault might diverge from its general international law meaning, requiring a nuanced approach to determine its application in cases governed by the Liability Convention. This interpretation challenges the importance of examining the Convention's provisions and the broader principles of international treaty law to understand fault in treaties.

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[22] BROWNLIE, SYSTEM OF THE LAW OF NATIONS: STATE RESPONSIBILITY 44, (1983).

[23] Fundamental differences between the meaning and role of fault in international law are divided into two schools of thought: the objective theory and fault theory. G. Palmisano, *Fault*, September 2007, at para. 8, available at http://opil.ouplaw.com/view/10.1093/law:epil/9780199231690/law-9780199231690 e1034?rskey=1KmHzq&result=2&prd=OPIL. For a detailed examination of the conflicting views on fault, see especially 'Chapter III Doctrine Section 1: Writings of Specialists', 2(1) ILC Yearbook (1978) 188, paras 487–560.

[24] Vienna Convention on the Law of Treaties (VCLT) 1969, 1155 UNTS 331.

[25] B.A. Hurwitz, *State Liability for Outer Space Activities in accordance with the 1972 Convention on International Liability for Damage caused by Space Objects*, 33 (1992).

To understand the term "fault" in the Liability Convention, we should look at the purpose of the treaty, which is to establish clear rules for liability for damage caused by space objects. The treaty doesn't directly define "fault," so we need to interpret its meaning based on the overall aim of the treaty, which is to create effective rules and procedures for dealing with such liability. One way to understand this better is to consider the context provided by the Outer Space Treaty. This treaty, which serves as a foundational agreement for space law, includes principles of customary international law that apply to space activities. By looking at these principles and the broader context of the Outer Space Treaty, we can gain insights into how "fault" might be understood within the Liability Convention. Article III states:
"States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the Moon and other celestial bodies, per international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding."

Article III of the Liability Convention integrates customary rules of international law related to state liability and state responsibility into the space law framework.[26] This incorporation means that ambiguities in interpreting "fault" under the Liability Convention may be necessary when referring to general international law principles. When the term "fault" in the Liability Convention is not clear, we have to look at relevant customary international law rules, as per Article 31(3)(c) of the Vienna Convention on the Law of Treaties (VCLT), which recognizes customary international law as evidence of general practice accepted as law.

(i) Customary Law

The International Law Commission (ILC) has addressed the customary rules of state liability during its release on the injurious consequences of acts not prohibited by international law, including space activities, from 1978 to the early 2000s.[27] The ILC found that the concept of state liability was not well-established in international law and that distinguishing liability for lawful hazardous activities from state responsibility for wrongful acts was problematic. The

[26] Goldie, *Concepts of Strict and Absolute Liability and the Ranking of Liability in Terms of Relative Exposure to Risk*, 16 Netherlands Yearbook of International Law 175, 194 (1985).
[27] P. Sreenivasa Rao, Special Rapporteur, First Report on the Legal Regime for the Allocation of Loss in Case of Transboundary Harm Arising Out of Hazardous Activities, UN Doc. A/CN.4/531, 21 March 2003, at 76, para. 5.

ILC's attempts to clarify these liability regimes highlighted the confusion surrounding fault-based and no-fault liability systems, compounded by the lack of supporting state practice.[28] The ILC often linked liability for activities that are not prohibited to state responsibility for wrongful acts, finding it difficult to differentiate between them. It is noted that state liability had been sufficiently addressed in the articles about State Responsibility, as harm from lawful activities often involved a duty of care, which derived from primary rules considering the state's intent and fault. Consequently, the ILC could not avoid falling into the regime of responsibility for wrongful acts, particularly signalling and emphasizing the duty of due diligence relevant to state liability.

Given the lack of clarity on the meaning of fault in customary international law and the ambiguous nature of the term in the Liability Convention, space law as a special regime does not provide a solution to this interpretive issue. Notably, Ian Brownlie commented that international law, including United Nations Charter principles, applies in outer space, and space law cannot function in isolation from the general international legal system.[29] Legal subsystems cannot exist in isolation; there will always be some degree of interaction with the broader international law framework. While space law can create mechanisms like the Liability Convention for resolving liability issues, there is a presumption against creating completely self-contained regimes.[30] When space law is inadequate or silent, it is necessary to revert to general international law, as indicated by the ILC. Therefore, the Liability Convention, due to its reference to "fault," cannot be examined in isolation from the general rules of international law, such as the Articles on State Responsibility.

AVENUES FOR RECOVERY

A state whose nationals suffer damage from another state's space object can seek compensation through at least three theories, excluding domestic legal systems. This section of the article focuses on fault-based liability, explicitly mentioned in the Liability Convention, but also

[28] Boyle, *Part II International Responsibility: Development and Relation with Other Laws* (Ch. 10 Liability for Injurious Consequences of Acts Not Prohibited by International Law), The Law of International Responsibility 95, 97 (2010).
[29] Brownlie, *The Maintenance of International Peace and Security in Outer Space*, 40 British Yearbook of International Law 1, 1 (1964).
[30] Simma and Pulkowski, *Part II International Responsibility Development and Relation with Other Laws, Ch. 13 Leges Speciales and Self-Contained Regimes*, Crawford et al., 143.

discusses other recovery theories for context. Although responsibility and liability in international space law overlap, they are based on different criteria.[31] States are held responsible for their national space activities, but liability is imposed on launching states through Article VII of the Outer Space Treaty and the Liability Convention.[32] The type of damage, the damaged object, and the damage location dictate proof requirements; sometimes, a wrongful act is needed, while in other cases, mere damage triggers liability.

1. State Responsibility Theory

A state whose nationals have suffered damage from another state's space activities can seek compensation through the concept of state responsibility. This method is less frequently discussed, but it is supported by Franz van der Dunk, who states that state responsibility could provide compensation where liability concepts fall short.[33] A state harmed by the debris could thus claim compensation from another state responsible for damages by failing to meet Article VI of the Outer Space Treaty obligations, avoiding the technical requirements of Article VII or the Liability Convention, which might exclude certain damages.

In international law, states are held accountable for internationally wrongful acts or omissions attributable to them.[34] Such wrongful acts breach a state's international obligations, which can come from treaties, customary international law, or general principles of international order. Article VI of the Outer Space Treaty imposes obligations on states to authorize and supervise the space activities of their non-governmental entities, reversing the general rule that states are not responsible for private citizens' actions.[35] This article clarifies that states are responsible for national activities in outer space, including those by non-governmental entities, thereby making these activities attributable to the state.

The differentiation between *"responsibility"* and *"liability"* is complex and unique. Responsibility means answerability for an act or omission, while liability is a subset of responsibility involving reparations when a legal rule is breached, causing damage to another.

[31] Frans von der Dunk, International Space Law, in Handbook of Space Law 29, 52 (Frans von der Dunk & Fabio Tronchetti eds., 2015).
[32] Liability Convention, Art. IV.
[33] *Id.* at 30.
[34] Int'l Law Comm'n, Draft Articles on the Responsibility of States for Internationally Wrongful Acts, with commentaries, arts. 1-2 [hereinafter ILC Draft Articles], in Int'l Law Comm'n, Rep. on the Work of Its Fifty-Third Session, U.N. Doc. A/56/10, at 26
[35] 9 JAMES CRAWFORD, IX BROWNLIE'S PRINCIPLES OF PUBLIC INTERNATIONAL LAW 524-551 (2019).

Absolute liability is rare in international law but could apply to super-hazardous space activities. The absolute or fault-based liability standard completely depends on the damage's location and nature, with absolute liability likely for Earth surface damages and fault-based liability for space object damages.

The state responsibility theory has its advantages, such as a broader scope of compensable damages, including indirect and consequential damages typically excluded by the Liability Convention. It is also useful when a private actor from a non-launching state acquires a space object and causes damage, allowing the harmed state to claim against the acquirer's state.[36] This approach may be preferable if the responsible state has greater financial resources than the launching state.

2. Fault in the State Responsibility theory

In the framework of state responsibility, any action or omission that can be attributed to a state and breaches an international obligation is considered wrongful, thus making the state liable.[37] Special Rapporteur Roberto Ago, in the context of the ILC's Articles on State Responsibility, clarifies that 'responsibility' refers to the principles governing state liability for internationally wrongful acts.[38] These principles are distinct from the rules that impose obligations on states, whose violation triggers responsibility.[39]

Responsibility states the consequences of breaching an obligation specific to each state, with these obligations often term as primary rules. Primary rules establish substantive obligations for states. On the other hand, the secondary rules of state responsibility outline the conditions under which a breach of a primary rule occurs and its ensuing consequences. Therefore, state responsibility deals with the secondary obligations arising from violating primary obligations. This distinction raises questions about the role of fault in the regime of responsibility, highlighting the need to understand how fault integrates into the principles governing state liability for wrongful acts.

3. Liability Under Article VII of the Outer Space Treaty

[36] BIN CHENG, STUDIES IN INTERNATIONAL SPACE LAW 487 (1997).
[37] Articles on State Responsibility, Arts 1, 2.
[38] *Ibid.*
[39] 'Chapter IV: State Responsibility', 2 ILC Yearbook (1970) 305, at 306, para. 66(c).

The Outer Space Treaty of 1967 established foundational principles for space liability in Articles VI and VII. It incorporated elements from the 1963 United Nations Declaration on Legal Principles Governing Space Activities. Article VI holds states responsible for national activities in space, including those by governmental and non-governmental entities and international organizations in which they participate.[40] It mandates States to authorize and supervise non-governmental space activities. Article VII states that any State that launches or procures the launch of a space object is internationally liable for damages caused by that object or its components to other States or their citizens, whether the damage occurs on Earth, in airspace, or outer space.

The treaty does not define "damages," leading to broad interpretations of the meaning, compared to the Liability Convention. There is ambiguity regarding the liability standard, whether it is absolute or fault-based and whether these standards change depending on where the damage occurs. Bin Cheng notes the common assumption of absolute liability, especially for damage on Earth, based on customary international law and conventions like the 1952 Rome Convention. However, it remains uncertain if this applies to collisions in space, suggesting fault-based liability might be relevant for damages not occurring on Earth or to aircraft in flight.[41]

4. The Liability Convention

In 1972, the Liability Convention built on international law foundations, including the Trail Smelter Arbitration (1938, 1941),[42] the Corfu Channel Case (1949),[43] and the Outer Space Treaty. It defined "damage" and "space object" and clarified that a launch covers an attempted launch. The convention specified that damages include "loss of life, personal injury, or other impairment of health; or loss of or damage to property of States, persons (natural or juridical), or international intergovernmental organizations." A "space object" includes its component parts, launch vehicle, and parts thereof. The term "Launching State" is defined consistently

[40] BIN CHENG, STUDIES IN INTERNATIONAL SPACE LAW 487 (1997).
[41] *Ibid.*
[42] Trail Smelter Arbitration (U.S. v. Can.), 3 R.I.A.A. 1905, 1963 (Apr. 16, 1938, Mar. 11, 1941) (addressing the obligation to prevent transborder damage by air pollution, the Tribunal stated, "A State owes at all times a duty to protect other States against injurious acts by individuals from within its jurisdiction.").
[43] Corfu Channel Case (U.K. v. Alb.), 1949 I.C.J. 4 (Apr. 9) (referencing a "State's obligation not to allow knowingly its territory to be used for acts contrary to the rights of other States").

with the Outer Space Treaty and other space-related treaties, identifying a State as a launching State through one of four specific ways laid down below:

i) The State that launches the space object, its component parts, its launch vehicle or parts thereof;

ii) The State that procures the launch of a space object, its component parts, its launch vehicle or parts thereof;

iii) The State from whose territory a space object, its component parts, its launch vehicle or parts thereof is launched;

iv) The State from whose facility a space object, its component parts, its launch vehicle or parts thereof is launched.[44]

Since the Liability Convention is more recent and specifically addresses liability issues, it is the governing treaty for liability claims when both the potentially liable State and the State suffering damages are parties to it. However, the *pacta tertiis* principle means a State not party to the Liability Convention cannot invoke or be subject to it. Nonetheless, the principles of the Liability Convention might apply if they are established as customary international law.[45] Despite offering more clarity, the Liability Convention still leaves significant questions regarding liability for space-related activities unanswered.

(i) Absolute Liability in cases where damage is caused on the surface of the Earth The Liability Convention establishes absolute liability for damage caused by space objects on Earth or to aircraft in flight, independent of fault. The UN Committee on the Peaceful Uses of Outer Space's Legal Sub-Committee encountered little opposition to Article II, likely due to existing international support from the 1952 Rome Convention and the inherently hazardous nature of space activities.[46] The convention also allows a launching State to be exonerated from absolute liability if the claimant State's damages result from its own or its nationals' gross negligence or intentional actions.

(ii) Damage caused in outer space

Article III of the Liability Convention imposes a fault-based liability standard for damage caused by one State's space object to another or persons on board, all occurring in airspace or outer space. A State is liable if the damage results from its fault or that of the persons it is

[44] Liability Convention, art. I(c).
[45] BIN CHENG, STUDIES IN INTERNATIONAL SPACE LAW 487 (1997).
[46] Rome Convention, at 181-182.

responsible for.[47] This aligns with Article VI of the Outer Space Treaty, which holds States accountable for space activities by their governmental and non-governmental entities, although the term "appropriate State" remains ambiguous.

Despite the lack of significant opposition to Article III, the convention does not clarify what constitutes a fault. Judge Manfred Lachs supported fault-based liability in space, reasoning that all launching States assume similar risks once space objects leave the ground.[48] Article III may imply either limited liability to the extent of fault or total liability if fault and causation are proven. However, the specific definition of fault remains undefined, complicating the establishment of liability.

(i) Joint and Several Liability

The Liability Convention acknowledges that multiple States may be liable for damages from space activities. Article IV permits a claimant State to hold one or more launching States jointly or severally liable for damages. This liability is absolute for damage on Earth or to aircraft in flight. However, liability is fault-based for damage to a space object or persons/property onboard not on Earth's surface, depending on the fault of the launching States or those they are responsible for. Compensation is apportioned according to the degree of fault or equally, if the extent of fault cannot be determined. The term "fault" is not defined. While seeking recovery for damage occurring other than on Earth's surface or to aircraft in flight, a harmed State must prove fault to establish liability against the responsible State or States.

OTHER SPACE LAW PRINCIPLES RELATED TO LIABILITY

Space law includes various principles that regulate activities in outer space, emphasizing the importance of liability and responsibility among states. These principles ensure that space exploration is conducted safely, equitably, and for the benefit of all humanity. The Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space (1962) sets the foundational guidelines for state responsibility and accountability. The Principles Governing the Use by States of Artificial Earth Satellites for International Direct

[47] Paul S. Dempsey, *Liability for Damage Caused by Space Objects Under International and National Law*, 8 (unpublished comment) (on file with McGill University), (2011).
[48] MANFRED LACHS, THE LAW OF OUTERSPACE: AN EXPERIENCE IN CONTEMPORARY LAW-MAKING, 117 (1972).

Television Broadcasting (1982) ensure equitable access and oversight in satellite broadcasting. The Principles Relating to Remote Sensing of the Earth from Outer Space (1986) address the benefits and responsibilities of remote sensing activities. Finally, the Principles Relevant to the Use of Nuclear Power Sources in Outer Space (1992) emphasize liability and compensation related to the use of nuclear power in space. These principles collectively uphold the integrity and shared benefits of outer space activities.

1. *Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space (1962):*

These principles form the foundation of international space law and aim to ensure that space exploration and utilization are conducted for the collective benefit of humanity. The exploration and use of outer space should be carried out to benefit all of humanity. This principle emphasizes that the advancements and discoveries made in space should not favour any single nation or group of nations but should be shared for the common good.

Outer space and celestial bodies are accessible to all states equally, regardless of their level of development or technological capability. This principle ensures that space is a global common, open to exploration and use by any nation by international law.[49]

No part of outer space or any celestial body can be claimed by any nation as its territory. This means that sovereignty cannot be extended to outer space through means such as occupation, use, or any other method. This principle preserves space as a domain free from national ownership.

States are held internationally responsible for all space activities conducted by their national entities, whether they are carried out by governmental or non-governmental organizations. This principle ensures that states must oversee and regulate the space activities of their entities to comply with international law and the principles outlined in the Declaration. When space activities are conducted by an international organization, the organization and the states participating in it share the responsibility for ensuring compliance with the principles of this

[49] 1962 (XVIII). Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, https://www.unoosa.org/oosa/en/ourwork/spacelaw/principles/legal-principles.html.

Declaration. This principle reinforces collective responsibility and accountability in international space endeavours.[50]

2. *Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting (1982):*

This is also known as also known as *Broadcasting Principles*. These principles address the conduct of international direct television broadcasting by satellite, ensuring equal rights, responsibilities, and access to technology for all states.

Every state has the right to engage in and authorize activities related to international direct television broadcasting by satellite. This principle ensures that no state is excluded from participating in satellite broadcasting and that all states have an equal opportunity to engage in such activities. Access to the technology required for international direct television broadcasting by satellite should be available to all states without discrimination. This access should be based on mutually agreed terms, ensuring that no state is unfairly denied the opportunity to acquire and utilize this technology.[51]

States are internationally responsible for the activities related to international direct television broadcasting by satellite that are conducted by them or under their jurisdiction. This responsibility includes ensuring that these activities comply with the principles outlined in the document. States must oversee and regulate these activities to maintain adherence to international standards and principles.

When international direct television broadcasting by satellite is conducted by an international intergovernmental organization, both the organization and the participating states share responsibility. This principle ensures that there is collective accountability for compliance with the principles, promoting responsible and coordinated efforts in international satellite broadcasting. [52]

[50] *Ibid.*
[51] 37/92. Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting, https://www.unoosa.org/oosa/en/ourwork/spacelaw/principles/dbs-principles.html.
[52] *Ibid.*

3. Principles Relating to Remote Sensing of the Earth from Outer Space (1986):

These principles focus on the conduct of remote sensing activities, emphasizing benefits for all countries, international responsibility, and compliance with international law. Remote sensing activities should be conducted to benefit all countries, regardless of their economic, social, scientific, or technological development level. Special consideration should be given to the needs of developing countries. This principle ensures that the advantages of remote sensing technology, such as environmental monitoring, disaster management, and resource management, are accessible to all nations, promoting global equity. [53]

States that operate remote sensing satellites are internationally responsible for these activities. They must ensure that their remote sensing activities comply with the principles and norms of international law. This responsibility applies regardless of whether the activities are conducted by governmental entities, non-governmental entities, or international organizations to which the states are parties. This principle explains states' accountability for actions taken within their jurisdiction or by their nationals, ensuring oversight and regulation of remote sensing activities to uphold international standards.[54]

This principle highlights that the norms of international law regarding state responsibility apply to remote sensing activities. It reinforces that the existing legal framework governing state conduct and responsibility in international law is relevant and must be adhered to in the context of remote sensing. This ensures that states are held accountable for any breaches of international obligations arising from their remote sensing activities, promoting lawful and responsible use of remote sensing technology.

4. Principles Relevant to the Use of Nuclear Power Sources in Outer Space (1992):

These principles are based on the international legal framework governing the use of nuclear power sources in outer space, emphasizing state responsibility, liability, and compensation. States are internationally responsible for activities involving the use of nuclear power sources in outer space conducted by their governmental or non-governmental entities. This

[53] 41/65. Principles Relating to Remote Sensing of the Earth from Outer Space, https://www.unoosa.org/oosa/en/ourwork/spacelaw/principles/remote-sensing-principles.html.
[54] *Ibid.*

responsibility ensures that all national activities comply with the Outer Space Treaty and relevant recommendations. When such activities are conducted by an international organization, the organization and the participating states share the responsibility for compliance. This principle underscores the need to oversee and regulate nuclear power use in space to ensure safety and adherence to international standards. [55]

States that launch or procure the launching of space objects and states from whose territory or facility a space object is launched are internationally liable for any damage caused by those objects, including those carrying nuclear power sources. This liability applies jointly and severally when two or more states launch a space object jointly. This principle is based on Article VII of the Outer Space Treaty and the Liability Convention, ensuring that states are held accountable for any harm caused by their space activities, including potential nuclear incidents in space.

The compensation states are liable to pay for damage caused by their space objects, which is determined according to international law and principles of justice and equity. The goal is to provide reparation that restores the affected party, whether an individual, state, or international organization, to the condition that would have existed if the damage had not occurred. This principle ensures that compensation is fair, just, and sufficient to address the harm caused.
For the purposes of this principle, compensation includes the reimbursement of substantiated expenses related to search, recovery, and clean-up operations. This also includes expenses for assistance received from third parties. This ensures that all costs associated with mitigating the damage, especially those involving complex operations such as dealing with nuclear contamination, are covered by the responsible state(s). This principle emphasizes the comprehensive nature of compensation, addressing both direct and indirect damage costs.[56]

SHORTCOMINGS IN THE LIABILITY CONVENTION AND PROBABLE SOLUTIONS

Despite its significance in addressing liability issues in space activities, the Liability Convention has several gaps and shortcomings that have become apparent over time. One

[55] 47/68. Principles Relevant to the Use of Nuclear Power Sources In Outer Space, https://www.unoosa.org/oosa/en/ourwork/spacelaw/principles/nps-principles.html.
[56] *Ibid.*

notable gap is the limited scope of liability coverage, particularly regarding the definition of ***"damage."*** The convention primarily focuses on physical damage caused to space objects or property. Still, it does not address other types of harm, such as economic losses, environmental damage, or individual harm.

Additionally, the convention provides provisions regarding fault-based liability pose challenges in practical application. Determining fault in space activities can be difficult due to the inherent risks and uncertainties involved, including the vast distances and lack of direct oversight. This ambiguity can lead to legal disputes and hinder liability claims' fair and timely resolution. The convention's framework for allocating liability among multiple parties involved in space activity, such as launching states, satellite operators, and manufacturers, is often unclear and subject to interpretation. This ambiguity can result in disputes over the apportionment of responsibility and delay the compensation process for affected parties.[57]

Further, the convention does not adequately address emerging issues in space law, such as the increase of private space companies and the increasing complexity of space activities. The involvement of non-governmental entities in space exploration and utilization presents new challenges for liability determination and enforcement, which the convention does not fully account for.[58]

The Liability Convention's current strict liability regime, which holds the launching state responsible based on ownership rather than control, presents significant conceptual and practical challenges in the contemporary space environment. This approach contradicts fundamental principles of state responsibility and customary international law, emphasizing control over ownership in attributing responsibility for harm caused by space activities.[59]

The convention also fails to address intervening acts by third parties, potentially incentivizing malicious actors to exploit satellites for harmful purposes without bearing accountability. As a result, innocent launching states are unfairly burdened with liability for harm caused by actions

[57] Kayser, V., *Launching space objects: Issues of liability and future prospects*, 1 Springer Science & Business Media 227, 236-238 (2001).
[58] Benkö, M., Schrogl, K.U., Digrell, D. and Jolley, E. eds., *Space law: current problems and perspectives for future regulation*, 2 Eleven International Publishing, (2005).
[59] Kehrer, T., *Closing the liability loophole: the liability convention and the future of conflict in space,* 20 Chi. J. Int'l L 178, (2019).

beyond their control, undermining the convention's purpose of ensuring proper restitution for victims.

Its reliance on goodwill and cooperation between involved states poses weakness, particularly in contexts of armed conflict where claims are unlikely to be compensated. Non-cooperative or hostile launching states can undermine the dispute resolution process by simply refusing to participate, highlighting a fundamental flaw in the convention's design. Which can be currently seen in the Israel-Palestine issue. The strict liability framework lacks exceptions for acts of war, making it unrealistic to expect compensation during ongoing conflicts. It fails to address emerging threats such as cyberwarfare, which can exploit vulnerabilities in satellite systems.[60] To address the gaps and shortcomings in the Liability Convention related to space law, several viable solutions can be proposed:

(i) Expanding the scope of liability coverage to include a broader definition of "damage" is essential. This would involve updating the convention to encompass physical harm to space objects or property, economic losses, environmental damage, and harm to individuals. By acknowledging these additional forms of harm, the convention can better protect the interests of all stakeholders involved in space activities.

(ii) Verifying and refining the provisions regarding fault-based liability is crucial for practical application. Introducing clearer guidelines and criteria for determining fault in space activities, considering the complexities and uncertainties inherent in the space environment, would help mitigate legal disputes and ensure timely resolution of liability claims. This may involve establishing expert panels or arbitration mechanisms to assess fault.

(iii) Enhancing the framework for determining liability among multiple parties involved in a space activity is necessary. Providing clear guidance on the roles and responsibilities of launching states, satellite operators, manufacturers, and other stakeholders would help prevent disputes over the apportionment of liability. This could involve developing standardized contracts or agreements clearly defining each party's obligations and liabilities.

[60] *Ibid.*

(i) Interpret the convention to attribute responsibility based on control rather than ownership, thereby ensuring that the party responsible for causing harm bears accountability.

Another option is to excuse launching states from liability when harm is intentionally caused by another party, respecting state agency but potentially leaving victims uncompensated. However, the most viable solution is to amend the convention to create a hybrid regime that introduces a presumption of liability on the launching state but allows it to present evidence of another responsible party. This approach balances the need to ensure compensation for victims with respect for state agencies, creating a workable regime that holds accountable the actual wrongdoer while deterring malicious actors and ensuring proper restitution for harm caused by space activities.[61]

CONCLUSION

The Liability standard in space law has a lot of shortcomings and calls for an update in the laws. The article revolved around the concept of liability in international law, focusing on state responsibility and fault-based liability, and analysed the specific provisions of the Liability Convention, which form the basis of collision in outer space or debris falling on the surface of the earth. Although international space law has established a framework for peaceful exploration and use of outer space, it must adapt to the dynamic nature of the space industry. Treaties like the Outer Space Treaty and the Liability Convention provide a foundation for addressing liability issues but require continuous interpretation and potential updates. As space activities become more complex and diverse, ongoing dialogue and collaboration among states and stakeholders are crucial to ensure the sustainable and equitable use of outer space for the benefit of all entities.

[61] Larsen, P.B., *Does New Space Require New Liability Laws*, 68 ZLW 196, (2019).