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Limits of responsibility of subjects of international law for the use of weapons of mass destruction in outer space

ABSTRACT

In the long history of space exploration, we could witness a creation of multiple treaties and principles covering the responsibility of states and other parties of international law for the use of weapons of mass destruction in outer space. Comprising a range of potential usage of weapons of mass destruction on the Earth's orbits, moon and other celestial bodies, they present a vague range of boundaries under which parties might be held accountable for their actions in outer space. The paper presents a perspective on possible limitations of responsibility of subjects of international law for the use of weapons of mass destruction in outer space by providing the legal analysis of the topic with due regard to historical records and currently available data. Paper is placed in context of previous work of scholars in the respective fields. Keywords: limits of responsibility, weapons of mass destruction, outer space, low earth orbit.

1. Introduction

Number of artificial objects launched into outer space has risen significantly in the last decade. From the time of the first man-made object leaving Earth in the early 50s to the year of 2012, the number of annually registered objects did not exceed 200 per year, oscillating in the range of 100-150 registered objects per year. In 2013 the first barrier was overcome when the number of annually registered space objects amounted to 210. In 2018, only five years later, the value

have more than doubled, to the amount of 454 objects. Only to account for almost 2500 objects launched into space in the year of 2022.¹

Steadily increasing number of objects in the outer space, in particular in Low Earth Orbit² is a trend that is to be continuing in the foreseeable future. With over million satellites scheduled to be launched that are to operate in over 300 mega constellations,³ humanity as a whole might develop earth based capabilities that might yet be beyond our comprehension. They may range from eliminating broadband internet access exclusion in the remote areas of Earth, rapid development of innovative drugs and cosmetics, acquiring space mining capabilities, *in situ* resource utilisation or further exploration in outer space and expansion of human footprint to still pristine celestial bodies.

However, provided that humanity achieves even a part of what is planned, the amount of satellites in LEO and outer space will raise a question of risk management. Even for the time being an omnipresent dependence of states, organisations and individuals on the artificial space objects, is to be observed. The aforementioned risk steadily increases parallelly to the amount of artificial objects present in LEO and outer space in general.⁴

Considering a current lack of risk management related to dependence on space objects, sudden loss of any number of preexisting ones could seriously impair interests of all the parties involved in the exploration and commercialisation of outer space. Such scenario, whether seemingly not likely, have higher than zero chance of occurring, especially when taking into account the usage of weapons of mass destruction⁵ in outer space.

To avoid misconceptions, WMDs have already been used in outer space. Starting from Argus launches in 1958, which mark the beginning of United States of America⁶ nuclear warheads tests in LEO, through US operation “Fishbowl”, to the trials of their Soviet Union counterparts as part of ‘Project K’⁷ programme. Later on, similar WMD tests were not continued, it was unanimously agreed that the usage of WMD in outer space possess far more significant danger than anticipated. Therefore, freedom of their usage, independently of the matter of their possession, should be restricted on the basis of international law. Such a conclusion, although partially based on the environmental danger WMDs might have on Earth

¹ United Nations Office to Outer Space Affairs (UNOOSA) database of officially registered space objects (see <https://www.unoosa.org/oosa/en/spaceobjectregister/index.html>).

² (hereinafter: **LEO**).

³ Falle, A. et al. (2023). *One million (paper) satellites*. Science 382, 150-152.

⁴ Bensoussan D. (2023) *Satellite Risks: Navigating A Transforming Risk Environment*. Beazley.

⁵ (hereinafter: **WMD**).

⁶ (hereinafter: **US**).

⁷ Russian ‘Проект К’.

and its atmosphere, was not detached from the danger they pose to other objects in space. The consequences related to Starfish Prime detonation as part of operation “Fishbowl” are representative example of not limiting that approach.

As follows, in the long history of space exploration, we could witness a creation of multiple treaties and principles covering the responsibility of states and other parties to international law for usage of WMD in outer space. Comprising a range of potential usage of WMD on the Earth’s orbits, moon and other celestial bodies, they present a vague range of boundaries under which parties of the international law might be held accountable for their actions in the outer space.

The paper provides a framework for extended analysis in further studies in particular delimitations that limit the responsibility of subjects of international law in regards to use of weapons of mass destruction in outer space.

Author’s approach is to place the paper in context of previous work of scholars in the respective fields. In particular, research of Carus W. S. in defining the weapons of mass destruction, work of Hess, W. N., Vittitoe, C. N., Smallwood K., Li, W. & Hudson on the effects of high-altitude explosions, academic record of Cheng, B. on relation of non-governmental entities in respect to art.VI of Outer Space Treaty, work of Blount, P. J., Mosteshar, S on legal aspects of military actions in space, publications of Fessler, E. A. on juridical analysis of directed-energy weapons, record of Christol, C. Q. providing comprehensive overview regarding 1979 Moon Agreement, notable titles of Shaw, M. N., Goedhuis, D. in regards to general international law and space law, *sensu largo*.

2. Definition of a weapon of mass destruction

2.1. General definitions of WMD

In spite of the general public knowledge regarding vague definitions of WMDs, there does not exist an universal and generally accepted definition of WMD in international law. Dozens of definitions of WMDs are in usage by international organisations, governments, courts and tribunals, the line of open dispute naturally being scope and range of given definitions.

Definitions of WMD have been evolving over the years along with the rapid development of sociological values and gradual changes in perception of WMD in the public opinion. Firstly, weapons of mass destruction were considered merely as weapons that have potential to cause destruction higher compared to other means of warfare, as reflected in the first recorded

mention of the term by the Archbishop of Canterbury in 1937.⁸ In the following decades an expansion of the subject definition might be observed.

As reflected by Carus W. S. ‘almost all of the more than 40 definitions (...) fit into 1 of 5 alternative definitions, allowing for some slight variations in meaning:

- WMD as a synonym for nuclear, biological, and chemical (NBC) weapons,⁹
- WMD as chemical, biological, radiological, or nuclear (CBRN) weapons,¹⁰
- WMD as CBRN and high explosive (CBRNE) weapons,¹¹
- WMD as weapons that cause massive destruction or kill large numbers of people, and do not necessarily include or exclude CBRN weapons,¹²
- WMD as weapons of mass destruction or effect, potentially including CBRNE weapons and other means of causing massive disruption, such as cyberattacks.^{13 14}

Taking into account a focus of the most recent attempts to define the term, laid on expanding the definition further into yet emerging weapons based on new technology and inventions, it is believed that in XXI century, definitions of WMDs should not be bound to the sole nuclear weapons. Moreover, even a triad of ‘NBC’¹⁵ would not represent the most recent developments in the terminology of WMDs.

⁸ “Archbishop’s Appeal: *Individual Will and Action; Guarding Personality*,” The Times (London), December 28, 1937.

⁹ For instance President Clinton Executive Order 12938 (“Proliferation of Weapons of Mass Destruction”) issued on November 12, 1994, which stated: “*the proliferation of nuclear, biological, and chemical weapons (“weapons of mass destruction”) and of the means of delivering such weapons, constitutes an unusual and extraordinary threat to the national security, foreign policy, and economy of the United States, and hereby declare a national emergency to deal with that threat.*”

¹⁰ For instance: Department of Army, *Dictionary of United States Army Terms*, AR 310–25, March 1969 ‘*In arms control usage, weapons that are capable of a high order of destruction and/or of being used in such a manner as to destroy large numbers of people. Can be nuclear, chemical, biological, and radiological weapons, but excludes the means of transporting or propelling the weapon where such means is a separate and divisible part of the weapon.*’

¹¹ For instance Joint Publication 1–02, Department of Defense Dictionary of Military and Associated Terms (Washington, DC: Joint Chiefs of Staff, April 2001). ‘*Chemical, biological, radiological, or nuclear weapons capable of a high order of destruction or causing mass casualties, and excluding the means of transporting or propelling the weapon where such means is a separable and divisible part from the weapon.*’

¹² For instance: US Department of Homeland Security is providing a definition stating that a WMD is ‘*a nuclear, radiological, chemical, biological, or other device that is intended to harm a large number of people.*’

¹³ For instance 2004 National Military Strategy of the United States of America issued by the Joint Chiefs of Staff. *The term WMD/E relates to a broad range of adversary capabilities that pose potentially devastating impacts. ‘WMD/E includes chemical, biological, radiological, nuclear, and enhanced high explosive weapons as well as other, more asymmetrical “weapons.” They may rely more on disruptive impact than destructive kinetic effects. For example, cyberattacks on U.S. commercial information systems or attacks against transportation networks may have a greater economic or psychological effect than a relatively small release of a lethal agent.’*

¹⁴ Carus W. S. (2014) *Defining “weapons of mass destruction”*, National Defence University Press.

¹⁵ NBC – Nuclear, Biological and Chemical weapons.

Due its universality and therefore much wider acceptance in comparison to others, the most profound is the United Nations¹⁶ definition of WMD. Firstly defined by the UN Disarmament Commission in 1948, later reaffirmed by UN Resolution A/RES/32/84-B in 1977, it states that WDMs are: *'Atomic explosive weapons, radioactive material weapons, lethal chemical and biological weapons, and any weapons developed in the future which might have characteristics comparable in destructive effect to those of the atomic bomb or other weapons mentioned above.'*¹⁷

The following definition is particularly important due to the part *'and any weapons developed in the future which might have characteristics comparable in destructive effect to those of the atomic bomb or other weapons mentioned above'* which implies the possibility of weapons being classified as WMD despite them not originally classified as such at the of defining the term. That leave a place for many weapons that will be yet developed, illustrating the immense foresight of the UN Disarmament Commission, being able to successfully predict an appearance of another arms race present on a global scale.

2.2. Defining WMD in Space Law

Recalling the art. IV of 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies¹⁸, placement of WMDs in outer space is prohibited. The definition adopted in OST appear to be related to the definition adopted by UN Disarmament Commission in 1948, therefore allowing for the extension of WMDs to weapons possessing *'characteristics comparable in destructive effect'* to preexisting WMDs.

In outer space these might include, but are not limited to:

- The militarization of asteroids, meteors, other objects present in space and the intentional guidance of these objects towards targets based in outer space and on celestial bodies,¹⁹

¹⁶ (hereinafter: UN).

¹⁷ 1977 UN General Assembly Resolution A/RES/32/84-B.

¹⁸ (hereinafter: **Outer Space Treaty** or **OST**).

¹⁹ Most objects present in outer space, whether it being a space debris or a meteor have a velocity exceeding the equivalent of 20 Mach on Earth, that is 20 times the speed of sound. Potential force of such an object, transitioned to kinetic force in case of collision with other objects might account for classification of WMDs in case of existing means to control its target.

- Intentional exposure or redirection of ubiquitous in outer space, particularly harmful alpha, beta and gamma rays,²⁰
- The use of directed-energy weapons,²¹
- Intentional induction of the Kessler Syndrome defined as the triggering of a chain reaction resulting in the destruction of a great amount of artificial space objects present in LEO.²²

3. Historical usage of WMDs in outer space

Historically, the usage of WMD in outer space has accounted for only a brief period of human history.²³ In 1958 US have conducted the first instances of WMD usage in outer space by launches of Argus I, Argus II and Argus III nuclear warheads to an attitude of 300 miles.²⁴ Argus tests were carried out in the South Atlantic to study an influence of Earth's magnetic field on trapping of energetic particles. A study which undoubtedly succeeded.²⁵

These were followed in early 1960s with the US operation “Fishbowl”, as part of far greater operation “Dominic” conducted in response to an unprecedented series of atmospheric nuclear tests conducted by the Soviets, abrogating the 34 month old nuclear testing moratorium.

Operation “Fishbowl” was essentially Thor missile launched warheads detonated at very high altitudes (30-248 miles) to evaluate the destructive mechanisms and effects of high yield explosions against ballistic missile RVs.²⁶

²⁰ With many instruments of artificial space objects and human beings themselves being particularly vulnerable to such radiation, an appearance of a similar WMD is quite possible in the foreseeable future.

²¹ As an already proven mean of combat, for now mostly used in outer space for peaceful communication purposes their characteristics prove that their widespread militarisation in outer space might be only a matter of time.

²² Given the right set of conditions in which one would consider the Kessler Syndrome as a weapon itself, interpreting the intentional action that starts the destructive chain reaction similarly to a fuse in other types of WMDs the author would argue that Kessler Syndrome does constitute a WMD.

²³ As of the usage of WMD in outer space we consider usage of WMD at attitude of at least 50 miles (in an ongoing dispute over delimitation of outer space figures between 50 to 100 miles have been put forward).

e.g. Notion of the UK that: ‘for practical purposes the limit [between airspace and outer space] is considered as high as aircraft can fly’,⁷⁰ British Yearbook of International Law, 1999, p. 520, e.g. Soviet Union arguing for 110km boundary, Soviet Union, 21(4) UN Chronicle, 1984 p. 37 and e.g. UK and US feeling it premature to establish such a fixed delimitation, see *Ibidem* For further information see e.g. Christol, C. Q. (1982) *Modern International Law*, see also Shaw, M. N. (2021). *International Law* (9th ed.). Cambridge: Cambridge University Press and e.g. Goedhuis, D. (1982) “*The Problems of the Frontiers of Outer Space and Air Space* (Volume 174)”, in: Collected Courses of the Hague Academy of International Law.

²⁴ Hess, W. N. (1964) *The effects of high-altitude explosions*. National Aeronautics and Space Administration. Washington, D.C.

²⁵ *Ibidem*.

²⁶ See e.g. nuclearweaponarchive.org.

The operation was not conducted flawlessly, several test failures occurred due to electrical failures, malfunctions of power motors and missile veering out of control. However, in perspective the biggest failure was without a doubt a formally successful detonation of nuclear warhead “Starship Prime” at the altitude of 400 km at Johnston Atoll, around 1400 km from the coast of Hawaii.²⁷

The detonation of “Starship Prime” warhead emitted a massive EMP burst, much wider than firstly anticipated. The widened blast resulted in direct implications both on the surface of earth knocking down around 300 streetlights on the island of Honolulu, Hawaii,²⁸ as well as in outer space damaging or destroying around 1/3 of satellites present in LEO at the time of detonation. That included Ariel-1, Great Britain’s first satellite put into orbit, mere weeks after its successful launch.²⁹

While some of the energetic beta particles resulting in “Starship Prime” detonation followed the Earth’s magnetic field and illuminated the sky, other high-energy electrons became trapped, creating new artificial belts, augmenting preexisting natural radiation belts around the Earth, drastically increasing radiation of Van Allen radiation belts.³⁰ In the following days, Earth radiation belts accounted for a loss of another 4 satellites on LEO, including the famous Telstar satellite, which was the first commercial communication relay satellite designed to transmit signals across the Atlantic.³¹

On the other side of the Pacific, in the wilderness of Siberia the Soviet Union conducted high altitude explosions on 22nd and 28th of October and then a third one on 1st of November 1962 as part of ‘Project K’ operation. Soviet nuclear tests, although conducted similarly to their US counterparts, did not generate nearly as powerful EMP blasts. Therefore, no satellite has suffered any major damage from ‘Project K’ detonations in outer space.

In 1963 following a successful adoption of Treaty Banning Nuclear Weapon Tests in the Atmosphere in Outer Space and Under Water, any further high-altitude based nuclear weapon tests of great powers were put into a permanent halt.

That has marked an end to undisputed usage of WMD in outer space. Since 1963 there were not a single situation in which subject to international law have utilised or placed WMD in outer

²⁷ For further information regarding the influence of “Starship Prime” warhead detonation on the Hawaiian coast see e.g. Vittitoe, C. N. (1989). *Did High-Altitude EMP Cause the Hawaiian Streetlight Incident?* Sandia National Laboratories.

²⁸ 300 streetlights accounted for around 1% of all installations present at the time on the island of Honolulu.

²⁹ Smallwood K. (2015) *That Time the US Accidentally Nuked Britain’s First Satellite*. TodayIFoundOut.com.

³⁰ See e.g. Li, W., & Hudson, M. K. (2019). *Earth’s Van Allen radiation belts: From discovery to the Van Allen probes era*. Journal Of Geophysical Research: Space Physics, 124.

³¹ *Ibidem*.

space. However, that might differ depending on the view on consideration the anti-satellite (ASAT) weapons as WMDs.³²

4. Relevant legal acts concerning the usage of WMD in outer space

‘Efforts in the UN to maintain outer space for peaceful purposes began in 1957, months prior to the launch of the first artificial satellite into Earth’s orbit. Early proposals for prohibiting the use of space for military purposes and the placement of weapons of mass destruction in outer space were considered in the late 1950s and early 1960s by the UN.’³³ Prior to the adoption of the OST, the use of outer space was subject only to general international law. Members of the UN were bound by the terms of the UN Charter and its provisions.³⁴

‘However, international law contains no rule relating to the military use of space or the placement of any weapon in space. It follows that such uses are permitted, subject to observation of the rules of international law.’³⁵ The applicable provisions prohibiting the usage of WMDs in outer space were incorporated to international law by *lex specialis* – treaties and conventions concerning the outer space and weapons of mass destruction.

4.1. 1963 Limited Test Ban Treaty

Following series of nuclear tests by each signatory state, on 5th of August 1963 the US, Soviet Union and Great Britain have signed first arms control agreement of the Cold War “Treaty Banning Nuclear Weapon Tests in the Atmosphere in Outer Space and Under Water”³⁶ prohibiting any kind of nuclear weapons testing in the atmosphere, in outer space, and under water.³⁷ Entering into force on 10th of August 1963 Test Ban Treaty have:

- Prohibited nuclear weapons tests or other nuclear explosions under water, in the atmosphere, or in outer space,

³² Since the early 50s to modern day, every great power and most regional powers have gained the necessary capabilities and performed a test or practical use of an ASAT weapon targeting an object in outer space. Given the right set of conditions, an ASAT missile might be accounted b/y WMD. For instance, if a connection might be established between usage of an ASAT missile and a Kessler syndrome, in the author’s view such a weapon might be considered as a WMD.

³³ United Nations Office for Disarmament Affairs (<https://disarmament.unoda.org/topics/outerspace/>).

³⁴ See also Cheng, B. (1997). *Studies in international space law*. New York, NY: Oxford University Press.

³⁵ Blount, P. J. (2012). *Targeting in outer space: Legal aspects of operational military actions in space*. Harvard National Security Features, 3.

³⁶ (hereinafter: **Test Ban Treaty**).

³⁷ See e.g. Nuclear Test Ban Treaty, July 26, 1963; *Treaties and Other International Agreements Series #5433*; General Records of the U.S. Government; Record Group 11; National Archives.

- Allowed underground nuclear tests as long as no radioactive debris falls outside the boundaries of the nation conducting the test,
- Pledged signatories to work towards complete disarmament, an end to the armaments race, and an end to the contamination of the environment by radioactive substances.

In particular, the treaty explicitly bounded the signatory states to:

“1. (...) prohibit, to prevent, and not to carry out any nuclear weapon test explosion, or any other nuclear explosion at any place under its jurisdiction or control:

- a. in the atmosphere; beyond its limits, including outer space; or under water, including territorial waters or high seas; (...)*³⁸

4.2. 1967 Outer Space Treaty

‘In 1963, the UN General Assembly approved two resolutions on outer space that subsequently became the basis for the OST. UN Resolution 1884³⁹ called on countries to refrain from stationing WMD in outer space. UN Resolution 1962⁴⁰ set out legal principles on outer space exploration, which stipulated that all countries have the right to freely explore and use space.’⁴¹

Only four years after the Test Ban Treaty, after careful consideration by the Committee on the Peaceful Uses of outer space and the UN General Assembly, sides agreed on text of OST. Providing the basic framework for international space law, OST entered into force on 10th of October 1967.

In article IV Outer Space Treaty establishes that:

“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 manoeuvres on celestial bodies shall be forbidden. The use of military personnel for scientific research or for any other peaceful

³⁸ 1963 Test Ban Treaty.

³⁹ 1963 UN General Assembly Resolution A/RES/1884(XVIII).

⁴⁰ 1963 UN General Assembly Resolution A/RES/1962 (XVIII).

⁴¹ Rusek, B. (2020). The outer space Treaty at a Glance, Arms Control Association.

*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.*⁴²

As follows, OST prohibits signatory states to the treaty to place WMD or any objects carrying WMD in orbit around the Earth and outer space *sensu largo*. However, there is no restriction on conventional weapons placement.⁴³

Furthermore, ‘OST does not prohibit the testing, development, or deployment on Earth or perhaps even the deployment of ground-based nuclear systems designed for use in outer space or against space objects’⁴⁴

There is still an ongoing debate on how provisions regarding militarisation of outer space should be understood. A minimalist conception would argue that only aggressive military activity should be banned, while the latter would prohibit all military behaviour.⁴⁵

4.3. 1976 ENMOD

On 10th December 1976 UN General Assembly resolution 31/72 approved the Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques⁴⁶ establishing that states parties undertake not to engage in military or any other hostile use of environmental modification techniques having widespread, long-lasting or severe effects as the means of destruction, damage or injury to another State Party⁴⁷

Article II of ENMOD establishes that:

*“(...) the term "environmental modification techniques" refers to any technique for changing-through the deliberate manipulation of natural processes-the dynamics, composition or structure of the Earth, including its biota, lithosphere, hydrosphere and atmosphere, or of outer space.”*⁴⁸

Reflecting specifically to any change or modification of the Earth environment by a deliberate manipulation of natural processes outer space, the ENMOD prohibits signatory states to conduct any usage of WMD in atmosphere or outer space that might have any implications

⁴² Article IV OST.

⁴³ Mosteshar, S. (2008). Outer space: Arena for war or peace. Proceedings of the International Institute of Space Law, 51.

⁴⁴ Mosteshar, S. (2019). Space Law and Weapons in Space. Oxford Research Encyclopedia of Planetary Science, e.g. Fessler, E. A. (1979). Directed-energy weapons: A juridical analysis. New York, NY: Praeger.

⁴⁵ Shaw, M. N. (2021). International Law (9th ed.). Cambridge: Cambridge University Press.

⁴⁶ (hereinafter: **ENMOD**).

⁴⁷ Article I 1976 ENMOD.

⁴⁸ Article II 1976 ENMOD.

on the Earth environment. Hence, considering the destructive nature of WMD established and reflected by its definition, ENMOD prohibits any “conventional” types of WMDs, not regulating the types of WMD without any environmental damage caused due to their usage. Nevertheless, for the time being, there are no WMDs that might be able to fulfil the provided criteria.

4.4. 1979 Moon Agreement

On 5th December 1979 UN General Assembly adopted an Agreement Governing the Activities of States on the Moon and Other Celestial Bodies,⁴⁹ which entered into force in July 1984.⁵⁰

The Moon Agreement reaffirmed and extended the subjective scope of the provisions firstly established in article IV OST by stating that on the Moon along with orbits around and trajectories around it and other celestial bodies within the solar system, other than the Earth, placement or usage of WMD is prohibited. Furthermore, Moon Agreement constitute the usage of moon and other celestial bodies in the solar system exclusively for peaceful purposes. As follows, article III of Moon Agreement establishes that:

“1. The moon shall be used by all States Parties exclusively for peaceful purposes.

2. 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.

3. States Parties shall not place in orbit around or other trajectory to or around the moon objects carrying nuclear weapons or any other kinds of weapons of mass destruction or place or use such weapons on or in the moon.

4. The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military man uses on the moon 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 and use of the moon shall also not be prohibited.”⁵¹

⁴⁹ (hereinafter: **Moon Agreement**).

⁵⁰ See also Christol, C. Q. (1985). *The Moon Treaty Enters into Force*. The American Journal of International Law, 79(1), 163–168.

⁵¹ Article III 1979 Moon Agreement.

Combined with other acts of WMD or Outer Space affairs *lex specialis*,⁵² The Moon Treaty establishes a baseline for the qualification and assessment of situations as the prohibited usage of WMDs in outer space, eventually leading to a possibility of its penalisation.

5. Accountability of subjects of international law for the usage of WMDs in outer space.

Some international treaties and agreements do not cover actions of all subjects of international law, in particular they do not cover international organisations. Such view is presented by the Test Ban Treaty and ENMOD, taking into account only actions taken by the appropriate State Party. A different approach is taken by the Outer Space Treaty and Moon Agreement.

Article VI of OST states that:

“States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. The activities of non-governmental entities in outer space, including the moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty. When activities are carried on in outer space, including the moon and other celestial bodies, by an international organization, responsibility for compliance with this Treaty shall be borne both by the international organization and by the States Parties to the Treaty participating in such organization.”

Similarly, article XIV (1) of Moon Agreement states:

“1. States Parties to this Agreement shall bear international responsibility for national activities on the moon, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in this Agreement. States Parties shall ensure that non-governmental entities under their jurisdiction shall engage in activities on the moon only under the authority and continuing supervision of the appropriate State Party.”

Subsequently under the OST and Moon Agreement:

⁵² Despite not being mentioned as one of the acts relevant to the issue of responsibility of subjects of international law for the use of weapons of mass destruction in outer space, there are legal acts that deserve an honourable mention. e.g. Treaty on the Non-Proliferation of Nuclear Weapons, see also e.g. Liability Convention.

- State Parties to the treaty shall bear international responsibility for national activities in outer space and celestial bodies, whether the activities are carried out by a national government agency of the State Party, non-governmental entities under State Party jurisdiction or an international organisation State Party is a part of,
- Non-governmental entities shall not bear any international responsibility whatsoever for their actions, being covered by an appropriate jurisdiction of a given State Party to the treaties,⁵³
- International organisations shall bear international responsibility as an independent entities, in parallel to any States Parties to the Treaty participating in such organization.

Therefore, any international responsibility for the usage of WMD in outer space might only be attributed to the State Parties to treaties or in case of OST and Moon Agreement also to international organisations.

6. Limits of responsibility for the usage of WMDs in outer space and its preclusions

Provided that a given subject of international law conducts an action that might account for the usage of a weapon of mass destruction in outer space, the responsibility will be borne by either the sole subject that have therefore constituted one or more breaches of international obligations under treaties, agreements and general international law or by the subject itself and any other State that is party to the relevant treaty and is a part of a subject that have constituted a relevant breach, if a subject that conducted a breach of international law is an international organisation.

Furthermore, if the usage of WMD in outer space is conducted by a non-governmental organisation, not being a subject of international law by itself, the appropriate state will bear responsibility for only the actions that are considered its “national activities”. That is, actions of non-governmental entities that are under its territorial, quasi-territorial or personal jurisdiction, under the provision that the following actions of non-governmental entities are undertaken under state “effective jurisdiction”, that is jurisdiction with no other overriding jurisdiction of other States.⁵⁴

Therefore, there are in existence limitations in terms of the sole attribution of the subject of international law to bear responsibility for the usage of the WMDs in outer space.

⁵³ ‘Everything that is done by such non-governmental entities is deemed to be an act imputable to the State as if it were its own act, for which it bears directly responsibility. Thus a breach of whatever provision of the Space Treaty by such a non-governmental entity involves immediately the State's direct responsibility, as if it were a breach by the State itself.’ See e.g. Cheng, B. (1998) ‘*Article VI Of The 1967 Space Treaty Revisited*’. Journal of Space Law.
⁵⁴ *Ibidem*.

Provided that the responsibility for the given action is attributed to a particular party, the next step is raising the question whether the conducted action is indeed a usage of a WMD in outer space. Under such classification actions conducted over the surface of the Earth, to the given attitude might not qualify as such, considering a debatable border of delimitation of outer space from airspace.⁵⁵ Furthermore, it should be noted that the definition of WMD is still a part of an ongoing debate. Hence, it is possible for the action to not be considered a use of WMD whatsoever.⁵⁶

At last, subject to international law that bears the responsibility for the usage of weapons of mass destruction in outer space might be in position to invoke circumstances precluding wrongfulness of an act under Draft Articles on Responsibility of States for Internationally Wrongful Acts.⁵⁷ That is:

- Consent,
- Self-defence,
- Countermeasures,
- Force majeure,
- Distress,
- Necessity.

7. Conclusions

Over 60 years have passed since the times of widespread usage and placement of weapons of mass destruction in outer space. However, high-altitude tests in the atmosphere might be long gone, with rapidly growing innovations and appearance of new technologies on a daily basis, including the ones with much destructive potential, the emergence of completely new challenges for the international community and international law as a whole is imminent, being only a matter of time.

Provided that the following would be the case, a special attention should be paid to limits of responsibility for the usage of weapons of mass destruction in outer space. Especially to rule of practical jurisdiction over non-governmental entities, increasingly relevant in context of steadily growing presence of private space companies. Additionally, attention is to be put

⁵⁵ Shaw, M. N. (2021). *International Law* (9th ed.). Cambridge: Cambridge University Press. p. 464.

⁵⁶ Carus, W. S (2014) *Defining “weapons of mass destruction”*, National Defence University Press.

⁵⁷ (hereinafter: **ARSIWA**).

on circumstances precluding wrongfulness under ARSIWA, providing states and international organisations with the means to avoid or limit their responsibility for the selected actions.

The current limits of responsibility are vague, providing much potential for wide interpretation, that in wrong hands could be utilized to punish the innocents and leave back the guilty. Factors, such as lack of concrete classification of WMD or unclear delamination of outer space might provide subjects to international law of a chance to avoid responsibility for their actions associated with use of WMD.

Only a passage of time, with special attention to be put in context of the next 20 years will determine whether the pre-existing boundaries will suffice to prevent upcoming crisis's fronted by a drastic change of outer space landscape led by a wide introduction of non-governmental entities.

Bibliography

- Falle, A. et al. (2023). *One million (paper) satellites*. Science 382, 150-152.
- Archbishop's Appeal: Individual Will and Action; Guarding Personality,*" The Times (London),
- Bensoussan, D. (2023) *Satellite Risks: Navigating A Transforming Risk Environment*. Beazley.
- Blount, P. J. (2012). *Targeting in outer space: Legal aspects of operational military actions in space*. Harvard National Security Features, 3.
- Cheng, B. (1998) 'Article VI Of The 1967 Space Treaty Revisited'. Journal of Space Law.
- President Clinton Executive Order 12938 ("Proliferation of Weapons of Mass Destruction") issued on November 12, 1994.
- Cheng, B. (1997). *Studies in international space law*. New York, NY: Oxford University Press.
- Christol, C. Q. (1982) *Modern International Law*.
- Christol, C. Q. (1985). *The Moon Treaty Enters into Force*. The American Journal of International Law, 79(1), 163–168.
- Goedhuis, D. (1982) "The Problems of the Frontiers of Outer Space and Air Space (Volume 174)", in: *Collected Courses of the Hague Academy of International Law*.
- Fessler, E. A. (1979). *Directed-energy weapons: A juridical analysis*. New York, NY: Praeger.
- Hess, W. N. (1964) *The effects of high-altitude explosions*. National Aeronautics and Space Administration. Washington, D.C.
- Joint Publication 1–02, Department of Defense Dictionary of Military and Associated Terms (Washington, DC: Joint Chiefs of Staff, April 2001).

Smallwood, K. (2015) *That Time the US Accidentally Nuked Britain's First Satellite*. TodayIFoundOut.com.

Li, W., & Hudson, M. K. (2019). *Earth's Van Allen radiation belts: From discovery to the Van Allen probes era*. *Journal Of Geophysical Research: Space Physics*, 124.

Mosteshar, S. (2008). *Outer space: Arena for war or peace*. *Proceedings of the International Institute of Space Law*, 51.

Mosteshar, S. (2019). *Space Law and Weapons in Space*. *Oxford Research Encyclopedia of Planetary Science*.

Nuclear Test Ban Treaty, July 26, 1963; Treaties and Other International Agreements Series #5433; General Records of the U.S. Government; Record Group 11; National Archives.

Rusek, B. (2020). *The outer space Treaty at a Glance*, Arms Control Association.

Soviet Union, 21(4) UN Chronicle, 1984.

Shaw, M. N. (2021). *International Law* (9th ed.). Cambridge: Cambridge University Press
nuclearweaponarchive.org.

United Nations Office for Disarmament Affairs
(<https://disarmament.unoda.org/topics/outerspace/>).

Carus, W. S. (2014) *Defining "weapons of mass destruction"*, National Defence University Press.

Vittitoe, C. N. (1989). *Did High-Altitude EMP Cause the Hawaiian Streetlight Incident?* Sandia National Laboratories.

70 British Yearbook of International Law, 1999.

1963 *Treaty banning nuclear weapon tests in the atmosphere, in outer space and under water* (Test Ban Treaty).

1963 UN General Assembly Resolution A/RES/1884(XVIII).

1963 UN General Assembly Resolution A/RES/1962 (XVIII).

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

1970 Treaty on the Non-Proliferation of Nuclear Weapons (NPT).

1971 Convention on International Liability for Damage Caused by Space Objects (Liability Convention).

1977 UN General Assembly Resolution A/RES/32/84-B.

1978 *Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques* (ENMOD).

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

2001 *Draft Articles on the Responsibility of States for Internationally Wrongful Acts* (ARSIWA)

2004 National Military Strategy of the United States of America issued by the Joint Chiefs of Staff.