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Fragmented International Law and Uncertainties Related to Dual Use Space Technology

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Abstract: *If an attack is ever carried out on an outer space object, it will require the relevant international law to be referenced. This includes the laws concerning international humanitarian law, international space law, and general international law. However, present legal frameworks are insufficient to provide a clear answer to which outer space may be utilised for military purposes. In this context, the advancement of space with dual applications presents a more complex situation for the application of laws. Attacks on the ground-based space systems or strikes on space-based assets are not fully covered by either international law or the IHL. The potential responses of the current legal frameworks to dealing with space weapons and dual-use technology are limited. This paper aims to explore how international law deals with the use of force in space. It focuses on the limited scope of the law dealing with dual-use technologies and space weapons.*

Key Words: Military Objectives, Precaution, Dual Use Space Technology, Civilian Applications Satellites, Global Positioning Systems

Introduction

During times of armed conflict, targets are classified as either civilian or military in nature, and there are hardly intermediate or mixed categories within the legal frameworks. Civilian facilities contributing to military objectives are considered legitimate targets. Likewise, if a civilian application satellite also serves military functions during a period of conflict, it may be considered a military target. A dual-use satellite which serves, occasionally or sequentially, both military and civilian clients for communications or remote sensing or any of the other functions of satellites is, under this framework, a valid military objective during wartime. However, if a satellite is entirely for civilian use and purpose, then it would remain an unlawful target.

Generally, civilian satellites provide valuable applications for economic growth and development in civilian sectors. They are mainly used for communications, weather, and remote sensing. Specifically, Global Navigation Satellite Systems (GNSS) are utilised for everyday banking, stock markets, and power grids. GNSS and Earth

observation satellites are used for precise positioning, managing land resources, including environmental and agricultural monitoring, as well as aircraft landing and ship navigation. On the other hand, military satellites play an active part in modern war gaming and strategy. They are utilised for reconnaissance, planning, deployment, surveillance, and advance-attack warning systems as they enable precision navigation and targeting. Armed forces rely heavily on satellite navigation systems, including the GPS, which is important for the operations of ships, drones, and aircraft.

Contemporary space technology is valuable in both civilian and military capacities; it can be conveniently technology of dual use. The main service providers for both kinds of utilisation are the American "Global Positioning System (GPS), Russia's Glonass system, the European Galileo system, and the Chinese BeiDou system". As the level of dependency on space-based technology has increased enormously, sovereign states are naturally engaged in creating deterrence measures to ensure the safety of their space assets. The importance of creating deterrence in

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space is corroborated by the recent tendency among spacefaring states to test anti-satellite (ASAT) weapons. Similarly, advanced ground-based laser systems are being developed to damage a satellite's sensor system.

The first significant utilisation of space-based technology was observed during the Gulf War. During the war, Operation Desert Storm was highly dependent on space-based technology, which provided an "integrated battle platform to assist the implementation of military strategy" (Freeland, 2016). Later on, the U.S. administration embraced a policy intent on dominating the "space dimension of military operations". Following suit, European Union has "identified outer space as a key component of its defence and security" policies. Both Russia and China regarded space as an essential part of their military strategies. "China and Russia also regard space as a vital part of their military infrastructure". It is hypothesised that in the event that deterrence fails, a conflict that either initiates in space "or extends into space will be fought over" vast distances and at incredible speeds. This will present significant difficulties for the "governance of space and the creation" of international law governing space (Pope, 2020).

Dual use of space technology poses serious challenges to regulating the military usage of outer space. As civilian and military assets have become increasingly intertwined, the need for the proper regulation of military use applications in outer space becomes increasingly apparent. Any attack on a space-related system must be assessed by the application of international law, international space law and IHL. As space-based technology has become an essential aspect of everyday activity on earth, attacking a space-based system becomes a complex humanitarian law concern made worse by the impact of collateral damage. It specifically assesses the legal restrictions relating to a dual-use satellite. It also highlights the uncertainties of international space law and complexities residing within *Jus ad bellum*.

The expression 'outer space systems and assets' implied in this article includes human-made systems and assets, spacecraft, satellites, and all other related infrastructure, located in space on other celestial bodies, including Moon.

Element of Uncertainties of International Space Law and International Law

All five U.N. space treaties are the result due to the efforts of the "United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS)". The

purpose of these treaties is to ensure the peaceful usage of outer space well as to minimise the potential for conflict. In this regard, the OST is pivotal in addressing the issues of law of armed conflict (*jus ad bellum*) and laws related use of force in international law (*jus in bello*). In order to identify the shortcomings of OST, it is necessary to reflect on the time "period of the space age, which coincided with the height of the Cold War. Politics during the Cold War established the initial course for efforts to regulate weapons in outer space".

As a result, of the power dynamic that existed at the time, both the Russian and the American space powers had concluded to successfully accomplish their national security goals was "to prohibit the use of weapons of mass destruction" (WMD) in space. On the other hand, there was resistance to the idea of prohibiting all kinds of "military uses of outer space". The legal lacunae and issues of different interpretations of OST were purposefully left unanswered. This was done in the hope that these issues would be resolved in following treaties in future.

In line with the OST, the states who are parties to it have undertaken to conduct activities concerning "the exploration and use of outer space in a manner that is consistent with international law" and serves to promote the preservation of peace. Through the treaty, the promotion of cooperation and understanding among parties was ensured so that the placement of nuclear weapons in outer space would be avoided. In the same manner, the "establishment of military bases" and "the testing of weapons or conducting military manoeuvres on celestial bodies" was also forbidden. It was hoped that this basic framework of international space law would lead to more concrete treaties. Ironically, the moon agreement was only ratified by 18 parties, the United States not among them. Moreover, the Artemis Accords introduced by "the National Aeronautics and Space Administration (NASA)" through bi-lateral agreements further undermined broader consensus on interpretation and considering outer space as global commons. Lack of consensus on interpretation issues has resulted in legal confusion on the subject, varying interpretations, and difficulty deciphering existing treaties, particularly the "1967 Outer Space Treaty and the 1979 Moon Agreement".

Today, for both offensive and defensive usage, space can be used. However, the use of space for defence but offensive use of force is generally prohibited. However, some states may justify their action based on self-defence or pre-emptive attack. "Article 2(4) of the UN Charter prohibits the use of

force or the threat to use of force, though this provision is applicable to space" as well (UN Charter, Art. 2). In this regard, any attack on satellites is considered against international law. However, there can be some exemptions to such a breach. Firstly, the exemption can be based on prior authorisation of attack through chapter seven of the United Nations Charter, and secondly, based on the notion of pre-emptive attack. Article 51 of the U.N. charter permitted the right of self-defence to legitimise the use of force under certain parameters. Use of force may be permitted in the case of an armed attack where the "Security Council has taken necessary measures" (UN Charter, Art. 2). "In international law, the right to self-defence has been codified, and it has the status of customary international law (CIL)". The concepts of 'armed attack' and 'self-defence' are the lingering interpretation issues of international law. There is little consensus between states on these issues. For some states, self-defence includes 'pre-emptive' or 'anticipatory' self-defence where there is an imminent threat to security (NSS, 2002). The contradictory interpretations of the aforementioned concepts illustrate the gaps in existing international law.

When these notions are applied in space, it is often illegal to target the satellites of another nation. The only exceptions to this norm are self-defence and explicit sanction from the United Nations Security Council (UNSC). It is essential to note that in the politics of international law, the right to anticipatory or pre-emptive self-defence is always susceptible to manipulation. Some states have engaged in acts of aggression using the pretence of pre-emptive strikes to justify their actions. Article 3 of the OST tries to avoid the fragmentation and conflicting issues between international law and space laws. Nevertheless, it also raises ambiguities associated with the concept of self-defence. The concept of international space law is a central component of international law, but it is not designed to address the various challenges that arise from space. For instance, while international law is primarily focused on terrestrial affairs, it is not designed to handle space-related issues ([Freeland and Gruttner 2020](#)).

Legal Lacunae of OST Regarding Missile Testing

The U.S., Russia, China, and recently, India have all experimented with ASAT weapons. These States have been able to conduct these tests by exploiting the legal lacunae in existing international space treaties. In other words, there is no [real] prohibition regarding conducting ASAT tests. ASAT tests verify and improve a state's anti-satellite capabilities. Tests in outer space

orbits have spread hazardous space debris. Article 3 of the OST is the main ASAT provision which connects space law as a component of public international law; hence the UN Charter maintains the active umbrella for all space law accords (OST, 1967 Art. 3). Correspondingly, the existing issues of explanation of International law, "increase the element of uncertainty of international law". The issues of "armed attack, self-defence", and 'pre-emptive strike,' are discussed in the next part of this article.

The OST article nine stipulates that state parties are obliged to conduct their space operations in consideration of the interests of all other parties. This article prohibits states from contaminating the outer space environment with harmful substances. Governments are required to take preventative actions and warn other states in order to avert the negative consequences of their activities. As required by the article, states should consider the interests of all other parties when conducting space operations. This article prohibits polluting outer space. States must take precautions and notify others to avoid unwanted repercussions. However, not all ASAT testing states have communicated with other OST party states regarding the potential harm their ASAT test could bring. In this sense, states are disregarding the obligation of due regard.

With relevance to space debris, Kessler Syndrome warns of the cascade repercussions of hitting space junk. This explains the potential for a large "number of fragments to hit with other things, creating still more fragments, until all objects are reduced to an impenetrable cloud of rubble capable of destroying any spacecraft in its" vicinity ([Pelton, 2013](#); [Kessler, 1978](#)). The efficiency of the law of state responsibility must be evaluated in this regard. The codified "Draft Articles on State Responsibility of States for International Wrongful Acts (Draft Articles) were adopted by the International Law Commission in 2001". The proposed "articles address when and how a state is held accountable" for violating its international obligations. These Articles are an active and valuable part of the international law process. Article 12 of it stipulates that a violation of an international responsibility exists when a state's action is not in compliance with its international obligation. Since these articles are not binding in nature, therefore, CIL is utilised to determine the legality in practice ([Crawford, 2013](#)).

As a result of states engaging in ASAT activity, the space environment is being polluted, and a space arms race has been sparked. It is a serious consideration which ought to be addressed by the world community

as a whole as soon as possible. In this reference, we have ICJ proceedings regarding the "Republic of Marshall Islands' application against the Nuclear States claiming that these States had not fulfilled their obligation regarding nuclear disarmament and the cessation of the nuclear arms race. Marshall Islands claimed that nuclear testing States are in breach of the international obligation on the basis of (a) obligation to pursue in good faith negotiations to cease the nuclear arms race at an early date, as well as to pursue in good faith negotiations leading to nuclear disarmament in all its aspects under strict and effective international control. The case set a precedent that any State directly or indirectly affected by any harmful act of other State is in position to file an application in the ICJ" (ICJ, 2014).

Core Principles Applicable to an Armed Attack

The Law of Armed Conflict (IHL) is a comparatively developed area of international law. It has the status of *lex specialis*, which means that during armed conflict, it prevails over general international law as well as over international Outer Space Law.

Based on the CIL prevalent during armed conflict and the laws and obligations specified in the "Geneva Conventions and their Additional Protocols", IHL has been designed to regulate the terrestrial elements of war and armed conflict. The laws are not developed in the context of outer space; therefore, there are chances of the use of force in space. In this scenario, the use of kinetic or non-kinetic weapons through outer space and ground-based systems could have devastating consequences for life on Earth. The application of the law is not only for kinetic military actions but also for non-kinetic actions.

Through non-kinetic operations, satellites' functionality may be impaired without physically damaging them. In this regard, Jamming and spoofing pose the biggest risks to GNSS availability and dependability (Heue, 2018). All anticipated incidental harm or damage to civilian objects, both direct and indirect, must be taken into account for the legal evaluation of any strike on a dual-use satellite. IHL's fundamental tenets forbid attacks that are indiscriminate in nature or result in unnecessarily suffering (ICRC, 2008). They serve as the cornerstones for the formulation of the laws and practices of war. There are some complexities when applying these rules to armed conflicts involving space.

Before applying the core principles of IHL, the nature of a certain armed conflict must first be identified and defined. Situational conflicts are sometimes difficult to categorise as either "non-

international armed conflicts (NIAC)" or "international armed conflicts (IAC)" (Moir, 2002). Extremely a few specific types of "conflicts are covered by Common Article 3 of the 1949 Geneva Conventions, and the term NIAC" is loosely defined in it (ICRC, 1949). For the principle of military necessity, distinction, proportionality, and precaution to be properly applied, a conflict's nature must be made explicit.

Armed attacks must be restricted to military objectives, and this is the basic principle of military necessity. Art. 52(2) of the AP-I requires both military objectives and definite military advantages must be achieved. These criteria must be completed for a conflict to be considered a military necessity (ICRC, AP-I, 1978). This principle's application to the dual use of satellites complicates the problem. Similarly, the concept of distinction mandates that attacks be limited to specific targets of military value (AP-I, Art. 48). Article 51(4) of AP-I forbids indiscriminate strikes of all nature. The principle of precaution dictates that an attack must be cancelled or postponed if it becomes obvious that unintentional civilian casualties are possible. Systems and assets located in outer space that belong to the armed forces are considered to be military objectives since, by their very definition, they make a significant contribution to the military activity of the party in the conflict.

Targeting a dual-use satellite or its ground station may result in "collateral damage" for the purposes of qualifying the principle of distinction. A dual-use space object differs from a dual-use terrestrial facility. A bridge, for instance, can serve both civilian and military objectives concurrently (Ahmad, 2021). For example, commodity transport for civilian uses and military purposes, such as troop and weapon transport. In the event that a satellite is attacked, the debris that is created and the adverse consequences are not restricted to the parties involved in the battle alone.

AP-I does not include the term dual usage facilities. Nonetheless, the definition of military objective provided in the first section of Article 52(2) can be understood to classify dual-use facilities. According to the Article, anything may be regarded as a lawful military target if, by virtue of its position and function, it contributes effectively to military operations; the destruction of such an object must also provide clear military advantage. Therefore, legitimacy is contingent on distinction and the proportionality principle. The notion of proportionality can be subdivided into three subsets for measuring a strike on a satellite. These are limited, enhanced and protective proportionality.

Article 52(2) stipulates the limited proportionality

a requirement that an object must contribute effectively to the conduct of armed operations, and its destruction must deliver a tangible military advantage. As the article is silent on the civilian contribution facility, it is, therefore, argued by some scholars that in dual-use object considerations of civilian usage, the object in question will hardly matter. According to the criterion of enhanced proportionality, it is inquired whether the expected loss of the civilian function is disproportionate when compared with the military advantage gained by its destruction.

According to protective proportionality, the protection of indispensable objects to the survival of the civilian population is obligatory. In this regard, para 2 and 3 of Article 54 provide that it is forbidden to attack any object "indispensable to the survival of the civilian population", such as foodstuffs, drinking water, supplies and installations or anything of value to the civilian population ([IHL Database, 2005](#)). Further, under the same article, it has also been stated that these objects should not be targeted because of reprisals.

At the time of war, states have hardly applied the principle of protective proportionality. It has been witnessed that aerial bombardment in cities causes harm to civilian populations because of the destruction of basic infrastructure and electricity ([Crawford III, 1997](#)). The civilian purpose of dual-use facilities cannot be guaranteed in accordance with the principle of proportionality.

The precautionary principle dictates that reasonable efforts must be made to confirm that targets are military objectives (AP-I, Art. 57). Further, harm to civilian property and civilian deaths should not be disproportionate to military gains. This principle is required for air missile warfare. Similar to proportionality, the three subgroups of preventive measures are as follows.

At first, precautions must be taken so that systems and objects related to civilians do not become the target of any strike unless they meet the criteria to be considered military objectives. It should also be ensured that all measures have been taken to avoid excessive incidental losses while targeting those objectives. It requires states to cancel any unlawful attack. Thirdly, for any lawful attack, measures must be taken to minimise loss for civilians. This includes the obligation to choose means and methods considered least harmful and for warnings to be given prior to an attack. The principle also imposes a duty to take constant care of the natural environment. The preservation of the natural environment is widely accepted, and it has status under IHL; the protection of

the natural environment should be ensured as much during the conflict as during peace.

As a party to the international treaty on space, states are required to consider the interests of other space users when it comes to their outer space activities (OST, 1967). The term "due respect" refers to the execution of an action with a given level of care, attention, or observance. Consequently, the installation of nuclear weapons in outer space is prohibited (OST, 1967, art. 4).

Due to the orbital debris, targeting military or dual-purpose satellites could have more severe and long-lasting impacts because of the peculiar "environment of outer space". The domino impact of this debris is destructive to all types of spacecraft and other objects in space. In this regard, the "International Committee of the Red Cross" submitted a position paper on the issues outlined in General Assembly Resolution 75/36 "to the Secretary-General of the United Nations" ([ICRC Report, 2021](#)). The study outlines how utilising weapons in orbit could damage, destroy, or disable civilian or dual-use satellites. For example, space systems are essential for critical civilian infrastructure, including health, energy, and commerce. Because space systems can be used for both military and civilian purposes, they are more versatile. When it comes to air traffic control and maritime commerce, in particular, the use of satellite navigation systems such as GPS and GLONASS is critical. In addition, they are essential for the flawless "synchronisation of critical civilian infrastructure", including worldwide "communication networks", power grids, and banking and financial systems. Satellites used for these purposes may also be employed by the military, which in some situations might make them military targets. In this scenario, kinetic or non-kinetic means disabling or degrading such satellites could have severe repercussions for civilians (ICRC Report, 2021).

The report emphasises that the interruption of satellite capabilities will impede the distribution of humanitarian and emergency aid. For instance, space objects contribute to all facets of humanitarian operations, including emergency aid distribution and disaster management and conflict risk prevention. The bottom line is that prior to the use of weapons and/or the testing of weapons in space, questions pertaining to an actual military objective, assessments of potential excessive collateral effects, reasonable precautions, consideration of needless suffering, prior warnings, and the preservation of the natural environment must be addressed.

Conclusion

Even though the OST offers a foundational framework for the use of outer space, it is insufficient for addressing military conflict in space. The militarisation and weaponisation of space are ongoing. States utilise the insufficiently binding restrictions of the international legal regime for the placement and technological demonstration of their space-based weapons for this purpose. Certain spacefaring nations have developed highly advanced methods of warfare, yet serious efforts to put the use of new technology under current legal frameworks lag behind.

The complexity of the legality of attacking a dual-use satellite poses a serious challenge. At the time of an armed conflict, a given satellite's dual use capacity would make it a legitimate military target, and consequently, civilians would be deprived of that facility. Under the developed principles of military operations, it is required that militaries separate themselves from civilian populations and objects. In principle, the military is obligated to avoid intertwining itself with civilians and civilian facilities. The same applies to space-related technologies; however, in the case of dual-use satellites, this principle is being largely disregarded. As discussed, during periods of armed conflict, everything is classified as either a military or civilian object. Having applied the principle of military advantage, precaution, distinction, and proportionality, a dual use facility would be a legitimate target during a time of war.

There is no consensus on the relevant concepts of international law, for example, 'self-defence', 'armed attack', 'peaceful purpose', 'anticipatory self-defence or 'pre-emptive self-defence', and 'military uses.' Similarly, the concept of 'space weapons' and 'delimitation of space between airspace and outer space' has yet to be defined for purposes of legal clarity. Due to the grey areas in existing treaties, space weaponisation and militarisation continue under the expression of passive militarisation. This being the case, states follow their own interpretations to justify their actions as they see fit.

Outer space requires the development of binding rules without ambiguity. However, the placement "of international space law" under the umbrella of international law has the consequence of transferring the elements of uncertainty "to international space law". The already fragmented international law can further complicate the legality of the issue. This means that while drafting international space law, the international community must clarify existing uncertainties of international law and IHL. If states want to address the legal lacunae of existing treaties to deter additional military pursuits in outer space, it is mandatory to design clear laws/rules for "*jus ad bellum*" as well as "*jus in bello*" that are specific to the space environment and technology, primarily for the dual-use technologies.

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