

SHOTS IN THE DARK: PROPORTIONALITY, DISTINCTION AND LEGALITY OF ATTACKS IN OUTER SPACE DURING ARMED CONFLICT

SHOTS IN THE DARK: PROPORCIONALIDADE, DISTINÇÃO E LICITUDE NOS ATAQUES NO ESPAÇO EXTERIOR, EM SITUAÇÃO DE CONFLITO ARMADO

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Abstract

This study analyses how International Humanitarian Law is applicable to the conduct of hostilities in outer space in the absence of a body of legal norms specifically adapted to the conduct of hostilities in that domain. The key criteria are the principles of distinction, proportionality and precautions. The extension of hostilities between States to the space domain, in the event of open armed conflict, seems an inevitability, given the growing dependence of States' military power on their space capabilities – especially for the most technologically advanced States. Methodologically, a legal-dogmatic, qualitative approach was adopted, based on a systematic analysis of the relevant sources of Law. The results of the study indicate that attacks on space objects, including dual-use ones, are in principle lawful as long as they fulfil the key criteria of International Humanitarian Law. The distinction between legitimate military targets faces particular challenges in outer space. The application of the principle of proportionality is especially complex, given the difficulty in predicting collateral damage, yet the rule requires foreseeability anchored in requirements of reasonableness and good faith. The adoption of precautions that are reasonable and feasible is indispensable to ensure compliance with the requirements of legality. The study, in the end and in systematic fashion, proposes interpretative guidelines to guide decision making in this new area of conflict.

Keywords: International Humanitarian Law; Outer Space; Armed Conflict; Military Objectives; Proportionality.

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Resumo

Este estudo analisa como o Direito Internacional Humanitário é aplicável à condução de hostilidades no Espaço, na falta de um corpo de normas jurídicas especificamente adaptadas à condução de hostilidades no Espaço. Os critérios-chave são os princípios da distinção, proporcionalidade e precauções. A extensão das hostilidades entre Estados para o domínio espacial, em caso de conflito armado aberto, parece um inevitável passo, dada a crescente dependência do poder militar dos Estados das suas capacidades espaciais – sobretudo dos tecnologicamente mais avançados. Metodologicamente, adota-se uma abordagem jurídico-dogmática, qualitativa e assente na análise sistemática das fontes de Direito relevantes. Os resultados do estudo indicam que os ataques a objetos espaciais, incluindo os de utilização dupla, são, em princípio, admissíveis desde que cumpram os critérios-chave do Direito Internacional Humanitário. A distinção entre alvos militares legítimos enfrenta desafios particulares no Espaço. A aplicação do princípio da proporcionalidade é especialmente complexa, dada a dificuldade em prever danos colaterais, contudo a previsibilidade exigida continua ancorada em exigências de razoabilidade e boa-fé. A adoção das precauções que sejam razoáveis e praticáveis é indispensável para assegurar o cumprimento dos requisitos de licitude. O estudo propõe, no fim e de modo sistematizado, linhas interpretativas para orientar a tomada de decisões neste novo domínio de conflitualidade.

Palavras-Chave: *Direito Internacional Humanitário; Espaço Exterior; Conflito Armado; Objetivos Militares; Proporcionalidade.*

War is the province of uncertainty: three-fourths of those things upon which action in War must be calculated, are hidden more or less in the clouds of great uncertainty.

Carl von Clausewitz, *On War*, Book I, chapter III

1. Introduction

For better or worse, outer space (or Space) has become an essential component of 21st century warfare (SCHMITT, M. N., 2006, 90).

Although no single nation can claim sovereignty over outer space, its economic and strategic value have rendered it highly competitive, congested and contested (COSTA, P. 2015, 16).

States inevitably perceive space as an arena of conflict. This was its origin, and it is likely to remain so in the future¹, given the vital role that space capabilities play in States' economies,

¹ In the sense that, today, the international community acknowledges that warfare in outer space is not only foreseeable, but also poses significant risks to national security and civilian activities, both on Earth and in Space, see STEPHENS, D., ZWART, M. (2017), 1.

critical technological infrastructure and national defence and security².

It is against this backdrop, where the prospect of warfare in outer space appears increasingly inevitable, that the central research question of this study is formulated: what are the criteria that must be met for attacks against targets in outer space to be considered lawful under the Law of Armed Conflict?

The study aims to analyse and address this question, and, ultimately, to develop systematic guidelines for a response, which will be presented in the concluding sections of the paper.

Having identified the object of study, the scope of the analysis must be delimited, bearing in mind specific aspects of the overarching criterion of “legality”. Those delimitations and the specific research questions that helped guide the study will be presented in the following sections.

First, the body of Law underpinning this study is International Humanitarian Law (IHL), also referred to as the Law of Armed Conflict, specifically in its function of regulating the conduct of hostilities³. That is, the legal framework governing acts of violence directed against an adversary⁴ during armed conflicts between States⁵. It is important to clarify that this study *does not* examine attacks on space objects belonging to an adversary *during peacetime*, although that constitutes an equally significant issue for military operations in outer space, which fall under the scope the United Nations Charter⁶ and Customary International Law⁷.

Accordingly, we have chosen to address the question of the legality of attacks on military objectives in outer space within the framework of an armed conflict between States, rather than from the more commonly examined perspective of peacetime, for one simple reason: in an armed conflict, there is a more clearly defined set of legal rules and principles that specify the circumstances in which attacks are deemed unlawful.

² Civilian applications of space capabilities include secure and instant communication systems that enable television broadcasting; voice and data links; internet access; email services; online commerce and ATM banking; global positioning systems that provide cost effective and precise navigation for aircraft, ships and private vehicles; daily weather forecasting; monitoring of earth resources such as crop yields and tracking deforestation and the impacts of global warming. See KOPLOW, D. (2009), 1190. As for military uses, space capabilities enable the collection of satellite imagery for monitoring adversaries’ activities and detecting early risk indicators; support command and control communications; facilitate the use of unmanned systems and missiles through global positioning systems; and essential critical weather data for conducting air and naval operations. See BOOTHBY, W. H. (2012), 359.

³ IHL serves two purposes: 1) to protect the victims of armed conflict: wounded and sick combatants, prisoners of war, combatants rendered *hors de combat* and civilians; and 2) to place limits on the means (weapons) and methods (tactics) of warfare that the parties to a conflict may employ against one another. See, inter alia, THURER, D., (2011), 40 and 46.

⁴ In this context, the term “adversary” refers either to an enemy State in the case of an international armed conflict or to an organised armed group in a non-international armed conflict. However, given that States remain the principal actors under existing International Space Law, this study focuses exclusively on analysing the legal framework applicable to international armed conflicts.

⁵ According to Article 2(1) of the 1949 Geneva Conventions, only two conditions are required to establish the existence of an international armed conflict: 1) the use of armed force 2) between States. Political recognition of the conflict, the reasons behind it, or the intensity of hostilities are not required criteria. See ICRC (SANDOZ, Y., SWINARSKI, C., & ZIMMERMANN, B. (Eds.)), §§ 246 and 251.

⁶ Under the Charter, the prohibition on the use, or threat thereof, (Article 2, paragraph 7) rules international relations between States. This is excepted only by the Law on self-defence and the use of force authorized by the Security Council, mainly under articles 42 and 53 of Chapter VII of the Charter.

⁷ The body of Law governing the grounds for excluding unlawfulness (such as consent, legitimate defence, countermeasures/reprisals, force majeure and state of necessity) are particularly relevant to this analysis. See International Law Commission (2001) and BAPTISTA, E. C. (2003), 103 to 112.

Outside of armed conflict, the assessment of the legality of a given act of violence focuses on its effects (such as whether they constitute, or not, a use of force, and if so, their severity) and the reasons behind the military operation (that is, its justification). Therefore, we will focus on the conduct of the attack, rather than the context that justifies it.

What we wish to examine here are attacks⁸ against military objectives: those that “by their nature, location, purpose or use make an effective contribution to military action and whose total or partial destruction, capture or neutralisation, in the circumstances ruling at the time, offers a definite military advantage”⁹. A space object¹⁰ owned by a State that meets these criteria qualifies as a legitimate military objective.

Second, the relevance of the topic is underscored by the absence of specific regulation in the treaties governing outer space and space exploration, most notably the Outer Space Treaty (OST). Article IV of the OST imposes restrictions on the military use of outer space and celestial bodies, but it provides only a rather narrow framework to distinguish between permissible and prohibited military activities. Consequently, when addressing the conduct of hostilities in space, it becomes necessary to “borrow” from other branches of International Law. It is inevitable that *new issues will be addressed using outdated solutions*, leaving critical aspects unresolved, that is, *in the dark*. Moreover, the importance of understanding the Law of Armed Conflict extends beyond a State’s capacity to conduct attacks in space: such knowledge is essential not only to assess the legality of actions by one’s own State, should that need arise, but also to evaluate the legality of actions taken by other actors.

Third, the rules of IHL were originally designed for terrestrial and maritime military operations, and later extended to aerial warfare, and do not account for the unique characteristics of military operations in outer space. Although Article III of the OST¹¹ confirms the applicability of IHL to space, some adaptations must be made – the pivotal question is which adaptations are required.

Finally, the military actions examined in this study (specifically, attacks) should not be conflated with the *weaponisation* of Space. The term “military activities” in the context of Space refers to the use of space capabilities to support military operations on Earth (see footnote 2) – a State practice that has accompanied space exploration from its inception. *Weaponisation* involves the placement of destructive weapons in orbit or installing/stationing them on celestial bodies (for more on this distinction, see TRONCHETTI, F., 2015, 333 and 334). While Article IV of the OST explicitly prohibits the *weaponisation* of Space, it does not ban military activities *per se*, as the analysis that follows will show.

⁸ The term “attacks” refers to acts of violence directed against an adversary, either offensive or defensive (see Article 49(1) of Protocol I Additional to the Geneva Conventions of 12 August 1949 on the Protection of Victims of International Armed Conflicts (PA I), adopted on 8 June 1977).

⁹ See Article 52(2) of PA I. The two core criteria are: 1) the status of the object that determine its effective contribution to the adversary’s military operations and 2) the military advantage associated with the effects listed in the article.

¹⁰ See Article 52(2) of PA I. The two core criteria are: 1) the status of the object that determine its effective contribution to the adversary’s military operations and 2) the military advantage associated with the effects listed in the article.

¹¹ See footnote 19 below.

Next, the main research objective will be addressed by examining the three core principles of IHL governing the conduct of attacks: distinction, proportionality and precautions. The study will answer specific research questions: it will explore whether attacks against space objects classified as military objectives are, by nature and in the abstract, unlawful; it will examine the challenges posed by the principle of distinction in outer space and the solutions provided by IHL; it will assess the legality of attacks in outer space in regards to the principle of proportionality; finally, it will identify the unique implications of the precautions rule when conducting attacks in space.

Following the methodology section, the study is divided into five main sections, structured according to a legal-dogmatic approach (each section outlines the theoretical and conceptual framework for the dimensions of “legality” in attacks on space objects during armed conflicts, drawing from the relevant literature and defining the current state of research). The first section addresses important preliminary questions regarding the general legality of such attacks, beyond the specific criteria of IHL, such as: what is “outer space”; which rules of international law (as outlined in treaties governing outer space) may apply to the conduct of hostilities; what is the “tie breaker” rule for resolving legal ambiguities or grey areas; what is IHL and what constitutes an “attack” under its framework. The following three sections examine and explain the fundamental principles of IHL that determine the legality of attacks – distinction, proportionality and precautions –, highlighting unique challenges and specificities that arise when applying them to the space domain. The study concludes with a systematized set of guidelines, which offer practical and accessible approaches for implementing these principles in military operations in space.

2. Methodology and method

This study employs a descriptive research design and follows a legal-dogmatic methodology (which involves identifying the legal norms applicable to a specific issue through a qualitative approach; systematically interprets those norms in relation to the research question; and proposes coherent criteria for their legal application, both in general and abstract terms, as well as in concrete cases).

A deductive method is used to analyse the rules of International Humanitarian Law (IHL) governing the conduct of attacks, with particular focus on the specific adaptations required for attacks on space objects. That is, the study conducts a systematic and interpretative examination of established IHL rules as applied by States and international jurisprudence, complemented by an assessment of relevant space law and specialised legal doctrine.

The data collection technique is a literature review. Primary sources included the 1977 Additional Protocol I to the Geneva Conventions of 1949 on the Protection of Victims of International Armed Conflicts. Secondary sources encompassed books, scientific articles, international court rulings and studies by international organisations such as the International Committee of the Red Cross and the United Nations International Law Commission. The review focused on literature related to the core concepts addressed in the study (the foundational principles of Space Law and, within the framework of IHL, the rules governing

the conduct of attacks: the principles of distinction, proportionality and precautions). The review also included manuals developed by international groups of experts, such as the Tallinn Manual 2.0 (2017) and the Woomera Manual (2024), and studies by leading scholars on the unique challenges of applying these legal principles in the context of outer space.

The final section of the study provides a systematisation of interpretative guidelines for conducting military operations targeting space objects during armed conflict, evaluated through the lens of legality under international law. These guidelines synthesise the key insights developed in the preceding chapters.

3. Violence in space and preliminary questions

It would be unwise to delve into the complexities of attacks in space before addressing some preliminary questions, the first of which spatially defines the scope of our analysis: what constitutes Outer Space?

The delimitation of outer space (also referred to as Sidereal Space, or simply Space) – that is, the question of where airspace (the vertical extension of a State’s territory, that is, the area over which it exercises exclusive sovereignty, in accordance with Article 1 of the Convention on International Civil Aviation, signed in Chicago on 7 December 1944) ends and where the infinite expanse beyond national sovereignty begins (the zone that is freely accessible, usable and exploitable by all States, as established in Article II of the OST) – remains unresolved, even for the United Nations working group which convenes experts on that specific matter (LEGAL SUBCOMMITTEE, 2017, §§ 14 and 15).

The delimitation of outer space has remained unresolved since it was first discussed in 1966 within the United Nations forum for the development of Space Law. Two dominant perspectives have emerged: the “spatialist” approach, which advocates for a fixed boundary between airspace and outer space, determined by scientific or widely accepted criteria; and the “functionalist” approach, which argues that such a boundary is either unnecessary or unfeasible, proposing instead that activities in these areas should be regulated based on the purpose of the spacecraft – whether it is designed for atmospheric flight or space operations (LEGAL SUBCOMMITTEE, 2017, §13).

In recent years, this debate, which had remained largely theoretical, has been reignited: the rise of private space exploration and space tourism – along with the associated questions of jurisdiction and State responsibility – require a clearer distinction between Airspace and Outer Space (where one begins and the other ends). The “functionalist” position (traditionally supported by the United States of America and much of academia due to the lack of consensus on “spatialist” criteria) has begun to lose ground in relation to the position that demands the definition of a clear boundary (DUNK, F. V. D., 2015, 62 to 65). Though it is not universally accepted nor codified in international law, the most successful proposal for an objective delimitation of where Space begins is the “[Theodore] von Kármán line”: the boundary that marks the altitude at which an aircraft must exceed orbital velocity (7.8 km/s) to generate sufficient aerodynamic lift, as the Earth’s atmosphere becomes too thin to support conventional flight. It is where aeronautics ends and astronautics begins. Originally calculated at about

84 kilometres above sea level, the figure that seems to be more widely accepted today is 100 kilometres: that being the limit endorsed by the Legal Subcommittee (mentioned above), the *Fédération Aéronautique Internationale* and the International Academy of Astronautics (LEGAL SUBCOMMITTEE, 2017, § 24, and DUNK, F. V. D., 2015, 69 to 71).

However, it is important to note that this issue is not particularly relevant to determining the lawfulness of attacks on space objects: the fundamental rules applicable remain those of conventional IHL. The key differences in space warfare concern the considerations that must be made regarding the principles of distinction, proportionality and precautions. This assessment focuses more on *how* an attack is conducted and *what* its effects are, rather than *where* it takes place.

A more pressing question is whether attacks in outer space are, in general and in the abstract, unlawful *ab initio*?

The foundational principle governing the exploration and use of space is that outer space shall be explored and used for peaceful purposes¹². However, this does not mean that the use of outer space for military purposes is prohibited in all circumstances, as only certain military uses are explicitly forbidden (HOBE, S., SCHMIDT-TEDD, B. & SCHROGL, K.U (Eds.), 2009, (hereinafter COCOSL); MAČÁK, K., 2022, 404). In fact, Article IV of the OST only imposes limitations on two specific categories of conduct: the use of nuclear weapons or weapons of mass destruction¹³ in space and the use of the Moon and other celestial bodies must be limited to exclusively peaceful purposes, which does not exclude the use of military personnel for those purposes.

Nuclear weapons or weapons of mass destruction are broadly prohibited: they cannot be placed in Earth's orbit, installed on celestial bodies or stationed in space¹⁴. The Moon and other celestial bodies must be used solely for peaceful purposes¹⁵. This includes a prohibition on establishing military bases or facilities, testing any type of weapon, or conducting military manoeuvres on celestial bodies¹⁶.

¹² The exploration and use of space for peaceful purposes is the first principle featured in the preamble to the OST (serving as a key interpretative element of the Treaty, in accordance with Article 31(2) of the 1969 Vienna Convention on the Law of Treaties). This principle is also included in Article III, which establishes the obligation to conduct space activities in a manner that preserves international peace and security. Additionally, it is one of the guiding principles for the exploration and use of outer space solemnly proclaimed in Resolution 1962 (XVIII) of the United Nations General Assembly adopted unanimously on 13 December 1963.

¹³ Lethal radioactive, biological or chemical weapons or other weapons, or any future weapons with equivalent destructive power or effects.

¹⁴ For example, this ban does not extend to transporting nuclear weapons or weapons of mass destruction between two points on Earth via space or to launching such weapons from space. Nor does it prohibit placing in orbit military satellites, conventional weapons or anti-satellite weapons unless they fall under the prohibited categories. See HOBE, S., SCHMIDT-TEDD, B. & SCHROGL, K.U (Eds.) (2009), (hereinafter COCOSL) 78 and 79.

¹⁵ Since the OST does not define precisely what constitutes "exclusively peaceful purposes", this issue has led to doctrinal debate, where two opposing interpretations exist: that celestial bodies should be used solely for non-military purposes and another that contends that only aggressive military activities are prohibited. Given the similar phrasing in the Antarctic Treaty and subsequent State practice (which may change in the future), it is safer to interpret this rule as a broad prohibition of uses for military purposes (not only overt aggression) on the Moon and other celestial bodies. See COCOSL 82 and 83. However, military personnel may still be used for scientific research or other peaceful activities on the Moon and other celestial bodies, as well as necessary equipment or facilities for peaceful exploitation.

¹⁶ The prohibitions in § 2 of Article IV of the OST do not apply to the "empty" space between celestial bodies, a (widely accepted) omission that allows for the lawful use of satellites for military purposes, such as reconnaissance and positioning. When the OST was adopted, both the United States and the Soviet Union were already doing it. See COCOSL 81 and 82.

In addition, Article IX of the OST establishes an indirect limitation on military activities in space: it mandates that States conduct space exploration in manner that prevents harmful contamination, including the generation of space debris (COCOSL, 177) and adverse alterations to Earth's environment. If a State anticipates or has reason to believe that space activities (its own or another's) could result in such contamination, it is obligated to initiate or request appropriate international consultations. This obligation is directly tied to the duty of avoiding the Kessler syndrome: a scenario theorised by Kessler and Cour-Palais in which a collision between satellites in orbit could trigger a chain reaction, resulting in a cascade of debris that could render space activities and satellite operations unsustainable for generations (BENTO, J. P. C. R., 2021, 54).

Alongside the specific rules of Space Law found in international treaties, general international law, which governs a State's conduct on Earth, is also applicable to its activities in and through outer space. This is explicitly affirmed in Article III of the OST¹⁷ and encompasses the IHL directly relevant to the present study¹⁸.

In the analysis that follows, we encounter grey areas where the law does not provide a definitive or unequivocal answer regarding the unlawfulness of certain actions. In such cases, it is essential to recall a tie-breaking fundamental principle of international law: States have the freedom to act unless the action in question is explicitly prohibited by a binding legal rule. When there is doubt regarding the legality of an action, international law does not allow the presumption of unlawfulness (as established by the PERMANENT COURT OF INTERNATIONAL JUSTICE, 1927, 18; BAPTISTA, E. C., 81). This presumption is particularly relevant in IHL, where the application of core principles governing the conduct of hostilities often involves a degree of uncertainty¹⁹. Given that Article 35 of PA I recognises belligerents' *right* to conduct hostilities (albeit not without limits), when there is legal ambiguity (*non liquet*) as to a violation of these limits, a presumption of unlawfulness cannot be made²⁰. A consequence of the non-unlawfulness of attacks against space objects, as long as they comply with IHL, which acts as *lex specialis* for the conduct of hostilities, is that belligerents will not bear international liability for the resulting damage, under the special provisions of Article VI of the OST.

Following on to this principle of non presumption of prohibitions, it is important to emphasise that attacks on space objects – particularly satellites –, whether kinetic or non-

¹⁷ "The States Parties to this Treaty shall conduct their activities in the exploration and utilization of outer space (...) in conformity with international law".

¹⁸ While this initially raised doubts, since Article 49(3) of PA I explicitly applies to "any land, air or naval operation", it is now widely accepted that IHL also governs military operations in outer space. See MACÁK, K. (2022), 411 and 412, and BEARD, J., STEPHENS, D. (Eds.) (2024), 273 to 275 (hereinafter WOOMERA).

¹⁹ For example, when assessing the excessiveness of collateral damage and the uninterrupted causal link of effects under the proportionality rule, as well as the feasibility of measures within the duty to take precautions.

²⁰ See the conclusions of INTERNATIONAL COURT OF JUSTICE, 1996, Nuclear Weapons, §§ 95 to 97. It is worth highlighting that a "principle of military necessity" is recognized, which underlies not only Article 35 of PA I, but IHL as a whole. This principle of military necessity means that belligerents are permitted to take measures essential to achieving the war's objectives, provided such actions comply with the laws and customs of war (INTERNATIONAL COMMITTEE OF THE RED CROSS (hereinafter ICRC) (SANDOZ, Y., SWINARSKI, C., & ZIMMERMANN, B. (Eds.)) (1987), § 1389.

kinetic, are not included among the means or methods of warfare prohibited under IHL (see TRONCHETTI, F., 2015, 337 and 342 to 349, for a list of specific prohibitions on certain methods of warfare, that is, certain weapons), even when significant collateral or environmental consequences are anticipated. Under existing international law, the legality of an attack on a space object must always be assessed on a case by case basis.

Finally, it is important to clarify a pivotal concept central to this analysis. IHL, which seeks to regulate hostilities, prioritises the protection of civilian populations from the effects of warfare. This is codified in Article 49(1) of Protocol I Additional to the Geneva Conventions of 12 August 1949 on the Protection of Victims of International Armed Conflicts, adopted on 8 June 1977 (hereinafter PA I). An attack is defined as any “act of violence against an adversary” (INTERNATIONAL COMMITTEE OF THE RED CROSS (hereinafter ICRC) (SANDOZ, Y., SWINARSKI, C., & ZIMMERMANN, B. (Eds.)), 1987, § 1875)²¹. As demonstrated by the connection between the definition of “attack” and the fundamental principle of distinction found in Article 52(2) of PA I, the typical effect regulated by IHL in the case of an attack has been the “total or partial destruction, capture or neutralisation” of a military objective. In other words, historically, the concept of “attack” has evolved primarily in relation to kinetic means of warfare.

However, a distinctive characteristic of potential conflict in outer space is that threats to space objects are also non-kinetic (in fact, threats are increasingly non-kinetic in nature). Conventional weapons systems have been supplemented by a range of non-kinetic systems that operate across the electromagnetic spectrum, including electronic measures utilising radio waves, as well as directed energy weapons (such as lasers) and microwave radiation, which have numerous applications in space warfare (WOOMERA, 302). Recent innovations have resulted in new anti satellite weapons, robotic systems and manoeuvrable space objects. Operations conducted through network infrastructures (cyber operations²²) are also highly relevant.

Should the use of non-kinetic weapons be classified as an attack under IHL and subject to its restrictions?

In the case of the first type of weapons (weapons that use radiation or the electromagnetic spectrum), according to an interpretation based on the means used for an attack, there is little doubt their such use may or should constitute an attack under Article 49 of PA I, because they are analogous to conventional weapons systems traditionally associated with the use of armed force (WOOMERA, 302 and 303).

As for cyber weapons, the prevailing doctrine (and the one we endorse) holds that the use of *violence* against a target is what distinguishes attacks from other military operations. The operational core of the concept lies in the *effects* it is reasonably expected to produce. It is

²¹ For example, military operations that do not result in “violence” (and therefore do not qualify as attacks) are not subject to the limitations imposed by proportionality and precautions. However, other core principles remain applicable, such as the duty to constantly endeavour to spare the civilian population, civilians and civilian property during military operations (Articles 48 and 57(1) of PA I).

²² What sets cyber operations apart from conventional military operations is that they utilise computers to target other computers or digital infrastructure, rather than employing kinetic force against physical targets. See BOOTHBY, W. H., 380.

the consequences of an operation, rather than its nature, that generally define what qualifies as an “attack” (SCHMITT, M. N. (Ed.), 2017, 415 and 416, hereinafter TALLINN MANUAL, and WOOMERA, 303 and 304). Consequently, the notion of “violence” should be interpreted as *expected violent consequences* and not merely violent actions (through kinetic *means*).

Moreover, in certain contexts, loss of functionality alone may be sufficient to qualify an act as an “attack”. In this regard, the majority of experts contributing to the Tallinn Manual agree that, for a cyber operation to constitute an attack, it must produce violent effects, such as injury or death to individuals or damage, destruction, or loss of functionality that necessitates the replacement of physical components in a physical object (TALLINN MANUAL, 416). This majority considered that interference with functionality qualifies as damage if the restoration of functionality requires the replacement of physical components (TALLINN MANUAL, 417). However, a minority of experts argue that interference with functionality should also be considered “damage”, as outlined in the rule in question, if restoring that functionality requires reinstalling an operating system or specific data. In this perspective, reversible actions are included in the definition of attack.

Actions in outer space introduce even more specific challenges. For instance, in the case of an action that relocates a space object, whether the space object was physically damaged or only temporarily disabled may be irrelevant. Any action that moves a satellite out of its designated orbit may destroy that satellite or render it unusable, either temporarily or permanently. Temporary jamming, “blinding” or disabling of an early warning satellite during a time of crisis (even if the loss of functionality is only temporary) could be perceived as an attack by the affected State (WOOMERA, 305).

Conversely, not all non-kinetic operations qualify as attacks. Operations that do not have violent outcomes or consequences (TALLINN MANUAL, 416²³), such as acts of cyber espionage, are not regarded as attacks unless the means or methods employed result in destruction or neutralisation (TALLINN MANUAL, 418). Similarly, jamming or spoofing operations are not classified as cyber-attacks on satellites – unless they are reasonably expected to produce violent outcomes – because, historically, interference with radio communications or television broadcasts has not been considered an attack under IHL.

4. The principle of distinction as a criterion of IHL

The first fundamental principle articulated in Articles 49 and 57 of PA I establishes that military attacks (including attempted attacks) may only be directed against military personnel, military equipment and military sites.

This principle is part of customary international law (ICRC, 2009a, 3 to 8), and is binding on all States, given the universal applicability of the Geneva Conventions and their Additional Protocols (INTERNATIONAL COURT OF JUSTICE, 1996, Nuclear Weapons, § 84).

²³ Experts agree that a minimum threshold of violence is required for a cyber operation to qualify as an “attack” in the sense that is analysed here. When the effects are merely inconvenience, stress or psychological discomfort, this threshold is not met.

Civilians protected under IHL (defined negatively as all individuals who are not combatants, provided they are not taking a direct part in hostilities) may not be intentionally or directly targeted. Neutral States and their property are also protected from attacks. Any weapons system that is inherently incapable of making this distinction – or one that, although technically capable, is used indiscriminately in practice – is considered unlawful²⁴.

When choosing a target, both the operational planner and the decision maker who authorises the attack must confirm that the intended target is a legitimate military objective and not a civilian object. This verification process is particularly complex in space. The nature of outer space severely limits direct observation of satellites and other space objects in orbit. As a result, planners rely on intelligence gathered from various sources, such as sensors and records. However, these sources often provide incomplete information, making it difficult to identify the precise nature of the target (BLOUNT, P. J., 2012, 6).

With regard to individuals in space, an interesting challenge arises in the case of military astronauts from an enemy State. They are designated as “envoys of mankind in outer space” under Article V of the OST, a status that inherently prohibits direct attacks against them, even during armed conflict. Despite this, this protected status is forfeited if and for as long as they directly participate in hostilities²⁵.

For space objects, one potential source of information about their nature and purpose is the United Nations Register of Space Objects²⁶. However, the limited and often delayed nature of the data (States are obligated to submit information “as soon as practical”, update it “from time to time” and disclose it to the “greatest extent feasible”) makes it difficult to rely on the UN register for determining the true purpose of a space object. The register does not specify whether a satellite is civilian or military in nature. Moreover, not all satellites are registered (BLOUNT, P. J., 2012, 8, identified 438 unregistered space objects in the UN Register).

For an object to qualify as a military objective under Article 52(2) of PA I, that object, by its nature, location, purpose or use, must actively contribute to the adversary’s military operations, and its total or partial destruction, capture or neutralisation must offer a specific military advantage in the circumstances ruling at the time of the decision. It is important to emphasise that the criterion of “effective contribution to military action” must be interpreted narrowly. Not all satellites can be targeted, even if they have economic importance or indirectly sustain an enemy’s war capacity. Only objects with a direct and sufficiently close link to the conduct of hostilities may be lawfully targeted (MAČÁK, K., 2022, 413 and 414, who also discusses the doctrinal divisions on this issue).

²⁴ Even in a broader interpretation, under Article 36 of PA I, it is not only the use of a new weapon, but also its development or acquisition that must be legally reviewed by States, if such weaponry could be prohibited in certain or all circumstances.

²⁵ As for the criteria typically used to assess when non-combatants’ actions constitute a direct participation in hostilities, namely 1) the threshold of harm caused to the adversary’s military operations, 2) a direct causal link between the act and that damage and 3) a belligerent nexus between the non-combatant’s act and the consequent damage in support of one party to the conflict, see ICRC (MELZER, N. (Ed.)) (2009), 46 to 64.

²⁶ Provided for in Article II of the Convention on the Registration of Objects Launched into Outer Space. This Convention complements Article VIII of the OST and mandates the registration of all objects launched into space in an open-source registry. Therefore, it is considered *lex specialis*.

A recurring challenge in the space domain is the prevalence of dual-use satellites, which serve both civilian and military purposes (COUTINHO, F. P. and FRAZÃO, J., 2025, 428 and 429). For legal accuracy, under Article 52(1) of PA I, an object cannot simultaneously be civilian and military, as civilian objects are defined as those that are not military objectives (MAROZAS, T., 2020, 31). Accordingly, dual-use objects are regarded as legitimate military objectives (STEER, C., 2016, 10) and the protection of the civilian population is ensured primarily through the application of the principle of proportionality²⁷. Nonetheless, for a satellite to be classified as a military objective, the services it provides must have a sufficiently close link/ direct and specific connection to the enemy's conduct of hostilities, i.e., it must have specific military applications, including communications, intelligence gathering, and other applications which we have already mentioned.

5. The principle of proportionality as a criterion of IHL

The conventional foundation of the principle of proportionality is set out in Article 51(5) (b) of PA I, which prohibits attacks expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated. Like other core principles governing the conduct of hostilities, it has the status of customary international law (ICRC, 2009a, 46-50).

This means that, under IHL, it is acknowledged that collateral damage (unintentional or indirect harm to civilians or civilian objects) may occur during attacks on military objectives.

To properly understand the rule of proportionality, it is helpful to break it down into its essential conventional elements. According to the case law of the International Criminal Tribunal for the former Yugoslavia (ICTY) (ICTY, 2003, Prosecutor v. Stanislav Galic), this involves a balancing test between:

- The anticipated concrete and direct military advantage of the attack; and
- The expected incidental harm (loss of civilian life, injury, damage to civilian objects, or a combination thereof) resulting from the attack.

An attack is prohibited if the expected incidental harm to civilians is excessive compared to the other element in the balance (the anticipated military advantage).

To apply the proportionality rule correctly, several key aspects and concepts must be understood: the concrete and direct aspect of military advantage; the anticipated element of military advantage; the subjective judgment of the military decision maker; the foreseeability of the harm to civilians and civilian objects resulting from the attack. These key elements are briefly explored below²⁸.

²⁷ Article 54 of PA I prohibits attacking, destroying or rendering inoperable “objects indispensable to the survival of the civilian population”, which raises a critical question: could the technology or services provided by a specific satellite or space application be considered indispensable to the survival of the civilian population – in our opinion, the answer is negative in most cases.

²⁸ According to the delimitations provided by MARTINS, P.G. (2025), 160 to 164.

5.1. Concrete and direct military advantage

The preparatory works of PA I clarify that the term “concrete and direct” implies that the military advantage must be “substantial and relatively close” and that advantages that are hardly perceptible or only expected to materialise in the long term should not be considered. Despite this, the provision still allows for a considerable degree of discretion in its application (ICRC, 1987, § 2209²⁹). When assessing an anticipated military advantage in terms of proportionality, the focus is not on strategic outcomes (such as the results of a large scale operation or winning a campaign, but on the means that will be used in a *specific tactical operation*. However, *if an attack is part of a specific coordinated whole across multiple locations, it must be evaluated as a whole* (ICRC, 1987, § 2218³⁰).

While the ICRC argues that an attack, even if individually lawful, cannot result in serious civilian losses or *extensive destruction* of civilian objects, some respected scholars, such as SCHMITT, M. N., (2015, 284), contest this interpretation, emphasising that proportionality is inherently a *relative standard* that requires weighing the harm caused to civilians and civilian property against the military advantage gained from the attack³¹.

5.2. Anticipated military advantage

The principle of proportionality, as articulated in the relevant Article, focuses not on the actual damage caused or the military advantage achieved after an attack, but on the “anticipated” advantage. This means that the legality of a decision must be evaluated based on the intelligence available to the military commander at the moment of the decision, rather than through retrospective analysis (ICTY, § 59, fn. 29).

Thus, the rule does not allow for after-the-fact evaluations of incidental harm to civilians and civilian property, or the military advantage gained from an attack.

As previously discussed in this paper, the principle of proportionality is closely tied to the obligation to take precautions, as outlined in Article 57 of PA I. While there is no blanket requirement to always use or acquire the most advanced or precise capability, if taking a precaution is “feasible”, that precaution must be adopted.

In short, if using a specific capability is the only way of avoiding an indiscriminate or disproportionate attack, there are only two lawful options: either employ that capability or refrain from conducting the attack (ZEITH, A., 2024, 63).

²⁹ With regard to this perception, according to § 58 of the ICTY, the phrase “concrete and direct military advantage anticipated” refers to a good-faith expectation that an attack will contribute in a relevant and proportionate way to the military objective in question”.

³⁰ In practice, when attacking a satellite constellation, the excessiveness of collateral damage is measured against the military operation as a whole, and not only against the advantage gained by neutralising or destroying each individual satellites in the constellation. Similarly, an attack on a satellite may be connected to the destruction of a ground-based asset, such as an artillery unit. If the satellite provides communications or early warning capabilities to a ground system, proportionality is evaluated based on the impact of destroying the ground system. See WOOMERA, 341.

³¹ FENRICK, W. J. (2009, 277) argues that “proportionality is proportionality and, while the risk of substantial civilian casualties can be acceptable if the anticipated military advantage is greater, it [PA I] does not justify these losses. It accepts that they can occur without rendering an attack unlawful”. By contrast, regarding the unique complexities of outer space, KOPLOW, D. (2009, 1245) argues that kinetic attacks that generate uncontrolled, long-lasting space debris should always be considered unlawful.

5.3. The subjective judgement of the military decision maker

As affirmed by the ICTY in the *Galic judgement*, determining the proportionality of an attack requires evaluating whether a *reasonably well-informed person*, acting under the same circumstances as the decision-maker and *making reasonable use of the information available* at the time, could have anticipated that the attack would result in excessive civilian casualties. While additional intelligence may emerge after the fact, what is legally relevant is the information available to the decision maker at the moment of decision or execution (ICTY, § 58).

Even though these criteria involve a degree of subjectivity, their interpretation must be grounded in *common sense and good faith* on the part of military commanders and cannot be reduced to mathematical or absolute formulas, nor are there universal benchmarks for measuring this balance (ICRC, 1987, §§ 2218 and 2210, and SCHMITT, M. N., 2015, 283).

The evaluation of proportionality is not left solely to the individual discretion of the commander, as the rule specifically mentions an “attack *that can be expected*”. This standard is both objective – in the sense that the decision maker is held accountable for *the knowledge he should have possessed, had he taken reasonable steps* to assess the situation – and subjective – in the sense that the assessment is based on the intelligence available at the time of the decision (SCHMITT, M. N., 2015, 284, adds that, while the precise degree of expectation or anticipation required cannot be quantified, a practical benchmark is whether excessive incidental harm *is probable to occur*).

5.4. Foreseeability of damage to civilians and civilian objects resulting from an attack.

Since the principle of proportionality focuses on the incidental effects of an attack, it is important to clarify that damage to *individuals or objects that have lost their protection under IHL* – such as civilians directly participating in hostilities and civilian objects, such as active dual-use satellites, that actively contribute to the adversary’s military operations – *are not counted as “civilian harm”* when assessing proportionality (see ROSCINI, M. 2014, 221, and HOLLAND, J., 2002, 62).

The scope of incidental damage to be considered is not limited to direct effects (see, consensually, WOOMERA, 339). The indirect or “second order” effects of an attack must also be factored into the assessment of proportionality. This means that *all* incidental harm to civilians or civilian objects that *can be anticipated, with a reasonable degree of certainty, as a consequence of the attack*, regardless of “how direct they may be”, must be included in the proportionality calculations; that is, *consequences that might only occur in the future, are a remote possibility, are hypothetical or represent risks that depend on third-party intervention* fall outside this scope (see WOOMERA, 339).

Finally, the decisive criterion in determining whether to include “reverberating” effects is their *foreseeability*. IHL does not impose temporal or geographic limits on assessing the damage caused by attacks. Only indirect effects the military decision maker knew or reasonably should have known about are relevant to evaluating whether an attack complies with the principle of proportionality.

Applying this principle in the space domain presents significant challenges that make it difficult to estimate both the anticipated military advantage and the expected collateral damage, as there is no empirical basis for such estimates due to lack of historical precedents. In the case of kinetic attacks that produce large volumes of space debris, evaluating the long-term effects of such debris is necessary; however, as previously noted, this assessment must quantify these consequences specifically in terms of civilian deaths, injuries, and damage to civilian objects. Other detrimental effects fall outside the scope of proportionality.

As for the complexities introduced by the space environment, the prevalence of dual use objects means that incidental damage is both “inescapable and often substantial” when such objects are attacked (MAČÁK, K., 2022, 415).

6. The principle of precautions as a criterion of IHL

The fundamental principle regarding precautions is that, during the conduct of hostilities, constant care must be taken to spare the civilian population, individual civilians and civilian objects. The principle of precautions, in its active dimension, mandates that *all* (including evaluating alternatives beyond the choice of weapons and methods of attack) *practically feasible* precautions must be taken to avoid, and in any case minimise, accidental harm to civilians or collateral damage to civilian objects. While this rule is autonomous³², it is closely linked to the principles of distinction and proportionality, as it requires a feasible assessment of compliance with those principles both before and during an attack.

In cases of doubt, the most accurate and up-to-date intelligence should be obtained before launching an attack. However, taking all practically feasible precautions does not mean implementing every possible measure: what is *practically feasible* includes both military and humanitarian considerations and may be limited by the attacker’s available capabilities, the operational risks of exposing forces or assets, and the costs of each measure, both in terms of time and resources. The practical difficulties in gathering intelligence about space objects, including their purpose and relevance, must also be taken into account (WOOMERA, 333).

This fundamental rule is essential because, if an attack causes harm to civilians or damage to civilian objects that would be excessive in relation to the concrete and direct anticipated military advantage, it must be cancelled or suspended. Even after an attack has been launched, if it becomes apparent that the target is not a lawful military objective, and it is practically feasible, the operation must be cancelled.

There is also a rule that specifies that when multiple military objectives offer an equivalent advantage, the preferred choice, where feasible, should be the target that is least likely to cause collateral damage (Article 57(3) of PA I) – this may favour the use of cyber or non kinetic means, where available.

³² In other words, even if an attack does not result in excessive collateral damage, it may still be considered unlawful if all feasible measures are not taken to minimise collateral damage because this would violate the principle of precautions.

This principle also raises legal considerations regarding the distinction between the physical destruction of a space object and its temporary or permanent neutralisation (BLECHOVÁ, A., HARAŠTA, J. & KASL, F., 2024, 277). This caution stems from two international obligations: Article 35(3) of PA I prohibits means or methods of warfare that cause, or may cause, “widespread, long-term and severe damage to the natural environment” and, as previously mentioned, Article IX of the OST imposes a duty to avoid creating space debris that could harmfully contaminate space or interfere with the peaceful exploration activities of other States: it is a duty of *due diligence*³³ that reflects the shared nature (*res communes omnium*) of the global commons that lies beyond the “final frontier”³⁴.

In the context of outer space, it is reasonable to argue that the precautions required before conducting an attack must, at a minimum, *extend beyond* conventional standards. Relevant intelligence, such as the resilience of the adversary’s capabilities, should be taken into account³⁵. The process of verifying whether a space object qualifies as a military objective may include gathering intelligence from Space Surveillance and Tracking (SST) systems, radar or infrared sensors, and analysing the “electronic signatures” of space objects (WOOMERA, 332), while recognising that adversaries may employ countermeasures, such as signal masking, to obscure such signals.

As previously noted, one of the most complex challenges will be integrating long term effects of attacks on space objects into proportionality “calculations”. Based on the established criteria, in practice, this may involve identifying and separating anticipated collateral damage from effects that are merely hypothetical or represent latent risks, providing justification for these classifications. Additionally, consequences that do not involve deaths or harm to civilians or damage to civilian objects should be addressed at the policy level, rather than within the legal framework of the proportionality principle. Furthermore, attack planners are responsible for taking all reasonable and feasible precautions to ensure that the effects of an attack are not indiscriminate (i.e., that they do not affect civilians, civilian objects and military targets without distinction).

7. Systematisation: interpretative guidelines for military operations against space objects

To summarise the preceding analysis, we outline below a set *interpretative guidelines* for the conduct of military operations against space objects during armed conflict. These

³³ States must be able to prove beyond reasonable doubt that every possible step was taken to prevent unlawful acts in the specific circumstances of the case (COCOSL, 176).

³⁴ Article IX of the OST was originally intended to express a broad principle – rather than establish a binding obligation – of promoting cooperation in the scientific exploration of outer space to prevent harmful contamination, of both space and Earth’s environment, to ensure that all States (including those lacking autonomous space capabilities) can benefit from space exploration (see COCOSL, 171 to 174).

³⁵ For example, the legal margin within which an operation that leads to the deactivation of a dual-use satellite may be deemed lawful becomes narrower if that satellite is part of a large constellation, particularly if the operation targeting that satellite provides no concrete military advantage. Conversely, the potential ripple effects on other satellites in the constellation must be considered, as they could either enhance the anticipated military advantage or increase incidental damage (BLECHOVÁ, A., HARAŠTA, J. & KASL, F., 2024, 277).

guidelines are customary, as recognised by the ICRC study (2009a), and are therefore binding on all States.

7.1. General legality

- Kinetic or non-kinetic attacks on space objects are not inherently prohibited under international law, including IHL, in situations of armed conflict.

- The legality of such attacks must be evaluated on a case-by-case basis, in accordance with the relevant principles governing the conduct of hostilities: distinction, proportionality and precautions.

7.2. Distinction

- Attacks may only be directed at military objectives, that is, objects that, by their nature, location, purpose, or use actively contribute to military operations, and whose total or partial destruction, capture or neutralisation would, in the circumstances at the time, offer a specific military advantage.

- A distinctive feature of space conflicts is that satellites, as targets that represent a significant military advantage, are frequently used for both civilian and military purposes. As dual-use assets, they are regarded as lawful targets.

- However, only satellites whose purpose, location or use has a *sufficiently close link* to the enemy's conduct of hostilities, irrespective of ownership, and which do not merely support national defence functions, qualify as military objectives.

7.3. Proportionality

- Applying the principle of proportionality presents some of the most sensitive challenges regarding the lawfulness of attacks against space objects.

- When conducting attacks, proportionality implies balance between the concrete and direct military advantage anticipated from an attack against the expected incidental loss of civilian life or injury, damage to civilian objects, or a combination thereof. A violation of the rule occurs only when the incidental harm is excessive in relation to the military advantage, as judged by a military commander acting reasonably and in good faith. This assessment involves a degree of discretion, and a violation occurs when this excess is obvious or egregious.

- The anticipated military advantage must be direct and concrete, not hypothetical or remote. It should be evaluated in the context of the specific tactical operation in which the attack occurs, rather than in isolation.

- The standard for judging proportionality is based on the perspective of a military decision maker who acts reasonably and in good faith, using all available intelligence at the time of the decision.

- The damage to be weighed against the military advantage is limited to reasonably foreseeable loss of civilian life, injury, or damage to civilian objects, excluding hypothetical, remote or uncertain consequences.

7.4. Precautions

- All attacks must comply with the duty of precautions, which requires the adoption of all practicable and feasible measures to minimise incidental harm to civilians or civilian objects.
- A failure to take feasible precautions, and thereby ignoring the reasonably expected consequences of an attack, increases the risk that the attack will be deemed indiscriminate, and therefore unlawful.
- Nevertheless, the rule of precautions is one of conduct, not of result. The lack of technical capability by a party to assess how much and what kind of collateral damage the attack may cause, or the inability to prevent it, *do not automatically render an attack unlawful*.
- A reasonable and well-informed military commander, considering the specific circumstances, is not required to *anticipate* what is unforeseeable: what is required is a demonstration of *constant care*.
- This principle encourages the use of non-kinetic weapons in space operations, while recognising that the destruction of a satellite may represent a measure of *last resort*.

8. Conclusions

The increasing importance of space capabilities (and their benefits for economic development, technological infrastructure, everyday applications and, most critically, security and defence) has rendered space infrastructure and objects essential to States' security and power. As a result, it is both foreseeable and, in some cases, inevitable that interstate conflicts will extend into the space domain. However, treating space as a military operational domain introduces unique legal challenges, particularly regarding the application of IHL. That is, it involves the application of the body of law that governs the conduct of hostilities outside the conventional scenarios and circumstances for which it was originally designed. In light of the IHL as *lex lata*, military operations in space can be seen as a *shot in the dark*, making it necessary to reconsider how IHL is applied in this domain.

This study set out to assess the legality of attacks against space objects in the context of interstate armed conflict, evaluated through the traditional criteria of IHL: the principles of distinction, proportionality and precautions as outlined in PA I, taking into consideration the unique characteristics that arise when applying these principles to the space environment.

Methodologically, the study employs a legal-dogmatic and qualitative approach, using descriptive research and deductive reasoning, relying on a systematic examination and interpretation of international legal norms governing the conduct of hostilities in armed conflicts between States, complemented by doctrinal insights from leading scholars in the field.

To summarise the analysis conducted in this study and present the research findings in a clear and accessible manner, a set of *interpretative guidelines* was outlined in the previous section. Regarding general legality, the main conclusion is that attacks on space objects during armed conflict are not, in general and in the abstract, unlawful, either inherently or universally. Whether these attacks comply with the principles of distinction, proportionality and precautions must be assessed on a case-by-case basis during both planning and

execution. This assessment will determine whether or not the attacks are lawful in the specific operational context.

Under the principle of distinction, an attack may lawfully target satellites (or other space objects), even those serving both civilian and military purposes, only if they meet the criteria for military objectives (they must, by their nature, purpose or use, actively contribute to the enemy's military operations, and their destruction, capture or neutralisation must offer a military advantage in those specific circumstances), and if they have a sufficiently close link to the enemy's conduct of hostilities.

The principle of proportionality requires a careful balance: the foreseeable collateral damage (including civilian casualties, injuries, damage to civilian objects, or both) must not exceed the concrete and direct military advantage anticipated from the attack. An attack constitutes a violation of this principle when the excess of the former is clearly or manifestly excessive. Only reasonably foreseeable collateral damage (whether likely or merely possible) in terms of civilian casualties, injury or damage to civilian objects is taken into account, thereby excluding hypothetical, remote or uncertain consequences. An important caveat is that all foreseeable collateral damage must be considered, including second order or reverberating effects, such as the generation of space debris (considering its duration and potential risks to civilian life and property). Predicting collateral damage in space operations presents significant challenges; nonetheless, the limit of the duty is bounded by what a reasonably well-informed military decision-maker, acting in good faith, could have foreseen.

Regarding the principle of precautions, it is important to emphasise that it constitutes an obligation of conduct, not an obligation of result (the occurrence of unforeseen collateral damage or events does not automatically render an attack unlawful). However, failing to take feasible and practicable precautions (considering the operational context and the capabilities available to the attacker) increases the risk of the attack being classified as indiscriminate – and thus unlawful.

This study advances legal-operational knowledge by proposing a systematised interpretative framework that aligns with IHL and addresses the unique characteristics of the space domain. This framework can assist military and legal decision makers in assessing the legality of space operations in armed conflict scenarios. However, we recognise the limitations arising from the lack of established State practice and applicable jurisprudence specific to space warfare, which throughout the present study demanded from us some normative speculation based on analogies, despite the growing body of research on the subject, as reflected in the works cited throughout this study.

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