

Application of the Principle of Distinction under IHL in Outer Space

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Abstract

The principle of distinction can be applied to armed conflicts in outer space. Under the principle of distinction, combatants refer to armed personnel who directly participate in hostile actions in outer space, and military objects refer to those that have made actual contributions to military operations in outer space and can provide a definite military interest. All other personnel and objects are non-military targets that must not be attacked. Objects on which spaceflight participants depend for their survival, certain areas and cultural relics on celestial bodies, outer space, the natural environment of the earth, and space objects used for humanitarian relief are special protected objects. In order to implement the principle of distinction, the defender needs to effectively differentiate its own personnel and objects, and the attacker also needs to take feasible preventive measures.

Keywords: armed conflicts, outer space, international humanitarian law, principle of distinction, reverse distinction, precautions

1. Introduction

With the increase of outer space development and exploration activities, as well as the advancement and application of space technology, while outer space activities promote the development and prosperity of human society, the security challenges and risks brought about by them are also increasing.¹ Words such as "competition", "rival" and "threat" have become frequent in a series of documents such as the *National Space Policy* of the United States and the *Comprehensive Report on Defense, Diplomacy and Development* of the United Kingdom.² The United States put forward the so-called "Sino-Russian Space Threat Theory", defined outer space as a new "combat territory", and established an independent outer air force and outer space command.³ The United Kingdom has set up a special space command and plans to create a force capable of fighting in outer space and increase investment in research and development of space weapons.⁴ The North Atlantic Treaty Organization (NATO) also defined outer space as an "operational domain" for the first time, strengthening member states' military cooperation capabilities in outer space.⁵ The militarization or weaponization of outer space seems to have gradually become a reality in the development and use of outer space, although this may conflict with the principle of peaceful use of outer space. Studying the application of international humanitarian law (IHL) in the field of outer space does not legitimize or encourage the militarization or weaponization of outer space but aims to limit the potential humanitarian costs of hostile actions in outer space.⁶

¹ United Nations General Assembly (2021). *Report of the Secretary-General on Reducing Space Threats through Codes, Rules and Principles of Responsible Conduct*, A/76/77, 13 June 2021, para. 289.

² Permanent Mission of the People's Republic of China to the United Nations (2020). *Document Submitted by China Pursuant to General Assembly Resolution 75/36 (2020)*, Retrieved from http://un.china-mission.gov.cn/chn/zgylhg/cjyjk/ldyw/202105/t20210505_9126963.htm.

³ US Department of Defense(2018). *Final Report on Organizational and Management Structure for the National Security Space Components of the Department of Defense*, Retrieved from <https://media.defense.gov/2018/Aug/09/2001952764/-1/-1/1/ORGANIZATIONAL-MANAGEMENT-STRUCTURE-DOD-NATIONAL-SECURITY-SPACE-COMPONENTS.PDF>.

⁴ UK Space Agency, *National space strategy*, Retrieved from <https://www.gov.uk/government/publications/national-space-strategy/national-space-strategy#contents>.

⁵ NATO, *NATO's Approach to Space*, Retrieved from https://www.nato.int/cps/uk/natohq/topics_175419.htm?selectedLocale=en.

⁶ ICRC(2022), *International Law Constraints on Military Operations in Outer Space During Armed Conflict*, Retrieved from <https://www.icrc.org/en/document/constraints-under-international-law-military-space-operations>.

2. Applicability of the Principle of Distinction in Armed Conflicts in Outer Space

2.1 Definition of Armed Conflict in Outer Space

Regarding the connotation of armed conflict in outer space, scholars and practitioners have yet to reach a consensus. There is no precise definition of "armed conflict in outer space" under international law.⁷ According to the practice of the United Nations General Assembly and the views of domestic and foreign scholars, in an armed conflict, belligerent countries may carry out space operations to intensify hostilities, and attack space systems by various means from outer space and the earth.⁸ If hostilities take place in outer space, through outer space or from outer space, and fall within the category of armed conflict, they will be governed by IHL.⁹

The definition of armed conflict in outer space by the International Committee of the Red Cross is more representative. "Armed conflict in outer space" means military operations in or related to outer space, usually manifested with the aim or expectation of disrupting, destroying or invalidating space systems.¹⁰ Judging from the current practice in outer space, armed conflicts in outer space have the following characteristics:

1) The targets of armed conflicts in outer space are mainly space systems

The space system mainly includes three parts, one is the space-based part, such as satellites and launch vehicles; the other is the ground-based part, such as the space monitoring system and command and control system; the third is the data link between the two, including the uplink and downlink, and services to end users, etc.¹¹ The attack on the space system can be either a physical entity attack or a virtual information attack.¹² Armed conflicts using space systems can include four situations: ground-to-air, air-to-air, ground-to-ground and air-to-ground.¹³

2) Hostile acts may originate from, pass through or be carried out in outer space

Although the international community has not fully reached a consensus on the exact scope of outer space, it is generally believed that the area above 100 kilometers above sea level is outer space.¹⁴ When the armed conflict occurs completely above this altitude, it belongs to "armed conflict in outer space". A more common situation is that some aspects of the conflict may occur below this altitude, or briefly rise above this altitude, but then fall below this altitude, which may constitute an "armed conflict emanating from or passing through outer space". However, location is not the decisive criterion for an armed conflict in outer space. Even an armed conflict that takes place entirely on earth can still be regarded as an armed conflict in outer space if it is mainly conducted using outer space systems.¹⁵

3) Belligerents in an armed conflict in outer space need to pay careful attention to the secondary effects of hostilities

In an armed conflict in outer space, the "secondary impact" or even "tertiary impact" of hostilities is more critical, which may seriously affect the civilian population or the natural environment on earth. For example, using kinetic energy weapons to destroy outer space object A, its "direct impact" may only be the damage of object A, but the "secondary impact" may be manifested as damage to the outer space environment and outer space traffic, or it may be manifested as a large scope disrupts the normal life of civilians on earth. If the debris cloud produced by destroying object A collides with outer space object B, it will further cause a "tertiary impact". In addition,

⁷ Yang Kuan (2018). On the Application of International Humanitarian Law in Armed Conflicts in Outer Space. *Renmin University Law Review*, (1).

⁸ United Nations General Assembly (2021). *Report of the Secretary-General on Reducing Space Threats through Codes, Rules and Principles of Responsible Conduct*, A/76/77, 13 June 2021, paras. 5-7; Freeland, S. (2006). Applicability of the Jus in Bello Rules of International Humanitarian Law to the Use of Outer Space. *The Proceedings on the Law of Outer Space*, (49), 338-347; Freeland, S. (2011). In Heaven as on Earth the International Legal Regulation of the Military Use of Outer Space. *US-China Law Review*, (3), 272-287.

⁹ Schmit M. (2018). *Tallinn Manual 2.0 on International Law Applicable to Cyber*. translated by Huang Zhixiong et al., Social Science Literature Press, rule 58; Schmitt, M. (2017). *Tallinn Manual 2.0 on the International Law Applicable to Cyber Operations*, Cambridge University Press, Rule 58; Stephens, D. (2018). The International Legal Implications of Military Space Operations: Examining the Interplay Between International Humanitarian Law and the Outer Space Regime. *International Law Studies*, (94), 75-101.

¹⁰ ICRC (2022). *International Law Restrictions on Military Operations in or Related to Outer Space During Armed Conflict*, 3 May 2022.

¹¹ Supra note 1, United Nations General Assembly, Canada's response dated 29 April 2021.

¹² Macak, K. (2018). Silent War: Applicability of the Jus in Bello to Military Space Operations. *International Law Studies Series. US Naval War College*, (94), 1-i.

¹³ Supra note 9, US Michael Schmidt, Rule 58; Supra note 9 Schmitt, M., Rule 58.

¹⁴ Treaty on the Prevention of the Placement of Weapons in Outer Space, the Use or Threat of Force in Outer Space Objects" (Draft), Article 1; edited by Zeng Lingliang(2018). *Public International Law* (Second Edition). Higher Education Press, 271-272.

¹⁵ Steer, C.(2015). Avoiding Legal Black Holes: International Humanitarian Law Applied to Conflicts in Outer Space. *Proceedings of the International Institute of Space Law*, (58), 193-210.

belligerents should also consider the impact of hostilities on the natural environment, especially the increasingly serious problems of space debris and celestial collisions.¹⁶

4) There are no special rules of IHL to regulate armed conflicts in outer space

In an armed conflict in outer space, hostilities in outer space can be part of traditional land warfare, naval warfare, and air warfare, or they can be conducted independently. For the former, existing IHL rules related to land, sea and air combat can be used for reference; but for the latter, considering the particularity of the outer space combat environment, it is difficult to directly apply existing rules, thus new IHL rules may need to be created.

2.2 *Applicability of the Basic Principles of IHL in Armed Conflicts in Outer Space*

According to the existing norms of outer space law and IHL as well as international practice, IHL can be applied to armed conflicts in outer space.

1) Outer space law provides that international law, including IHL, applies to outer space

The *Outer Space Treaty* establishes the principle that the exploration and use of outer space must abide by international law and the Charter of the United Nations.¹⁷ Article 1 of the Charter of the United Nations states that its purpose is to "promote and inspire the respect for human rights and fundamental freedoms for all human beings".¹⁸ IHL is a branch of international law. It is also the refinement and implementation of the purposes of the Charter of the United Nations to promote and stimulate human rights. It naturally can be applied to outer space. It is worth noting that "the legality of the use of force" and "restriction on methods and means of warfare" are two separate concepts. The application of IHL to outer space does not encourage or legalize armed conflicts in outer space, nor does it violate the Charter of the United Nations. The aim of IHL is to maintain international peace and security.¹⁹ In addition, the existing system of outer space law originates from the Cold War and is unable to effectively deal with the new situation in outer space in recent years. New rules of IHL are urgently needed.²⁰

2) The fundamental principles of IHL could be applied in any type of armed conflict

The Martens Clause has been included in many international documents,²¹ and is regarded as a general principle of law or customary law, constituting the source of IHL. According to the Martens Clause, in the absence of treaty law, the inhabitants and belligerents shall still be protected and governed by the principles of international law, because these principles are derived from the customs established among civilized nations, the humanitarian law and the requirements of public conscience. Although there is no treaty that specifically regulates armed conflicts in outer space, the basic principles of IHL undoubtedly meet the requirements of the Martens Clause. Furthermore, Additional Protocol I stipulates that it applies to any land, air or naval warfare.²² Although outer space is not mentioned, there is no basis to suggest that the drafters intended to exclude armed conflicts in outer space.²³ The provisions on new weapons and environmental protection in Additional Protocol I²⁴ can also be applied to armed conflicts in outer space. In short, IHL is applicable to all armed conflicts that have occurred or have not occurred, anticipated or unforeseen, and its core principles will adapt to new situations and new challenges in the field of outer space, and will continue to evolve with the development of armed conflicts.²⁵

3) International practice recognizes the applicability of IHL in armed conflicts in outer space

The International Court of Justice pointed out in the *Advisory opinion on the Legality of the Threat or Use of Nuclear Weapons* that international law neither authorizes nor prohibits the use of nuclear weapons, but relevant actions should comply with the principles and provisions of IHL.²⁶ According to the *Corfu Channel* case, even in

¹⁶ Supra note 1, United Nations General Assembly, paragraphs 10-12.

¹⁷ Outer Space Treaty, Article 3.

¹⁸ Charter of the United Nations, Article 1.

¹⁹ Supra note 10, ICRC; The Charter of the United Nations, Article 1; Supra note 12, Macak, K., 1-i.

²⁰ Max Plank Encyclopedias of International Law, *International Humanitarian Law*, paras. 47-48.

²¹ Hague Regulations, Preamble; GC I, Article 63; GC II, Article 62; GC III, Article 142; GC IV, Article 158; Additional Protocol I, article 1; Additional Protocol II, preamble; Convention on Certain Conventional Weapons, preamble.

²² Additional Protocol I, Article 49.

²³ Supra note 7, Yang Kuan, 321-343.

²⁴ Additional Protocol I, Articles 35, 55, and 36.

²⁵ The Geneva Conventions, Common Article 1; Niels Meltzer (2019). *Introduction to International Humanitarian Law*. (ICRC East Asia Regional Office 2019 Edition), 10, 16; ICRC (2016). *Questions and Answers on International Humanitarian Law*. (ICRC East Asia Regional Delegation 2016 edition), 3.

²⁶ International Court of Justice(1996). *Legality of The Threat or Use of Nuclear Weapons*, Advisory opinion of 8 July 1996, para 105.

the absence of specific treaty provisions, Albania's obligations stem from "fundamental considerations of humanity".²⁷ It was further confirmed in the *Nicaragua* case that "basic considerations of humanity" refer to "general fundamental principles of IHL".²⁸ In addition, the International Committee of the Red Cross recommended to the United Nations in 2021 that the applicability of IHL in armed conflicts in outer space should be recognized, and that its application would not legalize or justify the weaponization or militarization of outer space.²⁹ The United States regards outer space as a combat domain, and has set up a separate chapter in the US Department of Defense's *Law of War Manual* to stipulate the norms of IHL for outer space warfare.³⁰ NATO, Australia, Japan and other countries, although they have not clearly stated their positions, also have the same general tendency in the application of IHL.³¹ It can be seen that international practice recognizes that, out of consideration of humanitarian values, the basic principles of IHL will apply to various types of armed conflicts.

Regarding the order of application of IHL in outer space, first of all, the United Nations Charter shall be applied first. Since most of the content of IHL is the elaboration and interpretation of the United Nations Charter, it can also be applied in priority.³² Secondly, the basic principles of IHL also need to refer to the provisions of outer space law. The interpretation of a certain provision should be adopted if it can both conform to the principles of humanitarianism and military necessity, and satisfy human welfare or humanitarianism to the greatest extent.³³

2.3 The Principle of Distinction in Armed Conflicts in Outer Space

The principle of distinction is one of the basic principles of IHL. According to the St. Petersburg Declaration of 1868, the only legitimate goal that nations should strive to achieve during a war is to weaken the enemy's military strength.³⁴ The principle of distinction is fully reflected in international conventions such as the Geneva Conventions, the two additional protocols, and the Rome Statute.³⁵ Moreover, in international practice, the principle of distinction has also been recognized as customary international law, which has a universal binding force.³⁶ As stated in the International Court of Justice's *Advisory opinion on the Legality of the Threat or Use of Nuclear Weapons*, the principle of distinction is customary international law and one of the inviolable basic principles of IHL.³⁷

According to the principle of distinction, on the one hand, the parties to the conflict must distinguish between civilians and combatants in all circumstances. Only attacks against combatants are allowed, and direct attacks against civilians are prohibited. On the other hand, all parties to the conflict must at all times make distinctions between civilian objects and military objects, and attacks against civilian objects are prohibited.³⁸ The principle of distinction mainly involves civilians and combatants, civilian objects and military targets. It is necessary to first determine their basic meanings in the context of armed conflicts in outer space. On this basis, the attackers and defenders of armed conflicts in outer space should take feasible preventive measures respectively to promote the implementation of the principle of distinction.

There are potential difficulties in applying the principle of distinction to armed conflicts in outer space. For example, there are ambiguities in the identification of the status of civilians in the outer space forces, the identification of space tourists and astronauts, and the identification of the legal status of objects in outer space. The existence of dual-use space objects makes it difficult for the defender to effectively distinguish its own outer

²⁷ International Court of Justice(1949). *Corfu Channel (United Kingdom of Great Britain and Northern Ireland v. Albania)*, Judgment of 9 April 1949, para 22.

²⁸ International Court of Justice(1986). *Military and Paramilitary Activities in and against Nicaragua (Nicaragua v. United States of America)*, Judgment of 27 June 1986, para 215.

²⁹ ICRC (2021). The potential humanitarian costs of the use of weapons in outer space and the protections afforded by international humanitarian law, 7 April 2021.

³⁰ US Department of Defense, *Law of War Manual*, Chapter 14, Retrieved from https://dod.defense.gov/Portals/1/Documents/law_war_manual15.pdf.

³¹ Matthew T. K. & Laurie R. B. (2019). International Law and Security in Outer Space: Now and Tomorrow. *AJIL Unbound*, (113), 125-129.

³² Von der Dunk, FG (2021). Armed Conflicts in Outer Space: Which Law Applies? *International Law Studies Series. US Naval War College*, (97),188-231.

³³ Supra note 9, Stephens, D., 75-101.

³⁴ St. Petersburg Declaration.

³⁵ Geneva Convention I, Chapter II, Chapter III, Chapter IV, Chapter V, Chapter VI, Chapter VII; Geneva Convention II, Chapter II, Chapter III, Article Chapters IV, V, VI; Third Geneva Convention; Parts II, III, Fourth Geneva Convention; Additional Protocol I, Parts II, III, IV; Additional Protocol II, Parts II, III, IV; Rome Statute, Articles 8(2)(b)(i-ii), 8(2)(e)(i - ii) Clause.

³⁶ Jean-Marie Henckaerts & Louise Doswald-Beck (eds, 2005), *Customary International Humanitarian Law, Vol. 1: Rules*, Cambridge University Press.

³⁷ ICRC Study on Customary International Humanitarian Law, Rules 1, 7; Supra note 26, International Court of Justice, para. 78.

³⁸ Additional Protocol I, Article 48; ICRC Study on Customary International Humanitarian Law, Rules 1, 7.

space objects; the outer space environment's fragility and the attack's secondary impact will not be conducive to the attacker's taking feasible preventive measures. These are issues that IHL urgently needs to address, and they are also the focus of this essay.

3. The Object of the Principle of Distinction in Armed Conflicts in Outer Space

In this essay, the "object" of the principle of distinction refers to the entity/person to which the rights and obligations under the principle of distinction are applied. According to the principle of distinction, belligerents should distinguish between civilian population and combatants, civilian objects and military targets,³⁹ so the above persons and objects are the "objects" of the principle of distinction. Hostile actions in outer space may involve spaceflight participants such as outer space forces, military and private astronauts, and space tourists; outer space objects such as rockets, satellites, spacecraft, spaceships, and space stations. Some special objects may also be involved in outer space hostile actions, such as the objects on which space flight participants depend for survival (such as extravehicular space suits, space stations, space food, etc.), certain areas and cultural relics on celestial bodies (such as probes and footprints left by humans on the moon), the natural environment of the earth, space objects used for humanitarian relief, etc.

3.1 Distinguish between Combatants and Civilians

Combatants are all members of the armed forces of a party to the conflict, with the exception of medical and religious personnel.⁴⁰ Civilians are persons who are neither part of the armed forces of a party to the conflict nor take part in popular resistance.⁴¹ The principle of distinction divides persons in armed conflicts into two categories in law, civilians and combatants. However, in hostilities in outer space, the identities of many persons still need to be clarified.

1) Combatants in armed conflicts in outer space

Armed forces are combatants, and the armed forces generally consist of "organized armed forces, groups and units under a command responsible to that party for the actions of their subordinates".⁴² At present, the forms of the armed forces of various countries are becoming more and more diverse. China's national defense and military consists of the Army, Navy, Air Force, Rocket Force, Strategic Support Force, Joint Logistics Support Force, and Armed Police Force.⁴³ The United States has added Space Force to its armed forces.⁴⁴ Russia's armed forces also include Aerospace Forces, consisting of Space Forces and Aerospace Defense Forces).⁴⁵ However, no matter how armed forces are arranged or named, as long as the relevant forces meet the requirements of IHL, those who actively participate in hostilities in outer space can be identified as combatants. It is worth noting that, in addition to regular armed forces, irregular militias and other voluntary forces may also be regarded as combatants, provided that they are commanded by persons responsible to their subordinates, are recognizably fixed and conspicuously marked, carry arms openly and comply with the laws and customs of war in combat.⁴⁶ In an armed conflict in outer space, private astronauts, space tourists and other spaceflight participants who meet the above criteria will also be considered combatants.

2) Civilians in armed conflicts in outer space

According to the definition of "civilians" in IHL, civilians in armed conflicts in outer space mainly include space tourists, private astronauts, and personnel of armed forces in outer space who do not directly participate in hostilities.

(1) Space tourists and private astronauts. With the commercialization of space, space tourists and private astronauts will become important participants in spaceflight. As far as space tourism is concerned, several space trips by non-professional astronauts will be completed around the world in 2021. China Aerospace will also cultivate and develop new forms of space economy such as space tourism and is expected to start suborbital travel.⁴⁷ In addition,

³⁹ Ibid.

⁴⁰ Additional Protocol I, Article 43(2); ICRC Study on Customary International Humanitarian Law, Rule 3.

⁴¹ Additional Protocol I, Article 50; ICRC Study on Customary International Humanitarian Law, Rule 5.

⁴² Additional Protocol I, Article 43(1); ICRC Study on Customary International Humanitarian Law, Rule 4.

⁴³ State Council Information Office (2019). *China's National Defense in the New Era*. People's Publishing House, 28-31.

⁴⁴ US Department of Defense. *Armed Forces*, Retrieved from <https://www.defense.gov/About/>.

⁴⁵ Ministry of Defense of the Russian Federation. *Structure*, Retrieved from <https://eng.mil.ru/en/structure/forces/type.htm>.

⁴⁶ Hague Regulations, Article 1.

⁴⁷ State Council Information Office (2022). *China's Space Program: A 2021 Perspective*. Retrieved from http://www.gov.cn/xinwen/2022-01/28/content_5670920.htm.

in order to develop the space economy and reduce development costs, there are NASA Astronauts and Private Astronauts in the United States. Private astronauts are encouraged to work in the International Space Station led by the United States to engage in commercial activities.⁴⁸

In an armed conflict in outer space, whether it is outer space tourists or private astronauts, usually they have not received professional combat training, nor belong to the armed forces of the belligerent countries, and have no actual contribution to the belligerent operations. Although these individuals are often attached to the armed forces or operate in areas or facilities controlled by the armed forces, this does not affect their civilian status. Such personnel would be considered civilians similar to war correspondents, private contractors, and civilian intelligence personnel.⁴⁹ There are similar norms in naval and air combat. According to Article 13 of the *Second Geneva Convention*, the crew of the merchant fleet and the staff of civil aircraft enjoy special protection.⁵⁰ Therefore, if spaceflight participants such as outer space tourists and private astronauts do not meet the requirements of combatants, they should be regarded as civilians and not be targeted. Moreover, even if there is a dispute as to whether space tourists belong to the scope of astronauts, out of humanitarian considerations, the right of astronauts to be rescued and repatriated should be interpreted as applicable to all personnel participating in spaceflight.⁵¹

(2) Personnel in the armed forces in outer space who do not directly participate in hostilities mainly include medical personnel, religious personnel, and members of the armed forces who specialize in humanitarian duties and technology research and development. As for personnel who are specifically responsible for humanitarian duties, according to Article 82 of *Additional Protocol I*, belligerents should deploy legal advisers in their armed forces to provide advice to military commanders on the application of IHL.⁵² The application of new space technologies will make combat more automated, and armed conflicts in outer space will rely more on the evaluation of combat methods by legal advisers and other personnel.⁵³ For members of the armed forces who are responsible for technology research and development, modern warfare is becoming more and more modernized and scientific. Countries are also gradually promoting the reform of the military system and increasing the proportion of civilian personnel in the military. However, it usually takes a long time for space technology to be developed and put into practical use. When an armed conflict in outer space actually occurs, the civilian personnel responsible for the research and development may not be at the military location at all.

Although the traditional Geneva Conventions and customary IHL only emphasize the special status of medical personnel and religious personnel, this does not mean that the above two categories of personnel are not subject to special protection. First of all, regarding the issue of whether to grant special protection to a certain type of subject, the Geneva Conventions and the additional protocols mainly make judgments based on the nature of the activities of the relevant subject. For example, respect, protection and all possible assistance should be provided to military or civilian medical personnel;⁵⁴ religious personnel should refer to the applicable protection and identification regulations for medical personnel;⁵⁵ Humanitarian organizations and personnel participating in relief operations should be provided with special protection.⁵⁶ It can be deduced that medical personnel and religious personnel are not an exhaustive list of special protected groups. According to the purpose of the treaty, as long as relevant personnel specifically undertake humanitarian duties in armed conflicts, they should be given special status. As stated in Article 13 of the *Second Geneva Convention*, civilian personnel on board military aircraft, although accompanying the armed forces, are not actually members of the armed forces, and should enjoy protection under special provisions for war correspondents, suppliers, labor brigade workers, or armed forces welfare workers.⁵⁷ Secondly, there has also been state practice for expanding the scope of non-combatants. As pointed out in the *Joint Service Manual of The Law of Armed Conflict* in the United Kingdom, medical personnel

⁴⁸ NASA, *Private Astronaut Mission FAQSS*, Retrieved from <https://www.nasa.gov/leo-economy/frequently-asked-questions>; NASA, *What is in Space Production Applications?*. Retrieved from https://www.nasa.gov/mission_pages/station/in-space-production-applications/what-is-in-space-production-applications/

⁴⁹ *Supra* note 25, Niels Meltzer, 85.

⁵⁰ Geneva Convention II, Article 13.

⁵¹ Freeland S. (2005). Up, up and back: The Emergence of Space Tourism and Its Impact on the International Law of Outer Space. *Chicago Journal of International Law*, (1), 1-22.

⁵² Additional Protocol I, Art. 82.

⁵³ Beard, J. (2009). Law and War in the Virtual Era. *American Journal of International Law*, (3), 409-445.

⁵⁴ Additional Protocol I, Article 15; Additional Protocol II, Article 9.

⁵⁵ Additional Protocol I, Article 15.

⁵⁶ Geneva Convention I, Article 9; Geneva Convention IV, Article 10; Additional Protocol I, Article 71.

⁵⁷ Geneva Convention II, Article 13.

are not limited to doctors and nurses, but also include a wide range of experts, technicians, maintenance personnel, drivers, chefs and management personnel.⁵⁸ Armed forces are increasingly dependent on civilians for technical and administrative support, but as long as they are not directly involved in hostilities, those involved remain non-combatants.⁵⁹ The *Tallinn Manual 2.0* also states that civilian government employees sometimes conduct cyber operations during armed conflict, and that unless they are directly involved in hostilities or form part of an organized armed group, they should be treated as civilians and not be targeted.⁶⁰ Thirdly, based on the principle of military necessity, the only legitimate military purpose in an armed conflict is to weaken the military capability of the opponent. IHL should strike a balance between military necessity and humanitarianism. Members of the armed forces who make no real contribution shall be immune from attack.⁶¹

3) Persons whose identities are disputed in armed conflicts in outer space

Astronauts sent by governments are different from private astronauts. Private astronauts are usually regarded as civilians, but the status of astronauts sent by governments is extremely controversial. Astronauts sent by governments are generally selected from the Air Force, so most of them are members of the armed forces. For example, the US Space Force is a part of the Air Force.⁶² The Russian Space Force and the Air Force are both aerospace forces.⁶³ But at the same time, according to Article 5 of the *Outer Space Treaty*, astronauts are "envoys of mankind", and countries should give them all possible assistance.⁶⁴ It can be seen that military astronauts should be regarded as combatants in armed conflicts, but they should also be regarded as "envoys of mankind". The conflicts between IHL and outer space law have caused great theoretical controversy.

At present, there are three views in academia on military astronauts, i.e supporting the application of IHL, the application of international space law and the theory of compromise. According to IHL, based on the practice of the International Court of Justice and the statement of the International Committee of the Red Cross, the basic principles of IHL should not be derogated in any way, and astronauts should not be granted any privileges.⁶⁵ Under international space law, considering the extremely high risk of outer space activities, in order to promote international cooperation in good faith, outer space law should be applied to astronauts even during armed conflicts.⁶⁶

The compromise theory holds that specific issues should be analyzed in detail. The first scenario is when military astronauts actively participate in military activities. In this case, it is unreasonable to grant the astronaut the diplomatic status of an envoy, since he has engaged in acts contrary to peaceful purposes.⁶⁷ Moreover, this would also conflict with the rule of diplomatic immunity, since persons granted diplomatic immunity cannot take part in armed hostilities.⁶⁸ The second scenario is that military astronauts do not participate in military activities. Astronauts have received specialized and costly training, risking their lives every time they perform a mission. Moreover, the survival and well-being of astronauts reflect the good intentions of all countries. Even during the Cold War, hostile countries were willing to provide protection to astronauts of any nationality.⁶⁹ Thus, the mere fact that an armed conflict exists does not necessarily make a military astronaut a combatant, and a military astronaut shall continue to maintain his status as an envoy of humanity unless and until he engages in acts that are substantially connected with an armed conflict.⁷⁰

The author agrees with the compromise theory. First of all, the astronaut's "human special envoy" status comes

⁵⁸ The Joint Doctrine and Concepts Center of UK. *The Joint Service Manual of the Law of Armed Conflict*, Rule 4.2.3, Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/27874/JSP3832004Edition.pdf.

⁵⁹ *Ibid.*, *UK Manual of the Law of Armed Conflict*, Rule 4.3.7.

⁶⁰ *Supra* note 9, Schmitt M., rule 96.

⁶¹ ICRC. *How Does Law Protect in War*, <https://casebook.icrc.org/glossary/military-necessity>.

⁶² Mike Wall. *US Space Force Releases Foundational Doctrine*, Retrieved from <https://www.space.com/space-force-spacepower-doctrine-capstone.html>.

⁶³ *Supra* note 45, Ministry of Defense of the Russian Federation.

⁶⁴ *Outer Space Treaty*, Article 5.

⁶⁵ *Supra* Note 7, Yang, K., 321-343.

⁶⁶ *Ibid.*

⁶⁷ Maogoto, J. & Freeland, S. (2007). The Final Frontier: The Laws of Armed Conflict and Space Warfare. *Connecticut Journal of International Law*, (1), 165-196.

⁶⁸ Blount, P.J. (2012). Targeting in Outer Space: Legal Aspects of Operational Military Actions in Space. *Harvard National Security Journal*.

⁶⁹ Stephens, D. and Steer, C. (2015). Conflicts in Space: International Humanitarian Law and Its Application to Space Warfare. *McGill Annals of Air and Space Law*, (40), 1-33.

⁷⁰ *Supra* note 12, Macak, K., 1-i.

from the *Outer Space Treaty* and the *Rescue Agreement*.⁷¹ As of January 1, 2022, the Outer Space Treaty has 112 signatories and 23 signatories, and the Rescue Agreement has 99 signatories and 23 signatories.⁷² Many provisions of the two treaties have become rules of customary law and should be respected; second, when astronauts participate in hostilities, their actions may cause harm to human life, health and other rights, and the rules of humanitarian law should be applied. Therefore, it is more reasonable to judge whether a person is a combatant based on his behavior.

3.2 Distinguish between Military Objects and Civilian Objects

Objects in outer space mainly include rockets, satellites, spacecraft, spaceships, and space stations. According to the principle of distinction, these objects can be legally classified as military objects and civilian objects.⁷³ In traditional IHL, the criteria for judging military targets and non-military targets have been established.

1) Military objects in armed conflicts in outer space

During an armed conflict, there are two elements for determining a military object:

(1) Makes an actual contribution to the military operations of an adversary by nature, location, purpose, or current use. "Nature" relates to the inherent properties of an object, usually referring to objects that are military in nature and designed to facilitate military operations.⁷⁴ Objects such as military rockets, military satellites, military spacecraft, military spaceships or military space stations meet the "nature" standard under normal circumstances.⁷⁵ "Location" usually refers to a geographical area of special military importance, and if the location of an object can make an effective contribution to military operations, it can become a military object.⁷⁶ When a civilian satellite is used to provide energy supplies for enemy military satellites, or is used as a bodyguard satellite to protect important enemy military satellites, it can be considered a military target because of its location.⁷⁷ Conversely, a certain military target may no longer be considered a military target due to a change in location. Under the "current use" criterion, a civilian object becomes a military object when it is used for military purposes.⁷⁸ However, once the relevant space object has ceased to be used for military purposes, it must immediately resume its civilian status and regain its protection from attack. "Purpose" refers to the intended future use of an item, i.e. the item is not currently being used for military purposes but is expected to be so used in the future.⁷⁹ For example, a civilian transponder on a communications satellite becomes a military target if there is credible information that an adversary intends to use it for military purposes.

(2) Destroying, capturing, or disabling such objects would clearly make an "effective contribution" to military operations "in the circumstances."⁸⁰ "Effective contribution" generally refers to assisting in the execution of an enemy's operations, or otherwise directly supporting an enemy's military activities.⁸¹ And such contributions must be made on a "real-time" basis and not based on hindsight.⁸² Changes in the location, right to use, and ownership of a space object may cause it to no longer provide military benefits "under the circumstances" and thus no longer constitute a legitimate target of attack.⁸³

2) Civilian objects in armed conflicts in outer space

Due to the international consensus on the peaceful use of outer space, there are a large number of civilian space objects in outer space, mainly including space stations, civilian satellites, civilian spacecraft, and detectors

⁷¹ Outer Space Treaty, Article 5; Rescue Agreement.

⁷² United Nations General Assembly (2022). *Report of the Legal Subcommittee on its sixty-first session held in Vienna, A/AC.105/1260*, 28 March-8 April 2022, para. 44.

⁷³ Refer to China National Space Administration. *China Aerospace Products*. Retrieved from <http://www.cnsa.gov.cn/n6758824/n6759008/index.html>; China Manned Space Engineering Network. *Introduction to China's Manned Space Station*. Retrieved from http://www.cmse.gov.cn/ztbd/xwzt/zgzkjzmczjhdzt/zgkjz/201104/t20110423_39308.html; NASA. *Humans in Space Overview*. Retrieved from <https://www.nasa.gov/topics/humans-in-space/overview>.

⁷⁴ Sandoz Y., Swinarski C. & Zimmermann B. (eds, 1987). *Commentary on the Additional Protocols*, ICRC, para. 2020.

⁷⁵ Supra note 68, Blount, PJ.

⁷⁶ Supra note 74, Sandoz Y., Swinarski C. & Zimmermann B. (eds), para.2021.

⁷⁷ Supra note 69, Stephens, D. and Steer, C., 1-33.

⁷⁸ Hague Convention, Article 27; Supra note 74, Sandoz Y., Swinarski, C. & Zimmermann, B. (eds), para. 2022.

⁷⁹ Supra note 74, Sandoz Y., Swinarski C. & Zimmermann B. (eds), para. 2022.

⁸⁰ First Additional Protocol I, Article 52; Supra note 25, Meltzer, N., 92.

⁸¹ Hague Convention, Art.23.

⁸² Supra note 74, Sandoz Y., Swinarski C. & Zimmermann B. (eds), para. 2024.

⁸³ Supra note 7, Yang K., 321-343.

specially used for scientific research. The services they provide are used in all aspects of civilian life, including agriculture and farming, sustainable management of water and natural resources, forest and wildfire detection, ecosystem protection, fisheries and mining, health and medicine, navigation and timing, etc.⁸⁴

(1) During an armed conflict, civilian objects are all objects that are not military objects.⁸⁵ Belligerents need to distinguish between civilian objects and military targets, and attacks against civilian objects are prohibited.⁸⁶ Accordingly, in an armed conflict in outer space, no space system or any component thereof shall be attacked unless it becomes a military object.⁸⁷ The law of naval warfare and the law of air warfare also have similar provisions. For example, attacks must be strictly aimed at military targets. Enemy warships, military aircraft, merchant ships, and civilian aircraft are all civilian objects and cannot be attacked unless they meet all the requirements of military targets.⁸⁸ In the field of cyber-armed conflicts, international experts have also reached a consensus that civilian goods must not be the target of cyber-attacks, and only when the network infrastructure meets the conditions of military targets can it become the target of attacks.⁸⁹

(2) Pursuant to Article 52 (3) of *Additional Protocol I*, where belligerents have doubts as to whether an object normally used for civilian purposes is used to make an effective contribution to military operations, the object shall be presumed not to have been so utilized.⁹⁰ The United States denies that this rule can be recognized as customary international law, arguing that the provision inappropriately shifts the burden of proof from the defender to the attacker.⁹¹ The United States objected to this rule for obvious reasons, because it often carried out high-altitude bombing and wanton damage to civilian objects in armed conflicts, but most countries believed that this rule was a customary international law.⁹² "Ordinarily" means that the item has never been used in any routine or substantial way for military purposes, such as a place of worship, house or other residence or school.⁹³ If a belligerent has doubts about the nature of military objects and civilian objects, it shall make a favorable presumption of the nature of those objects.

3) Specially protected objects in armed conflicts in outer space

Based on the consideration of balancing humanitarian spirit and military necessity, the objects on which spaceflight participants depend for survival, certain areas and cultural relics on celestial bodies, the natural environment of outer space and the earth, and humanitarian relief space objects shall receive special protection.

(1) Objects on which spaceflight participants depend for their survival, such as extravehicular spacesuits, space stations, and space food. First, for civilian spaceflight participants, belligerents are prohibited from using methods of warfare that starve the civilian population and from attacking objects indispensable to the survival of the civilian population.⁹⁴ For those spaceflight participants who are considered civilians, the objects on which their survival depends undoubtedly receive special protection. Second, with respect to combatant spaceflight participants, on the one hand, the prohibition of "superfluous injury or unnecessary suffering" prohibits the use of methods of warfare that inflict suffering on combatants without providing the attacker with any military advantage.⁹⁵ On the other hand, any act or omission committed against any person that seriously endangers the physical or mental integrity is a grave breach of international humanitarian law.⁹⁶ Consequently, even spaceflight participants who are considered combatants must not be targeted for attacks on objects upon which their survival depends. The *Tallinn Manual 2.0* also adopts a similar provision, regardless of whether military or civilian astronauts, the objects on

⁸⁴ United Nations General Assembly (2022). *Report of the Committee on the Peaceful Uses of Outer Space*. A/77/20, 1-10 June 2022, para. 77.

⁸⁵ Additional Protocol I, Article 52; ICRC Study on Customary International Humanitarian Law, Rule 9.

⁸⁶ ICRC Study on Customary International Humanitarian Law, Rule 7.

⁸⁷ Supra note 10, ICRC.

⁸⁸ San Remo Manual of Naval Warfare, Articles 41, 59, 62, and 65.

⁸⁹ Supra note 9, Michael Schmitt, rule 99.

⁹⁰ Additional Protocol I, Art. 52.

⁹¹ US Department of Defense(1992). *Conduct of The Persian Gulf War: Final Report to Congress*. Retrieved from https://www.tjsl.edu/slomansonb/9.7_Conduct_PGW_I.pdf.

⁹² Zhu W.Q.(2018). *International Humanitarian Law*.The Commercial Press,138.

⁹³ Additional Protocol I, Article 52(3); Program on Humanitarian Policy and Conflict Research at Harvard University(2013). *HPCR Manual on International Law Applicable to Air and Missile Warfare*, Cambridge University Press, Rule 12(b).

⁹⁴ Additional Protocol I, Article 54; Additional Protocol II, Article 14.

⁹⁵ Hague Regulations, Article 23; Additional Protocol I, Article 35; ICRC Study on Customary International Humanitarian Law, Rule 70; Supra note 93, Program on Humanitarian Policy and Conflict Research at Harvard University, Rule 5(b); Supra note 74, Sandoz Y., Swinarski C. & Zimmermann B. (eds), para. 1426.

⁹⁶ Additional Protocol I, Article 75

which they depend should be given special protection.⁹⁷

(2) Certain areas and artifacts on celestial bodies. Both international and non-international armed conflicts prohibit belligerents from attacking historical monuments and works of art that symbolize the cultural or spiritual heritage of peoples and from using such objects in support of military efforts.⁹⁸ In an armed conflict in outer space, some areas and cultural relics on celestial bodies have permanent cultural value for a certain country or for all mankind.⁹⁹ Taking the moon as an example, Russia's "Luna 9" automatic research station marked the first soft landing of human beings on a celestial body other than the earth, and the lunar module left after the US "Apollo" landed on the moon marked the first time humans landed on the moon. In 1966, humans discovered that there were 7 carefully constructed tower-like buildings on the surface of the moon that were not naturally generated.¹⁰⁰ The *Convention on the Protection of Underwater Cultural Heritage* adopted by UNESCO requires that the member states should protect the underwater cultural heritage for the well-being of mankind. In the same way, these areas and cultural relics on celestial bodies should also be specially protected. Attacking them will be a serious blow to the identity, memory and dignity of all human beings.

(3) The natural environment of outer space and the earth. The natural environment enjoys the right to protection similar to civilian objects, unless it meets all the constituent elements of a military object,¹⁰¹ prohibiting the use of methods or means of warfare that cause widespread, long-term and serious damage to the natural environment.¹⁰² Even if an attack must be launched, those who plan, authorize, or carry out the attack must follow the rules of proportionality and take precautions against anticipated collateral damage to the natural environment.¹⁰³ Armed conflicts in outer space involve the natural environment of outer space and the earth, and the damage to both is relatively unknown and uncontrollable. Especially for the outer space environment, on the one hand, it is vulnerable due to the threat of space debris, and on the other hand, it is very crowded due to spaceship launches and experimental activities.¹⁰⁴ As far as the natural environment of the earth is concerned, the international community has also emphasized the importance of preventing the re-entry of space objects and the impact of near-Earth objects.¹⁰⁵ Therefore, the belligerents are obliged to replace combat methods that may have an irreversible impact on the outer space environment (such as kinetic energy attacks) with more controllable ones (such as cyber-attacks). There is also an immediate obligation to report on situations that threaten the Earth's environment and to refrain from attacking space objects used for water management, climate change response, or natural disaster prevention and control.

(4) Space objects used for humanitarian relief. Under traditional IHL, belligerents must under no circumstances attack dispensaries, hospitals, or medical vehicles unless they are used to commit acts harmful to the enemy.¹⁰⁶ In naval and air warfare, hospital ships, coastal ambulance boats, wards and their equipment on warships, and medical aircraft should also be respected.¹⁰⁷ Based on this, in an armed conflict in outer space, space stations dedicated to medical treatment, sick rooms in space stations, medical services and functional space objects should also receive special protection. In addition, many space objects have been widely used in various stages of humanitarian work. For example, satellite navigation and positioning systems can provide location information needed for humanitarian operations, and communication satellites can bring medical personnel and humanitarian personnel together during natural disasters or armed conflicts. Weather satellites can effectively prevent or mitigate the impact of severe weather disasters such as hurricanes.¹⁰⁸ In view of the functions of the above space objects, they

⁹⁷ Supra note 9, US Schmitt M., rule 59.

⁹⁸ Additional Protocol I, Article 53; Additional Protocol II, Article 10.

⁹⁹ Johnson C. D. (ed., 2021). *The New Space Participant Handbook*. translated by Li T., etc., China Aerospace Press, 39-40.

¹⁰⁰ Zhao Q. Z. (2007). Cultural Relics and Mysterious Cases on the Moon. *Friends of Science*, 3.

¹⁰¹ ICRC Study on Customary International Humanitarian Law, Rule 43.

¹⁰² Additional Protocol I, Articles 35 and 55.

¹⁰³ Rome Statute, Article 8(2)(b)(iv).

¹⁰⁴ United Nations General Assembly (2021). *Report of the Committee on the Peaceful Uses of Outer Space, A/76/20*, 21 October 2021, paras. 55-63.

¹⁰⁵ See United Nations General Assembly. Adoption of 74/82. International Cooperation in the Peaceful Uses of Outer Space Pursuant to the Report of the Special Political and Decolonization Committee (Fourth Committee) (A/74/408), A/RES/74/82, Jan. 10, 2020.

¹⁰⁶ See Articles 19 and 21 of the First Geneva Convention; Article 14 of the Fourth Geneva Convention; Article 21 of the First Additional Protocol.

¹⁰⁷ Geneva Convention I, Article 20; Geneva Convention II, Articles 25, 26, and 39; Geneva Convention IV, Article 22; Additional Protocol I, Articles 22 and 24.

¹⁰⁸ Supra note 105, United Nations General Assembly; Wilson K. (2016). *Why Outer Space Matters: Krystal Wilson on Humanitarian Uses of Space*. Retrieved from <https://intercrossblog.icrc.org/blog/why-outer-space-matters-krystal-wilson-on-humanitarian-uses-of-space>.

are all objects used for humanitarian relief operations, unless they meet the requirements of military objects, they must be respected and protected.¹⁰⁹

4. Reverse Distinction Obligation of the Defending Party in an Armed Conflict in Outer Space

Article 58 of *Additional Protocol I* stipulates the obligation of the defender to take preventive measures to prevent the impact of the attack.¹¹⁰ Rule 2.5.3 of the U.S. Department of Defense's *Law of War Manual* expresses it as "distinguishing a party's own persons and objects". First, all parties to a conflict should ensure that combatants and civilians, military targets and civilian objects, and specially protected objects and personnel can be visually distinguished from each other.¹¹¹ Secondly, the above personnel and objects should also be physically separated.¹¹² Thirdly, respect to the protected persons and objects should not be abused to disguise military objects.¹¹³ In addition, based on the principle of "non-reciprocity" of IHL, even if an opposing party violates the principle of reverse distinction, the belligerent party must also abide by this obligation, and belligerent reprisals are only allowed under extremely strict conditions.¹¹⁴

4.1 The Special Importance of the Reverse Distinction

Most objects in outer space have both military and civilian functions, which makes it difficult for the attacker to apply the principle of distinction, and also makes the reverse obligation of the defender more critical. Making an effective reverse distinction is not only conducive to maximizing the humanitarian values, but also beneficial to the national interests of belligerent countries.

1) Dual-use space objects pose difficulties for the application of the principle of distinction.

Historically, the emergence and development of human space technology were driven by the state, with a strong military background. Up to now, military and civilian dual-use space systems have become the norm.¹¹⁵ Military space objects are usually used to provide data and services to support ground military activities, such as providing real-time communication, reconnaissance, global navigation and positioning, weather information and forecast, and signal intelligence functions for the armed forces.¹¹⁶ However, the functions of the space objects mentioned above can be used not only for military purposes in wartime but also as civilian objects in peacetime.¹¹⁷ For example, the US GPS system was originally only used in military systems, but now it has become an important part of transportation, communication, and remote sensing systems. In 2016, 40% of the communication needs of the US Department of Defense depended on commercial satellite communication systems.¹¹⁸ The reason is that the use of military-civilian dual-use space systems can not only reduce government budgets and expenditures but also disperse the country's outer space security capabilities to more commercial or civilian platforms, making it more competitive.¹¹⁹

Military-civilian dual-use space system is either a civilian target or a military target.¹²⁰ Despite its dual-use nature, if it meets the requirements of a military target, it will still be a military target. The principle of distinction does not prohibit attacks on dual-use space systems provided the military object requirements are met.¹²¹ The problem, however, is that, given the high reliance of civilian life on the technology provided by satellites, the potential harm to civilians could be catastrophic in the event that a dual-use satellite is destroyed or rendered useless if it also

¹⁰⁹ ICRC Study on Customary International Humanitarian Law, Rule 32.

¹¹⁰ Koplou, D.A.(2022). Reverse distinction: US Violation of the Law of Armed Conflict in Space. *Harvard National Security Journal*, (1); Boothby, W. (ed., 2018), *New Technologies and the Law in War and Peace*, Cambridge University Press.

¹¹¹ Additional Protocol I, Article 44(3) and Article 46; ICRC Study on Customary International Humanitarian Law, Rule 106 and Rule 107; Supra note 25, Meltzer N., 82.

¹¹² Articles 38 and 42 of the First Geneva Convention; Article 18 of the Fourth Geneva Convention; Articles 18, 38, 39 and 56 of Additional Protocol I Articles 59, 60; Additional Protocol II, Article 12.

¹¹³ Additional Protocol I, Articles 44 and 51.

¹¹⁴ Geneva Conventions, Common Article 1; ICRC Study on Customary International Humanitarian Law, Rule 140.

¹¹⁵ Supra note 99, Christopher D. Johnson, 86-88.

¹¹⁶ Space Security Index, *Military Uses of Outer Space*, Retrieved from <https://spacesecurityindex.org/2020/11/military-uses-of-outer-space/>.

¹¹⁷ National Academies of Sciences, Engineering, and Medicine (2016). *National Security Space Defense and Protection: Public Report*, The National Academies Press, 27.

¹¹⁸ Ibid., National Academies of Sciences, Engineering, and Medicine, 19-22.

¹¹⁹ Supra note 110, Koplou, D.A.; Supra note 113, Boothby, W.

¹²⁰ ICRC Study on Customary International Humanitarian Law, Rule 8; Supra note 30, US Department of Defense, Rule 5.7.1.2; Supra note 93, Program on Humanitarian Policy and Conflict Research at Harvard University, Rule 22.

¹²¹ Supra note 69, Stephens, D. and Steer, C., pp. 1-33; Supra note 68, Blount, P.J.; Stephens, D. *International Humanitarian Law: A Brief Introduction*. Retrieved from <https://intercrossblog.icrc.org/blog/twmzia1cp84kv2c29bi4iz6q4u03in>.

serves a civilian function.¹²²

2) The reverse distinction by the defender will affect the attacker's implementation of the distinction principle

Dual-use capabilities are often achieved by integrating multiple payload technologies such as satellite stacking, efficient swarming, hosted payloads, hosted platforms, and ridesharing.¹²³ On the same space object, military payloads are legitimate military targets that can be attacked, while adjacent civilian payloads should not be attacked. Due to the sophistication of these technologies, it is difficult for the attacker to directly distinguish them through visual or physical means, and it is necessary to further obtain accurate intelligence and information on related objects. However, the current space object registration system is not perfect, and there are disadvantages such as incomplete registration information, inaccurate or misleading registration content, and limited registration objects.¹²⁴ This makes it difficult for the attacker to carry out precise strikes on military systems, and the application of the principle of distinction will depend on the reverse distinction actively made by the defender.

3) Failure to make an effective reverse distinction will bring serious legal and humanitarian consequences

Considering that an attack in outer space may cause secondary or tertiary effects, such damage may be multiplied by the damage caused by the attack on the civilian part of a dual-use object. The defender must take into account any anticipated harm to protected civilians or civilian objects and strictly adhere to the principles of proportionality and precaution.¹²⁵ In addition, the defender is obliged to take precautions to clearly distinguish the civilian components of a dual-use space system so as to minimize the effects of an attack.

4) It is in the common interest of all countries to make an effective reverse distinction

Although the reverse distinction seems to bring additional costs, in the long run, however, considering the high value of outer space objects, the reverse distinction can limit the attack on one's own space objects to "military necessity", minimizing the loss of high-value outer space assets and the cost of war. Also, the reverse distinction will make one's own belligerent behavior more legitimate, so as to gain advantages in international public opinion and accountability after the war. Some scholars have pointed out that effectively reversely distinguishing one's own objects will make it more legal to attack the enemy's people or objects that have not been reversely distinguished.¹²⁶ However, this view violates the principles of "non-reciprocity" and "prohibition of reprisals" of IHL. If the belligerent party has not made an effective reverse distinction, this cannot exempt the other belligerent party from the obligation of careful assessment before attacking.

4.2 Reverse Distinction of Personnel

According to the Geneva Conventions, combatants, civilians, and protected persons should be visually distinguished and physically removed from military objects. The misuse of civilians and protected persons for military advantage should be avoided.¹²⁷

1) Distinguish between civilians and combatants with effectively identifiable signs

According to *Geneva Convention I* and *Additional Protocol I*, combatants should generally carry their weapons openly and wear fixed and distinctive emblems visible from a distance to distinguish themselves from the civilian population.¹²⁸ The state practice of various countries also follows a similar approach, such as the American Law of War Manual and the British Joint Service Manual on the Law of Armed Conflict.¹²⁹ During hostilities in outer space, the above rules should also be followed, but it is necessary to ensure that special signs can be effectively identified in the special environment of outer space. For example, different styles of aviation suits and badges can be worn by combatants and non-combatants. As stated by international experts in the field of air and missile warfare, in special environments different from land warfare, special signs made of materials that can be identified

¹²² Jakhu, R. S., Steer C. and Chen K. W. (2017). Conflicts in Space and the Rule of Law. *Zeitschrift für Luft-und Weltraumrecht-German Journal of Air and Space Law*, (4), 657-692.

¹²³ Supra note 99. Johnson, C. D., 39-40.

¹²⁴ Supra note 68, Blount, P.J.

¹²⁵ Supra note 9, US Schmidt, M., Rule 101.

¹²⁶ Colby, E. (2016). *From Sanctuary to Battlefield: A Framework for a US Defense and Deterrence Strategy for Space*, Center for a New American Security, 20-30.

¹²⁷ Articles 40 and 41 of the First Geneva Convention; Article 42 of the Second Geneva Convention; Article 20 of the Fourth Geneva Convention; Article 44 of the Additional Protocol I, Article 51.

¹²⁸ Additional Protocol I, Art. 44.

¹²⁹ Supra note 30, US Department of Defense, Rule 2.5.3.1, Rule 2.5.3.2, Rule 4.9, Rule 4.10, Rule 4.11, Rule 5.4.8, Rule 5.4.8.1, Rule 5.4.8.2, Rule 5.24, Rule 5.25; Supra note 58, The Joint Doctrine & Concepts Center of UK, Rule 4.4, Rule 4.4.1, Rule 4.6.

by detection technology should be used as much as possible.¹³⁰

2) Relocation of civilians away from areas affected by hostilities in outer space

According to Article 58 of *Additional Protocol I*, the defender shall endeavor to remove civilians under its control from the vicinity of military objects and avoid setting military objects in or near densely populated areas.¹³¹ In an armed conflict in outer space, feasible measures include but are not limited to:

a. Establish places where civilians and other affected persons may seek refuge.¹³² For hostile actions in outer space, the defender may also eliminate civilian spaceflight participants near military target space objects through warnings and other feasible means, and may specially set up space stations or areas for them as shelters.

b. Refer to the protection of "populated areas" in cyber-armed conflicts.¹³³ Based on the consideration of balancing military necessity and humanitarian spirit, space objects such as space stations, etc. that spaceflight participants rely on for survival should be specially protected, and the defender should not set up military targets in the above areas.

c. Greater consideration of the secondary or tertiary effects of hostilities on the civilian population on the earth.¹³⁴ Defenders can evacuate civilians on the earth from areas that may be affected by space hostile actions in advance, avoid setting the impact of attacks in densely populated areas and also establish supporting services such as civil defense forces, alarm systems, and fire emergency services.¹³⁵

3) Prohibition of misuse of civilian and protected personnel for military advantage

Pursuant to Article 58 of *Additional Protocol I*, the defender shall protect the civilian population, civilian individuals and civilian objects under its control from harm caused by military operations.¹³⁶ In air combat, international experts also recognized the applicability of the above rules, and believed that belligerent parties should not use the presence or movement of civilians, or direct the movement of civilians, to achieve specific military purposes, such as protecting military targets from attack.¹³⁷ There is also an international consensus in the field of cyber-armed conflict that it is clearly illegal to use the civilian presence to protect military targets from cyber-attacks, or to otherwise protect, support, or impede military operations.¹³⁸ Therefore, it is forbidden to abuse civilians and protected personnel to seek military advantages in armed conflicts in outer space, and it is especially necessary to assess and prevent secondary or tertiary effects of attacks on space-based facilities in advance. Unless unavoidable, secondary or tertiary effects should not be an excuse for belligerents to justify and criminalize violations of the above prohibitions.

4.3 Reverse Distinction of Objects

According to the ICRC, the separation of military and civilian use of space systems should be an obligation of states during armed conflict.¹³⁹ For the reverse distinction of objects in an armed conflict in outer space, unique and visible signs should be used visually to identify civilian objects and specially protected objects. Civilian objects or protected objects near military targets should be physically cleared as well.¹⁴⁰

1) Display special signs that can be effectively identified during hostilities in outer space

In armed conflicts in outer space, combatants mainly conduct hostile actions in space through non-visual measures, so the defender should adopt special non-visual identification methods.¹⁴¹ In this regard, the international practice in the field of air warfare and cyber warfare can provide some reference. In air combat, in addition to visual

¹³⁰ Supra note 93, Program on Humanitarian Policy and Conflict Research at Harvard University, Section K: Specific Protection of Medical and Religious Personnel, Medical Units and Transports.

¹³¹ Additional Protocol I, Art. 58.

¹³² Supra note 30, US Department of Defense, Rule 5.14. 3.

¹³³ Supra note 9, US Schmidt, M., Rule 121.

¹³⁴ Supra note 10, ICRC.

¹³⁵ ICRC Study on Customary International Humanitarian Law, Rule 22; Supra note 74, Sandoz, Y., Swinarski, C. & Zimmermann, B. (eds), paras. 2257–2258.

¹³⁶ Additional Protocol I, Art. 58.

¹³⁷ Supra note 93, Program on Humanitarian Policy and Conflict Research at Harvard University, Section H: Precautions by the Belligerent Party Subject to Attack.

¹³⁸ Supra note 9, US Michael Schmidt, Rule 114.

¹³⁹ Supra note 10, ICRC.

¹⁴⁰ Geneva Convention I, Articles 42, 51, 52; Geneva Convention IV, Articles 18, 22; Additional Protocol I, Articles 8, 18, Articles 38 and 56.

¹⁴¹ Supra note 69, Stephens, D. and Steer, C., 1-33.

identification, civil objects can also be identified by means of infrared features, radio, and electronic identification. The belligerents can also set electronic identification such as radar signals for medical aircraft through agreements or unilateral determinations.¹⁴² In cyber warfare, electronic marking and other means can also be used to ensure that military targets, civilian objects, and objects under special protection are clearly identified.¹⁴³ With reference to the above international practice, the defender in an armed conflict in outer space should also visually and effectively distinguish between civilian objects and objects under special protection according to the characteristics of the outer space environment.

2) Relocation of civilian objects away from the vicinity of military objects

In order to implement the principle of distinction, in accordance with the Geneva Conventions and the Additional Protocols, belligerent parties are obliged to move civilian objects and protected objects under their own control from areas where military objects are located.¹⁴⁴

a. In armed conflicts in outer space, the key is to distinguish between military and civilian functions of dual-use space objects. In this regard, the defender can effectively self-distinguish the civilian functions of space objects by providing detailed information to the enemy.¹⁴⁵

b. Equipping the civilian part of the dual-use space system with defensive means, such as defensive facilities and cryptographic equipment, anti-satellite weapons, bodyguard satellites, etc.¹⁴⁶ As stipulated in the *Joint Service Manual on the Law of Armed Conflict* of United Kingdom, belligerents may install weapons such as anti-aircraft or anti-missile missiles near projects or facilities containing dangerous forces for defense.¹⁴⁷

c. Separate military and civilian components and ensure that key civilian parts are repaired in a timely manner.¹⁴⁸ If it is difficult to distinguish and isolate, belligerents should stop all use of the military function of the space object as appropriate, otherwise it will lead to indiscriminate attacks.¹⁴⁹

3) Accurate registration of the military or civilian nature of space objects

The *Registration Convention* sets up a registration system for space objects, with a view to providing methods and procedures for contracting countries to help identify space objects.¹⁵⁰ During armed conflicts, improving the utilization rate and registration accuracy of space object registers can minimize system costs for reverse distinction. As stated by the ICRC, during hostilities in outer space, belligerents should accurately register civilian space objects under their jurisdiction, as well as space systems serving specially protected objects, objects indispensable to the survival of the civilian population.¹⁵¹

4) Distinguish between "specially protected objects" through "transparency and confidence-building measures"

The United Nations calls for "transparency and confidence-building measures" in peacetime.¹⁵² In order to distinguish protected objects, during armed conflicts in outer space, the belligerents can also be transparent and open about their intentions and policies, such as exchanging information and intelligence on specially protected space objects in real-time. There have been countries using this approach in the past. For objects such as hospital ships, the belligerent must provide information to facilitate the identification and recognition of the ship within a certain period of time before use, and confirm that the enemy has received this information. Belligerents may enter into an agreement to determine the manner of marking and identification of enemy aircraft that enjoy special protection.

¹⁴² Supra note 58, The Joint Doctrine & Concepts Center of UK, Rule 12.107, Rule 12.108, Rule 12.109.

¹⁴³ Supra note 9, Schmidt, M. Rule 124, Rule 133.

¹⁴⁴ GC I, Articles 40, 41; GC II, Article 42; GC IV, Article 20; Additional Protocol I, Articles 44, Article 51, Article 56, Article 58.

¹⁴⁵ Supra note 93, Program on Humanitarian Policy and Conflict Research at Harvard University, Section I: Protection of Civilian Aircraft, IV. Safety in flight; Supra note 58, The Joint Doctrine & Concepts Center of UK, Rule 12.45, Rule 12.46, Rule 12.47, Rule 12.48, Rule 12.49, Rule 12.50.

¹⁴⁶ Supra note 58, The Joint Doctrine & Concepts Center of UK, Rule 13.124, Rule 13.125; Supra note 93, Program on Humanitarian Policy and Conflict Research at Harvard University, Section L: Specific Protection of Medical Aircraft.

¹⁴⁷ Supra note 58, The Joint Doctrine & Concepts Center of UK, Rule 5.30.7.

¹⁴⁸ Supra note 9, Schmidt, M., Rule 121; Supra note 12, Schmitt, M., Rule 121.

¹⁴⁹ ICRC. Research on Customary International Humanitarian Law, Rule 13; Supra note 9, Schmidt, M., Rule 112; Supra note 93, Program on Humanitarian Policy and Conflict Research at Harvard University, Rule 13; Supra note 30, US Department of Defense, Rule 5.1.8.

¹⁵⁰ Registration Convention, Preamble.

¹⁵¹ Supra note 10, ICRC.

¹⁵² Office for Disarmament Affairs of UN, *Outer Space*. Retrieved from <https://www.un.org/disarmament/topics/outerspace/>.

5. Obligations of the Attacking Party to Take Preventive Measures in an Armed Conflict in Outer Space

Based on the principle of distinction, the attacking party and the defending party have different preventive measures obligations. As far as the attacker is concerned, when carrying out military activities related to outer space, it must avoid undue damage to civilians, civilian objects, and protected persons and objects in outer space and on Earth.¹⁵³ Specifically speaking, feasible preventive measures should be taken to ascertain the nature of the attack target, timely issue effective advance warning, and promptly cancel or stop the attack.¹⁵⁴

5.1 Feasibility of Preventive Measures

Assessing the feasibility of preventive measures takes into account all circumstances existing at the time, such as available intelligence, the accuracy of available weapons, the urgency of military operations, and the costs and risks associated with preventive measures.¹⁵⁵

1) Maintain the accuracy of the accessible database

Different from traditional armed conflicts, combatants in armed conflicts in outer space are usually physically far away from the actual battlefield, and can only identify and control outer space systems through non-visual means. Assessing the feasibility of preventive measures is highly dependent on the accuracy of orbital and other relevant data.¹⁵⁶ Therefore, a country can at least maintain the accuracy of databases in high-tech warfare as a “feasible” precaution,¹⁵⁷ enhancing intelligence gathering capabilities,¹⁵⁸ or hiring technical experts to assist.¹⁵⁹

2) Consider the "asymmetry" of countries' outer space capabilities

The extent to which the feasibility of preventive measures can be assessed depends largely on the outer space technology of the belligerent. There are differences in the development levels of outer space among countries, which will to a certain extent lead to the asymmetry of outer space combat capabilities among countries. Therefore, excessive assessment criteria should not be applied to countries with relatively backward space capabilities. However, for countries with strong space technology, the assessment standards should be appropriately raised.¹⁶⁰

5.2 Specific Preventive Measures

Pursuant to Additional Protocol I and customary IHL, prior to an attack, it should be ascertained, as far as possible, that the target of the attack is a military object and not civilians, civilian objects, or persons and objects under special protection. Effective prior warning of attacks shall be given to the affected civilian population.¹⁶¹ After an attack has begun, if it is found that the target has been misidentified as a military object or is no longer a military object, the attack shall be canceled or stopped.¹⁶²

1) Pre-attack precautions

For attacks that may affect civilians, an effective prior warning can be issued through the Internet or other early warning technologies to ensure that the intended recipients receive, understand and can act on the warning with sufficient time.¹⁶³ However, in armed conflicts in outer space, the imperfect registration system of space object information and the opacity of information among countries add difficulty in assessing the feasibility of preventive measures and issuing warnings.¹⁶⁴

Accurate registration of space objects is a basic requirement of outer space law. The United Nations Committee on Outer Space Affairs also advocates that all countries should appropriately increase the transparency of outer

¹⁵³ Supra note 10, ICRC.

¹⁵⁴ Additional Protocol I, Articles 51, 57; ICRC Study on Customary International Humanitarian Law, Rule 19; CCW Protocol II, Article 3; CCW Protocol III, Article 1 Article; Protocol II Amended to the Convention on Conventional Weapons, Article 3; Supra note 25, Meltzer, N., 101-104.

¹⁵⁵ Protocol II to the Convention on Conventional Weapons, Article 3; Protocol III to the Convention on Conventional Weapons, Article 1; Protocol II Amended to the Convention on Conventional Weapons, Article 3; Supra note 25, Meltzer, N., 101-104.

¹⁵⁶ Supra note 69, Stephens, D. and Steer, C., 1-33.

¹⁵⁷ Committee on the Peaceful Uses of Outer Space: Guidelines for the Long-term Sustainability of Outer Space Activities, Guideline B.2; Supra note 53, Beard, J., 409-445.

¹⁵⁸ San Remo Naval Warfare Manual, Article 46; Supra note 9, Schmidt, M., Rule 115.

¹⁵⁹ Supra note 9, Schmidt, M., Rule 115.

¹⁶⁰ Schmidt, M. (2006). War, technology and the law of armed conflict. *International Law Studies. US Naval War College*, (82), 137-182.

¹⁶¹ Additional Protocol I, Articles 51 and 57.

¹⁶² Additional Protocol I, Article 57(2); ICRC Study on Customary International Humanitarian Law, Rule 19.

¹⁶³ Supra note 9, Michael Schmidt, Rule 120.

¹⁶⁴ Supra note 68, Blount, P.J.

space activities in peacetime, establish "transparency and confidence-building measures" and collaborate and exchange information using negotiated or internationally recognized standards.¹⁶⁵ In times of war, the above obligations are even more important. As stated in the *McGill Manual on International Law Applicable to Military Uses of Outer Space*, member countries of the *Outer Space Treaty* shall inform the Secretary-General of the United Nations, the public and the international scientific community of the nature, conduct, location and results of their space activities, including military space activities.¹⁶⁶

2) Precautions during attacks

a. Carefully evaluate the secondary and tertiary effects of the attack. In armed conflicts in outer space, the secondary and tertiary effects of belligerent actions are more critical. On the one hand, it is necessary to avoid attacks affecting the normal life of civilians at all times and avoid causing non-military casualties to civilians. On the other hand, belligerents should always pay attention to the impact of their behavior on the natural environment, such as generating a large number of debris clouds and causing irreversible threats to the outer space environment. Belligerents should avoid causing extensive, long-term and serious damage to the earth's environment.¹⁶⁷ In order to minimize collateral damage to civilians, civilian objects and protected objects (especially the natural environment), different combat methods can be used when attacking different military targets.¹⁶⁸ It is worth noting that, in accordance with the *Guidelines for the Long-term Sustainability of Outer Space Activities* issued by the Committee on the Peaceful Uses of Outer Space, the attacker's obligations could also include assessments of space-based facilities during all phases of an attack to avoid potential unwanted collisions.¹⁶⁹

b. Pay attention to changes in the legal status of space objects in a timely manner. A military object should provide a "clear military benefit" under the circumstances".¹⁷⁰ The same space object may perform different functions at different times due to changes in its position, moving speed, ownership and other conditions. For example, a satellite that transmits power to a military satellite should be considered as a military target. But if it changes position to avoid an accidental collision, it cannot provide a clear military advantage and is no longer a legitimate target. It is the attacker's responsibility to monitor the attack in real-time, and those who planned, approved, or executed the attack should cancel, suspend, or reschedule the attack when the target is no longer used for military purposes or is specially protected. Where continuous monitoring is difficult, the degree of scrutiny at the planning and decision-making stages should be increased.¹⁷¹

6. Conclusion

Outer space is closely related to human security and well-being. All countries have extensive common interests in outer space, and the concept of a community with a shared future for mankind has become more prominent in outer space. All countries in the world should actively promote the signing of a treaty on the control of outer space, participate in international cooperation in the peaceful use of outer space, and carry out international space cooperation. The existing IHL is still insufficient to tackle new challenges of outer space security. Negotiation of new rules has become increasingly urgent. IHL may be applied during an armed conflict in outer space, but it does not legitimize or encourage the use of force in outer space.¹⁷²

Based on the discussions above, the following issues should be considered when applying the principle of distinction in outer space:

6.1 Civilians Are Persons Who Do Not Directly Participate in Hostilities in Outer Space and Shall Be Protected by IHL

(1) All space flight participants in armed conflicts in outer space, as long as they do not meet the requirements of IHL for combatants, should be regarded as non-combatants. The attacker should avoid attacking non-combatants, and the defender should effectively distinguish non-combatants.

(2) The complexity of new combat technologies has increased the demand for civilian personnel in the armed

¹⁶⁵ Committee on the Peaceful Uses of Outer Space. *Guidelines for the Long-term Sustainability of Outer Space Activities*, Guideline B.2.

¹⁶⁶ Jakhu, R. S. & Freeland, S., (eds., 2022). *McGill Manual on International Law Applicable to Military Uses of Outer Space: Volume I - Rules* (Montreal: Center for Research in Air and Space Law, 2022), McGill University Press, Rule 122.

¹⁶⁷ Supra note 10, ICRC. United Nations Office for Outer Space Affairs: *Guidelines for the Long-term Sustainability of Outer Space Activities of the Committee on the Peaceful Uses of Outer Space*, Guidelines B.4.

¹⁶⁸ Supra note 9, Schmitt, M., Rule 116, 118.

¹⁶⁹ Supra note 167, United Nations Office for Outer Space Affairs, Guideline B.4.

¹⁷⁰ Additional Protocol I, Article 52(2); ICRC Study on Customary International Humanitarian Law, Rule 8.

¹⁷¹ Supra note 9, Schmidt, M., Rule 119.

¹⁷² Supra note 10, ICRC.

forces of various countries. Members of the armed forces in the outer space are generally regarded as combatants, but those who do not directly participate in hostilities, such as legal advisers who specialize in humanitarian duties and civilian personnel responsible for technology research and development, should be considered non-combatants.

(3) In the manned spaceflight projects of various countries, astronauts usually engage in non-military activities such as scientific research and exploration. The mere fact that an armed conflict exists does not necessarily make an astronaut a combatant, and unless and until he engages in acts substantially connected with an armed conflict, an astronaut shall continue to maintain his status as an envoy of humanity.

6.2 Civilian Objects and Specially Protected Objects in Outer Space Enjoy Protection from Attack

(1) Space systems should generally be considered as civilian objects and enjoy protection from attack unless the attacker has sufficient information to confirm that they meet the requirements of a military object. In addition, when doubts arise about the nature of space objects or space systems that are normally used for peaceful purposes, a favorable presumption should be made.

(2) Space suits, space stations, space food, etc. are all objects that astronauts must rely on for survival. Regardless of whether it is for the attacker or the defender, objects on which military astronauts or private astronauts depend for survival should be distinguished and should be specially protected.

(3) Promoting space environment governance and implementing international space debris mitigation have become issues of concern to all countries. In the event of an armed conflict in outer space, all parties need to consider the secondary effects of hostilities and replace combat methods that have an irreversible impact on the natural environment with less lethal ones.

(4) Space assets can be widely used in public welfare and play an important role in ecological protection, disaster prevention, emergency management, weather forecasting and climate change mitigation.¹⁷³ These space objects can be used for humanitarian aid during wartime, or have a wide impact on civilian life, and should be regarded as specially protected objects and be effectively differentiated in reverse.

6.3 The Principle of Reverse Distinction

(1) Dual-use space objects bring difficulties to the application of the principle of distinction. The commercial aerospace companies of some countries are heavily involved in military space activities, blurring the boundaries between military and civilian activities.¹⁷⁴ Following the principle of reverse distinction can not only minimize the harm caused by space-hostile actions to civilian life but also conform to the common interests of all countries.

(2) For the reverse distinction of personnel, feasible methods include specifying special signs that can be recognized in outer space, setting up shelters, prohibiting the abuse of civilians and protected personnel for seeking military advantages, etc. Methods for the reverse distinction of objects include equipping important space assets with defensive means, isolating military and civilian components, accurately registering the nature of space objects, and improving "transparency and confidence-building measures".

6.4 Practice the Principle of Precautionary Measures

(1) When assessing the feasibility of preventive measures, the asymmetry of outer space capabilities of various countries shall be taken into account. The standards for developing countries should be appropriately lowered. Conversely, higher standards can be used on countries with mature outer space technology.

(2) During hostilities in outer space, all parties should honor their obligations under the *Registration Convention*, appropriately establish "transparency and confidence-building measures", and ensure accurate registration of the military or civilian use of space objects. It is feasible to distinguish military and civil objects with these measures.

(3) Countries should conduct consultations on standards for preventive measures. Prior to an attack, an advance warning must be given through effective early warning technology for any attack that may affect civilians. During an attack, countries need to take into account the secondary and tertiary effects of the attack, monitor the hostile actions in a real-time manner, and immediately cancel, suspend or reschedule the attacks when needed.

¹⁷³ Supra note 47, State Council Information Office.

¹⁷⁴ The Permanent Mission of the People's Republic of China to the United Nations (2022). *Document Submitted by China Pursuant to UNGA Resolution "Further Practical Measures for the Prevention of an Arms Race in Outer Space"* (No. 76/230), http://un.china-mission.gov.cn/zgylhg/202205/t20220503_10681319.htm.

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