The Outer Limits: Ethics in Destroying Satellites

By Mark Acebo (first rotation graduate, CASG. 2764 words)

Introduction

On 27 March 2019, India announced it had successfully conducted an anti-satellite missile test (ASMT). The ASMT involved shooting down a satellite in low-orbit with a missile. India is just the fourth country in the world to demonstrate this capability, after Russia, China, and the United States (Masih 2019). The test produced 400 pieces of debris, prompting NASA administrator Jim Bridenstine to criticise the test as endangering the International Space Station (ABC/Reuters 2019).

Earlier, President Donald Trump signed a directive ordering the US Department of Defense to establish a new armed branch dedicated to countering space-based threats (Cooper 2019). According to critics, the move could end up militarising space (Cooper 2019). Additionally, the US Defense Intelligence Agency released an extensive report about the Chinese and Russian efforts in increasing weaponisation of space (Sheetz and Macias 2019).

With these recent developments, a question arises whether it is necessary to have ethical guidelines on space warfare, particularly on destroying satellites. The contemporary multipolar world is making space conflict a dangerous likelihood. The introduction of the Australian Space Agency lends Australia an opportunity to plan for space power. Consequently, Australian military planners should start preparing rules of engagement on space warfare to serve as combat guidelines for the Royal Australian Air Force ('RAAF').

To understand the issues deeper, this paper will first discuss the 1967 UN Outer Space Treaty ('the Treaty'), the underlying legal framework of international space law. Then, it will explore whether the Treaty allows military action. Next, it will discuss whether international humanitarian law is applicable in an outer space conflict. Ultimately, it will propose two ethical principles for the RAAF should Australia need to destroy enemy satellites in the future.

PART I: Foundations of Space Law

One may state the Treaty is the *de facto* 'constitution' of outer space. Article I of the Treaty provides the use of outer space '*shall be carried out for the benefit and in the interests of all countries'*. Since outer space belongs to every country, the Treaty prohibits sovereignty claims, as per Article II:

> 'Outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.'

As Article II points out, outer space represent the space in between all the celestial bodies. Hence, one may state outer space is *res extra commercium* i.e. something incapable of owning or trading (Cheng 1983, 91–92). Nonetheless, it is unclear whether the Treaty applies to private, non-governmental ownership claims

over celestial bodies (Ramey 2000, 75). It is plausible non-state actors or global corporations could rival governments in space control.

In examining how the Treaty affects international law, one may refer to Article 34 of the 1969 Vienna Convention on the Law of Treaties (Cheng 1983, 92). The article states that 'a treaty does not create either obligations or rights for a third state without its consent'. Nonetheless, Article 38 of the same convention outlines that:

> 'Nothing in articles 34 to 37 precludes a rule set forth in a treaty from becoming binding upon a third state as a customary rule of international law, recognised as such'.

As at February 2019, 109 countries are party to the treaty and another 23 have signed but not ratified (United Nations Office for Disarmament Affairs 2019). The number of treaty parties lend support to the assertion that the Treaty has acquired general acceptance among international law (Cheng 1983, 92).

Military Involvement and Peaceful Purposes

Weapons of Mass Destruction and National Responsibility

Article IV contains an explicit prohibition against placing weapons of mass destruction on celestial bodies. Such prohibition includes installation and stationing of weapons. Furthermore, the Treaty forbids military bases, fortifications, and conducting military manoeuvres on the moon and other celestial bodies.

The Treaty offered a significant innovation in international law. Article VI requires states bear 'international responsibility for national activities in outer space…whether such activities are carried on by government agencies or non-governmental entities'. While it may not affect a state's capacity to wage war on space, it could affect military research and development. To illustrate, a military contractor could test weaponry on outer space, with the host state liable for the activity (Ramey 2000, 75).

The novel concept is relevant to national security, particularly regarding terrorism. Since states are liable for national activities in outer space, it could render them liable for unauthorised hostile space activities of its citizens. If an Australian citizen manages to destroy a US satellite in space, Australia will bear responsibility for his or her actions. Australia's responsibility applies even if the building, launch, and control of the attacking object occurred outside Australia (Ramey 2000, 76). This principle proposes a challenging question for states by attaching responsibility to their respective governments for their citizens' actions. While it is uncertain terrorists groups could target satellites, rogue state elements or a coup d'état could utilise this in the near future.

Peaceful Purposes

Ambiguity mires the term 'peaceful purposes' because it is not well defined in the treaty. In assessing a treaty term, it is practical to examine its meaning as used in other treaties. Article 1(1) of the International

Space Station ('ISS') Agreement requires that ISS use be reserved for 'peaceful purposes' (Ramey 2000, 80). Nonetheless, article 9, paragraph 3(b) provides 'the Partner providing an element shall determine whether a contemplated use of that element is for peaceful purposes'. Accordingly, each Partner decides for itself whether its proposed use constitutes a peaceful purpose.

Referring to the ISS agreement, unless a State's interpretation is so unlikely as to amount to bad faith, the decision regarding a proper interpretation of "peaceful purposes" under the Outer Space Treaty continues to rest with the party proposing the action (Ramey 2000, 81).

Allowable Military Actions

While Article IV does not permit placing weapons of mass destruction in space, it permits the use of military personnel for scientific research or peaceful purposes. Article IV states that "the use of any equipment or facility necessary for peaceful exploration of the moon and other celestial bodies shall also not be prohibited." Anyone familiar with legal studies may interpret the words "any equipment" as inclusive of military equipment.

Furthermore, while the Treaty bans the placement of nuclear or weapons of mass destruction, there is no specific prohibition against placement of weapons in general. Indeed, academics now warn that armed conflict beyond Earth is inevitable (Greene 2018).

PART II: International Humanitarian Law in Space

Evolving Conflict

Western states like the United States and the United Kingdom have developed sophisticated network-based war systems that rely heavily on space-borne assets. These include intelligence gathering through remote sensing, GPS-assisted weapons, satellite telecommunications, and drone technology. US military leaders have recognised 'space superiority is the future of warfare' (Stephens and Steer 2015, 4).

Early warning and navigation systems, global positioning systems, and surveillance are critical capabilities in future warfare. These technologies are all vulnerable without adequate defence. For example, electromagnetic pulse ('EMP') weapons can destroy sensitive circuitry. Unshielded electronic devices may be affected or disabled within several hundred kilometres of the blast radius (Stephens and Steer 2015, 6).

Space Reliance on Commerce

Similar to future warfare, global economy is reliant on space-based technologies. Long-range communications, public/commercial broadcasting, meteorology, are all highly dependent on satellite function (Haas 2015, 67). Additionally, shipping, civil aviation, agricultural planning, environment and

disaster management also rely on these technologies. Analysts estimate the provision of these services is valued over US$300 billion and remains a growth industry even after the Global Financial Crisis (Haas 2015, 67).

While the US and Russia remain at the forefront of space technology, more than 50 nations at present retain one or more satellites under their control. There are more than 1200 satellites operating in space, with US or Russia accounting for half. In the case of the US, private companies own almost half of their satellites (Haas 2015, 67). Because of the increased economic integration produced by globalisation, small or emerging states are now as vulnerable to space disruption as the superpowers. While superpowers possess the ability to absorb economic damage from orbital conflict (despite its steep cost), small states will find it difficult to unilaterally hedge against economic loss (Haas 2015, 67).

Since large sections of the economy rely on space-based technologies, any disruption to satellite functions would be devastating to many countries. An economic collapse would disproportionately affect small states, particularly developing countries. Hence, spacefaring countries need rules to prevent excessive impacts on the economy should space conflicts occur.

Application of Humanitarian Law in Space

The legal regulation of warfare has been primarily confined to land, sea, and air. The space environment finds limited expression in the present corpus of international humanitarian law. Nonetheless, McGill University launched the *Manual of International Law Applicable to Military Uses of Outer Space* (MILAMOS) project in May 2016. MILAMOS aims to 'develop a widely-accepted manual clarifying the fundamental rules applicable to the military use of outer space in times of peace and in periods of rising tension' ('Manual on International Law Applicable to Military Uses of Outer Space' 2016). While the MILAMOS project is underway, it is prudent to explore whether the existing international laws' text applies to space conflict.

Geneva Convention – Does it Cover Space?

The four Geneva Conventions signed in 1949 in the aftermath of World War II form the basis of international humanitarian law; with *Additional Protocol I* ('AP I') contained new rules on international conflicts. Much of the Protocols today are considered binding on all States and form part of international customary law (Alexander 2016, 2).

Articles 35(3) and 55 of AP I impose obligations on states regarding environment. The former prohibits warfare methods intended to cause 'widespread, long-term, and severe damage to the natural environment'. Article 55 instructs States to 'prohibit the use of methods…that are intended…to cause such damage to the

natural environment and thereby to prejudice the health or survival of the population.' While these articles do not mention outer space explicitly, it is logical to assume the provisions' effect extends beyond Earth.

Accepting the proposition that the Geneva Convention applies in space means the two core principles of humanitarian law are applicable; that is, military necessity and humanity. Additionally, and they serve as the basis for undertaking operational decisions in a conflict (Stephens and Steer 2015, 13).

Military Necessity and Humanity

For an attack to be lawful under international law, belligerents must be able to show the connection between the attack and the opponent's military capability (Ramey 2000, 35). The attacker must have a convincing reason that attacking the target will contribute to military victory. The more capable a belligerent in identifying these targets, the more responsibility it will possess under law.

Humanity requires any action undertaken during a conflict result in a minimum loss of life, and basic standards toward captured or injured combatants. Additionally, belligerents should ensure maximum protection of civilians who are unengaged in the conflict (Rogers 2004, 7). As the principle of humanity places restrictions on justifiable military actions, these two opposing norms present difficult ethical questions. An operation may have military necessity but could result in significant civilian casualties.

Three sub-principles originate from these principles: namely distinction, proportionality and precaution in attack. While they may offer more guidance, they are still principles and remain broad in scope. In the untested battleground of outer space, many uncertainties may differ compared to land, sea, and air combat.

Distinction

Belligerents should treat civilians and combatants differently. Article 48 of AP I prohibit attack on any person deemed as a 'non-combatant', and only permits targets against military objectives. The distinction extends beyond persons and into objects. Article 52(2) of the AP I define military objects as:

'…objects which by their nature, location, purpose or use make an effective contribution to military action and whose total or partial destruction, capture or neutralization, in the circumstances ruling at the time, offers a definite military advantage.'

Distinction obliges attackers to exercise reasonable care in the selection, engagement, and destruction of targets. Additionally, it imposes a duty commensurate with the belligerents' ability to distinguish (Ramey 2000, 38). The obligation is relevant in outer space conflict, as belligerents will likely use advanced and sophisticated targeting systems.

Proportionality

The principle of proportionality requires belligerents to utilise armed force proportional to the legitimate military objective (Ramey 2000, 39). The principle prohibits indiscriminate attacks against civilians and property. Article 51(5)(b) of the AP I define an 'indiscriminate attack' as:

'An attack which may be 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.'

Precaution

Precaution supplants the principle of distinction. Belligerents should not disregard civilian presence and take steps to minimise harm against them. Article 57 of the AP I prescribe attackers to take precautions during operations to spare civilian population and objects. Additionally, Article 58 instructs armies to protect civilian population and objects under their control against military attacks.

PART III: Ethical Recommendations in Destroying Satellites

As outer space is an unproven ground for warfare, it is difficult to cover all issues and scenarios of war. Nevertheless, there are two ethical principles recommended for RAAF to implement in their combat doctrine when attacking satellites. Woven within these suggestions are the principles and sub-principles flowing from the Geneva Convention, discussed previously.

1) *Avoid destroying dual-purpose satellites if negative effects on civilians outweigh military objectives*

Dual-purpose satellite technology such as GPS confers military advantages. Attacking an enemy GPS satellite cripples their intelligence-gathering capability and precision-guided munitions. Nevertheless, GPS disruptions may affect civil aviation, telecommunications, automated major waterworks and many others. It is difficult to distinguish where military and civilian usage of these satellites begin and end. If the collateral effects on civilians are disastrous, then the RAAF should not destroy a satellite. The planners' challenge is to determine whether only immediate impacts such as civilian loss of life need to be considered, or whether long-term effects should be part of the calculation.

The planners can consult scientists and engineers to determine the effects of destroying a satellite on civilian populations. Nevertheless, it is wise not to pursue action where the consequences are broad, unknowable, and risky.

2) *Plan for the potential impact of satellite debris rotating around Earth*

Precaution in attack is critical in space warfare. Using weapon systems in space include many effects not present in terrestrial warfare. When China targeted its Fengyun 1C satellite in 2007 as an ASMT, it created a large debris field (Stephens and Steer 2015, 28). If destroyed at the correct altitude, debris will circle the Earth because it maintains its orbit. Debris can circle around Earth at speed up to 27,000 kilometres per hour; therefore, they are capable of destroying objects in their path. Additionally, when debris is travelling at hyper-velocity in an area of dense satellite or other space object concentration, there is significant potential for space debris to multiply because of subsequent collisions (Kessler and Cour-Palais 1978).

The RAAF could use electronic warfare against enemy satellites, shutting them down rather than destroying them. For example, an electronic weapon could send a signal interrupting a satellite's intended commands, causing disruption to signal reception. An advantage of using a 'soft' approach is a lesser likelihood the target will respond with legal or military action. An intact but damaged satellite is likely insufficient grounds to start a war. Nevertheless, jamming signals represent a violation of commercial satellite regulations administered by the International Telecommunications Union (Moltz 2014, 128).

CONCLUSION

The world economy is increasingly reliant on sophisticated technology, but the likelihood of space-based conflict is increasing. Global superpowers continue developing better weapons capable of destroying satellites. Whilst provisions exist in international law regarding outer space and warfare, it is deficient in laying the foundations for ethical space-based warfare.

Australia's space capability is at its infancy stages. Nevertheless, it is vital in her interests to plan for future warfare. Australia remains capable of balancing the superpowers' interests as a middle power while pursuing a future-focused and high-tech defence force. While Australia may be unable to conduct an ASMT yet, rapid developments in technology may progress her capability sooner rather than later.

While the proposed recommendations consider Geneva and international law-derived ethics as the starting point, destroying critical satellites will have an impact on millions of civilians, if not hundreds of millions. It is in the world's sincerest wishes to avoid such a scenario from ever occurring.

BIBLIOGRAPHY

ABC/Reuters. 2019. ‘NASA Chief Criticises India over Debris from Anti-Satellite Weapon Test’. Text. ABC News. 2 April 2019. https://www.abc.net.au/news/2019-04-02/india-anti-satellite-test-created-dangerous-debris-nasa-warns/10963240.

Alexander, Amanda. 2016. ‘International Humanitarian Law, Postcolonialism and the 1977 Geneva Protocol 1’. *Melbourne Journal of International Law* 17 (1): 1–36.

Cheng, Bin. 1983. ‘Definitional Issues in Space Law: The “Peaceful Use” of Outer Space, Including the Moon and Other Celestial Bodies’. *J Space Law* 11 (89).

Cooper, Helene. 2019. ‘Trump Signs Order to Begin Creation of Space Force’. *The New York Times*, 20 February 2019, sec. U.S. https://www.nytimes.com/2019/02/19/us/politics/trump-space-force.html.

Greene, Andrew. 2018. ‘No Phantom Menace: Space Wars Inevitable, Experts Warn’. Text. ABC News. 10 April 2018. https://www.abc.net.au/news/2018-04-10/war-in-space-inevitable-experts-warn/9635358.

Haas, Michael. 2015. ‘Vulnerable Frontier: Militarized Competition in Outer Space’. Strategic Trends 2015: Key Developments in Global Affairs. Center for Security Studies: ETH Zurich. https://www.law.upenn.edu/live/files/7838-haasvulnrblfrntstratgctrnds2015pdf.

Kessler, Donald J., and Burton G. Cour-Palais. 1978. ‘Collision Frequency of Artificial Satellites: The Creation of a Debris Belt’. *Journal of Geophysical Research: Space Physics* 83 (A6): 2637–46. https://doi.org/10.1029/JA083iA06p02637.

‘Manual on International Law Applicable to Military Uses of Outer Space’. 2016. McGill University. 2016. https://www.mcgill.ca/milamos/.

Masih, Niha. 2019. ‘India Shoots down Satellite in Test of Space Defense, Modi Announces’. *The Washington Post*, 27 March 2019, sec. Asia & Pacific. https://www.washingtonpost.com/world/asia_pacific/india-shoots-down-satellite-announces-itself-to-be-a-space-power/2019/03/27/a1e73426-5068-11e9-af35-1fb9615010d7_story.html.

Moltz, James Clay. 2014. *Crowded Orbits*. Columbia University Press.

Ramey, Robert A. 2000. ‘Armed Conflict on the Final Frontier: The Law of War in Space’. *The Air Force Law Review* 48 (1): 1–157.

Rogers, Anthony Peter Vernon. 2004. *Law on the Battlefield*. 1st ed. Manchester: Manchester University Press.

Sheetz, Michael, and Amanda Macias. 2019. ‘Pentagon Warns of “weaponization of Space” by China and Russia’. CNBC. 13 February 2019. https://www.cnbc.com/2019/02/13/pentagon-warns-of-weaponization-of-space-by-china-russia-report.html.

Stephens, Dale, and Cassandra Steer. 2015. ‘Conflicts in Space: International Humanitarian Law and Its Application to Space Warfare’. *Annals of Air and Space Law* XL.

United Nations Office for Disarmament Affairs. 2019. ‘Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies’. United Nations. 2019. http://disarmament.un.org/treaties/t/outer_space.