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New Environment, Old Fears: The Security Dilemma and the Absence of a Prohibition on Space Weapons

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Unless otherwise acknowledged in the text, this thesis represents the original research of the author. The views expressed in this paper are my own and do not necessarily reflect those of other individuals or organisations. Any errors or omissions contained herein are, of course, mine and mine alone.

TABLE OF CONTENTS

NEW ENVIRONMENT, OLD FEARS: THE SECURITY DILEMMA AND THE ABSENCE OF A PROHIBITION ON SPACE WEAPONS

'Earthrise' As Seen From the Moon By Astronauts of the Apollo 8 Mission (24 December 1968)[1]

Executive Summary

During the Cold War, the United States and Soviet Union demonstrated a shared interest in a military status quo in Earth orbit and exercised considerable restraint by not placing weapons in space.

However, despite ever-increasing state dependency on civilian space applications, militarisation efforts have accelerated in recent decades, heightening fears that one or more states may deploy space weapons. Indeed, the catastrophic consequences of a space war appear to provide the world with an interest in keeping space conflict free but key space power states have been reluctant to implement a prohibition on weapons in space.

To understand why, this paper analyses the history of space militarisation and arms control and the two most prominent explanations offered to date – that the United States has acted as a non-status quo state and that international governance has failed to deliver on its promise. Finding these unsatisfactory, the paper proposes that the absence of a space weapons prohibition is instead best understood as the product of security dilemma dynamics. These can lead even benign states with significant common interests to a self-reinforcing spiral of insecurity driven by uncertainty and fear.

[1] Frank Borman (NASA), 'Earth Rise', photograph, 24 December 1968. Accessed 12 March 2013 at www.nasa.gov/multimedia/imagegallery/image_feature_102.html

Glossary

ABM Treaty	*Treaty on the Limitation of Anti-Ballistic Missile Systems*, or Anti-Ballistic Missile Treaty
ASAT	Anti-satellite weapon
BMD[S]	Ballistic Missile Defence [System]
CBM	Confidence Building Measure
ESA	European Space Agency
EU	European Union
GEO	Geostationary Orbit
GNSS	Global Navigation Satellite System
GPS	[United States] Global Positioning System
HEO	High Earth Orbit
ICBM	Intercontinental Ballistic Missile
ICOC	International Code of Conduct Against Ballistic Missile Proliferation
ISR	Intelligence, surveillance and reconnaissance
ISS	International Space Station
LEO	Low Earth Orbit
Outer Space Treaty	*Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies*
PAROS	Prevention of an Arms Race in Outer Space (agenda item of the United Nations Conference on Disarmament)
PPWT	Draft 'Treaty on the Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force Against Outer Space Objects'
SDI	[United States] Space Defence Initiative
SPACECOM	[United States Air Force] Space Command
SSA	Space Situational Awareness
SSN	[United States] Space Surveillance Network
TCBM	Trust and Confidence Building Measure
TMD	Theatre Missile Defence
UN	United Nations
USAF	United States Air Force
WMD	Weapon(s) of mass destruction

CHAPTER 1: INTRODUCTION

"[T]he import of space to civilian, commercial and, in particular, military objectives, means that there is a great deal at stake in terms of the access to and control over Earth's orbit. One cannot overstate this…point."
Francis MacDonald[2]

When the USSR launched the world's first satellite on 4 October 1957, it expanded the Cold War into Earth orbit and outer space became a key arena for competition between it and the US for prestige and influence. As Soviet and American spacecraft increased in both numbers and the variety of uses to which they could be put, it became clear that the space environment was one in which there was as yet no 'rules of the game'. Over the next three decades, the superpower rivals made significant efforts to regulate space use; a number of multilateral treaties on space were established, principles for space governance agreed, and new international institutions set up to develop and oversee space governance. Space governance arrangements trumpeted the 'peaceful' uses of outer space, but few real restrictions were placed on states' ability to utilise space for military purposes.

This is striking as both the Soviet and American militaries made increasing use of space applications, and this 'militarisation' trend has only accelerated since the end of the Cold War. Satellite communications, navigation and imagery have increasingly supported intelligence-gathering and military operations on the ground. New military space technology has been developed, including anti-satellite weapons (ASATs) which, while never fired in anger, have now been tested by a number of countries. It should be noted that military uses were not solely offensive; satellites supported nuclear deterrence through providing early warning of launches and satellite imagery assisted the verification of strategic arms control agreements.

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[2] Francis MacDonald, 'Anti-Astropolitik – Outer Space and the Orbit of Geography', *Progress in Human Geography* 31(5):592-615 (2007), p.606

Calls for restrictions on military use of space accompanied this increasing military and civilian use of Earth orbit. In particular, many politicians and academics expressed concern at the prospect that the gradual and largely passive militarisation of space might cross a threshold into full-blown 'weaponisation', and that space would become the arena for a new and potentially catastrophic arms race. These fears have not disappeared with the end of the Cold War. Despite their rivalry, the US and USSR demonstrated a shared interest in a military status quo in space, largely avoided destructive escalation, cooperated on arms control measures, and exercised considerable restraint by not placing weapons in space.[3] However, the increasingly congested nature of orbit and persistence of definitional issues in arms control efforts[4] have highlighted growing potential for misunderstandings, competition and conflict in space.[5]

Despite the seemingly pressing need and broad agreement by most commentators that it would be in the interests of all states, the world has never had a comprehensive legal regime prohibiting the weaponisation of space.[6] The *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies* ('Outer Space Treaty') of 1967, still the foundation of international space law, does ban the placement of nuclear weapons and other weapons of mass destruction (WMD) in space.[7] However, it does not explicitly prohibit the deployment of non-WMD weapons in Earth orbit, terrestrially-launched ASATs, or the development, testing, production or storage of space weapons on Earth.[8] A number of other treaties and anti-proliferation regimes do restrict some aspects of testing and deployment,

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[3] Nicholas Peter, 'The Changing Geopolitics of Space Activities', *Space Policy* 22:100-9 (2006), p.101; Nancy Gallagher, 'Space Governance and International Cooperation', *Astropolitics* 8:256-279 (2010), p.265
[4] Columba Peoples, 'The Securitization of Outer Space: Challenges for Arms Control', *Contemporary Security Policy* 32(1):76-98 (2011), p.78
[5] Gallagher, p.260 and Kim Rathman, 'Outer Space Commercialization and its Ethical Challenges to International Law and Policy', *Technology In Society* 21:135-166 (1999) p.139
[6] Tronchetti, Fabio: 'Preventing the Weaponisation of Outer Space: Is a Chinese-Russian-European Common Approach Possible?', *Space Policy* 27:81-88 (2011), p.88
[7] Tronchetti, p.82 and *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies*, 10 October 1967, Article 4
[8] Outer Space Treaty, Article 3

but do not prohibit space weaponisation itself.[9] Most recently, a 2008 joint proposal by China and Russia failed to establish a multilateral 'Treaty on the Prevention of Weaponisation of Outer Space'[10] (known as the PPWT) and the 2010 European Union 'Code of Conduct for Outer Space Activities' (EU Code of Conduct) is still to gain wide enough support to be considered to have changed the global situation.[11]

This absence of a ban on space weapons leaves open the possibility of armed conflict in space.[12] Such a conflict would have devastating consequences as most states and their populations are now critically reliant on space applications for everything from high-tech communications, finance and economic development to infrastructure planning and disaster response.[13] As one author puts it, space "may hold few human targets but the capture or disruption of satellites could have far-reaching consequences for life on the ground".[14]Adding to the potential impact of a space conflict is the risk of unintended consequences. Not only are satellite networks increasingly global in nature and interdependent, they also help to stabilise nuclear deterrence and their sudden disruption could increase the chance of nuclear war. Fears of weaponisation have increased following Chinese and American ASAT tests in 2007 and 2008 respectively, which many worried demonstrated these countries' willingness and ability to deploy space weapons in future conflicts.[15]

The increasing military and civilian use of space applications, let alone the potentially catastrophic consequences of a space conflict, would appear to provide states with a clear interest in keeping space conflict free. However, key space power states have been historically reluctant to implement a prohibition on weapons in space. This begs the question of *why.* Academics have put

[9] Tronchetti, p.83
[10] Tronchetti, p.84
[11] Tronchetti, p.85
[12] Jozef Goldblat, 'Efforts to Control Arms in Outer Space', *Security Dialogue* 34:103-108 (2003), p.108
[13] Tronchetti, p. 81
[14] MacDonald, p.600
[15] Tronchetti, pp.81, 84

forward a number of different explanations, but inconsistencies, flaws and oversights in these leave them unsatisfactory. This paper attempts to further academic understanding of this issue, adopting as its research question "why have key space power states failed to agree on a regime that would prohibit space weapons?"

The Politics of Space Weapons in Existing Literature

The politics of space has generated a significant amount of academic literature. In fact, it is possibly more accurate to say literatures, as the diversity of interests in space and its governance has led to a number of different disciplines – including history, law, and science – generating their own research. Relevant literature includes multi-disciplinary assessments on the possibility and likelihood of an arms race in space and the policy priorities of key space power states, strategic assessments of the evolution of space technology, and legal works on the possible form of a legal weaponisation. Along with refereed political science journals[16], relevant documentation includes the legal documents and UN General Assembly resolutions that form the core of international outer space law, public statements by space states,[17] as well as information collected by international organisations and think tanks[18].

Commentators agree that a military dimension has always existed to interstate relations in outer space and that this dimension has become particularly critical to space power states since the first Gulf War.[19] Indeed, many authors already consider space 'militarised' as space technologies

[16] For instance, these include *Space Politics*, *Astropolitics*, and *Acta Astronomica*
[17] Happily, and in light of the author's lack of Russian and Chinese language fluency, available literature contains a significant quantity of reliable information on Russian and Chinese space activities and the stances taken by these key space power states on arms control in space.
[18] The most useful of these is probably the *Space Security Index*, the only annual comprehensive report on global space security trends and developments. Begun in 2003, the Index relies on input from over 130 space experts from 17 countries in civil, commercial, and military space sectors. It can be accessed at www.spacesecurity.org.
[19] M Cervino, S.Corradini and S.Davolio, 'Is the "Peaceful Use" of Outer Space Being Ruled Out?', *Space Policy* 19:231-237 (2003), p.235; Alasdair McLean, 'A New Era? Military Space Policy Enters the Mainstream', *Space Policy* 16:243-247 (2000) p.243-244; Nancy Gallagher and John Steinbruner, Reconsidering the Rules for Space Security, American Academy of Arts and Sciences, Cambridge (2008), p.23

have become vital to space powers' military planning and operations.[20] Existing literature on space militarisation has three main focuses. Firstly, many articles focus on the desirability or lack thereof of arms control in the space environment. Secondly, almost all authors recognise the importance of defining 'militarisation' and 'weaponisation' to establishing a meaningful prohibition, though this distinction can sometimes blinker authors to wider concerns.[21] Third, there is considerable controversy over the question of whether the weaponisation of space is inevitable, why or why not, and the impact of this widely-held view on state efforts to prevent space weaponisation.[22]

There are also differences of opinion in the literature regarding the requirements of a 'successful' regime that prohibits space weaponisation. There is general agreement that a regime would need to secure the support of major space power states, clarify the ambiguity of weaponisation under current space law, and prohibit the research, development, production, storage and deployment of weapons regardless of their planned launching point or targets (ie. in Earth or in space).[23] A key issue lies in how to ensure state support for a prohibition, especially in light of fears that legitimate defence interests might be impacted.[24] Some argue that what is needed is a 'soft law' solution, namely a code of conduct along the lines of the 2010 EU Code of Conduct, to garner the greatest international support and to build norms.[25] One author stresses the importance of establishing agreement between Russia, China and Europe as these states have been responsible for the most significant and recent initiatives while the US is unlikely to lead on the matter.[26] Others point out that, as the country arguably most reliant upon space systems, the US "has a national

[20] Tronchetti, p.81; Columba Peoples, 'Assuming the Inevitable? Overcoming the Inevitability of Outer Space Weaponization and Conflict', *Contemporary Security Policy* 29(3):502-520 (2008), p.502
[21] Columba Peoples, 'The Growing Securitization of Outer Space', *Space Policy* 26:205-8 (2010), p.76
[22] Peoples, 'The Growing "Securitization" of Outer Space', p.205, McLean, p.246
[23] Tronchetti, pp.81, 84
[24] Tronchetti, pp.85-86
[25] Tronchetti, p.81
[26] Tronchetti, p.81

interest in keeping world commons secure", even if there are currently voices there arguing that the "law is basically what the USA says it is". [27]

There are two particularly prominent lines of argument for the failure of key space power states to agree on a prohibition on space weapons. The first argument is that the US has acted as an offensive realist state and has simply never wanted such a prohibition. Proponents base their arguments on what they see as historically aggressive past behaviour, expansionist conceptualisations of national security that make compromise impossible, as well as repeated American rejections of space arms control initiatives. They also often draw on the fact that many 'space nationalists'[28] among American scholars and policy-makers advocate aggressive policies that would increase US military space power.[29]

The second main line of explanation argues that the absence of a ban on space weapons is due to failures of international governance in the face of rapid changes in the nature and scale of space use. In other words, the absence of a prohibition is due to the fact the right arrangements have not yet been proffered, not an absence of state willingness to consider proposals. Reflecting an institutionalist focus on norms, law and governance systems, this argument assumes that the proper institution of an international legal framework may reduce tensions and promote peace in outer space.[30] It stresses the importance of multilateral space governance to providing states avenues for discussion, cooperation and dispute resolution.[31] This line of explanation is the most optimistic; relevant articles argue that space applications and technology intrinsically encourage international

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[27] Jonathan Galloway, 'Game Theory and The Law And Policy of Outer Space', *Space Policy* 20:87-90 (2004), p.88; McLean, p.247
[28] Michael Krepon,'Space: The Vulnerable Frontier', *Nonproliferation Review* 15(3):549-554 (2008), p.554
[29]Gallagher, p.260; Jonathan Galloway, 'Game Theory and The Law And Policy of Outer Space', *Space Policy* 20:87-90 (2004), p.88-9. For example, influential American academic and military scholar Everett C. Dolman advocates the adoption of a geopolitical approach to space control, which he terms 'Astropolitics', in order to ensure US space supremacy.
[30] Tronchetti
[31] Rathman, p.161; C.Arévalo-Yepes et al, 'The Need for a United Nations Space Policy', *Space Policy* 26:3-8 (2010), p.5

cooperation,[32] security on Earth is increasingly linked to peace in space,[33] military power has increasingly less relevance between great power states,[34] and that even the world's most militarily powerful country, the US, cannot overcome its vulnerabilities in space through deploying space weapons[35].

The Security Dilemma as a Possible Explanation for Space Militarisation

This paper proposes a third explanation, namely that the history of space militarisation and of efforts to ban weaponisation is best seen as the product of a 'security dilemma', most famously explained by Robert Jervis as stemming from the fact that "many of the moves by which a state tries to increase its security decrease the security of others".[36] In this way, even benign states with significant interests in common can be drawn into a spiral of response and counter-response that leads to competition and even conflict.[37] (A more comprehensive definition of this concept is set out in Chapter Five along with the discussion of how it helps to explain the history of space militarisation and arms control.)

The security dilemma was chosen as a potential explanation as it seems an obvious fit with the history of space militarisation. Firstly, the history of space politics is largely one driven by states and the nature of military technology, which are the focus of security dilemma considerations. Secondly, and perhaps most importantly, the security dilemma allows for conflict and competition to arise even where states have shared interests – such as in the case of space security – and where they harbour no expansionist or 'malign' intent. Thirdly, the security dilemma

[32] Tronchetti
[33] Arévalo-Yepes et al, p.6
[34] Galloway, p.88
[35] Gallagher, p.276
[36] Robert Jervis, 'Cooperation Under the Security Dilemma', *World Politics* 30(2):186-214 (1978), p.169
[37] Jervis, p.169

literature identifies possible regulators of intensity, allowing for potential explanations for why an issue may seem more difficult to resolve at some points than at others.

Despite its apparent applicability, few authors have explicitly considered the security dilemma concept when examining the threat of possible space weaponisation; the notable exception being those focussed on the narrower issue of the contemporary space relationship between the US and China.[38] However, there are a number of articles that discuss elements of the dilemma in other contexts. Firstly, several authors demonstrate in their work the security dilemma's focus on the importance of the character of technology – particularly the difficulty in distinguishing military from civilian technology and offensive from defensive weapons.[39] Secondly, several articles discuss the persistence of key space powers' uncertainties regarding the future intentions of their geostrategic rivals,[40] and the increasing complex task states face in assessing space security risks and appropriate responses as the number of space actors,[41] objects and possible applications grow[42]. Additionally, the literature points out, while states have grown in space capability they have also become increasingly vulnerable; the economic and strategic value of space continues to increase while potentially disruptive technology becomes more accessible to both state and non-state actors.[43]

Thesis Approach and Structure

This paper aims to address gaps in the literature by analysing the relative merit of a number of explanations for the fact that states have not been able to agree on a prohibition on space weapons. Chapter Two opens the discussion, providing a brief overview of space as a military

[38] Andrew Scobell, 'Learning to Rise Peacefully? China and the Security Dilemma', *Journal of Contemporary China* 21(76):713-721 (2012), p.720; Baohui Zhang, 'The Security Dilemma in the US-China Military Space Relationship', *Asian Survey* 51(2):311-332 (2011), p.313
[39] Peoples, 'The Growing "Securitization" of Outer Space', p.205 and Tronchetti, p.84
[40] Tronchetti, p.81
[41] Gallagher, p.260
[42] Rathman, p.139
[43] Gallagher, p.276

environment, the history of space militarisation, and key efforts to restrain and prevent the weaponisation of space. In doing so, it identifies a number of key characteristics of space militarisation and weaponisation that any comprehensive explanation of the absence of a prohibition on space weapons must address.

Chapters Three and Four set out and assess the two most prominent of the explanations in the literature for the absence of a space weapons prohibition. As foreshadowed above, these are, respectively, that the US has acted as a non-status quo, expansionist, and/or 'offensive realist' state, and the institutionalist view that international governance has failed to date due to definitional issues and the dynamic nature of the space environment.

Chapter Five proposes a relatively new explanation, namely that the history of space militarisation is best understood as the product of a security dilemma and that this security dilemma has prevented key space power states from agreeing on a prohibition on space weapons. This chapter explains the security dilemma concept before testing it against the history of space militarisation and arms control.

Chapter Six sets out the paper's main conclusions, chief of which is that the overall pattern of space militarisation (with certain exceptions) is consistent with the existence of a security dilemma, and that it is through the security dilemma that the failure of states to agree on a prohibition on space weapons is best understood. The paper ends by suggesting several potentially rewarding avenues for future research.

Scope and Key Terms

Before a proper discussion can take place, it is necessary to define this paper's scope and several key terms. This paper is an attempt to determine the best explanation for the fact that states have as yet been unable to establish a prohibition on space weapons. As a political analysis, it is not a technical study of the feasibility of various space weapons systems, an exhaustive history of space

militarisation or the development of space governance, or a legal analysis of different arms control proposals (except insofar as they reflect political realities).

For obvious reasons, the geographic focus will be on outer space. There is no agreed definition of 'outer space' (henceforth simply 'space'). However, this paper adopts the most commonly held unofficial definition, that space is all of the space surrounding the Earth in which objects can move without artificial propulsion systems and without being prevented from so doing by the resistance of the Earth's atmosphere. In practical terms, 'outer space' extends infinitely upwards from an altitude of approximately 100-150 kilometres,[44] but the particular focus of this paper is on Earth orbit as that is where the vast majority of human activity in space is located.[45] That said, it is important to note that the politics of space is "both terrestrial *and* extra-terrestrial: it is the relation of the Earth to its firmament".[46] In other words, the politics of space do not begin or end with the Earth's atmosphere, and events on Earth have always have had an impact on space politics and vice-versa.

The space focus requires attention be directed to particular states, namely those 'key space power states' with the greatest political weight. 'Key space power states' are therefore defined for the purposes of this paper as those states with the ability to indigenously produce, launch into orbit and recover spacecraft as these capabilities reflect the level of space technology required to provide at least a residual ability to attack objects in space. While the number of 'key space power states' has increased from one in 1957 to twelve by January 2013 by this definition, this paper will have a particular, though not exclusive, focus on the US, USSR/Russia, China and, to a lesser extent, Europe (originally the United Kingdom and France but increasingly a regional grouping). These entities have had the longest-running space programs, enjoy the most political weight and greatest

[44] Goldblatt, p.103
[45] James Moltz, 'Space and Strategy: A Conceptual Versus Policy Analysis', *Astropolitics* 8(2):113-136 (2010), p.133
[46] MacDonald, p.610

military power, represent the states most able to most weaponise space, and are the parties whose adherence to a prohibition would be most critical (including by pressuring other states to accede).[47] As veto-wielding members of the United Nations Security Council, they also play a dominant role in the organisation most likely to propose, oversee and potentially enforce any legal regime that prohibits the weaponisation of outer space.

On a related note, the timeframe the paper will cover is the period from the launch of Sputnik in October 1957 to the launch of STSAT-2C by South Korea in January 2013. These dates represent the first launches of indigenously produced satellites into orbit by the first and most recent states to do so, and thus the emergence of the first and most recent 'key space power states'.

This paper defines 'space weapons' broadly to include ground-launched weapons (including ASATs) as well as weapons – conventional and otherwise – placed in space. The difficultly in defining 'space weapons' is central to considerations of space arms control and is discussed in more detail in Chapter Two. Lastly, it also adopts a broad conception of a 'prohibition on space weapons and/or weaponisation', noting that a number of elements might make up a comprehensive legal framework and allowing for possibility of partial legal frameworks.

[47] Tronchetti, p.87

CHAPTER 2: SPACE MILITARISATION AND ARMS CONTROL

"Succeeding space arms control efforts have primarily served to highlight the difficulties which key space powers have in coming to terms with the regulation of outer space"
Columba Peoples[48]

Before this paper can examine the most prominent explanations for the absence of a prohibition on space weapons, it is important to first establish a clear view of the issue being considered. This chapter sets the scene for the debate conducted in the next three, providing a necessarily brief introduction to the nature of space geography before discussing the history of space militarisation and efforts to regulate it. It concludes by listing five key characteristics of this history that any argument needs to address to properly explain the absence of a prohibition on space weapons.

SPACE GEOGRAPHY

To some, the concept of geography might not appear to have application to space, which lacks the topographical features found on the Earth's surface, reflects no state borders and appears virtually limitless. However, space does indeed have its own distinct geography and this has had, and continues to have, a significant shaping effect on the activities of space actors.[49]

The most critical characteristic is the all-pervading importance of gravity. Indeed, Earth's gravity reflects its own 'topography' of gravity mountains and troughs; for instance, gravity is slightly less at the equator due to the fact the Earth is wider at that point.[50] Gravity (along with atmospheric drag) means that most of the effort, cost and difficulty in getting an object into space is spent on escaping Earth's atmosphere, but it also means that satellites can maintain orbits in certain

[48] Peoples, 'Securitisation of Outer Space' p.77
[49] MacDonald, p.599; Everett Dolman, 'Geostrategy in the Space Age: An Astropolitical Analysis', *Journal of Strategic Studies* 22:83-106 (1999), p.83
[50] MacDonald, p.599

positions with no artificial thrust. [51] The impact of gravity and the Earth's rotation means that the a launch's location, direction, and timing can make huge difference to the fuel required to enter orbit and to its possible payload and cost.[52]In particular, it is helpful to be able to launch from the equator and to aim east (to take advantage of Earth's spin).[53]

Secondly, there are a number of stable orbital paths around Earth, each of which has their own particular advantages.[54] Low Earth Orbits (LEOs) from about 150 to 800 kilometres assist close or detailed reconnaissance the Earth, robust communications links, and manned craft that need to maximise contact with ground control.[55] Medium Earth Orbits (MEOs) from 800 to 35,000 kilometres support linked satellite networks and are used for global navigation satellite systems and global telecommunications.[56] High Earth Orbits (HEOs) of at least 35,000 kilometres provide greater fields of view and maximum coverage with the smallest possible fleet of satellites.[57] Geostationary orbits (GEOs) are HEOs at 36,000 kilometres in which a satellite placed above the equator can maintain its position relative to a fixed point on Earth; carefully placed in GEO, only three satellites are required to view all of Earth to 70 degrees latitude North and South.[58]

Lastly, and more controversially, some authors – most notably Everett Dolman, a strident proponent of US military space development – argue that space, like the world's oceans, airspace, and ground is home to 'chokepoints', 'strategic narrows' and commerce lanes of particular strategic importance.[59] These include: specific orbits and transit routes that provide advantages in fuel efficiency, such as particularly efficient pathways from one orbit to another; the geostationary belt

[51] MacDonald, p.599; Dolman, pp.94-5
[52] Dolman, pp.100-101
[53] Dolman, pp.100-101
[54] Dolman, p.84
[55] MacDonald, p.599, Dolman, pp.86-7
[56] MacDonald, p.599, Dolman, p.87
[57] MacDonald, p.599, Dolman, p.86
[58] MacDonald, p.599, Dolman pp.86-9
[59] Dolman, p.96

around the equator; and the Lagrange Libration points (five specific locations where the gravitational forces of the Moon and Earth cancel each other out).[60] They also include the Van Allen radiation belts – two areas circling the Earth inside its magnetosphere that trap radiation that can cause damage to transiting spacecraft, limiting space traffic movements.[61]

HISTORY OF SPACE MILITATISATION AND ARMS CONTROL

The launch of Sputnik on 4 October 1957 is widely regarded as the start of the 'space age', although rocket technology had been tested since the mid-1940s by first Nazi Germany and then the US and USSR. It is also worth noting that Sputnik did not enter a complete international law vacuum when it entered orbit; the establishment of the United Nations (UN) in 1945 meant that states were subject to the general prohibition on the use of force under Article 2 of the UN Charter, subject to a right to proportionate and necessary self-defence, fully twelve years beforehand.[62]

Following the Soviet's success with Sputnik, the US House of Representatives passed a resolution in May 1958 that called for "strong [American] capability in the use of outer space, both as a deterrent to the use of military vehicles against this country and as an aid in developing antimissile techniques".[63] John F. Kennedy successfully appealed to Americans' fear of Soviet space weapons to help win the 1960 Presidential election,[64] and the 'space race' was on in earnest from the beginning of the 1960s.[65] In July 1962, the United State launched the 'Starfish' series of nuclear tests partly to test the devices' viability as ASATs, and in the process accidentally destroyed or damaged five American and one British satellites.[66] Several months later, and after the Cuban

[60] Dolman, pp.97-8
[61] Dolman, pp.98-9
[62] *Charter of the United Nations*, 26 June 1945, Articles 2 and 51
[63] McLean, p.243
[64] Gallagher and Steinbruner, p.9
[65] Goldblatt, p.103
[66] Michael Krepon and Michael Katz-Hyman, 'Space Weapons and Proliferation', *Nonproliferation Review* 12(2):323-341 (2006), p.326

Missile Crisis, American nuclear-tipped interceptors were deployed in the South Pacific to counter hostile Soviet satellites, but these were soon withdrawn.[67]

Despite his earlier rhetoric, President Kennedy was instrumental in the first real space arms control agreement. In 1963, the US and USSR renounced the deployment of WMD in space.[68] This paved the way for the Partial Test Ban Treaty of the same year, which limited nuclear testing to underground locations.[69] Militarily, the US continued its policy of 'contingent restraint' regarding ASATs – it kept activities at a low level as long as the USSR did the same.[70] This generally positive direction reached a milestone in October 1967 with the entry into force of the Outer Space Treaty, still the bedrock of international space law. This stressed that space was to be used for peaceful purposes, banned the placement of WMD in orbit or on celestial bodies, assigned states responsibility for their space objects, and prohibited bases, testing and military manoeuvers on celestial bodies.[71]

President Richard Nixon increased passive protection for American satellites and reduced ASAT research funding while maintaining the US' existing basic ASAT capability.[72] In 1972, and in recognition of the growing interdependence of nuclear deterrence, missile defence and space security, the US and USSR agreed to the bilateral Anti-Ballistic Missile Treaty. In the process, they severely restricted missile defence development, banned space-based ABM systems, and implicitly protected the use of satellites for monitoring compliance by banning interference.[73] That same year, the multilateral *Convention on International Liability for Damage Caused by Space Objects*

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[67] Krepon, 'Space: The Vulnerable Frontier' p.549
[68] Gallagher and Steinbruner, p.9
[69] *Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water*, 10 October 1963; Tronchetti, p.83; Jana Robinson, 'Transparency and Confidence-Building Measures for Space Security', *Space Policy* 27:27-37 (2011), p.28 and Goldblatt, p.105
[70] Gallagher and Steinbruner, p.11
[71] Goldblat, p.104, Robinson, pp.32-3
[72] Gallagher and Steinbruner, pp.11-12
[73] Gallagher and Steinbruner, p.10

(Liability Convention) reinforced the responsibility of states for damage caused by their space objects.

During the Ford and Carter administrations the USSR launched a number of ASAT test-flights, initiating a wave of anxiety in the US.[74] Carter responded by seeking to negotiate an ASAT ban while hedging with new programs to develop new kinetic energy ASATs.[75] Upon this backdrop, the 1975 *Convention on Registration of Objects Launched into Outer Space* (Registration Convention) established an [often unmet] obligation on states to keep details records of any object launched into or known to have exited space, including whether it had a military purpose, and to provide this information to the UN Secretary General.[76] The 1977 *Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques* (Environmental Modification Convention) banned military activities in space that affect natural environmental processes.[77]

During the late 1970s, the US and USSR restarted talks on ASAT controls. The talks were soon suspended indefinitely, but established an unofficial moratorium on ASAT development that was observed by both countries for almost two decades.[78] In 1979, the second round of Strategic Arms Limitation Talks (SALT II) banned 'fractional orbital bombardment' systems, a type of space weapon neither side had developed but was afraid the other might seek to deploy. In 1981, and reflecting growing concerns at the prospect of weapons in space, the USSR introduced the topic to the UN.[79] A subsequent UN General Assembly resolution added the 'Prevention of an Arms Race in Space' (PAROS) to the objectives of the UN Conference for Disarmament.[80]

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[74] Krepon, 'Space: The Vulnerable Frontier' p.549, Gallagher and Steinbruner, p.12
[75] Gallagher and Steinbruner, pp.12-13
[76] Goldblatt, p.105, Gallagher and Steinbruner, p.81
[77] Gallagher and Steinbruner, p.11
[78] Goldblat, p.107
[79] Tronchetti, p.83
[80] Tronchetti, p.83

The administration of President Ronald Reagan marked a clear change from previous US approaches, and emphasised the potential uses of space militarisation rather than the use of space for stabilising nuclear deterrence.[81] In 1983, Reagan announced the ambitious 'Strategic Defence Initiative (SDI)' to provide the US and its allies with effective ballistic missile defence systems (BMD), raising an outcry from Moscow. In 1985, an F-15 fighter jet destroyed an aging American meteorological satellite in 1985 using a 'direct ascent' missile.[82] In the mid-1980s, the USSR ceased ASAT testing and established the *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies* (Moon Agreement), which prohibited military basing and operations on the Moon and other celestial bodies but which enjoyed little support from other space powers.[83] In 1987, the Missile Technology Control Regime was stood up to control the proliferation of sophisticated military technology. In 1991 the USSR dissolved and left the US the world's sole superpower.

The Gulf War, deemed by several commentators as the first 'space war', saw the extensive use of space applications to support coalition operations in Kuwait and Iraq.[84] It was followed by the increasing prominence of both space militarisation and efforts to ban space weapons during the 1990s. On 19 June 1999, the US used a Theater High-Altitude Area Defense rocket to hit a target missile outside the Earth's atmosphere, leading one commentator to lament that "outer space should no longer be considered as a sanctuary safe from military operations".[85] In 2000, China proposed the creation of a new international legal instrument or instruments to address the militarisation of space.[86] An increasingly united diplomatic front between Russia and China soon developed, leading

[81] Gallagher and Steinbruner, p.13
[82] Krepon, 'Space: The Vulnerable Frontier' p.549
[83] Krepon, 'Space: The Vulnerable Frontier' p.549; Goldblatt, p.104; *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies*, 11 July 1984
[84] McLean, p.244 and Patrick Salin, 'Privatization and Militarization in the Space Business Environment', *Space Policy* 17:19-26 (2001), p.22
[85] Salin, p.19
[86] Goldblat, p.108

to the release of a joint working paper in 2002 on a possible treaty that would address the militarisation of space.[87] Reflecting what seemed to be a growing consensus on the need for regulation, the Hague Code of Conduct Against Ballistic Missile Proliferation (Hague Code) was established on 25 November 2002 to bolster efforts to curb ballistic missile proliferation.[88] The administration of President George W. Bush pursued a different path. The US unilaterally withdrew from the ABM Treaty in 2002,[89] and began the pursuit of a number of ambitious military space programs to develop and sustain capabilities to disrupt, deny, degrade and even destroy an adversary's space capabilities and satellites.[90] Russia threatened to deploy 'Iskander' missiles in Kaliningrad region in response.[91] US military doctrine and policy statements increasingly advocated 'space dominance' and reserved the right to develop 'offensive counter-space' capabilities.[92]

In 2003, China demonstrated its growing space capability with its first manned space mission, *Shenzou 5.*[93] In a move that shocked many, in January 2007 it conducted the world's first ASAT test since 1999. The US responded with its own anti-satellite operation in February 2008, for the first time using a missile designed for theatre ballistic defence to destroy the aging spy satellite USA 193.[94] To many, including commentators in both China and the US, these ASAT tests were indicators of the worrisome state of space security.[95]

In February 2008, Russia and China jointly proposed a 'Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force Against Outer Space

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[87] Krepon and Katz-Hyman, p.329; Goldblat, p.108
[88] Gallagher and Steinbruner, p.81
[89] Tronchetti, p.84
[90] Salin, p.2; Krepon and Katz-Hyman, p.324
[91] Meijer, Hugo L.E.: 'Reflections on Politics, Strategy and Norms in Outer Space', *Defense and Security Analysis* 25(1):89-98 (2009), p.94
[92] *National Defence Strategy of the United States of America* 2005 and Krepon and Katz-Hyman, pp.324-7
[93] Peoples 2008, p.508
[94] Peoples 2008, p.507; Krepon, 'Space: The Vulnerable Frontier' p.551
[95] Krepon, 'Space: The Vulnerable Frontier' p.551

Objects' (known as the 'PPWT') at the UN,[96] which failed in the face of US opposition[97]. The European Union's (EU's) 'Code of Conduct on Outer Space Activities', the second of the last decade's most significant proposals for space arms control, was circulated in 2010 but is yet to receive a level of support sufficient for it to be considered applicable.[98]

CHARACTERISTICS OF SPACE MILITARISATION AND ARMS CONTROL

History of restraint regarding the use of space weapons

Historically, states have demonstrated remarkable restraint when it comes to the development, deployment and use of space weapons.[99] Despite the fact that there was an average of two ASAT tests per year during Cold War, actual destructive testing has been very rare, and ASATs have never been used by one state against the assets of another.[100] Since the first space arms control efforts of the early 1960s, space power states demonstrated adherence to the notion that space should be kept as a 'sanctuary' from the kinds of conflict that have historically plagued the Earth's surface.[101] This view has persisted among many policy makers and the world's public, particularly outside of the US.[102] It is also reflected in the system of space governance, which has as its core goal the fostering of peaceful development of space, and has led to significant international scientific cooperation – including the establishment of the International Space Station (ISS).[103] Perhaps less idealistically, key space power states have historically demonstrated an awareness that

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[96] Loshchinin, Valery and Qun, Wang: 'Letter Dated 12 February from the Permanent Representative of the Russian Federation and the Permanent Representative of China to the Conference on Disarmament Regarding the Draft "Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force Against Outer Space Objects"', CD/1839 (2008)
[97] Tronchetti, p.82
[98] Tronchetti, p.82 and Robinson, p.34
[99] Krepon and Katz-Hyman, p.336
[100] Krepon and Katz-Hyman,p.326; Krepon, p.550; Space Security Index, p.24
[101] Cervino et al, p.235; Peoples, 'Securitisation of Outer Space' p.79
[102] Karl Mueller, 'Totem and Taboo: Depolarizing the Space Weaponization Debate', *Astropolitics* 1(1):4-28 (2003) p.9; Krepon, p.550
[103] MacDonald, p.593

space weapons might upset the nuclear status quo. Nuclear states rely on vulnerable surveillance satellites for the stability of nuclear deterrence, and the reluctance of the Cold War superpowers to develop and deploy sophisticated ASATs was at least partly due to the fear of the potential ramifications for nuclear stability.[104] Nuclear forces continue to rely on satellites for early warning, targeting, and survivability and thus the potential for space conflict to 'go nuclear' cannot be discounted.[105]

Accelerating Militarisation

While there has always been a military dimension to space politics[106], the accelerating pace of space militarisation – especially since 1991 – is striking. Firstly, and perhaps most obviously, more space actors are developing, deploying and using military space applications. Japan, India, Brazil, South Korea and a number of other states have joined the established space powers in deploying their own military satellites.[107] This has resulted in military space becoming more crowded than ever; by the end of 2011 there were over 185 dedicated military satellites in orbit.[108] Secondly, the use of military space applications has evolved to include an ever-wider range of activities and greater military capability. [109] Early satellites had little real military capability, but as the Cold War progressed, the US and USSR – and later China and several states in Europe – developed more capable space-based assets, improving the quality of satellite imagery, the fidelity and security of military communications, and information processing.[110] Military research also led to an ever broader range of military applications, including enhanced battlefield awareness, precise

[104] Krepon, p.549
[105] Krepon and Katz-Hyman, pp. 325-336
[106] Steven Lambakis, 'Space Cops: Reviving Space Arms Control', *Astropolitics* 11(2):75-83 (2003), p.75
[107] Moltz, p.115
[108] Space Security Index, p.105
[109] McLean, p.244 and MacDonald, p.601
[110] McLean, pp.243-4

navigation and targeting support, and real-time encrypted communications.[111] Lastly, the increasing scope and capability of military space applications helped to drive space into the 'mainstream' of military planning, particularly from 1991. Their practical utility was established first in the 1991 Gulf War, and cemented by later military operations in Kosovo, Afghanistan and Iraq.[112] States, especially the US and its European allies, increasingly placed space applications at the core of their military planning.[113]

The Continued Centrality of States, Especially the US

The history of space militarisation and regulation also demonstrates the continued dominance of space politics by states, particularly the established space powers. On one level, this is surprising. More than 50 states, non-government organisations and multinational corporations now have at least one satellite in space as space technology has become more accessible.[114] However, not all space actors are equal when it comes to power and influence space politics.

Firstly, among states the US and USSR/Russia have dominated military space, and continue to do so. Between them they launched more than 3000 military satellites to 2011, while all other states combined have launched fewer than 100.[115] Furthermore, the US has come to completely dominate military space since the end of the Cold War; it was responsible for 92.6 percent of the global military budget by 1999,[116] and by 2003 had 110 military-related spacecraft in orbit compared to Russia's [aging] 40 the rest of world's 20.[117] Russia's space and military budgets have recovered somewhat from the massive cuts endured during the 1990s, but were still only about five

[111] Space Security Index, p.9
[112] McLean, p.244; MacDonald, p.601
[113] Cervino et al, p.234; Dolman, p.93
[114] Gallagher and Steinbruner, p.16 ; Peoples, 'Securitisation of Outer Space' p.84
[115] Space Security Index, p.105
[116] Cervino et al, p.233
[117] Goldblatt, p.103

percent of the US' by 2006.[118] In 2011, the US still enjoyed a clear lead in the deployment of dedicated space systems to support military operations, accounting for roughly half of all dedicated military satellites, and outspent all other states combined on military space applications.[119]

Secondly, several authors point out that many of the new class of corporate space actors are far from independent of state interest, despite the fact that commercial revenues have grown so much that they now outpace government space funding.[120] In fact, at a minimum they are 'shaped' by the security concerns of states, and some even act as the active 'vanguard' of state interests.[121] This is due to a number of factors, including the history of state-ownership of space commercial entities, the fact that many companies make their money delivering on contracts with states, and the use of commercial competition by some states to grow their international influence.[122]

Lastly, policy can be said to lead practice when it comes to space weaponisation.[123] Indeed, space weapons and particularly space-based systems negation remain largely theoretical concepts, and states are yet to deploy such dedicated space systems.[124] The history of space arms control largely reflects efforts to pre-emptively address weaponisation or to plan for it, rather than responses to real events. Arguments both for and against the regulation of space weapons are therefore necessarily based on educated speculation, particularly regarding their potential political implications.[125] The rhetoric of space weapons can sometimes seem decoupled from military reality; supporters of space weapons often harbour unrealistic expectations about the cost and

[118] Krepon and Katz-Hyman, p.328
[119] Space Security Index, p.20
[120] Gallagher, p.273
[121] Salin, p.20; Space Security Index, p.19
[122] Salin, pp.19-20
[123] Peoples, 'Assuming the Inevitable?', p.514
[124] Space Security Index, p.25
[125] Mueller, p.24

capability of future weapons systems, and overlook the fact that non-space military capabilities would be more practical and cost effective in most situations.[126]

Ambiguity of Space Technology

The ambiguity of space technology has been absolutely central to states' historic difficulty in regulating space militarisation. Firstly, despite its critical importance, the issue of defining space weapons has been 'notoriously fraught'.[127] States and commentators alike disagree on where the line is between 'militarisation', which most states accept as legitimate, and 'weaponisation', which remains highly controversial.[128] Interestingly, some authors argue this distinction is itself useless.[129] Steven Lambakis argues arms control advocates use the term 'weaponisation' due to the negative connotations of the term, pointing out that "[t]alk of 'weaponising' the sea or air would have looked odd to generations past".[130] However, he does agree with the general academic consensus that that while a specific definition might be hard to arrive at, space militarisation is best seen as a continuum with totally peaceful use at one end and a subset of 'weaponisation' at the other.[131] This still leaves the difficulty in defining when the 'weaponisation' line is crossed.[132] The placement of weapons in space would clearly be weaponisation, but disagreement persists on the status of ground-based weapons, space-based components of terrestrial weapons systems, and non-military space vehicles which could be used as projectiles.[133]

The definitional issue shares significant overlap with another core problem, the 'dual-use' nature of space technology. Civilian space technology often has the ability to be used for military ends; almost all objects launched into outer space could be used, in one way or another, as a

[126] Goldblatt, p.104; Mueller, p.24
[127] Peoples, 'Securitisation of Outer Space' p.78
[128] Lambakis, p.75; Peoples, 'Assuming the Inevitable?', p.502
[129] Lambakis
[130] Lambakis, p.77
[131] Mueller, p.5; Lambakis, p.77
[132] Peoples, 'Assuming the Inevitable?', pp.502-3; Krepon and Katz-Hyman, p.325
[133] Mueller, pp.6-7; Peoples, 'The Growing Securitization of Outer Space', p.205

weapon.[134] Ground-based lasers can be used for communications and range finding as well as for blinding satellites,[135] while new and low cost 'microsatellites' could potentially be used as kinetic ASATs.[136] At the same time, states themselves are increasingly using civilian space assets and applications for military ends.[137] This is for a variety of reasons, including privatisation, cost-sharing, and wider conceptions of national interest, but has contributed to the general blurring of the line between military and civilian activity.[138]

Critically, the dual-use nature of space technology and the difficulty in defining acceptable space militarisation mean that space 'weaponisation' is therefore best understood as a political rather than technical concept. A number of factors including basing, potential targets, attack mechanisms, effects, level of target discrimination and utility "would shape the political impact of any particular decision to develop or deploy space weapons [and] whether the action in question would or would not be considered to constitute the profound violation of the current space sanctuary norm with which many space weaponisation discussions are primarily concerned".[139] As Mueller points out, understanding that weaponisation is a political notion makes it clear that "we have not yet crossed the principal space weaponisation threshold precisely because almost everyone believes that we have not".[140]

Lastly, the ambiguity of space technology has made it difficult for states to determine the likelihood and possible consequences of space conflict. Due to residual offensive capability, dual-use space assets already offer a number of states some ability to jam satellite communications

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[134] Tronchetti, p.87
[135] Krepon, 'Space: The Vulnerable Frontier' p.552
[136] Space Security Index, p.25; Peoples, 'Securitisation of Outer Space' pp.84-5; Krepon, 'Space: The Vulnerable Frontier' p.553
[137] Space Security Index, p.19; Cervino et al, p.233
[138] Cervino et al, pp.231-4
[139] Mueller, p.8
[140] Mueller, p.5

and control, kinetically attack satellites, or otherwise disrupt space activities.[141] At the same time, this makes it almost impossible for states to tell if other states have adopted offensive or threatening military postures in space. A classic example of this problem is that of BMD; while ostensibly defensive in nature, missile interceptors also can be used to attack space assets.[142] The difficulty in determining the nature and scale of the space threat is heightened by the secrecy under which states typically keep their military space activities. The fact that there have been no space conflicts as yet also makes it hard for states to be able to estimate the likely course of such a conflict, or even the 'rules' under which it might take place.[143]

Growing Vulnerability to Offensive Space Weapons

The world is increasingly reliant upon the benefits of space applications for a huge range of activities, including economic development, navigation, international finance and military planning.[144] This reliance has also generated significant vulnerability. Military and intelligence satellites are more valuable targets than ever due to their centrality to the planning and operations of space power states. Indeed, even minor disruptions to these would likely have significant military impact.[145] At the same time, the growing economic interest of states in space since the late 1980s, together with the increasing use of civilian satellites for military purposes, means that the loss of even civilian satellites (which are usually more vulnerable to attack than military ones) would cause significant damage to state interests.[146]

This vulnerability is heightened by the likely advantage of the offensive in any space conflict. Satellites are inherently very vulnerable as they are observable and predictable, limited in

[141] Robinson, p.37
[142] Peoples, 'Securitisation of Outer Space' p.84
[143] Krepon, 'Space: The Vulnerable Frontier' p.550
[144] Space Security Index, p.7
[145] Mueller, p.21
[146] McLean, pp.245-6; Space Security Index, p.9-19

their ability to evade objects, and difficult to fortify against collisions and attack.[147] On the other hand, ASATs have become progressively cheaper and more easily deployed.[148] The relatively inexpensive and potentially high potential of ASATs have led analysts to argue that some states, viewing space as both a new source of military threats and home to critical national infrastructure, might pursue asymmetrical responses to the perceived space dominance of others (particularly the US).[149]

[147] Gallagher and Steinbruner, pp.3-4
[148] Krepon and Katz-Hyman, p.329
[149] Krepon, 'Space: The Vulnerable Frontier' p.552; Space Security Index, p.9

CHAPTER 3: THE UNITED STATES AS AN OFFENSIVE REALIST STATE

"[C]an the United States ever have enough dominance when lives are at stake?"
Steven Lambakis[150]

One of the most prevalent notions in the literature of space arms control, and one that has only become more popular since 1991, is that the US is responsible for the absence of a ban on space weapons due to its offensive realist pursuit of military power. Henceforth referred to the 'US revisionism hypothesis', this line of explanation argues that the US has historically used its military and political strength to actively oppose efforts to restrict weaponisation and, in contrast to the security dilemma argument set out in Chapter Five, it has done so out of malignancy. Proponents of this view – and these include both supporters and opponents of US space hegemony – point to the superpower's historic technological lead, military superiority, and expansive definitions of its national security interests in space. Central to most discussions is the fact that with the dissolution of the USSR, US space policy has been freed to pursue its goal of total US space dominance.

'Astropolitics' and American Empire

Perhaps the most controversial of contributions to understanding US actions is the work of Everett Dolman and those who subscribe to his notion of 'Astropolitics'. Borrowing heavily from the literary tradition of 19th Century geopolitics, Dolman argues that space, much like the air and maritime environments, offers considerable advantages to the state that is best able to capitalise on its geography. As mentioned in Chapter Two, to Dolman space is home to 'chokepoints', 'strategic narrows' and commerce lanes of particular strategic importance, and the primary purpose of US pace policy should thus be to control these.[151] Dolman argues that the resources of space and ability

[150] Lambakis, p.82
[151] Dolman, p.96

to deny others access would make the US virtually invulnerable and perpetuate its dominance of terrestrial politics as well.[152]

Most advocates of US space militarisation and weaponisation do not go quite so far. However, they do agree that the best US approach to space politics is to dominate it both economically and militarily.[153] The end of the Cold War and removal of the US's only real superpower rival led some US decision-makers and military planners to adopt a particularly aggressive approach, arguing the US had a unique opportunity to take control of space for national interest reasons and even to secure the neo-liberal world order.[154] To these 'advocates of American Empire', the end of the Cold War was the end of a "zero-sum game, and one in which there had been one winner for all time – the US".[155]

Driving less aggressive proposals for space militarisation is the widespread view that conflict in space is inevitable, and that it is only prudent for the US to prepare by developing its own military and space weapon capabilities.[156] Even where policy-makers are aware that the US might lose more from the weaponisation of space than it gains, there is still the view that if space weapons are going to happen, the US would only be doing itself a disservice in not developing them first.[157]

Historical Restraint as the Product of Strategic Calculation

According to the US revisionism hypothesis, the historical restraint of space power states regarding space weapons is due to strategic calculation rather than any sense of space as a sanctuary. Firstly, several authors have argued that the US and USSR exercised restraint in weapons

[152] Quoted in Galloway, pp.88-9
[153] Galloway, p.89
[154] McLean, p.247; MacDonald, p.594
[155] Galloway, p.88
[156] Peoples, 'Securitisation of Outer Space' p.79
[157] Mueller, p.16

development during the Cold War in order to deny each other potentially threatening capabilities or to legitimise other military activities, not out of any concern for world peace. The language of cooperation used by the two superpowers during the Cold War was thus nothing but an excuse to buy time; "it seemed prudent to do everything possible to hinder the domination of the other – specifically, to declare space the unilateral province of all peoples while working feverishly to acquire the technological means and legal justifications to gain dominant control of it".[158] The Outer Space Treaty, so important in establishing international space law and the principle of peaceful use, was at best an "intermission, a period of détente in a win-lose encounter",[159] and at worst a successful attempt to legitimise the use of photo intelligence satellites by the USA.[160] The end of the Cold War, in leaving the US without a real rival, heralded an end to constraints on US action and freed it of the 'shackles' of arms control.[161]

Secondly, the continuing 'restraint' of all states but the US regarding space weaponisation since the end of the Cold War is argued to be best seen as reflecting the inability of those states to compete militarily. The US continues to outspend the rest of the world combined on military technology, including in space, and it seems natural that its strategic rivals might consider ways to hinder US capability. Evidence for this argument is found in the history of Chinese and Russian support for a treaty banning space weapons – this support has only really manifested after the Cold War, and the model proposed for the treaty would exclude terrestrially-launched ASATs that Russia and China have already developed.[162] Furthermore, China's ASAT test in 2007 seems to render its commitment to a space weapons prohibition somewhat hollow.[163]

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[158] Meijer, p.91
[159] Galloway, p.89
[160] Robinson, p.32
[161] Galloway, p.88; Lambakis, p.82
[162] Peoples, 'Assuming the Inevitable?', pp.514-6
[163] Peoples, 'Assuming the Inevitable?', p.515

Thirdly, and on a related point, the US's historic tendency to refusal to sign legal agreements that would prohibit space weapons is seen as only logical given that such agreements are only calculated efforts to restrict US capability. As Lambakis argues, the US "should never take anything having to do with space (especially access to space or freedom to operate in space) for granted, and we should never unnecessarily limit [its] options."[164] The US' decision to opt out of the ABM Treaty with Russia was thus a logical move in that it increased the US's range of strategic options.[165]

Overall, the US revisionism hypothesis partially explains the historic restraint of states regarding space weapons. Most usefully, it offers a good explanation for the US' reluctance to agree to limits on space militarisation and weapons since its emergence as the only space superpower with the end of the Cold War. It also offers an interesting rationale for Chinese and Russian efforts since 1991 to ban space weapons. However, it does not account for the full history of the Cold War, the number of arms control concessions made by the US since it became unipolar (for example, in relation to nuclear weapons) and moves by the Clinton and Obama administrations to further link US security in space to global security more generally.

Militarisation a Natural Extension of State Power

For proponents of the US revisionism hypothesis, the accelerated militarisation of space is simply the natural result of an increasingly capable space state seeking to pursue an expansive conceptualisation of its national interest. The US has always been a leader in space militarisation, and *the* leader since the end of the Cold War. It has always spent the most money on military space technology.[166] It has also always led the in applying space technology to military ends, and without

[164] Lambakis, p.82
[165] Lambakis, pp.80-1
[166] Peoples, 'Securitisation of Outer Space' p.84

question is the state most dependent on space applications for its military strength.[167] Space is now at the very centre of US military planning.[168] This space dominance is seen as a massive advantage in that it provides political and military decision-makers options that would be unavailable if control of space was lost to others.[169] It has also led to a growing feeling in some circles that space power is the most important form of military power and even the "apex of national security".[170]

US military policy and doctrine also has a history of reflecting ambitious plans for space technology. This is perhaps most clearly seen in the history of US BMD development; despite the USSR's decision that BMD development was not an efficient of resources, the US has over time and at great cost developed increasingly sophisticated BMD technology. Such weapons systems are far from perfected, but they are already central to US approaches to space security despite the fact that most commentators argue that in destabilising deterrence BMD development did US security interests more harm than good.[171]

Lastly, policy makers and military planners have demonstrated an adherence to the idea that the militarisation and eventual weaponisation of space is inevitable, and that it in the US' interests not to let other states get there first. This is most clearly seen in the influence of US military doctrine, which has long reflected the belief that it is only a matter of time before space becomes an arena of conflict. During the 1990s and early 2000s, the inevitability thesis increasingly moved from the realms of doctrinal debate to national security policy, resulting in an increasingly threat-based US view of space security. [172] Arguably, this has also resulted in a US 'doctrinal realism' that

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[167] Krepon and Katz-Hyman, p.332
[168] McLean, p.244; MacDonald, p.601; Cervino et al, p.234
[169] Lambakis, p.82
[170] Dolman, p.93
[171] Nicholas Wheeler and Ken Booth, 'Uncertainty – Rethinking the Security Dilemma' in Paul Williams (ed), *Security Studies: An Introduction*, Routledge (2008), pp.134-6
[172] Krepon and Katz-Hyman, pp.324-7; Peoples, 'Assuming the Inevitable?', p.506; Mueller, p.14. For example see the US Air Force's counterspace operations doctrine of 2004 or the *National Defence Strategy of the United States of America* 2005

considers notions of preserving space as a sanctuary from weapons naïve, and which has led some American opponents of arms development to bemoan the level of influence that the military has on national space policy making.[173] As Salin puts it, "[e]ven though military commanders do (or should) not dictate public policies, their leitmotiv constitutes the permanent background 'noise' that any present and future US administration and Congress has to live with".[174]

The US revision thesis thus helps explain the country's historic lead in space military technology development. It also highlights the hugely influential role that military doctrine has on US political perceptions of the space environment and appropriate responses to space security challenges. However, this line of explanation does not fully account for the fact that there have been times where US militarism efforts and budgets have decreased. Perhaps most fundamentally though, it also fails to take into account arguments that the US has the most to lose from space militarisation.[175]

Pursuit of State Interest Drives Space Politics

The US revisionism thesis is arguably most comfortable with historical fact that states, and the US in particular, have driven the politics of space weaponisation and arms control. It has little patience for international organisations, seeing them only as reflecting the interests of their state members. In this way, the history of the UN and its governance institutions is seen as a manifestation of first the interests of the victors of World War Two, the strategic competition between the US and USSR, and eventually, US unipolarity. The reason space governance seemed robust in the early decades of the Cold War was because it was in the interests of the US and USSR to restrict each other to a strategic status quo in space. Likewise, the weakening of space governance reflected the US's growing dominance after the Cold War and its decisions to pursue its

[173] Peoples, 'Securitisation of Outer Space' p.85
[174] Salin, p.24
[175] Gallagher, p.276

interests in space outside of multilateral frameworks.[176] The fact that these international organisations rely on state members for resourcing as well as to ensure compliance with international law is another sign to proponents of the revisionism thesis that state actors are the ones worth considering. For their part, commercial actors simply serve as an extension of national interest. The US can directly pressure commercial entities through either involvement with their activities through dual-use projects or through regulation.[177] Less directly, it influences their thinking by championing national commercial interests in space, a habit shared with other states.[178]

This line of argument also aligns well with the idea that policy has led practice when it comes to space weapons. The US has historically seen the development of its space capabilities, including in military fields, as an indispensable tool of its global leadership.[179] At times, this has required it to seek to develop advanced military space technologies, despite the uncertainty of success. More importantly, it has led to a US tendency to plan against notions of military technological development that are uncertain or even unfounded. US rhetoric on space weapons is sometimes decoupled from military reality altogether and harbours unrealistic expectations about the cost and capability of future weapons systems.[180]

In summary, the US revisionism thesis enjoys perhaps its best fit with the historically state-driven nature of space politics. Its rational choice assumptions about the utility of space governance institutions reflect the inability of the UN system to stop increasingly unilateral actions by the US after the Cold War, as well as the tendency of states to use commercial entities to further their national interest. It also helps to explain the history of state policy leading international

[176] Galloway, p.88; Lambakis, p.82
[177] Salin, pp.19-20
[178] Salin, p.20; Space Security Index, p.19; Gallagher, p.273
[179] McLean, p.246
[180] Goldblatt, p.104; Mueller, p.24

practice as the product of US ambitions (combined with doctrinal realism, as discussed in the previous section).

Ambiguity of Space Technology Drives Weapons Development

The US has been a world leader in the dual-use of space technology, making increasing use of civilian space assets for its military space applications. This has led it to adopt a broad conception of national security, and to consider the space assets which provide it economic, military and other services as critical infrastructure.[181] It has also been one rationale for US objections to past initiatives that would have controlled dual use technology; several presidents have argued that the dual-use nature of much space technology would make a ban on space weapons more likely to impede the peaceful use of space than provide a meaningful improvement to space security.[182]

On a related point, the involvement of the US government in dual-use technology development as well as actual dual-use (ie military use of civilian assets) has historically led to concern in its international rivals. US research and development in technologies such as high-powered lasers, microsatellites, nanotechnology and vehicle guidance can and have been interpreted as efforts by the US to develop its military capability.

Interestingly, the US has put considerable resources into developing the world's most capable space situational awareness (SSA) capability, partly to be able to detect hostile moves by other states – even if prosecuted by dual-use technology. Run by the US Air Force Space Command (SPACECOM), the Space Surveillance Network (SSN) is a network of ground-based telescopes, radars and satellites that give the US military the world's best view of the situation in space.[183]

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[181] Scobell, p.720
[182] Gallagher, p.266
[183] Robinson, p.31

The US revisionism thesis therefore explains the ambiguity of space technology as at least partly the product of the country's extensive use of civilian assets for military purposes and the history of government involvement in dual-use technology development. It also highlights the US's growing awareness that other states may use dual-use space technology to attack US space assets. However, given the state's overwhelming military dominance since at least since 1991, it fails to explain why the US has not moved to deploy specifically-designed space weapons to act as a deterrent.

Offensive Advantage as an Opportunity

For the US revisionism thesis, the offensive advantage of space weapons, combined with the growing vulnerability of states to space attack, provides a clear rationale for the US to develop its own space weapons.[184] Firstly, fears of US vulnerability due to its reliance upon space applications make it imperative that the country develop means of protecting its interests. If space weapons are too powerful to be built, the argument goes, they are also be too powerful to allow potential enemies to possess them.[185] This idea is most famously evoked by former US Secretary of Defense Donald Rumsfeld's warning of 'space Pearl Harbours',[186] and is manifested by a high level of US sensitivity to any moves by other states that hint at space weaponry. This helps to explain the level of alarm caused by the Chinese ASAT test of 2007, as well as arguable over-responses to Iranian and North Korean missile tests. George W. Bush, in renouncing the ABM Treaty, pointed to the need for the US to protect itself from 'rogue states' despite almost universal assessments that these states were no match for the US and would in any case find significantly greater utility in asymmetric military tactics on Earth.[187]

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[184] Lambakis, p.76
[185] Mueller, p.16
[186] Peoples, 'Assuming the Inevitable?', p.506
[187] Krepon and Katz-Hyman, p.331

Secondly, to advocates of US space weaponisation the offensive advantage provides a clear incentive to develop space weapons in order to capitalise on the military potential of these systems. With the end of the Cold War, the strategic rationale for the United States to maintain the prohibition against weaponising space is diminishing, leaving the way open for it to acquire potentially very useful space weapons as soon as possible.[188]

In summary, the US revisionism thesis points out that even the world's most powerful state is afraid of the offensive potential of largely theoretical space weapons.[189] It helps to explain the regression from shared international understanding on the mutual benefit of keeping space unweaponised, as is argued to have taken place during Reagan and George W. Bush administrations.[190] However, this aspect also highlights a critical flaw; if the US understands that the offensive has such a clear advantage, and that it is the most militarily powerful state, its decision not to deploy dedicated space weapons appears illogical.

CONCLUSION

In conclusion, the US revisionism thesis has a lot to offer, particularly in explaining how the history of space militarisation has largely been the product of US policy and actions since 1991. It also draws attention to the historical influence of doctrinal debates in the US, which has helped to drive militarisation by it and other countries. However, this argument is unable to explain the inconsistent approach that the US has taken to weapons and space arms control over time. The Reagan and George W. Bush administrations arguably fit the revisionist model, but were proceeded and followed by presidencies demonstrating considerably less aggressive approaches.

[188] Mueller, p.16; MacDonald, p.600
[189] Peoples, 'Assuming the Inevitable?', p.507
[190] Krepon, 'Space: The Vulnerable Frontier' p.554

CHAPTER 4: FAILURES OF INTERNATIONAL GOVERNANCE

"[T]he legacy [governance] regime remains incomplete and has been unable to adapt either to increasing commercial utilisation or to the growing sophistication and consequence of military uses, especially by the United States."
Nancy Gallagher and John Steinbruner[191]

The most common line of explanation for the absence of an international prohibition on space weapons is that failures of international governance have prevented states from agreeing to such a regime (the international governance argument). In an apparent contradiction, many authors that subscribe to this view are actually quite optimistic. International law, governance and trust-building measures are seen as offering the best possibility of resolving the collective action problem of space security through a weapons prohibition; the correct combination of measures has simply not yet been found and implemented.

This line of argument reflects a neo-institutionalist 'calculus' approach. Itself an umbrella concept under which multiple schools of thought exist, neo-institutionalism focuses on the relationship between institutions and the behaviour of political actors as well as on the process of institutional creation and change.[192] Neo-institutionalism also makes two key assumptions: firstly that institutions matter; and secondly that political systems are inherently complex and thus unpredictable. The analytical and conceptual focus is thus on arrangements, rules, norms and values that can be said to constitute 'institutions' and which govern, or at least shape, political interaction.[193] The calculus approach stresses the importance of strategic interaction between actors.[194] Institutions affect behaviour by giving actors different degrees of certainty about the

[191] Gallagher and Steinbruner, p.32
[192] Hall, Peter and Rosemary Taylor, 'Political Science and the Three New Institutionalisms', *Political Studies* 44(5):936-57 (1996), p.937
[193] Gerry Stoker and David Marsh, 'Introduction', in David Marsh and Gerry Stoker (eds) *Theory and Methods in Political Science (3rd ed)*, Palgrave Macmillan (2010), p.5
[194] Hall and Taylor, p.939

behaviour of other actors, including though the provision of relevant information or by providing enforcement mechanisms to deter or punish certain types of behaviour. The persistence of institutions is explained by reference to their ability to contribute to the resolution of collective action problems.[195]

THE COLLECTIVE ACTION PROBLEM OF SPACE SECURITY

Reflecting the calculus approach of neo-institutionalism, the international governance argument has at its core the idea that states face a collective action problem in space. This is the need for peace in space that stems from states' mutual interest in maintaining safe access to Earth orbit.[196] Proponents are optimistic that "compatible interests have always been far more common ion space than antagonistic ones",[197] and argue that by driving interdependency and trust, globalisation, transparency and information sharing will overcome obstacles to cooperation[198]. Proponents of the governance argument argue that "it would be in the interest of all states to have generally agreed rules of conduct enabling safety and security of space activities".[199]

The space collective action problem was linked to strategic stability during the Cold War, and provided the initial impetus for states to develop international space law and governance structures.[200] However, the scope of governance activities has broadened as states recognise the extent of their shared interests.[201] To governance proponents, the collective action problem in space has been made more difficult to resolve due to the post-Cold War unipolar world order. Indeed, commentators complain that, from their position of relative strength, many US decision-makers no longer see benefit in multilateral governance and increasingly view it as overly restrictive (this US

[195] Hall and Taylor, pp.937-45
[196] Peoples, 'Assuming the Inevitable?', p.515
[197] Gallagher, p.270
[198] Moltz, p.134
[199] Tronchetti, p.87
[200] Gallagher, p.269
[201] Moltz, p.134

view is reflected in the argument set out in Chapter Three). US unilateralism reached its zenith with the George W. Bush administration.[202] However, governance proponents are not deterred, and see two main reasons for optimism. Firstly, while the US is both the most capable space power, it is also the country most dependant on vulnerable space applications.[203] In the absence of an ability to defend all of its space assets all of the time – which few believe is possible – the US thus needs to prevent hostile action through restrictions on aggressive space activity and by reassuring other states of its own peaceful intentions.[204] Secondly, and slightly more pessimistically, other authors argue that even though US might currently dominate the international system, history shows that "other forces and powers will tend to make the system multipolar" in time, reinvigorating multilateralism.[205]

INTERNATIONAL SPACE LAW AND NORMS

During the Cold War, and particularly the 1960s and 1970s, the two superpowers managed to agree a number of legal agreements that regulated their uses of space to some extent (see Chapter Two for a more detailed history). The most important of these were the 1967 Outer Space Treaty, the 1979 Moon Agreement, the 1963 Partial Test Ban Treaty, the 1972 ABM Treaty and the 1977 Environmental Modification Convention.[206] The space legal and governance regime worked reasonably well during the early Cold War, as the US and USSR dominated space, shared an interest in stable deterrence, and were only able to deploy rudimentary space capabilities that limited military satellites to passive support.[207]

However, international law failed to keep pace with developments during the last decade or so of the Cold War as space grew more congested and the number of ways in which space

[202] Krepon, 'Space: The Vulnerable Frontier' p.549
[203] Peoples, 'Securitisation of Outer Space' p.80
[204] Gallagher and Steinbruner, p.75; Space Security Index, p.20
[205] Galloway, p.89
[206] Goldblatt, pp.105-6
[207] Gallagher and Steinbruner, pp.4-15

applications could be used increased.[208] It became clear that the Outer Space Treaty, which along with the BMD Treaty represented the only instruments limiting space weaponisation, lacked the compliance and governance mechanisms to allow for enforcement and the addressing of ambiguous situations and technologies.[209] It became increasingly clear that existing space law instruments were simply not up to the task of preventing space weaponisation.[210]

There have been a number of initiatives put forward in the last decade to attempt to address the growing problem posed by space weaponisation. The two most notable have been the Russian-Chinese joint proposal for a PPWT in 2008 and the EU's proposed Code of Conduct of 2010.[211] The PPWT failed in the face of opposition from the US, whose main objection was the document's failure to address the issue of ground-based ASATs, a capability owned by both Russia and China.[212] For its part, the EU Code of Conduct continues to receive mixed support[213]

One of the central problems facing international space law efforts at arms control is the difficulty in defining key terms. These stem from the Outer Space Treaty's failure to properly define the 'peaceful purposes' to which space could be put, and are most clearly visible in the issue of defining 'space weapons'.[214] As discussed in Chapter Two, the issue of defining 'weapons' in the space context has been historically fraught, with particular issues being the point at which acceptable military use become unacceptable 'weaponisation' and how best to address the challenge of the dual-use nature of space technology.[215] Other definitional issues make the definition of weaponisation even more difficult; space law currently has no comprehensive conception of

[208] Gallagher and Steinbruner, p.15
[209] Gallagher, p.273
[210] Tronchetti, p. 81
[211] Tronchetti, pp. 81, 83-5
[212] Tronchetti, p.84
[213] Space Security Index, p.15
[214] Tronchetti, p.82
[215] Peoples, 'Assuming the Inevitable?', p.514; Peoples, 'Securitisation of Outer Space' p.78

liability for damage caused by space assets, and is particularly problematic in its application to non-state actors.[216]

A number of global trends have also increased the difficulty of implementing a legal prohibition on space weapons. Firstly, more states are space actors than ever before, rendering reaching a consensus among stakeholders much more difficult. It is now increasingly unlikely that agreement between any two or three countries – even China, Russia and the United States – could adequately manage space security.[217] Secondly, the increasing number of private actors raises the problem of defining property rights in space and the liability of private actors, as well as risks states coming to conflict over commercial issues.[218] Thirdly, the increasing use of dual-use technology by states challenges the space law regime as it makes it harder to distinguish between civilian scientific research, commercial applications and military activities.[219]

The combination of complicating trends and definitional difficulties has led proponents of international space governance to argue for one or the other of two legal approaches. The first is the more traditional, or 'hard' law, solution found in binding international treaties that set out compliance and enforcement mechanisms. Such an approach would build on the widely-ratified Outer Space Treaty, which already includes many of the basic principles of space governance.[220] As demonstrated by the failure of the PPWT though, a treaty that bans space weapons would have to prohibit both space-based weapons and ground-based ASATs, as well as the testing of dual-use systems in 'ASAT mode'.[221]

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[216] Salin, p.20; Tronchetti, p. 81
[217] Moltz, p.120
[218] Salin, p.21; Galloway, p.90
[219] Cervino et al, p.235
[220] Gallagher, p.273
[221] Tronchetti, p.84; Goldblatt, p.106

Those who favour a 'soft law' approach, which stresses guidance over direction, argue that "the era of grand multilateral arms controls agreements in relation to outer space is, if not dead, then at the very least exhibiting morbid symptoms".[222] States have demonstrated a preference for soft law in space governance for several decades, especially on disarmament and security matters.[223] Importantly, while some have argued that soft law would be "less than ideal",[224] soft law can still build international norms through promoting confidence and openness and, over time, pressuring states who do not abide by those norms[225]. Supporters of the soft law approach argue that the EU Code of Conduct, which is a 'soft law' instrument and which already enjoys some support, offers a useful template for further development.[226] However, arguably the greatest benefit of adopting a soft law approach along the line of the EU Code of Conduct would be the ability to capitalise on a joint commitment to the prevention of the weaponisation of outer space by the major space powers of the EU, China, and Russia.[227]

SPACE GOVERNANCE

A natural focus of proponents of the international governance argument is the body of governance institutions set up to oversee space activities. These offer the potential to improve space governance if equipped with decision-making and implementation powers and the mandate, legal authority, and resources needed to effectively oversee space activities.[228] As the governance argument points out though, it is striking that despite the growth of institutions to oversee the peaceful use of space, the development of an overarching normative regime for space security has

[222] Peoples, 'Securitisation of Outer Space' p.77
[223] Tronchetti, pp. 86-7
[224] Peoples, 'Securitisation of Outer Space' pp.77-8
[225] Tronchetti, p. 87
[226] Tronchetti, p. 86
[227] Tronchetti, p. 85
[228] Gallagher, p.273

been painfully slow and space governance institutions are overly specialised and under-coordinated.[229]

The most prominent and important are the UN Committee on the Peaceful Uses of Outer Space (UNCOPUOS), the UN Conference on Disarmament (UNCD).[230] UNCOPUOS has historically struggled with the issue of space militarisation, reflecting disagreement between its state members on the question of the scope of its mandate to oversee the peaceful uses of outer space.[231] It has had some successes though, developing guidelines for space debris mitigation, concepts of state liability for objects launched from their territory and general space traffic management.[232] While the issue of the Prevention of an Arms Race in Outer Space (PAROS) was added to the agenda of the UNCD in 1982, discussions have largely been deadlocked on the issue ever since.[233] Protracted talks have failed to address issues relating to working methods, let alone the initiative's goal of mitigating space militarisation through building confidence and shared understandings of space as a security environment.[234] PAROS discussions have been further hampered by US objections that there is no arms race occurring in space in the first place.[235]

Central to notions of space governance is the idea that space security as a collective action problem requires a collective security response. Critically, international institutions themselves usually have little to no space or other military capability, and thus rely upon state members for monitoring and enforcement. This makes collective security in space problematic as collective security still relies upon the key space power states for enforcement.[236] With the US, China, Russia and the EU (through the United Kingdom and France) all veto-wielding members of the UN

[229] Space Security Index, p.8; Gallagher, p.273
[230] Galloway, p.88
[231] Cervino et al, p.233
[232] Robinson, p.31
[233] Goldblatt, p.107
[234] Goldblatt, p.107; Tronchetti, p.83
[235] Gallagher, p.266
[236] Moltz, p.131

Security Council, the UN seems unlikely to be able to take action against any of these space powers This reflects the continued centrality of key space power states to space politics.

TRUST AND CONFIDENCE-BUILDING MEASURES (TCBMS)

The last focus of the international governance explanation is the history of trust and confidence-building measures (TCBMs). To several authors, while TCBMS have their limitations, they offer useful insights into the history of relationships between space states, play a prominent role in the evolving space regime, and would increase the likelihood of agreement on a prohibition on space weapons.[237]

The foundational assumption behind TCBMs is that they facilitate transparency and reassurance by communicating the peaceful intentions of a state to potential rivals, especially as the level of transparency demonstrated by a state is itself a policy choice.[238] By building cooperation at the margins of a relationship between competing states, TCBMs can "stabilise strategic stability by ensuring that nobody believes they could gain more than they would lose by initiating an unprovoked attack, and by reducing misperceptions, false alarms of impending attack, command and control failures, and other problems".[239] International TCBMs often involve making public, or sharing with other states, information about a state's security policies, military capabilities, arms imports and exports, or defence budgets.[240] TCBMs can be bilateral or multilateral; the former tend to be easier to achieve while the latter bind states to greater responsibility through the discipline of peer pressure.[241]

[237] Robinson, p.28
[238] Robinson, p.27; Tronchetti, p. 86
[239] Gallagher, p.264
[240] Robinson, pp.27-8
[241] Robinson, p.29

Space has historically been seen by many as conducive to international cooperation given its absence of state borders and resulting "space perspective… [from which] the Earth appears as an integrated and independent system"[242]. TCBMs, primarily those related to arms control and nuclear non-proliferation, but also some relating to space, played a role in stabilising the Cold War military rivalry. Space TCBMs were often aimed at non-controversial security issues, such as dealing with dangerous orbital debris, establishing the potential for damaging collisions, managing the growing saturation of the radiofrequency spectrum and organising an increasingly crowded Earth orbit. TCBM success has always been influenced by the speed of technological change and broader geopolitical developments.[243]

One area in which analysts see particularly promising prospects for TCBMs is space situational awareness (SSA). SSA is critical to a range of civilian and military activities in providing awareness of space objects, the likelihood and nature of potential collisions, and indicators of hostile intent. It is also expensive and technically difficult, leaving a robust capability out of the reach of most states. SSA thus provides a potential opportunity for states to cooperate through sharing costs and technology. TCBMs relating to SSA cooperation may also give some states the confidence they need to agree on a 'soft law' code of conduct.[244]

TCBMs also have displayed historical difficulty in dealing with commercial actors and dual-use technology. Commercial actors present a special problem regarding transparency; how would a company clarify its intentions, to whom, and what would make its rhetoric credible given its absence of a clear territory?[245] The dual-use nature of space technology makes it hard to distinguish purely civilian projects from ones that might have a military use, and it has been argued that some civil organisations turn a blind eye to the fact that their work relies on, and in some cases

[242] Giuseppe Reibaldi, 'Contribution of Space Activities to Peace', *Acta Astronautica* 35(8):553-557 (1995), p.553
[243] Robinson, p.28
[244] Robinson, p.35
[245] Robinson, p.27

contributes to, the increasing militarisation of space.[246] The deliberate use by states of civilian infrastructure for military purposes makes the situation more difficult yet; dual-use projects can build military capability under circumstances of ambiguity, even if undertaken in a TCBM context, compromising the use of TCBMs in preventing space weaponisation.[247]

CONCLUSIONS

In conclusion, the international governance argument provides useful insights into the ways in which international space law, governance institutions and TCBMs have shaped the history of space militarisation and arms control efforts. It helps to explain the role of ambiguous space technology in driving militarisation through explaining the difficulty that negotiators have had in attempting to define 'space weapons'. Through discussion of the historic role of international law and institutions, as well as their gradual weakening by the end of the Cold War, it highlights a reason why space powers were restrained in their behaviour in the early decades of the space age but were less so later. In paying particular attention to the US' unilateral approach to space law and governance after the Cold War, it throws light on the central role of the US in the politics and governance of space. Lastly, it suggests the utility of a 'soft law' approach, supported by measures that assist transparency and trust, in addressing weaponisation concerns.

However, this line of explanation remains unsatisfactory overall. Most critically, it downplays the political dimension in which space governance operates, largely overlooking the importance of the relationship between states outside of international organisations. It fails to ask the question of why it is that Russia and China have become such great supporters of space arms control initiatives since the end of the Cold War, and in doing so misses the fact that multilateral governance can be seen as a tool through which states restrain the capabilities of rivals.

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[246] MacDonald, p.597
[247] Cervino et al, p.234

CHAPTER 5: THE SECURITY DILEMMA

"The security dilemma will operate much more strongly if statesmen do not understand it, and do not see that their arms – sought only to secure the status quo – may alarm others and that others may arm, not because they are contemplating aggression, but because they fear attack from the first state. The two failures of empathy are linked."
Robert Jervis [248]

The concept of the 'security' dilemma offers an alternative and particularly comprehensive explanation for the absence of a prohibition on space weapons that also addresses some of the shortcomings of the arguments for US revisionism and failures of international governance. This chapter explains the security dilemma concept before applying it to the politics of space militarisation and arms control and investigating the effect of relevant material and psychological regulators.

THE SECURITY DILEMMA CONCEPT

Argued by some to be one of the most important theoretical ideas in international relations, the security dilemma was first theorised by John Herz and Herbert Butterfield in separate publications in 1951, but is probably best known through the work of Robert Jervis.[249] These three authors argue that benign states can be drawn into conflict with one another by the dynamics of a dilemma in which security-seeking moves by one may lead another state to fear its intentions, causing it to strengthen its own military capabilities and decreasing security overall.[250]

Regrettably, the three great champions of the security dilemma defined the concept only loosely and there is thus no universally agreed definition.[251] This paper therefore adopts the definition set out by Shiping Tang, who combines the common elements set out by Butterfield,

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[248] Jervis, p.181
[249] John Herz, *Political Realism and Political Idealism: A Study in Theories and Realities*, Chicago University Press, Chicago (1951); Herbert Butterfield, *History and Human Relations*, Collins, London (1951); Tang, pp.587-94
[250] Jervis, p.169
[251] Shiping Tang, 'The Security Dilemma: A Conceptual Analysis', *Security Studies* 18:587-623 (2009), p.589

Herz and Jervis with other factors now recognised as integral.[252] Three elements are critical: states must be operating in an environment that is structurally anarchic and which leads to uncertainty and fear regarding the intention of other states; there must be a lack of malign intent on the part of the states involved; and there must be some accumulation of power.[253] Another five elements are either consequences or regulators of the security dilemma: the power accumulated by states to defend themselves inevitably has some level of offensive capability; dynamics are self-reinforcing and can lead to spiralling decline of interstate relationships; the accumulation of absolute power through some capabilities can become self-defeating by decreasing security in relative terms (eg. through arms races); the security dilemma can lead to tragic results such as unnecessary conflict; and severity can be regulated by material and psychological factors.[254]

In perhaps Tang's greatest contribution to security dilemma theory, he points out that the ambiguity of past definitions and their focus on how they lead to conflict through the dynamics of response and counter-response have led to a historical tendency to confuse the security dilemma with spiral theory.[255] As he points out, a "spiral merely denotes a situation in which tension between two states is continuously increasing because the process is driven by a self-reinforcing mechanism…[and] says nothing about the nature of the forces that drive the process".[256] This differentiation is useful for two reasons. Firstly, the security dilemma can lead to a spiral to conflict, but not all security dilemmas lead to conflict and neither are all conflicts driven by a security dilemma.[257] Secondly, and more importantly, the dynamics of the security dilemma and its relationship to spiral models should be understood as a reversible and graduated continuum.[258] As

[252] Tang, pp.593-4
[253] Tang, p.595
[254] Tang, p.595
[255] Tang, pp.614-5
[256] Tang, p.616
[257] Tang, p.597
[258] Tang, pp.617-9

Tang puts it, "anarchy generates uncertainty; uncertainty leads to fear; fear then leads to power competition; power competition activates a (dormant) security dilemma; and the activated security dilemma leads to war through a spiral".[259]

The security dilemma shares realism's view of the political system as structurally anarchic and underpinned by the dynamics of mutual fear and distrust between actors.[260] Uncertainty in politics is seen as structural, persistent and inevitable, as is the impossibility of an actor ever being able to fully empathise with other actors. [261] Uncertainty frequently prevents states from communicating their motives, and states cannot escape the fear that states which are currently status quo actors may change their minds later.[262] The security dilemma is most closely associated with defensive rather than offensive realism, because it assumes states are generally benign and security rather than power-seeking.[263]

There are a number of key empirical features of the security dilemma concept. Firstly, and reflecting its realist assumptions, the elements upon which the security dilemma focuses its attention are states and military technology; it is the ambiguous symbolism of the latter, as well as the former's perceptions of these, that inform most security dilemma analyses.[264] Secondly, security dilemma users often use historical studies, although it must be admitted that these are usually for the purposes of comparison between different dilemmas rather than the assessment of the validity of security dilemma forecasts. Thirdly, proponents borrow the idea of game theory, most famously the

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[259] Tang, p.595
[260] Jervis, p.167; Booth and Wheeler, pp.135-7; Tang, p.604
[261] Butterfield, p.21; Booth and Wheeler, pp.131-4
[262] Jervis, pp.168-9; Evan Montgomery, 'Breaking Out of the Security Dilemma', *International Security* 31(2):151-185 (2006), p.157
[263] As Tang points out, realism is not the only theory that makes use of the security dilemma concept. Neoliberals argue international institutions should aim to alleviate the security dilemma, liberal scholars claim democratic institutions support peace through mitigating the security dilemma and constructivists assert that reshaping identity to remake anarchy would transcend the security dilemma. Tang, pp.588, 620.
[264] Booth and Wheeler, pp.132-6; Tang, p.612

Prisoner's Dilemma and the Stag Hunt, from rational choice theory.[265] This allows for one-off or repeated deductive exercises in which the calculations of two (or more) actors under the security dilemma are posited and assessed.

A number of potential flaws in the concept need to be kept in mind. Empirically, the security dilemma can be used erroneously to project patters of past behaviour into the future, and its empirical record is poor in situations where logic would seem to hint that actors should change their course of action but do not.[266] The security dilemma's foundation in realism also opens it to criticisms of that school of theory; arguably, it fails to properly consider non-state actors, including international institutions and commercial entities, and pays insufficient attention to the process through which 'the state' defines its interests.

The concept also appears to have a major flaw of direct relevance to the discussion of space arms control. Traditionally, the security dilemma has been almost exclusively used to analyse paths to historical wars. This raises the question of whether the security dilemma is a self-fulfilling prophecy; if only applied to wars it is hardly surprising that its proponents find its dynamics lead to conflict. It also would seem to suggest only limited utility in studying a situation that has not, or at least has not yet, led to open conflict. However, in understanding the security dilemma – along with spiral theory – as a continuum, the history of space militarisation can be assessed to determine the role security dilemma dynamics may have played.

DETERMINING A SECURITY DILEMMA IN SPACE MILITARISATION

For the politics of space arms control to represent a security dilemma, it must meet the three-part test of Tang's definition; international anarchy, some accumulation of power, and an absence of malign intent.

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[265] Jervis, pp.167-8
[266] Jervis, pp. 171, 183-190, 192

At first sight, it would appear that space has historically been one of the least anarchical 'environments' in which states have interacted. The UN Charter placed limits on the use of force and created a system of collective defence through the UN Security Council 12 years before Sputnik was launched. International space law was established and developed in the early decades of the space age. A number of international organisations including UNCOPUOS and UNCD have been created to oversee space governance. However, further consideration makes it clear that space power states continue to operate under an international system that is, at its core, anarchical. International law is remarkably silent on the matter of space weapons (other than WMD), far from universally adhered to, and subject to the agreement of states for enforcement. UN actions involving the use of force (which is central to deterrence and thus collective defence) are subject to vetoes by representatives of the most powerful space powers, which are also coincidentally the states most capable of conducting aggressive space activities and developing space weapons. Additionally, uncertainty and fear persist in the space environment as well as on the ground. A growing number of increasingly capable state and non-state actors now interact in space in ever-more complicated patterns and by using dual-use technology.[267] States fear their growing vulnerabilities in space as they become more dependent on space applications. Exacerbating uncertainty has been the historically high level of secrecy of state space activities in space, out of either fear that transparency might reveal militarily capabilities or worry it would compromise the sources and methods of state intelligence collection.[268]

The second criteria that must be met is the accumulation by states of power that has at least residual offensive capability. In most environments, this power is obviously military in nature, and the absence of [clearly defined] space weapons dedicated to offensive purposes thus seems to be an

[267] Gallagher, p.270
[268] Booth and Wheeler, pp.135-7l; Krepon and Katz-Hyman, p.328; Salin, p.20; Gallagher and Steinbruner, p.77; Space Security Index, p.8

indicator that this element of the security dilemma might be problematic in the space environment. However, and as Chapter Two made clear, the history of space politics is one of states with growing military and civilian capability. Most obviously, key space power states have developed significant dedicated military capabilities. The most obvious of these are ASATs, which a number of states now have tested or at least designed, and the US' BMD interceptors.[269] While the legal status of these technologies as 'weapons' might be unclear, their offensive potential is not, and as the most visible manifestation of largely hidden state space weapons development, every ASAT test has historically stimulated the weapons development programs of other states.[270]Additionally, the development of advanced dual-use space technology has given states considerable 'latent' military capability in space.[271] Thirdly, even moves by states to develop 'purely defensive' ways to protect their space systems, such as through hardening or redundancy, can be seen as the accumulation of capability and may motivate adversaries to develop more effective weapons to overcome them.[272]

Lastly, for a genuine security dilemma to exist, there must an absence of malign intent. Indeed, this is arguably the most important criteria as anarchy and some accumulation of power are usually present.[273] It is also the most problematic, as determining a state's intentions is always difficult. The most useful indicator of intent is state conceptions of national security interest. Lofty security desires make it hard to capitalise on common interests, and if the irreconcilability of interests is the result of a state defining its security needs in an expansive way, that state is malignant and the security dilemma no longer exists.[274] One could argue that, for the majority of the Cold War, the US and USSR found ways to accommodate their security interests in space. The number of agreements between these two parties on space technology seemed to signal a shared

[269] Gallagher and Steinbruner, p.78
[270] Krepon, 'Space: The Vulnerable Frontier' p.550
[271] Krepon and Katz-Hyman, p.325; MacDonald, p.606
[272] Space Security Index, p.9
[273] Tang, p.598
[274] Tang, p.601;Space Security Index, pp.15-6

understanding of the hazards of using weapons in space and of the mutual interdependence required to benefit from space operations.[275] The exception to this rule is the Reagan administration, during which the US significantly expanded its national interest in space. The 1990s saw a return to more restricted notions of US national interest, if only because there seemed no clear threat, but the Presidency of George W. Bush saw the US adopt a drastically more aggressive space policy and renounce the ABM Treaty. The Obama presidency has (thus far) marked a return to more restrained rhetoric and a less confrontational approach to space security. For its part, China's tendency to avoid transparency in the objectives and activities of its space program makes it hard for other states to determine China's intentions, especially as China classifies satellites believed to be of military or dual use as 'scientific'.[276]

There is considerable evidence of self-reinforcing security dilemma dynamics in the history of space militarisation and arms control. The course of the Cold War itself arguably reflects a security dilemma – as one superpower developed more powerful, capable or numerous weapons technology, the other would take steps to improve its own capabilities.[277] The politics of space militarisation mirrored these dynamics and is most clearly demonstrated by the history of BMD and ASAT developments. Developments in these fields have always been interpreted as threatening.[278] Thus the US moved to match Soviet ASAT testing in the 1970s, the USSR and Russia threatened threats to deploy missiles in reaction to US moves to deploy BMD components in Europe, and China conducted its ASAT test in 2007 in response to US BMD developments.[279] Security dilemma dynamics have not disappeared with the end of the Cold War, and are particularly prominent in the US-China space relationship. Indeed, this is where the majority of literature on a strategic dilemma in space comes from; one author credits the security dilemma with causing an emerging Sino-US

[275] Krepon, 'Space: The Vulnerable Frontier' p.554
[276] Space Security Index, p.21
[277] Tang, p.618, Moltz, p.119
[278] Booth and Wheeler, pp.134-6
[279] Meijer, p.94; Zhang, p.331

strategic rivalry in space,[280] while others warn that missile defences and the possible weaponisation of space pose the danger of a 'new Cold War with China'[281].

The most important manifestation of dilemma dynamics has been the general failure of states to demonstrate 'security dilemma sensibility', namely the notion that their own security-seeking moves might be seen as threatening by states who would then feel a need to respond in kind.[282] This 'failure of empathy' is at the very core of the security dilemma.[283] Jervis, writing in 1979, pointed out that US decision makers were only just starting to realise it was possible that the USSR's military actions might be partly the result of fear of US aggression.[284] Despite this growing awareness, US policy makers continued to largely be oblivious to the fact that the more space-based systems reduced US concerns, the more likely Russia and China were to seek ways to shore up their own capabilities.[285] Particularly aggressive supporters of US weaponisation are also clearest examples of 'failures of empathy', often stating that the US – as a liberal democracy and force for international good – could not possibly pose a threat to any but potential wrongdoers.[286] Chinese policy-makers have also historically failed to demonstrate security dilemma sensitivity, arguing that their relative military weakness could not possibly pose a threat to the US.[287] For its part, Russia seems to be displaying a growing awareness of security dilemma dynamics, if only because the end of the Cold War has seen its role evolve from equal leader in space development to a more modest one in which it is more concerned about the implications of US and Chinese developments.[288]

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[280] Zhang, p.322
[281] Booth and Wheeler, pp.142-8
[282] Booth and Wheeler, BOOK, p.7
[283] Scobell, p.714
[284] Jervis, p.182
[285] Meijer, p.93; Scobell, p.719
[286] MacDonald, p.608; Lambakis, p.82
[287] Scobell, pp.713-8
[288] Quoted in Peoples, 'Assuming the Inevitable?', p.513

REGULATORS OF THE SPACE SECURITY DILEMMA

The security dilemma's intensity can be regulated by both material and psychological factors, which render it anywhere from dormant to acute.[289] A number of regulators have been noted by authors, although very few besides the character of military technology have been analysed in depth or applied consistently.[290]

Material Regulators

Firstly, where states share a faith in a functioning international security system, the security dilemma is less acute because the victim of any offensive moves would be able to mobilise support and resources for reprisals.[291] Historically, international governance has evolved as a regulator from a strong to weak moderating influence. The "vagaries of the space militarisation-weaponisation debate" have always played their part, preventing space power states from agreeing on a full prohibition on space weapons.[292] However, during the Cold War key space power states did agree – and for the most part, abide by – a number of international treaties and restrictions on military space technologies. The end of the Cold War, and the strategic rivalry that defined it, has seen the US in particular demonstrate a lack of willingness to agree to new accords, and even withdraw from them in the case of the ABM Treaty. Additionally, the US, Russia and China are all veto-wielding members of the UN Security Council, preventing the world's main enforcement mechanism from taking effective action against them.[293]

Secondly, geography has acted as a regulator in two ways. It makes access difficult in the first place, minimising the number of states that might threaten each other and highlighting the importance of space situational awareness (SSA) in the absence of international borders. Initially,

[289] Tang, p.615
[290] Tang, pp.621-3; Jervis, pp.186-7; Booth and Wheeler pp.132-7
[291] Jervis, p.176; Robinson, p.33
[292] Peoples, 'Assuming the Inevitable?', p.514
[293] Robinson, p.33

the influence of this factor was moderating as few states were able to interact in space. Due to the cost and technical requirements of space launches, states developed genuinely cooperative ties on SSA for scientific purposes.[294] However, while scientific cooperation has continued, space has become increasingly congested. At the same time, the US remains the only state with its own robust SSA capability.[295] This has left most states without the ability to both identify potential collisions and the possibility that a collision was the result of hostile intent.[296]

Thirdly, whether the offence or defence has the advantage in the event of conflict is a widely-recognised regulator of the security dilemma; an offensive advantage makes states both more afraid and more likely develop their own offensive weapons, rendering others less secure in turn.[297] This has always been one of the most intensifying regulators as the offence has a clear advantage in space for two reasons. Offensive weapons technology is less expensive and simpler to develop and use than defensive technology; ASATs are much cheaper and less technically demanding than expensive satellites.[298] Additionally, space weapons themselves are vulnerable because like all space objects, they move predictably due to orbital geography, cannot remain over friendly territory, and are difficult to conceal.[299] This makes it imperative to deploy them before they are attacked.[300]

Fourthly, and related to the offensive-defensive balance, is the ease with which defensive weapons can be distinguished from offensive ones. [301] If differentiation is possible, the security dilemma is alleviated somewhat as non-status quo states are easier to identify.[302] Unfortunately, the

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[294] Robinson, p.31
[295] Robinson, p.30; Krepon, 'Space: The Vulnerable Frontier' p.551
[296] Gallagher, pp.262-8
[297] Jervis, pp.186-8; Montgomery, p.157
[298] Goldblatt, p.106; Gallagher and Steinbruner, p.4; Krepon and Katz-Hyman, p.333; Space Security Index, p.22
[299] Mueller, p.11
[300] Jervis, p.196; Mueller, p.11
[301] Jervis, pp.186-99
[302] Jervis, pp.199-201

space arms control security dilemma is one in which differentiation has always been very difficult, and this regulator increases its intensity as a result. Systems which are recognised as military all have offensive potential, as is clear from the example of BMD interceptors.[303] Most critically though, space technology is characterised by its intrinsically dual-use nature (as discussed in Chapter Two), making it difficult to ascertain what is or may be a weapon, let alone whether a weapon is offensive in nature. The combination of offensive advantage and difficulty in differentiation makes the space weapons security dilemma what Jervis would call 'doubly dangerous'.[304]

The last of the material regulators is the level of asymmetry in power of international actors. This can act as a mediating influence where states are of roughly equal capability, thus offering each other only a moderate threat, or where one state is so dominant none can challenge it. Arguably, the strategic stability of space politics during the Cold War was at least partly a product of a the largely stable bipolar world order. Unipolarity has intensified the security dilemma; a world power "cannot help but have the ability to harm many others that is out of proportion to the others' ability to harm it" points out Jervis,[305] and as such states that see the US as a potential threat are driven to develop ways to counter US strength[306]. Even incremental advances in US capability pressures other states to respond. Russia and China have been the most obviously concerned, simultaneously improving their own space capabilities, investigating asymmetrical ways to counter US conventional strength and seeking agreement on limiting international instruments.[307]

[303] Krepon and Katz-Hyman, p.325
[304] Jervis, p.211
[305] Jervis, p.185
[306] Moltz, p.131
[307] Gallagher and Steinbruner, p.72; Space Security Index, pp.20-2; Krepon and Katz-Hyman, p.323; Robinson, p.33

Psychological Regulators

Several psychological regulators also have a noticeable effect on the security dilemma that underlies space militarisation and arms control.

First is the nature of the historical relationship between states.[308] Historical legacies have generally been an intensifying factor. The relationship between two major space actors – the US and [Western] Europe – has historically been good. However, and more importantly, space politics has always been marked by antipathy between at least two major space powers. Tang argues that, due to fact that the US and USSR had seen each other as expansionist threats between 1945 and 1953, Premier Khrushchev and President Eisenhower inherited a security dilemma that was very 'deep'.[309] The Cold War may have ended but it has left a legacy of distrust between the US and Russia. The historic enmity between the US and China dates to the end of the Chinese civil war in 1949, and has only been heightened by cultural misunderstandings.[310]

A second, and relatively new, potential psychological explanation for the difficulty in establishing a prohibition is that the increasing 'securitisation' of space politics has made it difficult for states to compromise and heightened their sensitivity to military threats. Most prominently espoused by Columba Peoples,[311] this notion posits that space issues are increasingly being framed as national security ones by states, partly in order to justify more urgent decision-making and the adoption of extraordinary measures (such as the expenditure of large amounts of money on security initiatives).[312] While this can be seen by optimists as raising the profile of space issues and thus

[308] Scobell, p.714
[309] Tang, p.620
[310] Scobell, pp.715-8; MacDonald, p.609
[311] Peoples, 'The Growing Securitization of Outer Space', p.205
[312] Peoples, 'The Growing "Securitization" of Outer Space'

international cooperation, it also heightens the sensitivity of decision-makers to developments in space as these are seen through a security lens.[313]

The third relevant psychological regulator is that of states' concern for their international reputations. While in a way this can temper the security dilemma – contemporary states do not want to be seen as aggressors – on the whole it has made it more acute. A desire for international prestige has always driven space capability development, and analysts have argued that the Chinese space program is the product of a desire by Chinese elites for China to be respected on international stage.[314] At its worst, the concern for reputation and prestige can manifest as aggressive space nationalism. The US and China have both used bellicose rhetoric and provocative military actions in recent years, arguably to play to domestic audiences, but these contradict other, more conciliatory gestures and help to intensify security dilemma dynamics between the two countries.[315] International credibility is also critical to alliance maintenance, and the US's history of expanding alliance commitments arguably force it to act more like a non-status quo power; it needs to maintain offensive capabilities in the event it needs to go to the aid of an ally, and simultaneously tends to define its national interests in a more expansive way as a result.[316]

The last, and potentially most interesting, psychological regulator is the extent to which the space powers' policies and actions reflect 'doctrinal [offensive] realism'.[317] Doctrinal realism, or the widely held view in military circles that militarisation is inevitable and must be planned for, has

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[313] Peoples, 'The Growing "Securitization" of Outer Space', p.208 and Cervino, Corradini and Davolio, p.231-233
[314] Scobell, p.719
[315] Scobell, p.720
[316] Jervis, p.202. As an example, the US'*2010 National Security Strategy* states that it "must work in concern with allies and partners to optimise the use of shared sea, air, and space domains…The United States will continue to safeguard access, promote security and ensure the sustainable use of resources in these domains" - White House, 'National Security Strategy', pp.49-50.
[317] Peoples, 'Assuming the Inevitable?', p.503; McLean, p.247

been particularly strong in the US. As a result, space has been viewed largely through a military lens, resulting in zero-sum paradigm security thinking and worse-case scenario planning.[318]

Doctrinal debates in the US military have affected the views of other states since at least the beginning of the Cold War, but doctrinal realism has spread since the end of the Cold War and emergence of the unipolar world order. [319]

CONCLUSIONS

In conclusion, the politics of space militarisation and arms control represent a security dilemma, albeit one that has not – at least not yet – driven states into open conflict. Importantly, there have been two periods where a security dilemma was not present due to revisionist intentions; the Reagan and George W. Bush presidencies reflected an expansion of national security interests to such an extent the US was effectively 'malign'. A range of material and psychological regulators have influenced the intensity of the security dilemma over time. The offensive advantage of space weapons and difficulty of distinguishing between offensive and defensive space technologies have always been significant intensifying factors, but their effects were moderated somewhat by international governance, geography and bipolarity for much of the Cold War. However, as the space age progressed, the dilemma has become at least moderately acute; international governance has weakened, asymmetry increased, and the politics of space become more securitised.

[318] Peoples, 'Assuming the Inevitable?', p.509-514; Krepon and Katz-Hyman, p.328
[319] Jervis, pp.209-10; Zhang, p.313; Peoples, 'Assuming the Inevitable?', pp.511-2

CHAPTER 6: CONCLUSIONS AND FUTURE RESEARCH

"You should know, then, that there are two means of contending: one by using laws, the other, force. The first is appropriate for men, the second for animals; but because the former is often ineffective, one must have recourse to the latter"
Niccolò Machiavelli[320]

The discussion above makes it possible to arrive at a number of conclusions. Firstly, the history of space militarisation and arms control can be characterised by five elements; the historical restraint of space powers regarding space weapons; accelerating militarisation; the continued central role of key space power states, particularly the US; the ambiguity of space technology; and states' growing vulnerability to offensive uses of space technology.

Secondly, the two most prominent explanations for the absence of a prohibition on space weapons provide some insights, but are ultimately unsatisfactory at explaining the major characteristics of the history of space arms control.

Thirdly, the history of space militarisation and arms control has reflected the existence of a security dilemma between key space power states, and it is as a result of security dilemma dynamics that the failure of states to agree on a prohibition on space weapons is best understood. This dilemma was managed for the most part reasonably well by the Cold War superpowers, with the arguable exception of the period of the Reagan administration, but grew more intense from 1991 in the face of unipolarity. From 2001 to 2008 the security dilemma was for all practical purposes suspended as US space policy became expansionist to the point that it was arguably no longer a 'defensive realist' state – a precondition for the security dilemma.

Fourthly, certain material and psychological regulators of the security dilemma have been particularly relevant to the difficulty of establishing a regime that would ban space weapons. These

[320] Quoted in Bellflower, p.108

are: the offensive advantage of space weapons; the difficulty in distinguishing between offensive and defensive space weapons; the legacy of historical distrust between the US and the USSR/Russia and China; the spread of 'doctrinal realism' from the US military to its politicians and other state decision-makers; and the increasing 'securitisation' of space politics.

Fifthly, the fact that the international politics of space weaponisation reflects a security dilemma offers valuable insights for states concerned with space security and negotiators aiming to conclude an international prohibition on space weaponisation. They highlight the importance of 'security dilemma sensitivity'; an awareness by states that the moves they take to improve their security in, from and to space may cause uncertainty and even fear in other states. They also demonstrate the potential benefit of focusing efforts on certain regulators of the security dilemma to reduce the fear and uncertainty that can make the security dilemma acute.

Sixthly, the involvement of the US in any regime that regulates space militarisation would be critical to the success of that regime. Space militarisation has been largely driven by a combination of the US military and responses to US moves by other states.

Lastly, the example of space militarisation and weaponisation proves the usefulness of a comprehensive definition of the concept of the security dilemma. It also demonstrates the utility in understanding the role that the security dilemma can – but does not always – play in leading states to conflict.

These conclusions identify a number of potentially rewarding avenues for future research. These include: the relationship of the space arms control security dilemma to other prominent military challenges, such as cyber warfare and nuclear deterrence; how interaction between decision makers within key space power states – particularly the military and legislative branches – drives and is driven by space security dilemma considerations; and the role that commercial entities will play in the politics of space arms control as their influence in space politics increases.

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