THE SECURITY DILEMMA IN (SUPRA)GEOPOLITICS: GREAT POWER POLITICS IN THE CREATION OF SPACE FORCES

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TAM I:
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ABSTRACT

Anna Hardage: The Security Dilemma In (Supra) Geopolitics: Great Power Politics In The Creation Of Space Forces
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There seems to be a common perception that outer space is a politically different or a realm separate from Earth. However, space is not a place that is uniquely free of humanity's fears and interests. This thesis examines the development of Space Forces in the Russian Federation, the People's Republic of China, the United States, and France, Germany, Italy, and the United Kingdom. Utilizing the theory of Neorealism, this thesis argues that each country perceived a level threat-based competition that compelled the development of specially designated Space Command in each national military structure. It will argued that the threat perception stems from the increase in digitized military operations and high-tech advances in traditional weaponry as well as the threat of space asset weaponization that have effectively launched terrestrial geopolitical concerns into orbit.

Key Words: Outer Space, Space Force, Realism, Space Security

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LIST OF ABBREVIATIONS

ABM	Anti-Ballistic Missile
ASAT	Antisatellite Missile
BRICS	Brazil, Russia, India, China, South Africa (Political) Cooperation
C4ISR	Command and control, communications, computers, intelligence, surveillance, and reconnaissance
CCP	Chinese Communist Party
COS	Comando Interforze delle Operazioni Spaziali
DoD	US Department of Defense
DSS	Defense Space Strategy
EMP	Electromagnetic Pulse
EU	European Union
GEO	Geostationary Orbit
GPS	Global Positioning System
HPM	High-Powered Microwave
ICBM	Intercontinental Ballistic Missile

LEO	Low Earth Orbit
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NDS	National Defense Strategy
NSpC	National Space Council
NSS	National Security Strategy
PAROS	Proposed Prevention of an Arms Race in Space Treaty
PLA	People's Liberation Army
PPWT	Placement of Weapons in Outer Space and the Threat or Use of Force Against Space Objects
PRC	People's Republic of China
SALT	Strategic Arms Limitations Talks
SRF	Strategic Rocket Forces
SSA	Space Situational Awareness
SSF	Strategic Support Force
TCBM	Transparency and Confidence-Building Measures

UK	United Kingdom
UN	United Nations
US	United States
USSF	US Space Force
USSR	United Socialist Soviet Republic
VKS	Vozdushno-kosmicheskiye sily
WMD	Weapons of Mass Destruction

1. INTRODUCTION

"Wars in outer space have long been the subject of science fiction books and movies, but recent advances in technology have now transformed what was once reserved for fiction into a grave reality" (Kuplic 2013).

1.1 Background

In the 21st century, digitizing military operations and high-tech advances in traditional weaponry have significantly broadened the realm of the possible in modern warfare. High-tech systems for most every facet of defense, from communication to reconnaissance and high-precision strike capabilities, rely heavily on satellites in space that ensure the functionality and effectiveness of defense systems. Modern military technology's reliance on space satellites has also heightened geopolitical tensions and competition between the great powers. Thus, there exists a fundamental paradox: satellite-based systems are simultaneously a solution and a cause of modern problems (Kaivo-Oja 2015).

Activities in outer space are revolutionizing the conduct of warfare, and space-based systems have become a critical component of military power. The use of space assets to conduct basic military operations has been occurring since the first satellite entered orbit in 1957 (Devezas 2012, WILPF (No Date)). As of 2022, more than 70 countries possess satellites in orbit (Hart 2011); the militaries use these satellites for command and control, communication, monitoring, early warning, and navigation with the Global Positioning System (GPS) (DeFrieze 2014, 111). Space capabilities are critical to execute these peaceful functions that provide solutions to modern problems; however, peaceful functions can be, and often are, leveraged for terrestrial combat, which creates new issues for space policy.

Satellites can be used to direct bombing raids, and modern precision-guided weapons such as hypersonic missiles rely heavily on an integrated 'system of systems' that combines intelligence, communications, navigation, and other military systems in orbit (Pike 2002). High military reliance on space capabilities gives new importance to the security of those assets in space. Accordingly, space weaponization is increasingly an issue of concern.

Specialists generally understand space weaponization to refer to installing orbiting capabilities that can destroy or disrupt another country's space resources, although the exact scope of this definition is contested. Some experts use the term to refer solely to weapons placed in orbit, whereas others suggest that ground-based systems used to attack space, and weapons that travel through space to reach their targets, like hypersonic missiles, also constitute space weapons (WILPF (No Date)). For instance, some experts argue that many elements of ballistic missile defense systems that are not used traditionally for space constitute space weapons. They reason that most of these systems currently being developed or planned possess "dual-use" characteristics that enable them to harm or destroy ballistic missiles on Earth and, theoretically, space assets as well (Stojanović 2021). Johnson-Freese provided the most adequate definition of space weapons, not including satellites, that will be referenced in this thesis: she defined space weapons as "a system that has the direct goal of destroying space installations from land or space or a system that targets enemy targets on Earth from space" (Johnson-Freese 2016, 67).

Recognizing the unprecedented importance of contemporary space-based military systems for terrestrial operations, great powers including the Russian Federation, the People's Republic of China (PRC), the United States (US), and European countries including France, Germany, Italy, and the United Kingdom (UK) have acted to improve their comprehension of

space as a warfighting domain and to better address critical needs (Stojanović 2021). By designating outer space as a "warfighting domain" in official strategic documents, each aforementioned country has also taken organizational steps to create official military units responsible for air and space security, commonly known as a Space Force, or a variation thereof.

1.2 Hypothesis, Assumptions, and Analytical Limitations

This thesis will approach the issue of space militarization and weaponization from a Neorealist perspective. The leading questions for this analysis are the following: To what extent does the development of specially designated military services for space security stem from increased perceptions of threats in space? Does the resulting insecurity reflect the tenets of Neorealism's 'security dilemma,' a situation in which a state's actions to increase its security causes a sense of insecurity, that, in turn, prompts other states to do the same and lead to a decrease instead of an increase in the original state's security (Waltz 1979)?

Specifically, in this paper, the following hypothesis will be explored: **The recent increase in the advent of Space Forces as specially designated military services, resulting from the augmented relevance of military operations in outer space and the threat of space asset weaponization, is rooted in the perceived threat-based competition to secure in space relative advantages of national defense capabilities, and can be rationalized by the theory of Neorealism.**

On the basis of the foregoing question, the following research assumes that states covered in the analysis, specifically Russia, China, the US, France, Germany, Italy, and the UK, perceive a level of great power competition in international relations. Great power

competition is characterized by a multipolar world order with numerous states capable of projecting influence in various arenas, and a sense of competition between two or more states for influence in the same areas (CRS 2022; Hoang and Nyugen 2021). Although the concept of great power competition and its influence in the international arena can be deliberated, the debate will be omitted from this thesis. Another limitation of this thesis is that it touches on only the historically large space powers, the US and Russia, and two other influential powers, Europe and China, as their closest allies. It will not touch on Space Forces for medium or emerging powers, such as India, despite the relevance of the rapidly evolving space programs of these countries. What's more, the commercialization of space and engagement of private sector actors will not be considered, despite their close engagement within the defense industrial base, because the responsibility for military operations ultimately remains in the hands of central governments. Lastly, in focusing on military and security aspects of space, this research will not include cooperation between great powers in other domains such as science and space exploration.

The political relevance of this analysis is supported by the topicality of the outer space policy generally, the recent creation of Space Forces, and the increased relevance of space assets for military operations in light of advancing weapons systems. Therefore, it is critical to develop a deeper and more holistic understanding of the relevant policy and actions taken by nations to find ways to adapt and adjust. This thesis neither includes policy recommendations, nor does it present a normative vision of the idealistic utilization of outer space. The aim is to present what the actors in the domain have done to further their interests in outer space and the reasons behind these actions based on an analysis of their strategic documents and a theoretical framework to contextualize space operations in the grander scheme of military force and weaponization in space.

1.3 Methodology

The aim of this thesis is to show that the formation of Space Forces since 2015 can be viewed as the direct result of nations' perceptions of relative insecurity in a competitive international system, and represent a general shift in focus from the militarization to weaponization of space. Summarized below are the methodological tools that will be used to analyze national perceptions of competition and threats from other states.

First, according to Thucydides and Kenneth Waltz, the theory of Neorealism in the study of International Relations is explained to define the concept of security and classify international engagement and serve as both an ontological and epistemological lens for the international system. To address the hypothesis, one must first understand how states interact with one another and how the actions of one state influence the actions of another. Second, a historical content analysis of treaties and agreements for outer space will contextualize the discourse on the weaponization of the domain. The final method that will be used is a qualitative analysis of relevant space policy, including government strategies, to follow the logic of discourse formation and policy implementation.

1.4 Structure

The first half of this thesis will focus on theoretical and practical questions regarding space in International Relations and the history of space regulation. To begin, the theory of (Neo)realism in international relations, and specifically concepts of Thucydides' Trap and the security dilemma, will be examined to establish a common understanding of states' interactions for the subsequent analysis. Then, a closer historical overview of existing treaties and agreements will be provided to define the formal diplomatic constraints, and loopholes, on states' weaponization efforts in space. Finally, chapter three will examine the meaning and

implications of space militarization and weaponization generally and address the question of what it means to be ‘secure’ in space.

The second half of the thesis is a country analyses for Russia, China, the US, and, under a heading of Europe, France, Germany, Italy, and the UK. Each country’s priorities outlined in strategic documents are reviewed to compare the justifications for the creation of a Space Force. Russia and China, as well as the US and Europe, cooperate regularly in defense matters in space; their cooperation will also be analyzed in the context of maximizing relative gains to achieving national goals. Finally, it will be determined to what extent the increase in the creation of Space Forces is rooted in the threat-based competition, and whether the competition can be justified by the International Relations theory of Neorealism to reveal the political implications in and out of orbit.

2. NEOREALISM IN INTERNATIONAL RELATIONS

Since the end of the Cold War (1949-1989), International Relations scholars have grappled with the relevance of theories for examining the external behavior of states (Telhami 2002, 158). Realism is one of the dominant schools of thought in the field of International Relations. Realism is considered to be one of the first theories of international relations with roots in some of humankind's earliest historical writings (Antunes and Camisão, 2018). The following chapter will discuss the logic of conflict analysis developed by one of the founders of Realist tradition, Thucydides, and assumptions underlying the theory of (Neo)realism in International Relations according to theorist Kenneth Waltz in his 1979 work. The patterns and motivations for states' behavior in the greater international system will be identified to establish a framework for the later analysis.

2.1 The Realist Tradition

Realism emphasizes a competitive and conflictual side of international relations because it strongly views international politics as solely the pursuit or struggle for power among states (Folarin 2015). The concept of power in the theories of Realism is understood through the lens of hard power capabilities and the ability to project force to defend one's national interest.

National interest, defined as a set of objectives a nation has articulated as its principal targets in its external relations, is a primary factor in international politics (Folarin 2015). National interest and the maximization of power are both an end in themselves and a means to an end. Power here refers to "national values, economic riches, or national wealth and the

occupation of a vantage position in the international community" (Folarin 2015). National power is the ultimate aim of states, and although tautological, a state needs to project power to be able to acquire it.

A foundational assumption shared by Realists is that principal actors in international politics are states that are constantly preoccupied with their own respective security; states pursue their own national interests and they are in an infinite struggle for power (Antunes and Camisão, 2018). In addition, states have the means to project power, which is measured by hard power capabilities in the Realist tradition. By assuming that a state is the most powerful actor, Realists view nonstate actors, such as individuals and non-governmental organizations, as unable to compete with states in the international system due to their lack of military capacities (Pease 2018). What's more, many Realists consider that the state is a unitary and rational actor. A rational state is considered a single actor capable of identifying goals and preferences and determining its relative importance and choosing optimal strategies for achieving its goals (Pease 2018, 48). Due to the belief that states are unitary, scholars do not consider internal differences in domestic policy as important as the state itself. Specialists argue that, regardless of any internal differences, the unified position is centered on the interest of the state (Korab-Karpowicz 2018).

2.2 The Premise of Neorealism

A core assumption shared by Realists is the idea that international relations are conflictual and that the international system is one of competition, tension, and conflict (Pease 2018, 48). The deciding factor for states in the international community is their uncompromised pursuit of national interest that can, and often does, clash with the ambitions of other states; consequently, international politics is characterized by active or potential

conflict between states (Korab-Karpowicz 2018). Neorealists attribute the structure of the international system to be the root cause of competition and main motivation for states' behavior. According to theorist Kenneth Waltz, Neorealists see the entire global system as one that leads to conflict guided by the notion of anarchy (Waltz 1979, Korab-Karpowicz 2018). It is believed that the world lacks an overarching authority that controls the behavior of actors within the state system; this lack of authority creates an anarchic and decentralized system (Waltz 1979, 88; Mcglinchey 2017, 5). In sum: external forces, specifically the actions of other states, dictate a country's behavior.

Neorealists focus predominantly on the ways that the global system limits or dictates behavior based upon the concepts of power and security (Antunes and Camisão, 2018). States respond to perceived threats from other states, and the effects of their interactions determine the respective states' policy, (Pease 2018, 50). Realists often refer to this as a "self-help system" in which the principal actors (each respective state) must protect their interests and preserve national sovereignty (Korab-Karpowicz 2018).

The anarchic international system generally compels states to arm themselves for self-defense, which results in a so-called security dilemma. A security dilemma is a situation in which actions taken by a state designed to increase its security and pursue national interests ultimately lead to a decrease in security. A state's search for absolute security often leaves other states in the international system insecure; this insecurity causes other states to act similarly and initiate policies to counteract the increase in relative power they perceive. Within a security dilemma, Realists see each state as being most concerned with relative gains, or its position vis-à-vis other states. This view stems from Realists' idea that International Relations is generally a zero-sum game, that is, one state's gain is another's loss (Korab-Karpowicz 2018). Thus,

perceived threats provide a powerful incentive for arms races and other types of hostile interactions (Korab-Karpowicz 2018; Pease 2018, 50; Waltz 1979).

In Neorealism specifically, the possibility for the formation of alliances is not "born out of any kind of moral suasion but *realpolitik*:" alliances are based on the reality of the situation as it affects national interest (Folarin 2015). Cooperation is possible if it is viewed as increasing the respective state's relative gains, and partners to the agreement must not perceive the other states as 'gaining more' from the agreement (Greico 1988, 487). Realism's identification with relative gains as a problem for cooperation is based on states in anarchy fearing for their survival as independent actors and their willingness to cooperate to increase their relative gains (Greico 1988, 487). One important consideration is that, in International Relations, cooperation is not equivalent to harmony. Harmony requires complete identity of interests, but cooperation can take place only in situations that contain a mixture of conflicting and complementary interests (Axelrod and Keohane, 1993).

In his 2004 defense of Neorealism, Waltz references the ideal balance of power for states: bipolarity. Two states sharing power creates a secure balance of power and provides for a simple system of "checks and balances" (Waltz 2004, 4). Unlike complex multipolar structures, power sharing in bipolar structures reduces uncertainties about who will oppose whom; in a unipolar world, checks on the behavior of the one great power drop drastically (Waltz 2004, 4). Waltz claims that bipolarity offers peace and suggests that nuclear weapons reinforce the promise of peace, and, in fact, nuclear weapons nearly guarantee peace, even if a state's conventional forces are inadequate: "Among states armed with nuclear weapons peace prevails whatever the structure of the system may be" (Waltz 2004, 5).

2.3 Conflict Escalation

The security dilemma describes the circumstances in which countries arm themselves in self-defense, though ultimately achieve a less secure international order. This raises the question of how the insecurity may escalate to the level of armed conflict in a bi- or multipolar world. A considerable amount of research has been conducted over the years in an attempt to address this question. One rationale for escalation that has been especially prominent in International Relations literature is described by the Power Transition Theory, which generally holds that great-power war typically occurs at the intersection of one hegemon's rise and another's decline.[1] This is the body of work underpins what has become known as the so-called Thucydides Trap (Brands and Beckley 2021).

The foundation of Realism was in part defined by Thucydides, an Athenian historian and author of the "History of the Peloponnesian War" (Antunes and Camisão, 2018). In his book, Thucydides offered powerful insights into states' motivation for war using the example of Athens and Sparta: "It was the rise of Athens, and the fear that this inspired in Sparta, that made war inevitable" (Allison 2015). On this basis, Allison used Thucydides Trap to describe a tendency towards conflict when an emerging power threatens to displace an existing great power as a regional or international hegemon (Allison 2015; Moore 2018, 1). Thucydides identified two key drivers of this dynamic. On the one hand, "the rising power's growing entitlement, sense of its importance, and demand for greater say and sway," and on the one hand, "the fear, insecurity, and determination to defend the status quo this engenders in the established power, on the other" (Allison 2015). Reinforcing Thucydides' claim, Allison

[1]Foundational works for Power Transition Theory include Organski (1958), Organski and Kugler (1980), Kugler and Lemke (1996), and Tammen et al. (2000) which address the root of Power Transition Theory including questions of war and peace. Recently the theory has been applied to additional questions of nuclear deterrence (Kugler and Zagare, 1990), the relationship between arms races and conflict (Werner and Kugler, 1996), and the democratic peace (Lemke and Reed, 1996) (Lemke and Temmen 2010).

noted that in 12 of 16 instances of great power transitions between the 16th century and the present, where a rising power confronted a hegemon in the international system, war followed (Moore 2018, 1).

The concept of Thucydides Trap is driven by a sense of insecurity in the hegemon's international status and national prestige, and the cause of the insecurity is the entitlement of the rising power and actions that imply their self-perception of being a great power. There are, however, theorists who claim the trap is an oversimplification of conflict escalation, notably Hal Brands and Michael Beckley (2021). They argue that rising powers do indeed expand their influence in ways that threaten reigning powers, however it is not the rise of another power in itself that leads to conflict, but rather the stagnation of the rising power's growth that causes war. Specifically:

> *"But the calculus that produces war—particularly the calculus that pushes revisionist powers, countries seeking to shake up the existing system, to lash out violently—is more complex. A country whose relative wealth and power are growing will surely become more assertive and ambitious. All things equal, it will seek greater global influence and prestige.* ***But if its position is steadily improving, it should postpone a deadly showdown with the reigning hegemon until it has become even stronger.*** *Such a country should follow the dictum former Chinese leader Deng Xiaoping laid down for a rising China after the Cold War:* ***It should hide its capabilities and bide its time****" (Brands and Beckley 2021).*

Brands and Beckley therefore do not discount the Thucydides Trap entirely, but effectively postulate that there must be a notable plateau in the rising power's capabilities that escalates the feeling of insecurity vis-à-vis the global hegemon that causes it to demonstrate the power it has. Both the works of Brands and Beckley, as well as Allison that touch on Thucydides Trap and aspects of conflict escalation will complement the theory of Neorealism and support the later analysis of various countries' Space Forces.

2.4 Practical Significance of Realism

In sum, the theory of Neorealism stipulates that states are the principle and most significant actors in international relations, and national security is the most important international affairs issue. The theory dictates that anarchic external forces determine states' actions, and the international arena is naturally conflictual and competitive, with each state acting rationally to protect its interests and uphold its sovereignty. States respond to perceived threats from other states, which causes a security dilemma that ultimately leaves actors less secure. Within the security dilemma, states try to maximize their relative gains in competition with other actors. Cooperation is possible if it is perceived as increasing the respective state's relative gains generally, but also compared to others' gains from the agreement. Waltz suggests that a bipolar international system reduces uncertainties about who will oppose whom, whereas a multipolar structure increases instability. Additionally, Thucydides Trap and theories of conflict escalation between established and rising powers describe a conflict as an instance when an emerging power threatens to displace an existing great power as a regional or international hegemon.

The theory of Realism in International Relations is a strong framework for understanding the history and current developments in militarizing and weaponizing outer space. In this analysis, states are considered to be the primary actors in space policy, especially as it pertains to great power politics and the militarization of space.[2] The focus on states as the primary actors in this context reinforces the validity of Neorealism to analyze defense policy decisions pertaining to space.

[2]As mentioned in the introduction, although the presence of private sector investment and activities in outer space have increased substantially during the prior decade (Weinzierl and Sarang 2021), these actors will not be considered for the analysis because their primary focus is commercializing instead of weaponizing space.

Nonetheless, the theory neglects some features. First, practitioners see the value of Realism primarily as a tool for analyzing history and not for predicting future developments. Second, Realism is criticized for its excessively materialistic approach that largely underestimates the importance of factors such as ideas, values, institutions, and norms. Lastly, Realism does not consider domestic issues in states; thus, Realism does not explain how a national interest is composed.

The assumption for the purposes of this thesis is that the US, select European countries, Russia, and China all perceive a relative level of military insecurity as it pertains to the use of outer space. This insecurity has led to the creation of Space Forces with enhanced capabilities and responsibilities. The explanatory value of Neorealism, and specifically the security dilemma, Thucydides Trap, and the zero-sum understanding of great power politics, will be demonstrated in the analysis of space policies.

3. (STRATEGIC) ARMS CONTROL: OUTER SPACE TREATIES

Space flight has been one of the most consequential human achievements of the twentieth century (Devezas 2012, 963). The first attempts to use weapons in the atmosphere can be traced back to World War II (1941-1945). Germany took the initiative in developing rockets and created the first liquid fuel, guided rocket able to carry missiles, known as the V-2, that traveled to space in September 1944 (Siddiqi 2010, 437; Devezas 2012, 967). Following World War II, both the US and Soviet Union (USSR) recognized the fundamental function of technology in the projection of national power and the potential to secure national interests in outer space. Thus, a US-Soviet technological rivalry followed, marked by the Space Race within the context of the Cold War (1947-1989) (Siddiqi 2010, 437).[3] The Space Race was a contest of political systems between two superpowers. Early in the 1950s, the militaries around the world and especially in the US recognized space as the new "high ground" and the need to control space for national security. (Hall and Neufeld 1998, 77). The nation that could exploit the potential benefits of this ultimate strategic high ground for military purposes would dominate the rest of the world. However, contemporaneously, the same countries demonstrated some will to regulate what became known as a "global commons"[4] because regulation was thought to be a crucial step to prevent (nuclear) war (Launius 2006, 53). The Cold War and especially the Space Race led the US and USSR to play the biggest roles as the architects of

[3]The Cold War "was the first total war between economic and social systems, an industrial test to destruction (…)" and was a non-combative state of political tension between two superpowers, the USSR and the US (Walker 1995, 1). The space race was the competition to achieve relative dominance in outer space, summarized by US President Lyndon Johnson: "Failure to master space means being second best in every aspect, in the crucial area of our Cold War world. In the eyes of the world first in space means first, period; second in space is second in everything" (Johnson 1982, in: Launius 2006, 50).

[4]Global commons are areas and resources beyond sovereign jurisdiction (Vogler 2012).

space law; the two superpowers shaped the laws in accordance with the geopolitical climate between them at the time (Beaver 2015).

The following chapter outlines the most important treaties and agreements in force and the constraints they impose. The focus is on the aspects of national security and the weaponization of space to demonstrate how the treaties have shaped the contemporary discussion of space policy.[5] The issues and limitations with the scope of current space laws will also be explained in this chapter.

3.1 Limited Test Ban Treaty

Throughout the 1950s and 1960s, the US and USSR tested their nuclear capabilities, with the two superpowers engaged in a series of test explosions (Office of the Historian (No Date)). It was not until other countries began doing the same that concerns about nuclear proliferation peaked. France tested its first weapon in 1960, and the People's Republic of China (PRC) appeared close to successfully building its own bomb. The Limited Test Ban Treaty prohibited all nuclear tests in the atmosphere, in space, or underwater. Specifically, the treaty banned the testing of weapons with nuclear components; the continued testing and development of non-nuclear weapons in space was permitted (Karas et al 1995, 92). The US, UK, and USSR signed the treaty in 1963 (Office of the Historian (No Date)). The PRC is not a signatory.

3.2 The Outer Space Treaty

As early as 1957, the US began proposing an agreement for partial disarmament in space and international verification and regulation of space activity to be reinforced by an inspection system (Outer Space Treaty 1967). The Soviet Union, in the midst of testing its first

[5]The following chapter will address only the treaties and agreements that directly pertain to weapons in space and is not a comprehensive overview of all space treaties.

Intercontinental Ballistic Missile (ICBM) and about to orbit its first Earth satellite, did not accept these proposals. Both sides worked to develop new and better space technology during the course of the late 1950s and early 1960s. The USSR successfully launched the first artificial satellite to reach orbit in 1957 (Sputnik 1) followed shortly thereafter by Sputnik 2 (Devezas 2012, 967). The US responded in 1958 with its first satellite, Explorer 1 (NASA 2017). In 1958, US President Dwight D. Eisenhower (1953-1961) established the National Aeronautics and Space Administration (NASA) to promote aeronautical research and respond to the Soviet challenge (Sagdeev 2008). The Soviet Union's unmanned satellites Luna E1 and Luna E2 reached the moon in 1959 (NASA 1959a, NASA 1959b), events that increased the sense of insecurity and urgency in the US (Devezas 2012, 967).

In 1959, the first treaty to demilitarize a global common, known as the first "nonarmament" treaty was signed – not for space but, instead, for Antarctica (Antarctic Treaty 1961). The treaty that officially entered into force in 1961 stipulated that (1) that the legal status quo of the Antarctic Continent remain unchanged; (2) that scientific cooperation continue; and (3) that the continent be used for peaceful purposes only (Antarctic Treaty 1961).[6]

Inspired by the structure and intentions in the Antarctic Treaty and the nuclear threat addressed in the Limited Test Ban Treaty, in 1967, the UN General Assembly approved two resolutions on outer space that subsequently became the basis for the Outer Space Nonarmament Treaty: UN Resolution 1884, which called on countries to refrain from stationing weapons of mass destruction (WMD) in outer space, and Resolution 1962, which determined legal principles on outer space exploration and stated that all countries have the right to freely explore and use space (Rusek 2020; Antarctic Treaty 1961; Agreement

[6]The significance of the Antarctic treaty lies in the precedent it set and will not be further explored within the framework of this analysis.

Governing the Activities of States on the Moon and Other Celestial Bodies 1979). The key provisions in the "Outer Space Treaty: The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space" are that parties to the agreement commit not to place any nuclear weapons or objects carrying WMD in orbit around earth or any other celestial body, install WMD on celestial bodies or station WMD in outer space in any manner, or establish military installations, conduct military exercises on the moon, or test "any type of weapons" (United Nations 2002). Other treaty provisions underscore space's role as a global common and aim to ensure that space remains accessible to all countries (Rusek 2020). The treaty was signed in January 1967 in London, Washington, and Moscow and entered into force in October of that year. It became the first and is the largest nonarmament treaty for outer space to date with 111 ratifications and 23 signatories, including China (Agreement Governing the Activities of States on the Moon and Other Celestial Bodies. 1979).

The Moon Agreement that entered into force in 1984 reaffirmed and elaborated on the Outer Space Treaty as it relates to the moon and other celestial bodies. The treaty stipulates that all celestial bodies should be used exclusively for peaceful purposes, their environments should not be disrupted, and the UN should be informed about any stations built on those bodies (Agreement Governing the Activities of States on the Moon and Other Celestial Bodies. 1979).

3.3 Strategic Arms Limitations Talks (SALT)

Amid the development and testing of Soviet and American Anti-Satellite (ASAT) weapons during the 1970s, Soviet President Leonid Brezhnev (1969-1982) and US President Richard Nixon signed Strategic Arms Limitation Talks (SALT I) in 1972. At the time, these agreements were the most comprehensive attempts for strategic arms control (History.com editors 2020). The SALT agreements addressed two major issues. First, they limited the two

countries to two antiballistic missile (ABM) sites[7], and the number of ICBM and submarine-launched ballistic missiles (SLBM) was frozen at existing levels. Article V of SALT I states that each Party shall use "national technical means of verification at its disposal in a manner consistent with generally recognized principles of international law," restricts the parties from interfering with each other's national means of verification, and the "deliberate concealment measures which impede verification by national technical means of compliance" (SALT I 1972, 1). The national technical means of verification in Article V can be interpreted to apply to satellite systems. The second round of talks known as SALT II was intended to make the interim SALT I into a long-term comprehensive Treaty that provides broad limits on strategic offensive weapons systems (SALT II 1979). Article IX prohibits the development, testing, or deployments of systems for placing into Earth orbit nuclear weapons or any other kind of WMDs, including fractional orbital missiles.[8]

3.4 Anti-Ballistic Missile (ABM) Treaty

The Anti-Ballistic Missile Treaty was signed in May 1972 and forbade Washington and Moscow from deploying nationwide defenses against strategic ballistic missiles. The treaty originally permitted both countries to deploy two fixed, ground-based defense sites of 100 missile interceptors each; one site could protect the national capital, and the second could be used to guard an ICBM field (Kimball 2020). In December 2001, President George W. Bush (2001-2009) announced the US' withdrawal from the treaty, claiming that it prevented the US from developing defenses against possible terrorist or "rogue-state" ballistic missile attacks (Kimball 2020).

[7]ABMs were missiles designed to destroy incoming missiles.
[8]A Fractional Orbital Bombardment System (FOBS) is a warhead delivery system that uses a low earth orbit towards its target destination (Stone 2021).

3.5 Proposed Prevention of an Arms Race in Space Treaty (PAROS)

The PAROS treaty is a UN resolution that seeks a ban on the weaponization of space. It was originally proposed in the 1980s by an ad hoc committee of the Conference on Disarmament (Butchard 2022). The PAROS treaty would complement and reinforce the 1967 Outer Space Treaty by preventing any nation from gaining a military advantage in outer space (NTI 2021). Specifically, PAROS prohibits nations from placing any objects carrying any type of weapon into orbit, installing weapons on other celestial bodies, and threatening to use force against objects in outer space. All Parties would also agree to practice agreed confidence-building measures (NTI 2021).

In November 2020, the First Committee of the UN General Assembly voted in favor of adopting five resolutions on outer space security: "Prevention of an arms race in outer space," "Further practical measures for the prevention of an arms race in outer space," "No first placement of weapons in outer space," "Transparency and confidence-building measures in outer space activities," and "Reducing space threats through norms, rules and principles of responsible behaviours" (Butchard 2022) The US voted in favor of only the resolution on reducing space threats. On December 7, 2020, the UN General Assembly adopted four resolutions from First Committee reports, excluding the resolution on further practical measures to prevent an arms race (NTI 2021).

3.6 Issues with Outer Space Nonarmament Treaties

The treaties on preventing the weaponization of space are insufficiently comprehensive in the 21st century. First, the space industry has changed drastically since the treaties were signed, and technology is developing at a much faster rate than the legislation can account for (Beaver 2015). Second, the distinction between military and nonmilitary uses of space is

increasingly blurred. The militarization of space, which in itself is noncombative, involves nations leveraging dual-use technologies like GPS to achieve national military aims. As technologies increasingly become dual-use, it becomes more difficult to restrict or regulate technology.

Specifically with regards to the treaties, the Outer Space Treaty, for instance, has a "largely ambiguous and idealist nature" (Johnson 2011). Article one emphasizes space's role as a global common that belongs to all nations and is to be used for peaceful purposes. But, with the vast increase of space actors since the initial drafting of the Treaty, there exists greater potential for conflict (Beaver 2011). In addition, the Outer Space Treaty does not define "peaceful purposes"; thus, the international community has interpreted the phrase to mean "non-aggressive" or "non-hostile" instead of "nonmilitary" (Azcárate Ortega 2021). The treaty does not require establishing an international body to provide for non-appropriation, 'peaceful' use, and some form of benefits sharing, leaving the verification up to other individual states (Johnson 2011). Without international oversight, these individual interpretations of international space law can cause conflict between space actors attempting to gain a military advantage. In this case, space actors may consider developing celestial bodies or weaponizing space to be 'allowed' so long as all actors have equal rights to do so (Beaver 2015).

Article IV of the treaty prohibits only the placement "in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner" and "[t]he establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies" (Outer Space Treaty 1967). The ambiguous ban on weapons provides countries with a loophole to deploy

other conventional weapons; thus, states have interpreted conventional weapons to be fair game as long as such weapons are not used aggressively against another space actor. ASAT testing is a result of this legal interpretation (Azcárate Ortega 2021).

The primary issues with the SALT treaties, although they can be interpreted to apply to satellite systems, are that they do not restrict developing, testing, or deploying ASAT weapons capable of harming other countries' national technical means of verification. What is more, the protections cover only systems that verify SALT capabilities, neglecting other systems used for combat, including in space (Karas et al 1995, 93). In SALT II, although it was never ratified, there were no provisions on multiple independently targetable re-entry vehicle missiles (single missiles carrying multiple nuclear warheads) or about the development of new weapons (History.com Editors 2020).

In an attempt to resolve some of these issues, on numerous occasions, the UN General Assembly has considered the weaponization of space, although most resolutions have not received enough support. In 2007, the UN adopted a resolution drafted by Russia and China on transparency and confidence-building measures (TCBMs) in outer space (Transparency and confidence-building measures in outer space activities resolution 2006). In 2010, the General Assembly agreed to launch a Group of Governmental Experts to explore and recommend TCBMs that could be pursued to enhance space security, although most states agree that it does not serve as a replacement for a binding treaty (WILPF (No Date)). In 2008, the European Union drafted an International Code of Conduct for Outer Space Activities to establish nonbinding norms of responsible behavior in space activities, although the Code of Conduct never got enough support from the international community (Azcárate Ortega 2021). Finally, the Chinese-Russian Draft Treaty on the Prevention of Placement of Weapons in Outer Space

and the Threat or Use of Force Against Space Objects (PPWT) was introduced in 2008. It was a legally binding multilateral agreement to prevent an arms race in space. The PPWT attempted to define and prohibit the proliferation of weapons in outer space and provided definitions of prohibited weapons. The PPWT failed to generate adequate support, both in 2008 and when a new version was submitted in January 2014 (Azcárate Ortega 2021). The US was the main (but not the only) critic of the proposed agreement. The primary criticisms were (1) the lack of a verification mechanism, which would not improve upon the Outer Space Treaty from 1967, (2) the lack of restrictions on the development and stockpiling of ASAT weapons on the ground, and (3) the fact that, although the PPWT would have banned the placement of weapons in outer space, it did not ban the direct-ascent ASATs launched from the ground that Russia had been testing, nor did it address weapons such as lasers that could be employed to permanently or temporarily disable a satellite (Azcárate Ortega 2021).

4. SPACE AS A WARFIGHTING DOMAIN

Space is a global common, as established in the 1967 Outer Space Treaty. Space was once thought to be a peaceful environment for scientific advancement, but, as national security objectives evolved, the significance of outer space has transformed as well (DeFrieze 2014).

The Introduction noted a significant difference between the processes of militarization and weaponization of space. Militarization implies space operations aimed at increasing the military power of the state, but without direct attack on the enemy's space-based facilities or attack from space (Lele 2013, 182). The peaceful side of military power encompasses self-defense against military buildup, invasion, or missile attack that are enhanced by surveillance from space. Critical space systems to be protected include satellites for GPS, missile warning, reconnaissance, and position, navigation and timing (DeFrieze 2014). Space systems have played a crucial role in a number of limited operations before the turn of the century, the most renowned being US Operation Desert Storm in 1990. Desert Storm is generally regarded as the first space war because it involved the first widespread use of military space systems by ordinary soldiers, sailors, marines, and airmen (Caton 1996).

Experts in the defense field agree that space weapons are "a system that has the direct goal of destroying space installations from land or space or a system that targets enemy targets on Earth from space," including systems used for peaceful purposes (Johnson-Freese 2016, 67). Therefore, any device or system that could strike targets on the ground, such as space-based lasers or satellites equipped with metal rods for deorbiting, and space systems

used to attack other satellites, such as co-orbital anti-satellites, are space weapons would be included (Weeden 2008).The following subchapters will provide an overview of different types of space weapons and possible meanings of space security to explain exactly what states are doing in orbit to further their national security aims and to provide context for the Space Force missions.

4.1 Emerging Threats and Technologies

It is nearly impossible to list the total number of space weapons or dual-use technologies that could be used for space warfare – to do so would even be beyond the scope and classification of this paper. All countries considered in this analysis default to the over-classification of outer space capabilities; there is limited information available to the general public for various reasons, most commonly the importance of space capabilities for national security (Harrison 2018). Over-classification arguably leads to many issues such as difficulties discussing escalation thresholds with other nations, thereby making the treaty process and enforcement difficult, even with allies (Harrison 2018).

Despite a lack of accessible information on the weapons (systems) themselves, different types of weapons can be distinguished. According to the Center for Strategic and International Studies Space Threat Assessment from 2021 (Harrison et. al), there are four distinct types of space weapons being tested: ‘Kinetic Physical Counterspace,’ ‘Non-Kinetic Physical Counter-Space’ ‘electronic’ and ‘cyber.’

Kinetic physical counterspace weapons have been the most common type of weapon in outer space (Kuplic 2013, 1138). A kinetic physical attack can be conducted by direct-ascent ASAT weapons, co-orbital ASAT weapons, (classified as conventional weapons), and ground station attacks. A kinetic physical attack involves physical force to damage or destroy

targets (Skinner 2020). The aforesaid weapons either strike satellites directly or detonate a warhead near a satellite or ground station. (Harrison el al. 2021, 4). Direct-ascent ASAT weapons are "launched from Earth on a suborbital trajectory to strike a satellite in orbit, while co-orbital ASAT weapons are first placed into orbit and then later maneuvered into or near their intended target" (Harrison et. al 2021, 4). Ground attacks with such weapons involve striking earth-based stations responsible for command and control of satellites or the relay of satellite mission data to users. Throughout the space age, almost all direct ascent kinetic ASAT systems have been based on ABM platforms. ABM systems have an inherent use as kinetic ASAT systems. Their abilities to target and intercept ballistic missiles can be modified for use against satellites in orbit (Skinner 2020).

The damage inflicted by kinetic physical weapons is considered irreversible. The weapons produce space debris that indiscriminately affects other satellites, and their use is one of the few counterspace actions that carry the potential for the loss of human life if targeted at crewed ground stations (Harrison et. al 2021, 4).[9] Kinetic ASAT capabilities date back to the early space age, but there is no recorded hostile use of these weapons. However, with great speed, the US, Russia, China, and India are successfully developing, testing, and demonstrating such capabilities of direct-ascent ASAT weapons (Skinner 2020). So far, all direct ascent intercept tests and demonstrations have been conducted in low Earth orbit (LEO), the location of most commercial satellites and many military reconnaissance satellites. However, there is evidence that China has conducted flight testing of kill vehicles as high as geostationary (GEO) orbit, roughly 36,000 km above the Earth. Historically, communications satellites have been located in GEO; so too are strategically sensitive military satellites used for command and control of military forces and nuclear weapons systems (Skinner 2020).

[9]Space debris, whether from a satellite or otherwise, is considered a threat to space assets due to its unpredictability and the perpetual risk of it striking and disabling satellites.

The second type of space weapon, the non-kinetic physical weapon, does not make physical contact with satellites or ground control. Different types include dazzlers, lasers, high-powered microwave (HPM), and high-powered radio frequencies to disrupt the sensors on satellites, cause permanent damage to satellite electrical circuits and processors, or cause components to overheat (Kuplic 2013, 1138; Harrison et. al 2021, 4). Satellites can be targeted with lasers and HPM weapons from ground- or ship-based sites, airborne platforms, or other satellites. High-powered microwave weapons require high beam quality, adaptive optics, and advanced pointing control to steer the laser beam precisely (Harrison et. al 2021, 4).

A laser can be effective against a sensor on a satellite if it is within the field of view of the sensor, a condition that makes it possible to attribute the attack to the laser's approximate geographical origin. An HPM weapon can be used to disrupt a satellite's electronics, corrupt data stored in memory, cause processors to restart, and, at higher power levels, cause permanent damage to electrical circuits and processors. High-powered microwave attacks can be more difficult to attribute to a particular source because the attack can come from a variety of angles, including from other satellites passing in orbit. For both laser and HPM weapons, the attacker may have limited ability to know if the attack was successful because the attack is not likely to produce visible indicators (Harrison et. al 2021, 4).

A nuclear device detonated in space also constitutes a non-kinetic weapon because it would cause an electromagnetic pulse (EMP) that would last for only one millionth of a second but could disable electronics within a several-hundred-mile radius of the blast (Kuplic 2013, 1140). The effects an EMP would be visible compared to the invisible effects of lasers or HPM (Harrison et. al 2021, 5). The use of nuclear weapons in space is banned under the

aforementioned Partial Test Ban Treaty of 1963, which has more than 100 signatories, but does not include China and North Korea.

Third, electronic counterspace weapons target the space systems that transmit and receive data; targeting occurs most commonly by the use of jamming devices that interfere with the communications to or from satellites by generating noise in the same radio frequency band (Harrison et. al 2021, 5). An up-link jammer interferes with the signal going from Earth to a satellite, such as the command-and-control uplink. Downlink jammers target the signal from a satellite as it propagates to users on Earth (Harrison et. al 2021, 5). Spoofing is a form of electronic attack in which the attacker "tricks" a receiver into accepting a fake signal produced by the attacker. False information can be injected into a data stream or, in extreme cases, issue false commands to a satellite to disrupt its operations (Harrison et. al 2021, 5). By a type of spoofing called "meaconing," counterspace weapons can even spoof encrypted military GPS signals. Meaconing does not require cracking the GPS encryption because it merely rebroadcasts a time-delayed copy of the original signal without decrypting it or altering the data. The technology needed to jam and spoof many types of satellite signals is commercially available and inexpensive, making it relatively easy to proliferate among state and nonstate actors (Harrison et. al 2021, 5).

Electronic attacks target the transmission of data, but cyberattacks target the data itself and the systems that use, transmit, and control the flow of data (Harrison et. al 2021, 5). Cyberattacks on satellites can monitor data traffic patterns, intercept data, or insert false or corrupted data in a system. These attacks can target ground stations, end-user equipment, or the satellites themselves. Although cyberattacks require a high degree of understanding of the systems being targeted, they do not necessarily require significant resources to conduct. The

barrier to entry is relatively low and cyberattacks can be contracted out to private groups or individuals. Even if a state or nonstate actor lacks internal cyber capabilities, it may still pose a cyber threat. A cyberattack on space systems can result in the loss of data or services provided by a satellite, which could have widespread systemic effects if used against a system such as GPS. Cyberattacks could have permanent effects if, for example, an adversary seizes control of a satellite through its command-and-control system. An attacker could shut down all communications and permanently damage the satellite by expending its propellant supply or issuing commands that would damage its electronics and sensors. Accurate and timely attribution of a cyberattack can be difficult because attackers can use a variety of methods to conceal their identity, like using hijacked servers to launch an attack (Harrison et. al 2021, 5).

4.2 The Illusion of Space Security

Security is a fundamental objective of a state. Traditionally, space security was defined in military terms in relation to the strategic balance between the United States and the Soviet Union (Sheehan 2015). Toward the end of the Cold War, however, with the increased reliance on satellite-enabled digitalization of terrestrial operations (as mentioned with Operation Desert Storm), the significance of satellites as "force multipliers" began to affect discussions of space security (Caton 1996; Sheehan 2015). The militarization of outer space has the potential to destabilize current relations between states and ultimately result in a less safe world. If countries currently capable of militarizing outer space pursue further orbital military operations, other nations will likely follow, making space increasingly unpredictable by the inclusion of new players (Kuplic 2014).

One can argue that a country's security in outer space depends on its ability to counter the threats mentioned earlier and its ability to preemptively address future threats. On a basic

level, space security includes protecting satellites and spacecraft in orbit, ensuring access to space, and increasing capabilities to contribute to earth-based security capacities and initiatives. Protection comes not only from technology, which has been capable for years of doing the job, but also protection comes from policy choice. Space policy was traditionally filtered through air forces; however, during the prior decade, many countries created a "Space Force" or some variation thereof, a separate military unit dedicated to identifying, classifying, and addressing threats in space.

The following portion of this thesis is a country analyses for Russia, China, and the US, plus France, Germany, Italy, and the UK as four brief studies under a heading of Europe. The structure and missions of their Space Forces are described and National Security Strategies and official Space Force missions are examined to establish a country's perception of risk and threat in outer space. The official strategic documents, coupled with press statements, are used to determine a country's justification of a separate military service for space. Note that the purpose of the analysis is not to assess the quality of those Space Forces in combat situations, but instead to view the creation of the Space Forces through the lens of national security necessity. Russia and China, and the US and Europe, cooperate regularly in (outer space) security matters, which will also be analyzed in the context of maximizing relative gains in national security issues.

5. RUSSIAN SPACE FORCE

In this chapter, provisions on outer space in official strategic documents outlined in the first subchapter will be used to contextualize the creation of the Russian Space Force, named the Aerospace Force, in 2015. The rationale for Russian engagement in space at the time the Aerospace Forces (Vozdushno-kosmicheskiye sily or VKS) was created, was based on strategic documents including the National Security Strategy (NSS) and the Military Doctrine from 2014. The NSS put forth an analysis of the state of Russian affairs and perceived threats to the country. The Military Doctrine referenced the same threats as contained in the NSS, but it delves deeper into the specific military strategies and, for space, the role of the Aerospace Force. Together, these documents offer insights into how Russian leaders perceive threats and how Russian military and security policymakers envision the future of conflict.

5.1 The Strategic Foundation of the Aerospace Forces

Russia considers outer space to be a strategic asset to enhance its terrestrial military capabilities, provide intelligence and communication functions, and achieve international status and prestige as a space power (Russian Federation 2015). Russia's NSS specifies that ensuring Russia's status as a great world power is one of the country's fundamental long-term interests that defines the actions taken by the Russian government.

Russia's 2014 Military Doctrine defines the main missions and responsibilities for the air and space domains. The overarching space mission of the Russian government is to deter and prevent military conflicts, including deterring "some states or group of states" from

achieving "military superiority" (Russian Federation 2015). The Military Doctrine included in its list of key external threats: 'global strike' (the US' strategy of being able to strike anywhere in the world with a conventional warhead in less than an hour), the intention to station weapons in space, and strategic nonnuclear precision weapons (Russian Embassy: UK 2014). The documents also reveal Russia's key principles on space policy, including the protection of state interests such as the right to self-defense, the promotion of economic development (including the development of space assets, launch vehicles, ground infrastructure; the development and use of space technology in the interests of Russia's socio-economic sphere and the space industry), and maintenance of Russia's primary position in the use of piloted flight (Jackson 2018; Russian Embassy: UK 2014).

Under Russian President Vladimir Putin (2000-2008/2012-present), Russia has sought global strategic parity with the US and identifies the US and its allies, especially within the North Atlantic Treaty Organization (NATO), as threats to Russia's pursuit of great power. NATO and specifically the US are named as primary adversaries.

> *"The strengthening of Russia is taking place against a backdrop of new threats to national security that are of a multifarious and interconnected nature. The Russian Federation's implementation of an independent foreign and domestic policy is giving rise to opposition from the United States and its allies, who are seeking to retain their dominance in world affairs. The policy of containing Russia that they are implementing envisions the exertion of political, economic, military, and informational pressure on it" (Russian Federation 2015).*

This provision was reinforced by other portions of the NSS that further explain the threat to Russia posed by NATO and the US. In the NSS, western policies are viewed as violating the international norms and laws, and their existence and expansion to the Russian border as a "national security threat" (Russian Federation 2015). The Military Doctrine names the largest external threats to Russia as:

> *"establishment and deployment of strategic missile defense systems undermining global stability and violating the established balance of forces related to nuclear missiles, implementation of the global strike concept, intention to place weapons in outer space, as well as deployment of strategic non-nuclear systems of high-precision weapons" (Russian Embassy: UK 2014).*

It is notable that the Military Doctrine names outer space as a domain for potential conflict (Russian Federation 2015; Russian Embassy: UK 2014). Interestingly, characteristic features of current military conflicts are defined by the Doctrine as exerting simultaneous pressure on the enemy throughout the enemy's territory in the global information space, airspace and outer space, on land and sea (Russian Embassy: UK 2015). What is more, a few US weapons systems pertaining to outer space were named specifically. According to the NSS, Russia's ability to "maintain global and regional stability" has been severely limited by the expansion of the US missile defense system, the practical implementation of the "global strike" concept, and the deployment of strategic nonnuclear precision weapon systems (Oliker 2016).

Regarding external dangers to Russian military power in space, the Military Doctrine's definition of "threats" is exerting simultaneous pressure on the enemy throughout the enemy's territory in the global information space, airspace, and outer space. This definition is embodied by the Russian description of US activities that are perceived threat and an obstacle to ensuring the primary goal of upholding Russia's status as a great power.

The Military Doctrine also defined the primary internal threat to Russia's space capabilities:

> *"impeding the operation of systems of state governance and military command and control of the Russian Federation, disruption the functioning of its strategic nuclear forces, missile warning systems, systems of outer space monitoring, nuclear munitions storage facilities, [and] nuclear energy facilities[.] (…) (Russian Embassy: UK).*

By defining the "impeding the operation of systems of state governance and military command and control" as an internal threat to the functionality of Russian space activities, one implies a level of perceived disorganization of space capabilities. This aim serves as the logical foundation for the structure of the Aerospace Forces. The Russian Aerospace Forces, designated as such in 2015, is in many ways a three-branch service that combines elements of the space forces, air forces, and air and missile defense forces under a single command (Bodner 2018). The purpose of consolidating decision-making responsibility was to streamline processes and enable decisions to be made faster and more accurately.

The strategic documents defined the means to combat the perceived threats to Russian space activities. The proposals included deploying strategic missile defense systems, placing weapons in outer space or deploying strategic nonnuclear high-precision weapon systems; also included were diplomatic initiatives to control weapons in space (Russian Federation 2015). Russia's aim is to promote a treaty on prohibiting the weaponization of space and adopt UN framework regulatory provisions to "govern the secure conduct of outer space activities, including safety of outer space operations in the general technical sense" and strengthen the country's potential in the area of monitoring objects and events in the near-Earth outer space, including the international cooperation mechanism in that area (Russian Embassy: UK 2014). Although the diplomatic means to reduce space weaponization may seem at odds with Russia's aims to increase its military power in space, the inclusion of diplomacy showcases Russia's reactive policies to policies of the US and give Russia the opportunity to be recognized as a key player (great power) in global affairs.

The Military Doctrine makes clear which countries Russia aims to counter with its influence in space. It also defines countries with which Russia is willing to cooperate and

within which international frameworks it is willing to collaborate to increase its influence over space and international affairs generally. These countries include members of BRICS (Brazil, Russia, India, China and South Africa), RIC (Russia, India, and China), the Shanghai Cooperation Organization, and other groups directed towards the Asian continent (Russian Federation 2015, Russian Embassy: UK 2014).

5.2 National Space Force: Aerospace Forces

The Russian Aerospace Forces (VKS), designated as such in 2015, is a three-branch service that combines elements of the space forces, air forces, and air and missile defense forces under a single command (Bodner 2018). The consolidated structure is relatively new for Russia, with older systems being separate from the air force.

In the 1950's, authority over activities in space were given to the Strategic Rocket Forces (SRF), the branch of the Soviet military that became a part of the nuclear triad with command authority over nuclear ballistic missiles (Chapman 2014). The SRF lasted into the 1980s when the USSR shifted the decision-making competencies for space assets to the Ministry of Defense. In 1992, in the post-Soviet era, the newly formed Russian Federation experimented with a variety of institutional constellations for its space capabilities. Russia created a special branch, the Space Forces, to oversee space launch, space defenses, and long-range radars to complement SRF (Bodner 2018). Ultimately though, the 1990s in Russia were characterized overall by economic stagnation, military disintegration, and dependency on the West, which led to a dramatic decrease in Russia's space budgets and space assets (Jackson 2018).

The Russian economic recovery in the 2000s coincided with a political emphasis on space as a strategic sector (Jackson 2018). The new refocus on space was mainly due to geopolitical agendas, particularly observation of American offensive strategies seen in Iraq and Afghanistan that involved the heavy use of space assets. The Space Forces was moved in and out of the Strategic Rocket Forces and saw gradual increases in funding (Bodner 2014). Meanwhile, missile defense and air defense were becoming closer to each other, and long-range radars were adept not only for tracking missiles, but also for controlling airspace and tracking satellites in orbit (Myers 2018). Therefore, in 2011, the Space Forces were integrated into the Aerospace Defense Force, an organization whose portfolio included air defense.

From 2014 to 2015, Russian special operations units launched the annexation of Crimea, followed by Russia's proxy war in Eastern Ukraine and the Syrian campaign (Zak 2019). For the Russian government, these unconventional conflicts were the first in which traditional battlefields were complemented by a space component. In 2015, Russia established a Space Forces branch within the larger Russian Aerospace Defense Forces that encompassed both traditional air force responsibilities and air defense responsibilities (Farley 2021). The VKS were funded at $20.5 billion for 2016 to 2025 (CSIS 2021). Russians use the term 'aerospace' rather than outer space because of the interrelatedness of air space and outer space in the context of contemporary threats and conflicts (Jackson 2018); 'aerospace' also reflects the nature of the three-branch service that was created.

Russian Defense Minister and General of the Army Sergey Shoigu (2012-present) described VKS as "the optimal option for improving the system of the country's aerospace defense" (TASS 2015). The concentration of responsibility for formulating military and technical policy in a single command "raises the efficiency of their use through closer

integration and (…) ensure[s] the consistent development of the country's aerospace defense" (TASS 2015).

VKS is responsible for air and space defense to combat kinetic physical, non-kinetic physical, electronic, cyber and cyber threats to Russian capabilities. This responsibility is achieved by combining elements of space forces, air forces, and air and missile command to ensure flexibility in their mission and approach. VKS is responsible for monitoring space objects, identifying potential threats to the nation from space, and preventing "attacks as needed" (Jotham 2018). Concretely, the VKS has been tasked with monitoring threats to Russian space assets in orbit, reporting on continuing and emerging issues in the space domain, ensuring the aerospace defense of facilities and readiness to counter air and space attacks, especially by the maintenance of communication systems and intelligence assets. Also, VKS handles the deployment and maintenance in the of military transport aviation to support daily the activities of the Armed Forces (Russian Embassy: UK). Although there is crossover with other services, the domains reserved exclusively for the Aerospace Forces are air and space defense and long-range military transportation aviation. For example, the VKS operates the high-altitude and long-distance systems including the surface-to-air missile (SAM) systems, namely the S-300s and S-400s (Myers 2018). Each unit across the country consists of an aviation division, one or more air defense brigades, helicopter bases, and some additional ground-based communications nodes (Myers 2018). The Russian VKS, although a specially designated part of the Russian military system, is not structured to be able to fight a war; instead, the VKS is designed to repel enemy aerial threats and support the warfighting capacity of the Russian Federation at large (Myers 2018).

Since the creation of the Aerospace Force, Russia has demonstrated anti-satellite weapon capability. A small projectile was released from its sub-satellite Kosmos-2521 in

2017 and Kosmos-2543 sub-satellite in 2020 into one of its own high-speed Soviet-era objects in low orbit. These events raised concerns about the use of this capability against other nation's satellites (Unal and Boulègue 2020). Russia launched its first kinetic physical direct-ascent ASAT missile in 2021 (Sonne, Ryan, Davenport 2021). Brian Weeden, director of program planning at the Secure World Foundation, said Moscow has conducted other types of anti-satellite tests that involved offensive actions by one satellite toward others (Sonne, Ryan, Davenport 2021). By destroying its satellite in space, Russia proved what it is capable of before ASAT capabilities are prohibited or significantly restricted by international mechanisms; in doing so, it ensured that it will be included as a critical space nation in any major international regulatory process for ASAT missiles, solidifying its status as a great power.

5.3 Summary

Russia's strategic documents outline the country's perceived adversaries and weapons threats, and the documents emphasize the importance of operations in space. Russia defines the aerospace as a strategic domain where Russia engages both offensively and defensively, and the creation of the VKS falls in line with the aforementioned security concerns and aims. The primary state actor that Russia aims to counter is the US and the American government's activities in the space domain including missile defense. An Aerospace Force that combines elements of the space forces, air forces, and air and missile defense forces addresses both the primary external and internal threats to Russia in space: the US missile defense systems, the intention to place weapons in outer space, space monitoring, and easing operation systems of state governance and military command and control. General Shoigu emphasized the efficiency factor as well by closer integration "ensure the consistent development of the

country's aerospace defense" (TASS 2015) and ultimately contribute to Russia's primary goal of ensuring Russia's status as one of the world's great powers.[10]

The Military Doctrine makes clear which countries Russia aims to counter with its influence in space, and which countries it is willing to cooperate with to achieve its aims. One of the most influential partners for Russia is the PRC. On Earth and in space, the China-Russia relationship is driven by an alignment of interests and an attempt to balance the power of the US. Because the US military is the service most reliant on space technologies to project power globally, Russia and China are incentivized to develop capabilities to negate these advantages (Hines 2021).

The comprehensive strategic partnership between China and Russia is based on long-standing framework of cooperation, with a clear strategic objective set out in their 1997 "Joint Declaration on a Multipolar World and the Establishment of a New International Order" and 2001 "Treaty of Good Neighborliness and Friendly Cooperation." As long as both countries remain at odds with the United States and the West, Russia and China expect to be able to jointly push toward a more favorable international order (Huang and Nguyen 2021).

China's aspirations for greater influence in the Pacific, and Russia's objectives in Eastern Europe and Eurasia, are driving them to innovate and expand their offensive capabilities in space (Bruno 2019). Thus far, most of the formal cooperation efforts have taken place in the scientific and diplomatic spaces. However, in the military space, both countries promoted the Treaty on the Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects. They have demonstrated

[10]Economic factors are a sizable factor in the motivation for the development of Russian space forces. They, however, will not be extensively considered for the purposes of this analysis.

mutual support of confirmed anti-satellite capabilities and signed a memorandum of understanding to develop a joint lunar base and embark together on other unspecified space expeditions (Hines 2021). Lastly, the Russian and Chinese governments believe that their missiles and satellites are targeted by US anti-missiles, and both governments perceive anti-satellite weapons tests by the US (2008) to be precursors to the weaponization of space.

6. CHINESE SPACE FORCE

In this chapter, official PRC strategic documents will be outlined followed by examination of the China People's Liberation Army (PLA) Strategy Support Force, created in 2015. China is unique in this analysis because the PRC's ruling party, the Chinese Communist Party (CCP), is the decision-making body responsible for modernizing, reforming, and reorganizing its military (PLA), to defend the Party's interests and meet defense requirements set by China's leaders. The opaque nature of the CCP's negotiations and decision-making processes complicate the analysis of Chinese strategic documents; often, second party analyses will be referenced to provide clarity on the decisions made by the CCP. The rationale for Chinese engagement in space is based on its National Security Strategy from 2014 and the Military Strategy from 2015. The rationale includes elements from the Party's National Strategy to establish the basis of China's trajectory in space and the manner in which leaders perceive threats and how Chinese military and security policymakers envision the future of conflict.

6.1 The Strategic Foundation of the PLA Strategy Support Force

Chinese concepts of future warfare have included space since 2004, when Hu Jintao assumed chairmanship of the Central Military Commission, two years after becoming general secretary of the CCP. In December of that year, he gave a speech in which he outlined the "historic missions of the PLA in the new phase of the new century" that notably included "safeguarding national economic development through defense of sovereignty, territorial integrity, and domestic security" and "safeguarding China's expanding national interests, specifically including access to space and the electromagnetic sphere" (Jintao 2004). By

incorporating space into the specific responsibilities of the PLA in terms of its new historic missions, China would seem to indicate a growing view of space as essential to Chinese security and undeniably direct the PLA to undertake military space missions (Cheng 2012). China has since progressed in its space endeavors by increasing its focus on high-tech capabilities and modern weapons systems and testing space combat capabilities such as the direct-ascent, kinetic-kill ASAT system in January 2007 (Cheng 2012).

The overarching aims for China, vision of national development and the future of the country's engagement with international partners in space, are outlined in the CCP guidelines and policy directives, including China's National Strategy (Heath, Gunness, and Cooper 2016, viii). Under current CCP Secretary General Xi Jinping (2012-present), the so-called 'Chinese Dream' defines China's goals as ensuring economic prosperity, social stability, and an overall higher quality of life for citizens. The goals also include restoring national prestige and assuring China's status as powerful nation (Xinhua 2012). Within the scope of the National Strategy, China's leaders also put forth a National Security Strategy in January 2015 that, in tandem with the Military Doctrine, would serve as the basis for the development of the PLA Strategy Support Force (Tiezzi 2015).

In 2014, the CCP adopted the outline of an NSS that references both internal and external threats to the PRC. The domestic portion included profound economic and social changes; proposed reforms entering a critical period, and a wealth of "social contradictions" (Tiezzi 2015). The external threats emphasized a shifting international environment and "unpredictable" and "unprecedented" dangers facing China, although the NSS did not name the dangers specifically. The NSS proposed consolidating and augmenting power at the top to reduce vulnerabilities, cope with threats, and support the nation's revitalization (Tiezzi 2015).

The NSS states: “national security must be under the absolute leadership of the CCP’s efficient and unified command,” and “China must hold fast to a centralized, unified, highly efficient, authoritative leadership system of national security work” (Xinhua (No Date); Tiezzi 2015; Heath, Gunness, and Cooper 2016).

Complementing the 2014 NSS, the PRC released a Military Strategy in 2015. The aim articulated in the Military Strategy is to pursue an independent foreign policy of peace and a national defense policy that is “defensive in nature, opposes hegemonism and power politics in all forms,” and that will never seek hegemony or expansion (The State Council Information Office of the People's Republic of China 2015). A second goal is for China to exercise its own power in outer space to break the hegemony of the US in global commons and redefine the current US-led world order.

The Military Strategy is the only strategic document at the time the Strategy Support Force was created that references China’s role in outer space. No non-traditional security challenges were mentioned in NSS despite the government’s increased attention to these new threats described in other forums. Strategies for dealing with these issues are not likely to have been excluded from the NSS, although the sections and strategies themselves are unavailable to the public (Tiezzi 2015). With regard to outer space, the Military Strategy provides an assessment of the political landscape and threats to China’s endeavors in space. Also, for the first time, the Military Strategy officially designated space as a military domain (Pollpeter, Chase, and Heginbotham 2017; The State Council Information Office of the People's Republic of China 2015). Specifically, it states that other (unspecified) countries are developing their Space Forces and instruments, and “the first signs of weaponization of outer

space have appeared" (The State Council Information Office of the People's Republic of China 2015).

China's Military Strategy emphasizes outer space as a domain for international strategic competition and describes outer space and cyber space as evolving and as a new domain for warfare. The Military Strategy proclaims that China aims to promote the "peaceful use of outer space;" the weaponization of and arms race in space is explicitly opposed, and international space cooperation is actively encouraged. That said, it also proclaims that China will do whatever is necessary to address security threats and challenges in that domain, ensure the security of its space assets, maintain outer space security, and engage in local wars under *"informationized"* conditions. This new phrase was first incorporated into the 2004 Chinese defense white paper. The phrase describes a battlefield as one in which all the relevant military activities—including tactics, operations, and decision making— are digitized, and military materials and equipment are managed by advanced information technology (The State Council Information Office of the People's Republic of China 2015). The shift in terminology reflected the PLA's conclusion that, among the various high technologies, the most important and most far-reaching are technologies that relate to information management controlled in outer space (Cheng 2012).

Threats and risks are defined as the increasing sophistication of "long-range, precise, smart, stealthy and unmanned weapons and equipment" that have altered international political and military landscapes and posed new and severe challenges to China's military security (The State Council Information Office of the People's Republic of China 2015). To adjust to these changes, China expressed its intention for military transformation and force restructuring.

The PLA is the primary guarantor for achieving China's national security goals (Heath, Gunness, and Cooper 2016). The PLA's official duties include engaging with the international and regional security environment by both combat and noncombat (peacekeeping) missions, defending core interests by maintaining a strategic deterrent, defending territorial and maritime claims, defending land borders, and conducting missions to protect more distant economic and other interests (The State Council Information Office of the People's Republic of China 2015; Heath, Gunness, and Cooper 2016). In the outer space domain, the PLA's focus has shifted since 2015 from territorial air defense to both defense and offense. The Military Strategy expressed the intention to build an air-space defense force structure to optimize the military strategic layout and meet the requirements of informationized operations and ultimately boost the defense force's capabilities for strategic early warning, air strike, air and missile defense, information countermeasures, airborne operations, strategic projection and comprehensive support (The State Council Information Office of the People's Republic of China 2015). The air-space defense force structure was proposed to clearly divide areas of responsibility for Chinese troops, deal with new security domains as outer space and cyber space, and enable each branch to support each other. The acceleration of the modernization of national defense and armed forces will "safeguard China's sovereignty, security and development interests" (Heath, Gunness, and Cooper 2016).

The Politburo announcement in Xinhua (No Date) commits China, even while seeking to ensure its own national interests, to "promot[ing] the common prosperity of all countries." To accomplish this aim, China defines three crucial points: (1) "great power relations," (2) the security environment in China's immediate neighborhood, and (3) cooperation among developing countries. The Politburo also pledged to "proactively participate in regional and global governance," a tendency that was on display in 2014 as China set the agendas for the

APEC Summit, CICA, and even the BRICS Summit (Tiezzi 2015). The trend in Chinese strategic documents is the emphasis on regional partnerships and (primarily economic) cooperation with countries. In the NSS, no specific countries are named as adversaries or partners, but security-related organizations and institutions that do not include US representation were promoted (Heath, Gunness, and Cooper 2016). The Military Strategy expressed the desire for further cooperation with the Russian military within the framework of the comprehensive strategic partnership of coordination between China and Russia, to foster a comprehensive, diverse and sustainable framework to promote military relations in more fields and at more levels. Regarding the US, the Military Strategy expressed the aim to foster a new model of military relationship with the US armed forces that conforms to the new model of major-country relations between the two countries to establish rules of behavior for safety of air and maritime encounters (The State Council Information Office of the People's Republic of China 2015).

6.2 National Space Force: PLA Strategy Support Force

Following the publication of the NSS and National Military Strategy, the PLA initiated reforms to its structure, model of warfighting, and organizational culture. Reforms included the creation of a Strategic Support Force (SSF) that centralizes most PLA space, cyber, electronic, and psychological warfare capabilities (Costello and McReynolds 2018).

Although China's space program dates from the 1956 founding of the Fifth Academy of the Ministry of Defense, little public information is available on PLA thinking about space in those early years. This lack of information is likely due, in part, to the limited space capabilities available to the PLA because China orbited its first satellite only in 1970 (Cheng 2012). In fact, support for China's overall space program did not improve until 1986 with

publication of "Plan 863," the National High-Technology Research and Development Plan, that showed the economic benefits of engagement in outer space. Even then, however, it is unclear how much of the Plan was incorporated into military planning because the PLA was undergoing fundamental shifts in its outlook and doctrine (Cheng 2012, 57).

Similar to Russia's development of its Aerospace Forces, Operation Desert Storm served as a wake-up call for the PLA (Cheng 2012, 58). China identified and absorbed lessons from the 1991 Gulf War, which, in its view, demonstrated that "the new revolution in military affairs had moved from theoretical exploration into the phase of implementation (…) drawing back the curtain on informationized warfare" (Ye 2013). The two primary takeaways for the Chinese were, first, that the widespread integration of information technology in warfare could confer overwhelming military superiority and, second, that use of these technologies created fundamental dependencies that could be exploited in wartime (Cheng 2012, 58). The lessons from the Gulf War fundamentally altered the way that China views warfare and an understanding of its own vulnerabilities, which prompted a drastic shift in Chinese thinking on the strategic role of information in warfare (Pollpeter, Chase, and Heginbotham 2017). Chinese strategists spent the 2000s focused primarily on applying these concepts and lessons, both with force-wide concepts such as integrated network and electronic warfare and at the operational level. Although the Chinese made significant progress, the command structures in the PLA remained static (Costello and McReynolds 2018).

The idea of forming a unified command organization for cyber and outer space was proposed as early as 2007 when China tested its first ASAT missile (Hines 2021). The inspiration for the idea was undoubtedly drawn from the US. Similarly, after the formation of US Cyber Command in 2009, there were numerous calls for China to establish its own

equivalent. In 2015, the SSF was established and functions as an independent military force under the direct command of the Central Military Commission (Costello and McReynolds 2018).

Organizationally, little official information exists on the SSF and its integration into the PLA's command structure. What can be said is that the Strategic Support Force's operational forces are split into two co-equal, semi-independent branches, namely the Space Systems Department, which heads a force responsible for space operations, and the Network Systems Department, which heads a force responsible for information operations (Pollpeter, Chase, and Heginbotham 2017). Thus, for the first time, the SSF was given major force structures dedicated to space and also retained control of electronic and cyber warfare (Mayfield 2021). Its mission is based on the aforementioned strategic threats and 'lessons learned' from the Gulf War, especially as they pertain to outer space, the cyber domain, and the electromagnetic spectrum (Costello and McReynolds 2018). For the first time in the PLA's history, the creation of the SSF also largely unified the responsibility for fielding critical systems in these domains and conducting operations to dominate each domain's battlespaces (Pollpeter, Chase, and Heginbotham 2017). China's SSF addresses the wide array of threats in space, kinetic, non-kinetic, cyber, and electronic, with a special focus on the cyber and information facets, unlike Russia, whose government was in some regards more focused on missile defense.

When defining SSF's mission, PLA strategists emphasize the crucial role of space in the struggle to gain and maintain information dominance, which they see as deciding the outcome of future military operations. Indeed, even as the PLA develops long-range weapon systems capable of striking US military bases and naval vessels, the PLA requires an

increasingly sophisticated command and control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) system. These requirements include a space-based C4ISR architecture to locate and track targets and, even more importantly, to maintain the missile defense systems (Pollpeter, Chase, and Heginbotham 2017).

6.3 Summary

The PRC's strategic documents outline the country's primary aims in outer space, first and foremost guaranteeing national security in an environment of increasing digitalization and countries striving for hegemony. China's goal is to secure its interests in outer space, restore national prestige, and assure China's status as powerful nation. China defines the aerospace as a strategic domain where the country engages defensively and in response to other nation's efforts to weaponize space, expressing a willingness to take any steps necessary to pursue national security aims. For this reason, both Russia and the US are named as potential partners, although, compared with the US, Russia has, according to the Military Strategy, a closer working relationship with China, with whom China would work to redefine its relationship in defense and security matters. Although Chinese strategic documents do not exclude any specific country as a potential partner, they do say implicitly that China would not work with countries that strive for hegemony at the expense of the power of the Chinese state. What is more, China places greater focus on the cyber and information risks compared with countries such as Russia, recognizing the security of satellites as a greater priority than missile defense systems, although such missile defense systems are leveraged for the purpose of securing Chinese satellites in space.

The priorities defined by the NSS and Military Doctrine are reflected in the creation of the Strategy Support Force, not least in the explicit intention to build an air-space defense

force structure known as the PLA Strategy Support Force. The SSF optimizes the military strategic layout to meet the requirements of informationized operations and boost capabilities for strategic early warning, air strike, air and missile defense, information countermeasures, airborne operations, strategic projection and comprehensive support. Clearly, to the extent possible, the mission of the SSF encompasses the perceived threats to the Chinese state.

Since the creation of the SSF, China has been even more active in space. For instance, several space-related initiatives, including various weapons tests, have demonstrated capabilities in countering kinetic physical threats with an orbital hypersonic glide vehicle weapons system. This specific weapon is designed to be launched into space on a rocket and then race to targets at near-orbital velocity. The hypersonic payload is designed to reenter the atmosphere at more than five times the speed of sound, and then maneuver to targets in ways difficult to intercept with current missile defense technologies (Stone 2021). Other countries, notably the US, have deemed the use of this weapon as an existential threat to national security.

7. UNITED STATES SPACE FORCE

In this chapter, the motivations for the creation of the United States Space Force will be examined using official strategic documents. The rationale for US engagement in space at the time the Space Force was created can be interpreted from the US National Defense Strategy (NDS) from 2018 and complemented by the 2017 National Security Strategy. The NSS communicates to the legislative branch the executive branch's national security vision and discusses and debates tools to achieve the vision, whereas the NDS is more focused on perspectives from the Department of Defense.[11] In 2020, the US Department of Defense (DoD) released a summary of its new Defense Space Strategy (DSS) that will also be considered for this analysis as the first true space strategy, despite its release after the formal creation of the Space Force. These documents will shine a light on the US' perceived threats and how the government, specifically the executive branch, proposed to address the threats.

7.1 The Strategic Foundation of the Space Force

The primary aim articulated in the NDS is to achieve 'peace through strength,' which entails deterring conflict by increasing preparedness for war (The Department of Defense 2018, 6). The central challenge to US prosperity and security is the "reemergence of long-term, strategic competition" from China and Russia, who, from the US perspective, want to shape a world consistent with their "authoritarian model" in contrast to "American democratic ideals" (The Department of Defense 2018, 2).

[11]Under the Goldwater-Nichols Defense Department Reorganization Act of 1986 (amending Title 50, Chapter 15, Section 404a of the US Code), the President must submit a report on the national security strategy of the United States to Congress each year. However, especially in recent years, these reports have been made late or not at all (National Security Strategy Archive). The most recent strategy was in 2017, hence its consideration for this analysis.

Long-term strategic competitions with China and Russia are the principal priorities for the Department of Defense because they require both increased and sustained investment "because of the magnitude of the threats they pose" to US security and the "potential for those threats to increase in the future" (The Department of Defense 2018, 4).

The emergence of great power competition between the United States, China, and Russia during the preceding several years has profoundly changed the conversation about each country's approach to defense issues. The strategic competition with Russia and China is omnipresent; thus, the competition includes outer space. In the NDS, the US considers both outer space and cyberspace as "contested" and warfighting domains, with challenges to the US military representing a shift in the global security environment away from American dominance in international affairs (The Department of Defense 2018, 4). The increasing relative power from China and Russia poses external threats to the US in space, and their rapid technological advancements have changed the character of war and contributes to increased military uses of space. Perceived technological threats include new technologies "big data" analytics, artificial intelligence, autonomy, robotics, directed energy, hypersonics, and biotechnology. The NDS recognizes the increasing digital connectivity of the military and how that connectivity creates significant vulnerabilities (The Department of Defense 2018, 4). Interestingly, beyond that recognition, the NDS does not mention specific threats to the US by nations such as China and Russia; the NDS simply states that the threats must be countered. To address the challenges, the NDS proposes increased investment in C4ISR, cyber defense, resilience, and the continued integration of cyber capabilities into the full spectrum of military operations (The Department of Defense 2018, 6). The NDS also names missile defense as a priority and proposes investments in Space Forces that "can deploy, survive, operate,

maneuver, and regenerate in all domains while under attack" (The Department of Defense 2018, 6).

In the NSS, the threat presented by foreign countries' satellites, and specifically ASAT weapons, is stated explicitly, bolstered by the statement that "any harmful interference with or an attack upon critical components of our space architecture that directly affects this vital U.S. interest will be met with a deliberate response at a time, place, manner, and domain of our choosing" (National Security Strategy of the United States of America 2017, 31). Beyond the threat of ASAT and vague mention of cyberattacks, the US strategic documents do not offer considerable insight into how the US plans to actually combat the threats that the country views as coming from, e.g., Russia and China.

Following the publication of the 2017 National Security strategy, the National Space Council (NSpC) was reactivated later in that year (National Security Strategy of the United States of America 2017, 31). The NSpC was established by law as part of the National Aeronautics and Space Administration Authorization Act of 1989, but it was not operational from 1993-2017 (White House (No Date)). The NSpC is responsible for developing and implementing space policy and strategy; although a space strategy was put forth in 2020, the focus was on the scientific aspect of space exploration as opposed to defense (White House (No Date)). The creation of the NSpC does, however, represent a shift in the US government's focus.

Aside from monetary investment in new technologies and capabilities, in all of its strategic documents, the US emphasizes the role of coalitions and long-term security partnerships in combating the threats the US perceives in outer space (The Department of

Defense 2018, 9; National Security Strategy of the United States of America 2017, 31). However, the documents do not name specific partners. Instead, vague terms are used about allies around the world, frequently alluding to certain countries or regions without explicitly calling them partners or allies. For instance, in the 2017 NSS, the passage: “Russia aims to weaken U.S. influence in the world and divide us from our allies and partners. Russia views the North Atlantic Treaty Organization (NATO) and European Union (EU) as threats” (25). This statement implies a US partnership with EU and NATO countries.

7.2 US Space Force

In 2018, former President Donald Trump (2016-2020) announced the creation of the "Space Force" as a new, sixth military branch to oversee missions and operations in the space domain (Pawlyk 2018). The US Space Force (USSF) was formally established December 20, 2019, when the National Defense Authorization Act was signed into law (United States Space Force (No Date)).

The US Space Force is a direct descendant of the Air Force Space Command established in 1982 (Barbier 2020). The former space command was an integrated part of the US Air Force and sought to expand the US advantage in space during the Cold War, primarily by launching advanced military satellites. Space Command played a crucial role in establishing the GPS, which improved US ability to quickly detect missile launches and monitor military movements worldwide (Barbier 2020; Hall and Neufeld 1998).

Following the Cold War, improved space technology, especially satellites, contributed to the victory in the Gulf War. The initial use of the GPS for navigation, the application of space-based missile warning systems, and the use of on-demand satellite communications

throughout the region were highlights of the integration of space into military activities (Caton 1996). Space Command further aided US military efforts in the Balkans and the War on Terror by locating enemy leaders and fugitives (Barbier 2020).

Learning from the successes in the Gulf War, China and Russia developed their own weapons capable of destroying (US) satellites. The countries began deploying more of their own space assets, causing space to gain even more attention from the US as a potential conflict domain (Hall and Neufeld 1998; Barbier 2020). Calls from officials to elevate Space Command to a branch of the military, to ensure more resources and support for US space efforts to meet the growing challenge from Russia and China in orbit, ultimately led the US to create a Space Force (Barbier 2020).

Trump, in 2017, said a new service was needed to ensure American dominance on the "high frontier" (Bodner 2018). Space Force was created in 2019 and was given its own command structure and position on the Joint Chiefs of Staff. However, Space Force was placed under the nominal authority of the Air Force, which handles about 75 percent of its support functions, such as logistics, personnel management, and business and IT systems (Barbier 2020; Bender 2021). Sixteen thousand personnel were transferred from Space Command to the new branch, forming the core of the new organization. In the NDS, the USSF was given the responsibility for organizing, training, and equipping the USSF personnel, so-called 'Guardians,' to conduct global space operations that enhance the way US joint and coalition forces fight, while also offering decision makers military options to achieve national objectives (United States Space Force (No Date)). Shortly after the creation of the USSF, the DoD released Defense Space Strategy (DSS) Summary in 2020 to guide the implementation of the USSF.

The primary goals outlined in the DSS include:

> *"Build a comprehensive military advantage in space; integrate military space power into national, joint, and combined operations; shape the strategic environment; and cooperate with allies, partners, industry, and other US government departments and agencies" (2020).*

Concretely, the USSF has been tasked with operating and defending military satellites and other space assets, including ground stations, that provide communications, navigation and Earth observation, such as the detection of missile launches (Barbier 2020; Erwin 2021; DSS 2020). The USSF also operates the GPS satellites that was originally developed by the Air Force. The GPS is used to track space debris, such as satellites that are no longer in operation, discarded rocket boosters or other "space junk" — more than 26,000 objects in all — that could interfere with other spacecraft or astronauts (Bender 2021). To deter potential enemies from damaging or destroying satellites, the USSF has in its arsenal a ground-based "jammer" that can block the transmissions of an adversary's satellites. In addition, it is believed (but not certain) that the USSF has other offensive space capabilities (Bender 2021; Barbier 2020).

Another part of USSF's mission is to act as a conduit for space-based intelligence and technology to reach the rest of the military, ensuring battlefield commanders, for instance, real-time access to satellite reconnaissance (Barbier 2020). However, the Space Force is designed to be more than a maintenance unit because multiple threats have emerged in recent years that require a substantial updating of US space presence. Particularly, China has homed in on the US' vulnerability by building a growing arsenal of anti-satellite missiles and technologies, including cyber-attacks. The Space Force's most urgent mission is finding ways to defend satellites to maintain US preeminence in space (Barbier 2020).

Aside from satellites, however, none of the US strategies mention by name weapons systems or exact threats, with the exception of countries. This absence of names is likely due

to the over-classification of space assets and limited information available to the general public, as mentioned in chapter three.

7.3 Summary

The US' strategic documents outline perceived adversaries and satellite threats, and they emphasize the importance of operations in space to achieve 'peace through strength' by deterring conflict with increased preparedness for war. The US designated space as a warfighting domain where it engages to counter the influence of Russia and China, both of which pose a threat to the US-led world order. Although Russia and China are not the only threats mentioned in US strategic documents, they are described as possessing the capability to cause the most long-term harm in space particularly.

Due to the over-classification of space capabilities, it is unclear the extent to which the US is focused on the different types of space threats, namely kinetic physical, non-kinetic physical, electronic, and cyber. Concrete steps and strategies are also not explicitly mentioned, with the exception of the 'necessity' to counter China and Russia's malign influence. Unanswered foundational questions include whether the US will pursue an offensive or defensive strategy in space (Barbier 2020).

A critical part of the strategic documents, however, does mention the US' cooperation efforts with 'allies.' Although no allies or partners are mentioned by name, in other forums, European and specifically NATO partners are considered to be some of the US' most important and long-term partners in space. The recent development of European Space Forces is discussed next.

8. EUROPEAN SPACE FORCES

The European Union (EU) does not have a Space Force. Since the US' announcement of the USSF in 2018, however, the four largest countries in Europe announced their own similar institutions: French Space Command, the German Air and Space Operations Centre, the UK Space Command, and the Italian Joint Space Operations Command. Although these institutions will be discussed like entities described in other chapters, due to the very recent creation of these entities, the sections will be brief and the focus will be on their intended cooperation within broader international organizations.

The US and Europe have a long history of cooperation in space that is not without issues. In the 1970s, Europe and the US demonstrated the roles of diverging interests in their pursuit of space power: the EU expressed the will to launch satellites into space but was reliant on US capabilities to do so. The US was only willing to launch European satellites on the condition that they were for scientific purposes, effectively barring European states from launching their own communications and reconnaissance satellites for military and commercial purposes (Bowen 2016). Europe, under the leadership of France, West Germany, and Italy, and supported by the UK, developed a European launcher, giving birth to the *Ariane* family of launchers in use today (European Space Agency 2009). The US viewed European satellites as competition and allowed European states to collectively follow a different strategic path to developing independent space power infrastructure (Bowen 2016).

Formal agreements on space-related matters between the partners date back to the 1990s. The European involvement in space actually begins from multiple national

perspectives as countries, particularly France, the United Kingdom, and Italy, pursued bilateral agreements with the United States. In 1999, the EU and US signed the Disaster Charter to handle humanitarian crises, and other agreements later included the Space Security Dialogues in 2009 to discuss space initiatives, and Space Situational Awareness (SSA) Agreements in 2014 (Ganote, Yurechko, Jack, and O'Shea 2019). Concerns regarding interoperability arose again in the Galileo satellite navigation negotiations between the US and the EU in 2004; only after extensive negotiations and the mention of possible Chinese cooperation did both parties agree to make Galileo and GPS compatible (Vikmanis-Keller 2022).

Like the US, the creation of space commands by France, Germany, the UK, and Italy was a response to the increased militarization and possibility for the weaponization of space and their own increasing reliance on satellites (Rome 2021; Rotter 2021). A major motivation for these European states is that they cannot effectively secure their interests in space independently; therefore, they seek cooperation with the US. For example, the US and EU have agreements for SSA that requires a global network of radar and sensors that no single European countries possesses (Rome 2021). These new commands are deepening military space ties with the US, which benefits both sides of the Atlantic by pooling information, capabilities, infrastructure, and expertise against threats (Rome 2021). Although most European nations do not name Russia and China explicitly as a threat in their respective space strategies, there is an understanding within NATO that those countries pose a global security threat and that new challenges from Russia and China in cyber and electronic warfare, as well as new missile and warhead technologies, must be considered to preserve deterrence[12] (Erlanger and Shear 2021).

[12] Article 5 of the Washington Treaty (NATO's founding treaty) can include threats to satellites in space and coordinated cyberattacks (North Atlantic Treaty Organization 2021).

A critical facet of transatlantic space cooperation is efforts put forth with the framework of NATO cooperation. In 2018, NATO Joint Air Policy Strategy was released that called for the defense "against peer competitors and anticipate the growing role of cyber and space-based assets" (North Atlantic Treaty Organization 2018). In 2019, NATO officially designated space its fifth theater of conflict after air, sea, land, and cyber (Posaner 2021). However, NATO neither owns nor directly operates any satellite; instead, NATO uses ground stations and terminals and user interfaces for satellite communication. The ownership of satellites and other critical infrastructure is dependent solely upon national inventories (Ganote, Yurechko, Jack, and O'Shea 2019). Thus, key NATO mission areas (such as ballistic missile defense and signals intelligence) are supported by a patchwork of sovereign Space Forces including the US and other European nations.

France was one of the first European nations to create a Space Force. In 2019, France released a national space defense strategy and launched its own Space Command, known as Commandement de l'espace, or CDE. In 2020, the French Air Force was renamed the French Air and Space Force to recognize the importance of space as its own warfighting domain (Poncet 2019). The new space weapons program would enable the country to move from space surveillance to the active protection of its satellites (Berger 2019). France perceives the greatest threats to its space assets to be missile tests conducted by Russia against satellites, the United States, China, and recently India. In addition, the French government has expressed concerns about an attempt by a Russian satellite to spy on French space assets (Chrisafis 2018; Berger 2019). Therefore, to address the risks from other nations' activities in space, France proposed projects including "nano-satellites that would patrol a few kilometers around French satellites, a ground-based laser system to blind approaching satellites, the possibility of machine guns on board some satellites" (Poncet 2019; Berger 2019).

Germany is an active partner within NATO's space efforts, and in 2017, the Federal Ministry of Defense presented the strategic framework and essential goals and needs for action in the Strategic Guideline Space (Rotter 2021). The Weltraumkommando der Bundeswehr (Space Command of the Army) was created in 2021. The Space Command was created within the Bundeswehr, and although specially designated, still remains under the jurisdiction of the Air Force. Shortly thereafter, Germany opened a German Air and Space Operations Centre (Machi 2021). Due to Germany's dependence on space-based capabilities for terrestrial economic, social and military functions, the Bundeswehr regards space use as a "permanent task" that includes the planning and execution of space operations to protect critical space infrastructures by means of situational imaging and operational support from space-supported capabilities (Rotter 2021).

During the prior several years, the US and Germany took many significant actions to increase cooperation in the space arena, including an agreement to share SSA services and information, assigning a German liaison officer to the 'U.S. Joint Functional Component Command for Space,' and collaborating in the Combined Space Operations Center, which was established to improve operational coordination and capabilities between the US and its allies. Furthermore, Germany has been quietly, but surely, acquiring and operating national security satellites and other space capabilities that will contribute to overall alliance security (Rose 2020). Germany sees the biggest threats in outer space as the modern weapons systems, especially attacks on cyber and satellite capabilities (Bundeswehr 2020).

The UK Space Command was formed on April 1, 202. It brings together the functions of Space Operations to "protect and defend UK and allied interests in space, and control all the UK's defence space capabilities," Space Workforce to "recruit, train, and develop defence

personnel to work in the space domain," and Space Capability to "develop and deliver space equipment programmes that integrate with other defence capabilities" (Royal Air Force 2022). The primary threats to British space assets are adversaries' offensive capabilities. Minister for Defense Procurement Jeremy Quin said "As our adversaries advance their space capabilities, it is vital we invest in space to ensure we maintain a battle-winning advantage across this fast-evolving operational domain" (Jennings 2021). While strategic documents do not name adversaries, government officials have spoken openly about which countries they aim to counter. For instance, Air Chief Marshal Sir Mike Wigston, the head of the Royal Air Force, told Sky News: "Right now we see countries like Russia and China testing and demonstrating anti-satellite weapons - satellites with all the characteristics of a weapon deployed in space" (BBC 2021). When at full operating capability, UK Space Command will provide command-and-control of all of the Ministry of Defense's space capabilities, including the UK's Space Operations Centre and others (Royal Air Force 2022). The primary mission is to track threats in the outer space domain,

In the Italian NSS for space, the government acknowledges the need for a new approach to space. "The international regulatory framework, which dates back to the 1967-1972 UN conventions, is no longer able to regulate the activities of more than 50 countries with space capabilities" (Presidency of the Council of Ministers 2019). In December 2019, the Undersecretary of Defense Angelo Tofalo announced the creation of the "Comando Interforze delle Operazioni Spaziali" (*Joint Space Operations Command*) or "COS" to address modern issues in space (Cavanna 2021). The COS's mission is to link the existing Air Defense Network with Early Warning and Missile Defense and Space Situational Awareness to "spot, identify and react to any threats brought into space or against space assets" (Cavanna 2021).

Cooperation between the US and European militaries has numerous advantages for all parties. European militaries enhance a US-led space security apparatus by contributing information, capabilities, infrastructure, and expertise (Rome 2021). The US' primary aims of countering China and Russia are supported by cooperation with Europe, and the USSF actively seeks partnerships with European countries to achieve this aim (Posaner 2021). For example, France, Germany, Italy, and the UK have, combined, four radar and five optical sensors that can feed into US SSA systems. In addition, France, Germany, Italy, and the UK are leading members of the European Space Agency, which has had an independent space launch capability since 1979 and maintains the aforementioned independent GPS satellite system Galileo. Combined, government and commercial entities in the four countries have two hundred thirty-five satellites currently in orbit (Rome 2021). Because most Europeans cannot effectively secure their interests in space independently, they benefit from the resources that the US provides.

9. ANALYSIS

The leading questions in this analysis were the following: To what extent does the development of specially designated military services for space security stem from increased threat perceptions in space, and can that insecurity be described by the tenets of Neorealism's 'security dilemma?' At this point, the theory of Neorealism will be applied to each country to address the hypothesis that **the recent increase in the creation of Space Forces as a specially designated military service, resulting from the augmented relevance of military operations in outer space and the threat of space asset weaponization, is rooted in the perceived threat-based competition to secure relative advantages in space with national defense capabilities, for which the theory of Neorealism serves as an explanatory framework.**

According to Kenneth Waltz, the theory of Neorealism in International Relations views interactions between states as competitive and conflictual because each state struggles for power, which is defined as hard power capabilities and the ability to project force to defend national interest. States are viewed as unitary actors that function rationally to achieve national aims, and, disregarding internal differences, the unified position is centered on the interest of the state. States respond to perceived threats from other states, and the effects of their interactions determine the respective states' policy, which is often referred to by Realists as a "self-help system" in which each respective state must protect its own interests and preserve national sovereignty. Complementary to the theory of Neorealism, the concept of Thucydides Trap generally holds that great-power war typically occurs at the intersection of one hegemon's rise and another's decline, and that the rising power's entitlement, sense of its

importance, and demand for greater say and sway, and the hegemon's fear, insecurity, and determination to defend the status quo are its defining elements.

Applying Neorealism to space treaties and the nature of the international system, one can argue that the limitations of currently drafted international space legislation have created an anarchical system in regard to the exploitation of outer space. According to the theory of Realism, anarchy means that the world lacks an overarching authority that controls the behavior of actors within the state system. In addition, states, in their uncompromised pursuit of national interest, can and often clash with the ambitions of other states; consequently, international politics are characterized by active or potential conflict. A primary criticism of all outer space legislation is the lack of a verification mechanism or overarching authority to enforce the treaties, causing states to act in ways that they subjectively see as compliant while still pursuing their national security aims. For instance, the ambiguous ban on weapons allows countries to view the deployment of conventional weapons as fair game. Also, with the advancement in capabilities of nation-states' space weapons, that are being developed at a much faster rate than the legislation can account for, and as technologies increasingly become dual-use, it becomes more difficult to restrict or regulate them.

Since space legislation was first signed, there has been a vast increase in the number of space actors, thereby increasing potential for conflict. During the Cold War when treaties were signed, great power interactions between the US and Russia played a predominant role in international defense and security (Hoang and Nguyen 2021). The bipolar world system has significant implications, including a sense of equilibrium in space activity. Sharing power between two states creates a more secure balance of power and provides for a simple system of "checks and balances" and reduces uncertainties about who will oppose whom. Now, two

decades into the 21st century, the status quo has shifted dramatically, with more than 70 countries possessing satellites in Earth's orbit (Hart 2011). The drastic rise also finds merit with Thucydides Trap, playing into Allison's drivers of conflict dynamics, specifically the rising power's growing entitlement, sense of its importance, and demand for greater say and influence. While most of the countries with satellites are not considered "great powers," the theory still explains the increased efforts to acquire such capabilities. The Security Dilemma can also be viewed in the recent creation of Space Forces, which be analyzed in the subsequent portion of this analysis, and the potential for conflict or cooperation will also be analyzed using Thucydides Trap.

Perceived Threats and Competition to Secure Influence

It is not an overstatement, historians and analysts say, to trace the roots of the Space Force to Desert Storm (Pope 2021). After observing the US' use of space capabilities in the Gulf War, Russia and China both began investing in their space sectors. Both Russia and the PRC aim to counter the US' (and NATO countries') influence in outer space. China and Russia both name the 'maintenance of the status of a great power' as a driving factor, and view the US as a threat to be able to do so. The insistence on recognition and sense of importance satisfy the first driver of Thucydides Trap according to Allison.

Russian national security documents explicitly mention perceived competition with adversaries that they name as NATO countries, and especially the US, that threatens Russia's ability to exist as a key player in space. Since the initial militarization of space in 1990, Russia specifically claims the US has abandoned international arms control obligations and said that US military activity, including the deployment of weapons systems near its borders, poses a threat to the country's strategic stability and international security. The actions of

NATO and the capabilities that the US possesses, specifically the US global strike system, the US' weaponization of space, and strategic nonnuclear precision weapons in NATO countries, forged a sense of insecurity in Moscow that Russia is at a relative disadvantage in space, which also explains Russia's emphasis on the right to self-defense.

Conversely, China's strategic documents express the desire to counter US hegemony and assert Chinese power in space. China perceives the US hegemonic posture internationally as a threat to the Chinese Dream of ensuring economic prosperity, social stability, and an overall higher quality of life for citizens and a threat to restoring national prestige and assuring China's status as a powerful nation. A portion of the Chinese Dream is the ability to safeguard China's national interests, including access to space and the electromagnetic sphere. The national security documents shine some light on the perceived insecurity of the PRC because the external threats to the country emphasized a shifting international environment and unpredictable and unprecedented dangers facing China, which serves as the reason why Chinese space policy is to be "defensive in nature, opposes hegemonism and power politics in all forms." It also aims to break to hegemony of the US in global commons and redefine the current US-led world order by exercising its own power in outer space, showcasing China's growing entitlement and sense of its importance as a rising power in the constellation of global power politics. In testing weapons and investing more in space capabilities, both Russia and China view themselves as securing its influence on the international stage and insisting on their national prestige. Thucydides Trap has merit in the analysis of China and Russia's behavior as the general perception of great power competition is perpetuated.

Not only does the expressed need for equal or greater hard power capabilities toward the US reflect Russia's and China's relative insecurity in the international system, but the diplomatic initiatives reflect it as well. The inclusion of diplomacy showcases their reactive policies to those of the US and, in Russia's case, reflects the limits of its current economic and military weaknesses. In pursuing a treaty in the UN to restrict weapons in space, Russia and China have the opportunity to be recognized as great powers in global affairs. Furthermore, by conducting tests of different types of weapons, the two countries ensure that they must be included in any treaty.

The central challenge to US prosperity and security, according to official strategies, is the "reemergence of long-term, strategic competition" from China and Russia. The NDS and NSS recommend greater investment in space weapons including missile defense and C4ISR, cyber defense, resilience, and the continued integration of cyber capabilities into the full spectrum of military operations to address the challenges "because of the magnitude of the threats they pose" to US security and the "potential for those threats to increase in the future" (The Department of Defense 2018, 4). The US names China's and Russia's rapid technological advancements as a primary threat to US military dominance and claim they have changed the nature of war, causing the US to feel it is losing the relative advantage over China and Russia in space matters. The US names China's and Russia's rapid technological advancements as one of the primary threats to US military dominance, and claim they have changed the nature of war, causing the US to feel it is losing the relative advantage over China and Russia in space matters, attributes of Thucydides second driver that pertains to the hegemon: fear, insecurity, and determination to defend the status quo.

The second driver also plays into the development of European Space Forces. France, Germany, the UK, and Italy all mention a level of threat to their satellites and space capabilities from other countries and emphasize the necessity to be able to keep up in the final frontier. European countries declared the goal of maintaining a relative advantage in outer space in light of 'adversaries' advancing their space capabilities. Particularly, France expressed a sense of insecurity with concerns of Russian satellite espionage. Thucydides Trap and the will to preserve the status quo, however, does not stem from the will to preserve their own hegemonic position in space, but rather to insist on their own and to partner with the US within defense cooperation frameworks to protect their assets in space. In this regard, one might say Neorealism's security dilemma (or the interaction of both factors) is a more influential variable in the case of Europe.

The Relevance of Military Operations in Space and the Threat of Weaponization

Each country in this analysis perceives both a level of threat and strategic competition in space, which need to be countered by an increase in their own capabilities. Assuming the thesis is correct, the perception of competition is the foundation of the augmented relevance of military operations in outer space and the threat of space asset weaponization.

All the countries in described in this thesis recognized space as a critical domain in the same year each respective military space unit was created. The Russian NSS and Military Doctrine from 2015, for instance, recognized the augmented relevance of military operations in outer space and addressed the threats from other countries' weapons in that domain. Russia defines aerospace as a strategic domain wherein Russia engages both offensively and defensively, and the Military Doctrine names outer space as a domain for potential conflict. For Russian leaders, US and NATO influence have dominated the outer space domain, and

they are viewed as being in violation of international norms and laws. That view formed the justification for Russia to take similar actions in space, including testing space weapons, to seek global strategic parity with the US.

Also similar to the Russian Federation, in 2015, China officially designated space as a military domain for international strategic competition for the first time in strategic documents, and China placed the blame of weaponization on other countries developing their forces and instruments. This recognition of (cyber) space as a warfighting domain for the first time serves as a justification for the country's insecurity and weaponization efforts in space because China has tested its capabilities, including ASAT, electronic, and other weapons, to assert its dominance in the domain. China views its actions in outer space as purely defensive, pushing back against the US' hegemony to pursue its national interests. The NSS also warns that China will do whatever is necessary to address security threats and challenges in that domain, ensure the security of its space assets, and maintain outer space security, and engage in local wars under *"informationized"* conditions. Already, China has indeed progressed in its space endeavors by increasing its focus on high-tech capabilities and modern weapons systems. China has demonstrated its space combat capabilities by launching a direct-ascent, kinetic-kill ASAT system in January 2007 and increasing engagement in orbit (Cheng 2012).

In the NDS, the US considers outer space and cyberspace as "contested" and warfighting domains, with challenges to the US military representing a shift in the global security environment away from American dominance in international affairs. Within the NATO framework, both the US and European countries have expressed similar sentiments; each country, along with NATO as an organization, designated space its fifth official theater of conflict after air, sea, land, and cyber.

The Creation of Space Forces

Taken together, each country's subjective level of insecurity in outer space, as articulated in strategic documents, can be seen as rooted in the threat-based competition. Following this logic of discourse and policy implementation, each country articulated the necessity to counter malign influence in space, including forming a unified air and space command.

The Russian Aerospace Force is a military service that combines elements of the space forces, air forces, and air and missile defense forces under a single command and addresses the threats to Russia from the US and NATO. The Russian Aerospace Force is designed to repel enemy aerial threats and support the warfighting capacity of the Russian Federation. The VKS is responsible for air and space defense to combat kinetic physical, non-kinetic physical, electronic, and cyber threats to Russia by combining elements of space forces, air forces, and air and missile command to ensure flexibility in their mission and approach. The VKS is responsible for monitoring space objects, identifying potential threats to the nation from space, and preventing attacks as needed, indicating Russia's desire to address the US' weaponization of space and combat threats as they arise. In streamlining their command, the VKS increases efficiency in managing space threats, and by closer integration, ensures the consistent development of the country's aerospace defense. Indeed, the analysis of Russian aims in space contains an implicit focus on relative gains in outer space and the zero-sum understanding of space capabilities because Russia argues that increasing its presence reduces the relative influence of the US and NATO. Therefore, it can be said that Russia is aiming to secure relative advantages in space by leveraging national defense capabilities.

China also incorporated space into the specific responsibilities of the PLA in terms of its new historic missions. This incorporation would seem to indicate a growing view of space as essential to Chinese security. The priorities defined by the NSS and the Military Doctrine are reflected in the creation of the Strategy Support Force to meet the requirements of informationized operations and ultimately boost its capabilities for strategic early warning, air strike, air and missile defense, information countermeasures, airborne operations, strategic projection and comprehensive support. China's focus on reducing US hegemony in outer space to increase Chinese influence also emphasizes relative gains in outer space and the zero-sum understanding of power in space. Therefore, it can be said that China is aiming to secure relative advantages in space by leveraging national defense capabilities.

The US designated space as a warfighting domain where it engages to counter the influence of Russia and China, both of which pose a threat to the US-led world order. The US' strategic documents outline the country's perceived adversaries and satellite threats, and they emphasize the importance of operations in space to achieve 'peace through strength,' which entails deterring conflict by increased preparedness for war. Space Force was created in 2019 and was given its own command structure to be able to build a comprehensive military advantage in space, integrate military space power into national, joint, and combined operations, shape the strategic environment, and cooperate with allies, partners, industry, and other US government departments and agencies. The US' thinking about power in outer space and the mission of the Space Force reflects a zero-sum understanding of power to the same extent as the thinking of Russia and China. The US views the increase in Russian and Chinese power as inherently decreasing its own power. Hence, to be able to retain as much power as possible, the US must focus on relative gains in outer space by that ensuring space assets, especially satellites, are defended to maintain America's preeminence in the space domain.

Lastly, European countries within NATO, specifically Germany, France, Italy, and the UK have developed their own Space Forces for the purposes of protecting their assets in space. Each European country analyzed emphasizes the importance of operations in space for terrestrial activities, both military and civilian. All of the European countries name the threats in space (as explained in chapter 4) in their justification for the creation of each Space Force, and within NATO, Russia and China are mentioned specifically. While some these countries, although primarily in interviews and news articles, name Chinese and Russian activity as a threat to their satellites, within the NATO framework for outer space cooperation, both adversaries are listed explicitly. Interestingly, as mentioned in the previous chapter, France perceives the greatest threats to its space assets to be missile tests conducted against satellites by Russia, China, and India – but also the US. Despite the formal cooperation with the US through NATO, France in particular sought its own Space Force to for self-protection against all activity in space, emphasizing what may be interpreted as the perceived security dilemma.

International Cooperation to Maximize Gains

In Neorealism, cooperation is possible if it is viewed as increasing the respective state's relative gains and if the state does not perceive the other cooperating parties as 'gaining more' from the agreement (Greico 1988, 487). Realism's identification with a relative gains problem for cooperation is based on the insight that states in anarchy fear for their survival as independent actors, therefore, they are willing to cooperate to increase their relative gains. Thucydides Trap dictates that conflict occurs when a rising power poses a threat to a system's hegemon, which this portion will also reference.

In recent years, the US has increased pressure on each of its perceived strategic competitors, just as China and Russia have been stepping up bilateral cooperation across

multiple domains to offset US pressure, counterbalance US influence in multilateral forums, and rebuke the US-led international order (Hoang and Nguyen 2021). Russia leverages international cooperation and names countries like the PRC as viable partners to counter US hegemony. Neorealism dictates that cooperation is possible if it is perceived as increasing the respective state's relative gains generally, but also compared to others relative gains in the agreement. Russia encourages collaboration with the PRC to ensure Russian survival in a system of anarchy and to increase its access to capabilities and funding. Russia views its relative gains from the agreement as being equal to if not greater to gain accrued by China. Although, in reality, Russia and China have yet to realize large and complex projects because of division-of-labor disagreements, but both countries stand to gain from cooperation because no partner offers Russia better prospects than China, and no partner other than Russia offers China more experience with manned space flights and space nuclear power plants (Azarova 2021). China also has expressed a willingness to engage in cooperation with any nation in orbit, including developing space nations, perhaps most significantly, by providing satellite development and launch services for developing countries that lack a significant presence in space. In December 2019, China launched Ethiopia's first-ever satellite (Hart 2020).

This analysis mentions the intention for Chinese and Russian joint lunar exploration. In theory, the International Lunar Research Station project could become a counterweight to the US-European cooperation. Certainly, China plans to promote it as an alternative for other countries interested in space exploration because China expressed a willingness to work with any willing country. For Russia, the project is an opportunity to make its space industry more dynamic and diversify its contacts in this area, especially as room for cooperation with the US continues to shrink.

The US and Europe have also leveraged international partnerships to increase the pressure on each of its perceived strategic adversaries, mainly within the context of NATO. As mentioned previously, in 2019, NATO members adopted a new Space Policy and, for the first time, recognized space as a new operational domain, alongside air, land, sea, and cyberspace. However, NATO serves as a forum to share information, increase interoperability and coordinate actions and in October 2020, the decision was made to establish a NATO Space Centre at Allied Air Command in Ramstein, Germany.

NATO as an organization does not directly operate any satellite, but it does use ground stations and terminals for satellite communication (Ganote, Yurechko, Jack, and O'Shea 2019). Thus, key NATO mission areas (such as ballistic missile defense and signals intelligence) are supported by a patchwork of sovereign Space Forces including the US and other European nations and is not developing space capabilities of its own (North Atlantic Treaty Organization 2021).Within the 2019 Policy, NATO names Russia and China as threats on the basis of their development and tests of a wide range of counter-space technologies, especially condemning Russia's anti-satellite missile test in November 2021. At the 2021 Brussels Summit, NATO members recognized that attacks to, from, or within space present a clear challenge to the security of the Alliance and could lead to the invocation of Article 5 of the Washington Treaty (North Atlantic Treaty Organization 2021).

At this point, the international collaboration efforts by all aforementioned countries contribute to the maximization of relative gains in pursuit of space policy, and the development of Space Forces to interact with one another supports these efforts. The anarchy in a multipolar system is the source of the uncertainty and heightened competition because each country arms itself for perceived increased threats in space. The security dilemma seems

to be a useful tool for analyzing the development of Space Forces in Russia, China, the US, and Europe. The security dilemma creates an especially interesting perspective on US and European cooperation, as both appear to cooperate out of a sense of urgency and insecurity against Russia and China, yet space militarization still appears to primarily be the responsibility of each nation-state. For a long time, each partner was only willing to address issues on a national level, and while this remains the dominant strategy, the signs towards greater cooperation can be interpreted as a response to perceived threats. Although the interests of each country do not align perfectly, Waltz states that cooperation can take place only in situations that contain a mixture of conflicting and complementary interests. Harmony, however, requires complete identity of interests.

A critical aspect of the security dilemma is that the result is an increasingly insecure system. One can see that each country in this analysis, since the creation of its Space Force, has consistently increased the number of weapons tests and engagement in outer space. Through augmented reliance on satellite capabilities, the rising number of space actors (who do not even need to have satellites in space) and the increasingly accessible disruptive technologies, the space domain has become increasingly contested and insecure for actors around the world.

The potential for conflict, as postulated by Allison in the term Thucydides Trap has explanatory value as well when observing the threat of space asset weaponization between emerging and established powers. During the Cold War, the US and Soviet Union were the dominant powers in space, which ended in 1990. The USSR became the Russian Federation, and its capabilities dwindled. At this point, and catalyzed by the Gulf War, not only was Russia working towards building a strong space program, but countries like China were as

well. China can be considered an emerging power in space that carries the potential for conflict as it asserts itself and its entitlement to the dangerous militarization of space, whereas Russia, while similar, is more so a *reemerging* power in space that threatens the US' hegemony. While there is some analytical value in Thucydides Trap in this paper, the question that arises is whether or not the conflictual nature of US-China-Russia-European relations will ultimately lead to an armed conflict, and also what the trajectory of the emerging states' power is. Whether or not the conflict would reflect Allison's concept of Thucydides Trap with indefinite power acquisition, or rather Brand and Beckley's idea of a plateau in the emerging power's capabilities, lies outside the scope of this analysis.

10. CONCLUSION

This thesis is an analysis of the development of various Space Forces around the globe through the lens of a classical theory in the field of International Relations, namely Realism. The thesis specifically evaluated creation of Space Forces that resulted from a security dilemma, as defined by theorist Kenneth Waltz. The previous chapters have verified the thesis statement that the recent increase in the creation of Space Forces as a specially designated military service, resulting from the augmented relevance of military operations in outer space and the threat of space asset weaponization, is rooted in the threat-based competition to secure relative advantages in space with national defense capabilities and can be justified through the International Relations theory of Neorealism.

The theory of Neorealism proved to be applicable to this study. The theory is based on the belief that international relations are anarchic, and that the actions taken by nations to increase their relative security vis-à-vis other states ultimately lead to a greater sense of insecurity among all nations. The creation of Space Forces in Russia, China, the US, and in Europe reflect a growing sense of insecurity and broader perception of threats by various nations developing weapons under strict classification, as shown by each country's strategic documents. At this point, space security is not a tangible concept; space security implies the ability to counter the threats mentioned in chapter three and the ability to preemptively address future threats. However, considering the classification of different national weapons systems, it is increasingly difficult to truly understand the threat posed to satellites and other space capabilities, let alone counter the threats. The creation of Space Forces to understand these threats on a base level is the first step in the direction of one day being able to do so.

The economic impact of Space Forces is far more ambiguous and complex, and the economic impact is tied to issues with each countries' defense industrial base. Not only have Space Forces enabled more countries to put their space capabilities on display as an exercise of national power, but they function as a policy instrument to enhance productivity and competitiveness in the space sector and serve as a symbol for patriotic inclinations. Therefore, the creation of Space Forces has to be considered as a foreign policy tool based on Realism with the ultimate goal of securing the respective nations in a volatile and unpredictable environment.

It is important to consider that race for space superiority has precedent, and the current struggle for power is not a new phenomenon, but it is much rather the same interests of achieving space superiority guided by a new technological, digitalized, and multipolar environment. Each country's use of powerful rhetoric is based on the belief that its adversaries are circumventing international nonarmament treaties to threaten their existence and right to be present in a global common. Although Russia and the US explicitly name each other as threats to their great power status, China and Europe arguably aim simply to reform the current state of affairs to ensure an equal division of power.

This paper is limited because it considers only large space powers; the commercialization of space and the engagement of private sector actors were not considered for the analysis despite their close connections within the defense industrial base. In addition, other domains including science and space exploration were not considered. The gaps in this thesis can serve as a topic of further analysis, specifically the topic of defense industrial bases to include the commercialization of space and provide a more holistic view of the use of space,

or the rapidly evolving space programs in countries including India and Japan to further the understanding of multipolar engagement in orbit.

The introductory quote stated: “Wars in outer space have long been the subject of science fiction books and movies, but recent advances in technology have now transformed what was once reserved for fiction into a grave reality” (Kuplic 2013). The core political motivation behind the creation of military space units should be recognized as politics of the great powers and begs the questions, Is the world experiencing a new space race, or is it on the verge of a new space age? How will new technologies, weapons, and power dynamics continue to characterize interstate relations? Will these policies actually be able to promote longer-term security in light of a continuously evolving security environment?

There seems to be a common perception that outer space is a politically different or a realm separate from Earth. However, space is not a place that is uniquely free of humanity’s fears and interests (Bowen 2016). By understanding and interpreting space warfare and space power as supra-geopolitics, and therefore ultimately being political activities regarding the exploitation of a geographic place and medium, one enables a its holistic understanding within the study of space warfare, and solidifies both the importance of the domain’s control and its significance for the furtherance of security for the many years to come.

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