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Splitting the Stars: U.S.–China Space Rivalry and Its Impact on Global Governance

Thesis Submitted in Partial Fulfillment of the Requirements for the Master's degree in Political
Science

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Relations between China and the United States need not, and should not, become a zero-sum game. For the pre-World War I European leader, the challenge was not that a gain for one side spelled a loss for the other, and a compromise ran counter to an aroused public opinion. This is not the situation in the Sino-American relationship. Key issues on the international front are global in nature. Consensus may prove difficult, but confrontation on these issues is self-defeating.

**Kissinger, H. (2011). *On China*.
New York: The Penguin Press.**

Dedication

This thesis is far more than words on paper. It is seventeen years of dreams, sacrifices, sleepless nights, silent tears, and unwavering hope. It is every morning I woke up before the sun, every moment of doubt I fought through, every time I felt exhausted but kept going because giving up was never an option.

Before any achievement, any title, or any success in my life, there are my parents.

To my mother: you were the first person who taught me to dream. Long before I understood the meaning of ambition, you were already planting it in my heart. You opened the doors of knowledge, languages, and possibility, and you never stopped believing in me. I will never forget the nights you stayed awake waiting for me to finish studying, refusing to sleep until you heard my books close. Your love shaped the person I became.

To my father: there are no words large enough to describe what I owe you. Every opportunity I have ever had was built upon your sacrifices. While I was chasing my dreams, you were carrying burdens I never fully saw. You gave up comfort so that I could have possibilities. You gave me the greatest inheritance a daughter could receive: resilience, dignity, and the courage to keep going no matter how difficult the road became.

To my siblings, Salouma, Dina, and Tarek: you are pieces of my heart walking outside my body. You have been my laughter during difficult days, my comfort during painful ones, and my reminder that I never walk alone. Salouma, seeing the way you look at me fills me with both pride and responsibility. I hope one day you know that everything I achieve is also for you.

And to **L•H:** thank you for witnessing the side of this journey that no one else saw. The stress, the fear, the exhaustion, the moments when I felt completely overwhelmed. You stayed through all of it. Your presence made heavy days lighter, and your support carried me through moments when I no longer believed I had anything left to give. Thank you my special Person,

As I write these final words, I realize that this thesis was never written by one person alone. My name may appear on its cover, but every page carries the fingerprints of those who loved me, believed in me, sacrificed for me, and stood beside me when the journey felt impossible.

This is not only my achievement.

It is ours...

Ikram

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I owe my foremost debt of gratitude to my supervisor, **Herr Hamza Ghoul**. His guidance shaped this thesis at every stage, from the framing of my central research question to the final revisions. I am especially grateful for not only a supervisor, but the older brother I didn't have. In moments of uncertainty, you became a guide, a mentor, and an *Obi-Wan* appearing exactly when needed.

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Their candour and insight form the empirical backbone of this thesis, and this research would not have been possible without their generosity of time and thought.

I thank in particular **Professor Everett C. Dolman** of the U.S. Air Command and Staff College, whose foundational work in astropolitics shaped the theoretical architecture of this study and whose interview sharpened its core arguments; **Professor John Hickman** of Berry College, whose territorial framework challenged and deepened every analytical claim made; **Dr. Juliana Süß** of the Stiftung Wissenschaft und Politik, whose expertise in space security and counterspace dynamics provided indispensable empirical grounding; and Rebecca Levy, NASA Asia Representative at the U.S. Embassy in Tokyo, whose practitioner's perspective brought the governance dimensions of this thesis into direct contact with policy reality.

This thesis would not exist in its present form without the team of the U.S. Algiers. Working at the Public Diplomacy section was the unexpected origin of this entire research project. I owe a particular debt of gratitude to **Officer Robert Ronci**, whose conversation over coffee first made me question the politics of outer space and ignited the curiosity that became this thesis; and to **Officer Julie Scherbill**, whose generosity in sharing contacts and whose practical support opened doors that would otherwise have remained closed to me. I also wish to thank the entire Public Diplomacy team at the U.S. Embassy Algiers, whose daily work demonstrated that diplomacy and ideas are inseparable.

Abstract:

This thesis examines how the intensifying U.S.-China rivalry in outer space is transforming the domain from a cooperative global common into a bifurcated governance order, and what this transformation implies for the future of international governance. Guided by the question of whether strategic competition is producing fragmentation, dual orders, or managed coexistence, the study employs a mixed-methods approach combining quantitative indicators, content analysis of primary policy documents, structural network mapping, and elite interviews with Professor Everett C. Dolman, Professor John Hickman, Dr. Juliana Süss, and Rebecca Levy from NASA.

The theoretical framework integrates power-transition theory, liberal institutionalism, complexity theory, and constructivist and structural-power approaches to explain the structural pressures of hegemonic challenge, the limits of legacy governance regimes, and the normative contest through which each power seeks to constitute the frameworks within which all other actors must operate.

The empirical analysis demonstrates that the United States and China operate two structurally incompatible models of space power, one distributing authority through institutional pluralism and public-private partnership, the other concentrating it through Military-Civil Fusion and infrastructural diplomacy, manifesting in competing governance constellations: GPS versus BeiDou, ISS versus Tiangong, the Artemis Accords versus the ILRS.

The central hypothesis is supported as a directional claim, bounded by the contingencies, the analysis identifies: bifurcation is underway, structurally driven, and increasingly path-dependent, yet it remains incomplete and, in important respects, reversible. The implications raise fundamental questions about multilateral governance resilience, the agency of smaller states, and the institutional imagination required to govern a domain whose strategic stakes now rival any other arena of great-power competition.

Keywords: *Astropolitics, U.S.-China Space Rivalry, Global Space Governance, Artemis Accords, Outer Space Treaty, Cislunar Space, Global Commons.*

ملخص:

تبحث هذه الأطروحة في الكيفية التي تحلّى بها التنافس المتصاعد بين الولايات المتحدة الأمريكية وجمهورية الصين الشعبية في الفضاء الخارجي من مجال عالمي مشترك قائم على التعاون إلى نظام حوكمة منقسم، وما يترتب على هذا التحول من انعكاسات على مستقبل الحوكمة الدولية. وانطلاقاً من التساؤل الرئيس حول ما إذا كانت المنافسة الاستراتيجية تؤدي إلى التجزئة، أو إلى نشوء أنظمة مزدوجة، أو إلى شكل من أشكال التعايش المفظم، تعتمد الدراسة منهجاً مختلطاً يجمع بين المؤشرات الكمية، وتحليل المضمون للوثائق السياسية الأساسية، ورسم الخرائط الهيكلية للشبكات، إلى جانب مقابلات مع نخبة من الخبراء، من بينهم البروفيسور إيفريت سي. دولمان، والبروفيسور جون هيكرمان، والدكتورة جوليا سوس، وريبيكا ليفي من وكالة ناسا.

ويرتكز الإطار النظري للدراسة على دمج نظرية انتقال القوة، والليبرالية المؤسسية، ونظرية التعقيد، إضافة إلى المقاربات البنائية والهيكلية للقوة، وذلك بهدف تفسير الضغوط البنيوية الناتجة عن تحدي الهيمنة، وحدود أنظمة الحوكمة التقليدية، والصراع المعياري الذي تسعى من خلاله كل قوة إلى صياغة الأطر المرجعية التي يفترض بسائر الفاعلين الدوليين العمل ضمنها.

وتظهر النتائج التجريبية أن الولايات المتحدة والصين تتبنيان نموذجين بنيويين غير متوافقين لقوة الفضاء؛ إذ يقوم النموذج الأمريكي على توزيع النفوذ من خلال التعددية المؤسسية والشراكة بين القطاعين العام والخاص، بينما يركز النموذج الصيني على تركيز السلطة عبر الدمج العسكري-المدني والدبلوماسية القائمة على البنية التحتية. وقد تجلّى ذلك في ظهور تكتلات حوكمة متنافسة، من بينها: نظام تحديد المواقع العالمي (GPS) في مقابل نظام (BeiDou)، ومحطة الفضاء الدولية (ISS) في مقابل محطة تيانغونغ (Tiangong)، واتفاقيات أرتميس في مقابل محطة الأبحاث القمرية الدولية (ILRS).

وتؤكد الدراسة الفرضية المركزية القائلة إن الانقسام في حوكمة الفضاء الخارجي أخذ في التبلور، تحكمه محددات بنيوية، ويتعمق تدريجياً بفعل الاعتماد المتزايد على المسار المؤسسي والاستراتيجي. وتثير هذه النتائج تساؤلات جوهرية بشأن قدرة الحوكمة متعددة الأطراف على التكيف، وفاعلية الدول الصغيرة والمتوسطة داخل هذا النظام، فضلاً عن الحاجة إلى تطوير خيال مؤسسي جديد قادر على تنظيم مجال أصبحت مخاطره الاستراتيجية تضاهي في أهميتها مختلف ساحات التنافس بين القوى الكبرى.

الكلمات المفتاحية: سياسة الفضاء، التنافس الفضائي بين الولايات المتحدة والصين، الحوكمة العالمية للفضاء الخارجي، اتفاقيات أرتميس، محطة الأبحاث القمرية الدولية، معاهدة الفضاء الخارجي.

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List of Acronyms

NASA – U.S. National Aeronautics and Space Administration
CNSA – China National Space Administration
PLA – People's Liberation Army
PLASSF – People's Liberation Army Strategic Support Force
MCF – Military-Civil Fusion
BRI – Belt and Road Initiative
BDS – BeiDou Navigation Satellite System
GPS – Global Positioning System
ILRS – International Lunar Research Station
ISS – International Space Station
OST – Outer Space Treaty (1967)
LEO – Low Earth Orbit
ASAT - Anti-Satellite Weapon
CMA - China Meteorological Administration
CNSA - China National Space Administration
COPUOS – UN Committee on the Peaceful Uses of Outer Space DoD – U.S. Department of Defense
DoS - U.S. Department of State
ESA - European Space Agency
FAA - Federal Aviation Administration
FCC – U.S. Federal Communications Commission
GAO – U.S. Government Accountability Office
ISECG - International Space Exploration Coordination Group
ISS - International Space Station
ITAR - International Traffic in Arms Regulations
LOP-G - Lunar Orbital Platform – Gateway
OST - Outer Space Treaty
PLA - Chinese People's Liberation Army

Introduction

I. General background

Since the end of the Cold War, space has undergone major and rough yet very calm and subtle transformations. What was once seen as a remote frontier, marked by symbolic triumphs and moments of prestige, has now become more central, though less conspicuous. Today, systems orbiting Earth are intricately woven into daily life, influencing military strategies, economic activities, and the exercise of power across borders. Despite its growing significance, the rules, expectations, and understandings that once seemed stable no longer appear as certain as they once did.

The earlier space race between the United States and the Soviet Union was often understood in simple terms: a competition of overall ideology, technology, and the great powers' pride. It had clear moments, clear milestones, and, in many ways, a clear narrative. But the present situation does not offer the same clarity. The emergence of new actors, new technologies, and new ambitions has created a more complex environment one in which competition is less visible, more continuous, and more deeply embedded in global structures.

At the center of this evolving landscape stand two Great Powers whose interactions go far beyond space itself: the *United States and the People's Republic of China*. Their place and importance are not only measured by missions, launches, or capabilities, but through something much more stable, that is: the ability to influence how others act, how to pull players to their spheres, how cooperation is shaped, and how the domain itself is understood. However, this influence is not uncontested, nor is it unfolding in isolation. Around them, other states are watching, adapting, and positioning themselves in ways that are not always immediately apparent.

Meanwhile, the idea of outer space as a shared and cooperative domain started to feel increasingly fragile. Technologies and all technological tools that connect, observe, and enable are capable of disrupting, excluding, or controlling. Institutional frameworks that were once considered sufficient now face challenges they were never designed to regulate or navigate. New initiatives, partnerships, and alignments are emerging, but it stays uncertain on whether they are going to reinforce cooperation or deepen division.

This provokes a number of fundamental questions that are not easily answered. Is outer space a domain shaped by shared scientific purposes and engagements, or is it becoming another arena of strategic competition? Are existing rules capable of adapting to these changes, or are they slowly being overtaken by new realities? And perhaps most importantly, are we witnessing a continuation of past patterns, or the formation of something fundamentally different?

These contingencies do not point to a single upshot. As an Alternative, they propose that outer space is no longer simply a passive background, AKA a backdrop to international relations, but a space in which deeper transformations may already be gradually emerging, and with outcomes that are just starting to be grasped.

II. Problematic

Thus, this study is guided by the following central problem:

How is the Sino-American space rivalry transforming outer space from a cooperative global common into a bifurcated governance order, and what are the implications of this transformation for the future of global governance?

III. Sub questions

To address this central research problem, the following sub-questions are formulated, each corresponding to one of the three chapters of the thesis:

1. How has the concept of outer space evolved from a neutral, almost depoliticized frontier to a contested domain of Astropolitik, and how do different theoretical lenses help explain contemporary space rivalry?
2. In way ways, do U.S. and China space strategies differ, how organized institutionally they both are, what do they bring to regulate commercial space actors, and how each party integrates space power into its broader respective grand strategy?
3. How does the emerging U.S.-China space race show up as a form of structural power in global governance, for example, through competing constellations of rules, institutions, and infrastructure, such as the Artemis Accords, the ILRS, THE Tiangong vs. ISS, and the emerging post-ISS landscape?

4. Can intense rivalry in orbit still coexist with managed cooperation or forms of shared or at least coordinated governance, or is the growing strategic competition in space inevitably pushing the system towards militarization and strategic decoupling?

5. Using analytical binoculars to see t2030, what are the plausible pathways that we can envisage for global space governance, such as managed competition within a still largely shared order with “DUAL” governance systems, or a more fragmented multipolarity, and what role will the U.S. and the PRC interaction play in shaping these outcomes?

IV. Hypothesis

In order to examine this research question and the sub-questions listed above, the study advances the following hypothesis:

The Sino-American space rivalry is restructuring outer space governance into a bifurcated order: one led by the United States through commercial and alliance-based frameworks, and a parallel one being built by China through state-directed, infrastructure-based cooperation.

V. Methodology

This hypothesis will be examined using the mixed methods approach, given that space rivalry is multidimensional and in the same time material and normative, structural and discursive, and also because global governance itself is such a complex object of analysis.

1. Quantitative Approach

Space power manifests in measurable outputs, satellite constellations, defense budgets, treaty adherence, and governance network centrality. Two methods are applied to assess each power's relative capabilities and governance footprint.

1.1. Hypothetico-Deductive Method. The central hypothesis is tested against observable empirical indicators: comparative space budget figures drawn from U.S. GAO reports, NASA and Space Force budget requests, and Chinese State Council White Papers; satellite launch statistics from the UCS Satellite Database and Space Foundation Annual Report; and governance arrangement typologies counted from Morin and Tepper's (2023) dataset of 1,764 international space agreements. The method moves systematically from theory to evidence and back.

1.2. Structural Network Method. Drawing on Susan Strange's concept of structural power, this method maps the Artemis Accords signatories (67 as of May 2026) against ILRS partners as two competing governance networks, revealing how norm-setting centrality is distributed between the two powers. Primary institutional data is drawn from Congressional records, USCC Annual Reports, and Senate and House Armed Services Committee hearings.

2. Qualitative Approach

Four qualitative methods are applied in an integrated, triangulated design to uncover the strategic logics and normative frameworks underpinning U.S. and Chinese space policy.

2.1. Content Analysis. Foundational policy documents from both states and relevant international bodies are systematically decoded. The corpus includes: for the United States the National Space Strategy (2018, 2024 update), Space Force *Spacepower* doctrine (2020), USCC Annual Reports (2020–2025), NDAA's (FY2021–FY2026), and NASA Artemis documentation; for China, State Council White Papers on Space (2016, 2021), Xi Jinping's "Space Dream" discourse, ILRS cooperation framework documents, and PLA doctrinal materials including *The Science of Military Strategy* (战略学); multilaterally the 1967 OST, UNCOPUOS Long-Term Sustainability Guidelines (2015), the Artemis Accords (2020–), and Security Council debates on space weaponization. The method identifies normative claims and governing principles, enabling systematic comparison of U.S. market-liberal and Chinese sovereignty-centric space norms.

The overarching phenomenon of space governance is disaggregated into four constituent sub-dimensions: legal (treaty regimes and soft law), institutional (UNCOPUOS, UNOOSA, bilateral arrangements), technological (dual-use systems, ASAT, mega-constellations), and economic (commercialization frameworks, resource extraction rules). Each is analyzed separately and reconciled in Chapter Three

2.2. Comparative Analysis. A most-different-systems design is applied across five axes: institutional design (decentralized vs. centralized); civil-military integration (public-private partnership vs. Military-Civil Fusion); coalition architecture (Artemis Accords vs. ILRS); normative orientation (market-liberal openness vs. state sovereignty); and governance philosophy (rules-based multilateralism vs. bilateral infrastructure dependency). The U.S. and Chinese models

represent maximally divergent applications of governance logic to an identical strategic domain, making controlled comparison analytically tractable.

2.3. Elite interview method: this study primarily focuses on conducting interviews with a purposive sample of academics and policy-relevant specialists whose expertise directly intersects with the core of this thesis; Astra politics international relations global governance international security outer space governance and the strategic implications of US-China rivalry. All participants were offered the option of full or partial anonymity in accordance with the standard research ethics protocols where a direct quotation was authorized expert testimony is incorporated as primarily qualitative evidence in the analytical chapter

The Interviewers were:

1. **Professor John Hickman**, Department of Government and International Studies, Berry College (Georgia, U.S.A.). he holds a Ph.D. in Comparative Politics from the University of Iowa and a J.D. from Washington University School of Law. He has served as Professor of Political Science at Berry College since 1992 and is one of the foremost academic authorities on the political economy and territorial dimensions of outer space.

2. **Juliana Süß**, Researcher in Space Security, Stiftung Wissenschaft und Politik (SWP) German Institute for International and Security Affairs; PhD Candidate in War Studies, King's College London; formerly Research Fellow for Space Security, Royal United Services Institute (RUSI) she served as Research Fellow and Policy Lead for space security within the Military Sciences team, producing analyzes on counterspace capabilities, deterrence, space governance, and the geopolitical implications of commercial satellite constellations, including the dual-use dimension of SpaceX Starlink

3. **Professor Everett Dolman**: Prof of Comparative Military Studies at the U.S. Air Command and Staff College. widely recognized as a Father (foundational figure) of astropolitics, particularly through his work on space as a strategic high ground and the concept of “command of space.” His expertise lies at the intersection of space power, grand strategy, and military doctrine, and his insights in the interview were used primarily to refine the theoretical framing of U.S.–China space competition and its implications for global governance.

4. **Rebecca Levy**: NASA Asia Representative at the U.S. Embassy in Tokyo, Japan. Based at the U.S. Embassy, she works on NASA’s diplomatic, scientific, and technical engagement

across the Asia-Pacific region. Her professional focus includes fostering cooperation with regional space agencies, supporting the implementation of NASA's international partnerships, and monitoring the implications of U.S.–China space competition for allied and partner countries in Asia. Her interview provided a practitioner's perspective on how high-level space governance dynamics and rivalries translate into day-to-day policy and coordination challenges in a key regional hub.

2.4. Case Study Method:

will be woven in Chapter Three, dedicated to examining the U.S.China space rivalry as a critical case of great power competition affecting and shaping global governance

This method, which combines quantitative indicators, document-based comparative institutional mapping, and expert interviews, is intended to address the different dimensions of the research problem, from the material distribution of space capabilities to the normative structure of global governance. Each method helps balance the limitations of others, allowing the study to rely on a broader, more robust body of evidence.

VI. Literature Reviews

This thesis engages not with a scarcity of scholarship but with its opposite: a rapidly expanding body of literature on outer space, Sino-American rivalry, and global governance that has grown substantially since 2011, rendering the distinction between analytically rigorous scholarship and policy advocacy a demanding editorial exercise. Sources were selected across theoretical orientations, ideological backgrounds, and institutional origins to construct the most balanced foundation the available literature permits.

A structural asymmetry complicates that foundation. The field is overwhelmingly American in origin or produced for the American strategic policy market. Chinese academic scholarship on space strategy and military doctrine exists in considerable volume but remains largely inaccessible to non-Mandarin readers; those studies that circulate internationally are frequently pre-filtered through translation or Western commentary. This thesis integrates Chinese perspectives through available translations, official State Council white papers, and scholarship by Chinese and Chinese-diaspora scholars writing in English. Where Chinese sources could not be

recovered directly, the limitation is acknowledged and the analysis relies on the most authoritative secondary treatments available. European, Indian, and Global South perspectives have been deliberately incorporated to counterbalance the field's structural bias.

The following constitute the core scholarly foundations of the study.

Everett C. Dolman, *Astropolitik: Classical Geopolitics in the Space Age* (Frank Cass, 2001). The foundational text of astropolitics as an academic discipline. Drawing on Mahan, Mackinder, and Spykman, Dolman introduces astrogeography and argues for U.S.-led free-market sovereignty in space. Indispensable to Chapter One for establishing the intellectual genealogy of the field and for theorizing orbital zones as strategic terrain carrying positional value analogous to coastlines and sea lanes.

Graham T. Allison, *Destined for War: Can America and China Escape Thucydides's Trap?* (Houghton Mifflin Harcourt, 2017). Allison's examination of sixteen historical hegemonic transitions, twelve of which ended in war, supplies the structural-tension framework applied throughout the thesis. Central to Chapter Three's diagnosis of the space rivalry as a power-transition dynamic and to the justification for examining governance mechanisms as potential stabilizing instruments.

Henry A. Kissinger, *On China* (Penguin Press, 2011). Drawing on decades of direct engagement with Chinese leadership, Kissinger analyzes the patient, civilizational - horizoned strategic culture that shapes Chinese foreign policy. Essential for contextualizing the logic behind China's Space Dream and for contrasting it with the reactive, episodic character of U.S. space policy as exemplified by the Wolf Amendment.

John Hickman, *Space Is Power: The Seven Rules of Territory* (Lexington Books, 2016) and *Reopening the Space Frontier* (Common Ground Publishers, 2010). Hickman reconceptualizes territoriality as a persistent rather than receding feature of international politics, extended into the orbital domain. His seven rules of territory are deployed in Chapter One to theorize space as a simultaneously strategic and territorial domain, and in Chapter Three to assess the governance vacuum created by the OST's non-appropriation norm.

Additional Primary and Secondary Sources

1. Bleddyn E. Bowen, *War in Space: Strategy, Spacepower, Geopolitics* — theoretical foundations of spacepower and the "cosmic coastline" conception of Earth orbit
2. Robert Jay Ronci (Graduate Thesis), *Dividing Heaven*, governance consequences of the Wolf Amendment and Chinese strategic autonomy
3. U.S.-China Economic and Security Review Commission, *2025 Annual Report*, authoritative open-source analysis of Chinese military-civil space structures
4. Jean-Frédéric Morin and Eytan Tepper, network analysis of multilateral and unilateral space governance frameworks
5. Secure World Foundation, *Global Counterspace Capabilities Report 2025* — counterspace proliferation data
6. CSIS, CSET, and MERICS reports, empirical data on Chinese civil, military, and commercial space sectors
7. Primary documents subjected to systematic content analysis: the 1967 Outer Space Treaty, U.S. Space Force *Spacepower* Doctrine, the Artemis Accords, Chinese State Council Space White Papers, the ILRS Framework Agreement, and the Wolf Amendment legislative provisions

VII. Aims of the study

The ultimate goal of the study is to assess the extent to which the intensifying rivalry between the United States and the People's Republic of China in outer space is reordering the architecture of global governance, and to determine if the aftermath of this race is making a fragmented dual order, a managed competitive coexistence, or an altogether new configuration of space governance that transcends the binary of cooperation and conflict.

VIII. Limitations of Study

Temporal Limitations: Focuses mainly on 2011–2030; earlier space history is only used for background.

Actors covered: Centers on the U.S.–China dyad; other space powers appear only where directly relevant.

Analytical Limitations: This study is necessarily confined to open-source and declassified documentation.

Methodological Limitations: interviews, while providing valuable primary data, were also subject to the inherent limitations of elite testimony: interviewees may exercise selective disclosure, particularly on sensitive policy matters. Findings are triangulated with documents and the cross-validation of competing expert perspectives.

Normativity: This study does not prescribe a preferred outcome for global space governance. It is explanatory, not advocacy.

IX. Importance of the study

The significance of the study comes from the intersection of several developments that are still understudied in international relations but have direct consequences for world politics:

- o **How do you treat space as a strategic domain?** Space is now central to the global economy, modern warfare, and geopolitical competition, not just to science, satellite support, navigation, finance, communication, and targeting. So any serious analysis of 21st-century international relations must also take space seriously.

- o **US-China rivalry in space:** The US and the PRC shape the international order across trade, technology, security, and increasingly space. The race in orbit and the claim that lunar space is part of a wider struggle over norms, institutions, and the distribution of power mean that understanding it helps us understand where the international order is heading.

- o **Global governance in transition:** The current global space-governance system, built around the 1967 Outer Space Treaty, was designed for a small number of state actors operating exclusively governmental programs. It must now contend with commercial mega-

constellations, dual-use technologies, and competing coalitions such as the Artemis Accords and the ILRS. Analyzing how this governance order is changing is therefore crucial before a new institutional division becomes structurally locked in.

O **Algeria in the global south perspective:** For countries such as Algeria, which are aligned with neither the Artemis Accords nor the ILRS, the U.S.–China rivalry carries direct implications for future access to orbits, frequencies, and cislunar infrastructure. By examining what this competition means for such states, the study brings a Global South perspective to astropolitics and contributes to the wider debate on equity, access, and sovereignty in the governance of outer space.

X. **Motivation**

Every serious research project begins somewhere unexpected. For this thesis, that somewhere was a conversation.

During a professional internship at the Public Diplomacy section of the United States Embassy in Algiers, I worked alongside American Foreign Service Officers whose responsibilities spanned strategy, public affairs, and science diplomacy. One exchange stood apart: a Foreign Service Officer whose independent research examined outer space governance and the Wolf Amendment as an instrument of U.S. foreign policy introduced me to a domain that had, until that moment, appeared distant and technical, the governance of outer space. The encounter also revealed a striking absence: virtually no scholar in Algerian or broader North African academia was examining space in political terms.

That gap is this thesis's point of departure. It connects the classical debates of great-power competition in International Relations with the emerging field of astropolitics, making the case that outer space is not a remote technical domain but the primary arena in which the foundational questions of the twenty-first century order, access, sovereignty, and structural power, are already being decided.

XI. Outline of the study

Reviewing numerous bodies on astropolitics, great-power competition, and space governance has led this thesis to be organized around three integrated frameworks, each developed in a dedicated chapter.

Chapter One: Conceptual and Theoretical Framework. Establishes outer space as a strategic domain and introduces the study's core concepts, space power, astropolitics, and global governance, before situating them within the International Relations traditions applied throughout: realism, liberal institutionalism, and complex systems theory, each brought to bear on the structural logic of U.S.–China rivalry in space.

Chapter Two: Analytical and Empirical Framework. Examines how both powers are reshaping contemporary space governance across two axes: first, a comparative analysis of U.S. and Chinese space strategies, focusing on institutional design, commercial actor integration, and the relationship between space power and national grand strategy; second, an empirical mapping of how that rivalry is institutionalized, through the Artemis Accords, the International Lunar Research Station, Tiangong, and the emerging post-ISS order.

Chapter Three: Practical and Critical Framework. Presents the case study and findings. Applying the thesis's methodological toolkit, it evaluates whether U.S.–China competition is producing governance fragmentation, dual parallel orders, or managed multipolarity. It concludes by assessing the implications for the Global South with Algeria as a primary case, and by charting possible trajectories for global space governance through 2030.

Chapter One: The Conceptual and Theoretical Framework of the Study

Theory does not decorate a thesis; it does the analytical work. Without a conceptual framework, the empirical record of the Sino-American space rivalry remains a catalog of events rather than an argument about their causes and significance. This chapter constructs the lens through which all subsequent chapters are read.

It proceeds in three movements. Section One traces the intellectual genealogy of astropolitics, from Ratzel and Mahan to Dolman's *Astropolitik* (2002) and its critics, Bowen, Moltz, and Hickman, situating this thesis within that tradition while interrogating its normative stakes and mapping space across its three structural dimensions: security, economy, and governance. Section Two applies four theoretical frameworks to the rivalry: Realist and neo-Realist perspectives on hegemonic competition and power transition (Mearsheimer, Waltz, Organski, Allison); Liberal Institutionalism and its prospects for cooperative governance (Keohane, Nye); Constructivist and structural-power approaches (Wendt, Strange); and Complexity Theory, which captures the non-linear, feedback-driven dynamics, the Wolf Amendment cascade, the 2007 ASAT test's systemic reverberations, that linear IR frameworks cannot adequately explain.

Together, these frameworks do not predict the outcome of the rivalry. They explain why it has the structure it does, why decoupling has accelerated, and why the governance crisis is not a failure of political will but a structural consequence of two powers building incompatible orders simultaneously.

Section One: Conceptualizing Space as a Strategic Domain

1. From Outer Space to Astropolitics: An Intellectual Evolution

Astropolitics derives from the Greek *astron* (star, space) and the Latin *politica* (the art of governance and relations between states). It is formally defined by Everett C. Dolman, widely recognized as the field's founding theorist, as "the study of the relationship between outer space terrain and technology with the development of political and military policy and strategy."¹ More broadly, astropolitics applies classical geopolitical tools to the orbital environment, treating outer space not as a neutral scientific frontier but as a structured strategic domain in which location, access, and control carry decisive consequences for Earth-bound power politics.²

Importantly, astropolitics did not emerge in a vacuum. The field's intellectual roots lie in the broader geopolitical tradition. Friedrich Ratzel's *Politische Geographie* (1897) established the core insight that political behavior is spatially determined and that the expansion of political space is an inescapable imperative of national power.³ established the core insight that political behavior is spatially determined, that states, like biological organisms, require space for growth and survival, and that is an inescapable imperative of national power.⁴ In one of his later writings, Ratzel even intuited the cosmic extension of this logic, lamenting the finitude of the earth's surface and suggesting that "*we must take our scales of geographic space and time from outer space, not from the earth,*" adding, strikingly, that "*in space, we read time.*"⁵ As Klinke argues, that power will eventually seek to extend itself beyond terrestrial limits is present in geopolitical thought long before satellites and rockets made it technically feasible.⁶

The decisive bridge between classical geopolitics and a fully articulated theory of space power was constructed by Colin S. Gray and Everett C. Dolman. Gray, a leading strategist of the

¹ Everett C. Dolman, *Astropolitik: Classical Geopolitics in the Space Age* (London: Frank Cass, 2002), 1.

² Dolman, *Astropolitik*, 1–10; Bledwyn E. Bowen, *War in Space: Strategy, Spacepower, Geopolitics* (Edinburgh: Edinburgh University Press, 2020), 1–8.

³ Ian Klinke, "Astropolitics and the Colonial Imagination: Ratzel, Schmitt and the Cosmic Frontier," *Review of International Studies* 51, no. 2 (2025): 1–5.

⁴ Friedrich Ratzel, *Politische Geographie*, 3rd ed. (Munich: R. Oldenbourg, 1897; reprinted 1990), 3–12.

⁵ Ratzel, as cited in Klinke, "Astropolitics and the Colonial Imagination," 4.

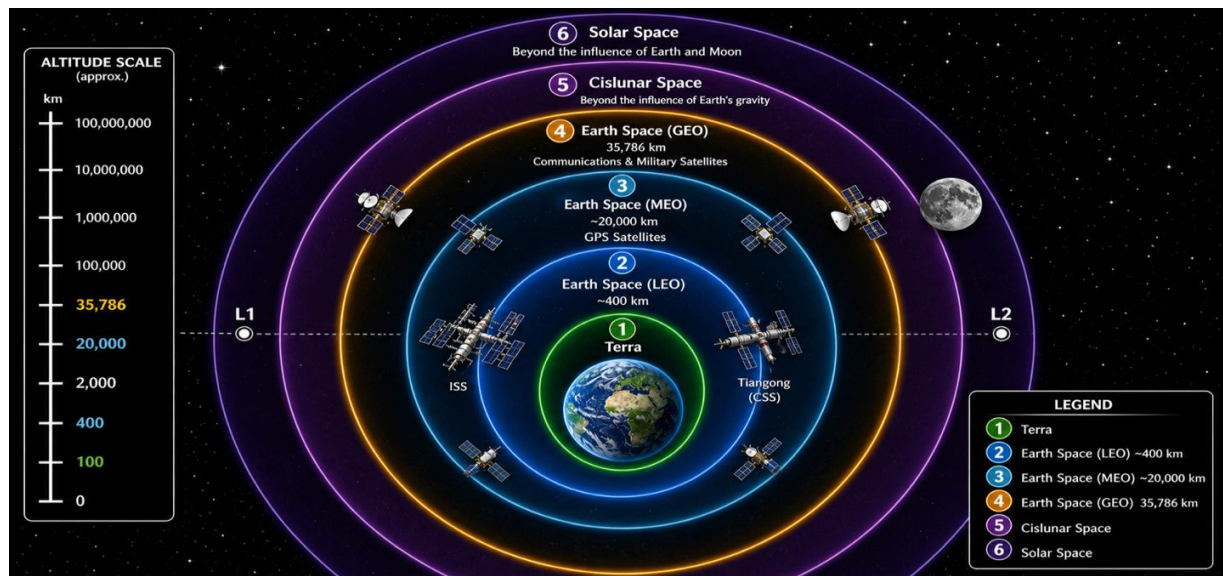
⁶ Klinke, "Astropolitics and the Colonial Imagination,".

Chapter One: The Conceptual and Theoretical Framework of the Study

late twentieth century, argued that strategic theory is universal: the principles governing land, sea, and air warfare also apply to space.⁷ He famously asked, "Where is the theory of space power? Where is the Mahan for the final frontier?" and insisted that "the unique geography of space does not point the way to some unique logic of strategy," thereby rejecting the idea that space is exempt from the logic of power that governs other domains.⁸ Dolman's *Astropolitik* (2002) answered Gray's call, grounding his approach explicitly in Mahan's sea power theory, Mackinder's Heartland thesis, and Spykman's Rimland concept.⁹ His key innovation was *astrogeography*, a strategic mapping of orbital zones (LEO, MEO, GEO, cislunar space) analogous to coastlines and sea lanes in terrestrial geopolitics. From this he derived his canonical dictum:¹⁰

*Who controls Low-Earth Orbit controls Near-Earth Space. Who controls Near-Earth Space dominates Terra. Who dominates Terra determines the destiny of humankind.*¹¹

Figure 1: Dolman's Astrogeography, Strategic Orbital Zones.



Source: Adapted and visualised by the author from Everett C. Dolman, *Astropolitik: Classical Geopolitics in the Space Age* (London: Frank Cass, 2002), 4–8. Figure generated with AI image generation tool

⁷ Colin S. Gray, "The Influence of Space Power upon History," *Comparative Strategy* 15, no. 4 (1996): 293–308; Colin S. Gray, *Modern Strategy* (Oxford: Oxford University Press, 1999), 255–270.

⁸ Gray, "The Influence of Space Power upon History," 296.

⁹ Dolman, *Astropolitik*, 3.

¹⁰ Dolman, *Astropolitik*, 4–8.

¹¹ Dolman, *Astropolitik*, 8.

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The spatial logic of this hierarchy is illustrated in this Figure on top, which maps each orbital zone as a distinct strategic layer with corresponding military and economic functions. The diagram depicts Dolman's six-tier orbital hierarchy: Terra, LEO (~400 km), MEO (~20,000 km), GEO (~35,786 km), Cislunar Space, and Solar Space. ISS and Tiangong (CSS) are in LEO. In Dolman's astropolitical framework, the lowest band is the critical chokepoint.

Control of LEO is thus the functional equivalent of controlling critical chokepoints, the positional foundation for all terrestrial strategic advantages.¹² Dolman drew the hegemonic implication directly, arguing the United States should "seize control of Earth Space" rather than treat it as a global commons.¹³ In interview, however, he stressed that *Astropolitik* was "a cautionary tale, never meant as a celebration of weaponizing space," but a realist "Red Team exercise" designed to force "both sides to talk about the real issues rather than trading slogans."¹⁴

Subsequent scholars have refined and corrected Dolman's framework without abandoning its analytical core. James Clay Moltz demonstrates that spacefaring states have repeatedly exercised restraint despite strong structural incentives for competition, introducing behavioral and institutional dimensions Dolman's hard-realist model left underdeveloped.¹⁵ Bleddyn Bowen's *War in Space* (2020) argues that Earth orbit is best understood as a "cosmic coastline", not a "simplistic high ground", because "what happens in orbit and on Earth intimately affect each other, whether through satellite infrastructure or anti-satellite weapons operations."¹⁶ Bowen reinforces the thesis's central claim: space matters because of what it enables and constrains in terrestrial political, economic, and military orders.¹⁷

Critical scholars have exposed the normative stakes. Havercroft and Duvall argue that Dolman's "free-market sovereignty" concept amounts to "a U.S. empire that uses the capacities of space-based weapons to exercise hegemony over the Earth."¹⁸ Klinke traces astropolitical

¹² Dolman, *Astropolitik*, 8–12.

¹³ Dolman, *Astropolitik*, 155–158.

¹⁴ Everett C. Dolman, interview by 2026.

¹⁵ Moltz, *The Politics of Space Security*, 15–30.

¹⁶ Bowen, *War in Space*, 5.

¹⁷ Bowen, *War in Space*, 6–12.

¹⁸ Jonathan Havercroft and Raymond Duvall, "Critical Astropolitics: The Geopolitics of Space Control and the Transformation of State Sovereignty," in *Securing Outer Space*, ed. Natalie Bormann and Michael Sheehan (Abingdon: Routledge, 2009), 48.

categories back to colonial spatial appropriation in Ratzel and Schmitt, underscoring that debates about space control carry forward older logics of territorial hierarchy.¹⁹

For the purposes of this thesis, astropolitics is understood in its widest analytical sense: the systematic study of how spatial position, technological capability, and normative frameworks interact to shape political, military, and economic competition in the space domain, and by extension, to redistribute power and authority in the international system.²⁰ It is through this lens that the U.S.–China rivalry ceases to be a story about rockets and missions and becomes a story about structural power, governance, and the future of global order.

2. Space as a Multi-Dimensional Domain: Security, Economy, and Governance

Outer space has never been only one thing at a time. From the moment the Soviet Union launched Sputnik into low Earth orbit on **4 October 1957**, it was simultaneously a scientific achievement, a military provocation, a demonstration of industrial capacity, and a governance challenge.²¹ The United States government's decision not to protest Sputnik's overflight set the first de facto legal precedent in the domain, establishing by practice what no treaty had yet articulated: that orbital passage did not violate territorial sovereignty.²² Dolman's formulation captures what that precedent already encoded: “the measure of great power is calculated in arms and industry, and space is so integral that unless there is a massive change in the current trajectory of global interaction, any future war between major powers will be won or lost in the battlefield of space.”²³ Security and economy are named in the same breath as governance; the question of who writes the rules for that battlefield and that industry is the third and analytically indispensable dimension.

Security, economy, and governance do not exhaust the full range of meanings states and nonstate actors attach to outer space. The domain also carries dimensions of scientific inquiry,

¹⁹ Klinke, “Astropolitics and the Colonial Imagination,” 9–15.

²⁰ Jean-Frédéric Morin and Eytan Tepper, “The Geopolitics of Space Governance,” *Global Studies Quarterly* 3, no. 2 (2023): 1–8.

²¹ Steve Garber, “Sputnik and the Dawn of the Space Age,” NASA History Division, last modified October 10, 2007, <https://history.nasa.gov/sputnik/>.

²² John Hickman, *Space Is Power: The Seven Rules of Territory* (Lanham, MD: Lexington Books, 2016), 3–5.

²³ Everett C. Dolman, “Classical Security Dilemma in the New Space Age,” interview, *Geospatial World*, November 16, 2023, <https://geospatialworld.net/prime/security-dilemma-new-space/>

environmental monitoring, soft power, and national identity construction.¹ Juliana Süss underlines that even in the early Cold War, the famous “**space race**” was in reality “**a missile race**”: Sputnik proved that the Soviet Union possessed missiles “that could potentially reach the United States mainland,” with the race to the Moon emerging as “another branch” of an underlying competition in delivery systems and nuclear posture.² These observations reinforce the analytical choice made here: the three dimensions examined in this section are used because they constitute the primary axes on how greatpower rivalry in space is currently organized, and because they offer the most tractable purchase for the theoretical and empirical arguments developed in subsequent chapters.

2.1. The Security Dimension: Space as Operational Infrastructure

The securitization of outer space began not with doctrine but with dependency. From the late 1950s, both superpowers recognized that satellites offered intelligence, early warning, and command-and-control capabilities no terrestrial system could replicate. American CORONA and Soviet Zenit reconnaissance satellites transformed the strategic environment, and both sides tacitly accepted overflights rather than destroy the mutual transparency those systems provided, embedding orbital infrastructure into the logic of deterrence decades before any doctrine formalized it.³ Hickman argues that this history confirms that outer space must be treated “as an integral component of the international system subject to the same structural incentives, competitive dynamics, and strategic logics that govern relations among states in every other domain.”⁴

By 1991, this dependency had become structural. Operation Desert Storm demonstrated that U.S. dominance in space-based ISR, PNT, and communications constituted the operational foundation of American military superiority.⁵ Chinese military analysts drew the lesson precisely: the most effective asymmetric response was to hold that infrastructure at risk.⁶ What followed is

¹ Nayef AlRodhan, “Implications of New Space Forces for Sustainable Space and Terrestrial Security,” *Global Policy Journal* (blog), February 19, 2021, <https://www.globalpolicyjournal.com/blog/19/02/2021/implications-new-space-forces-sustainable-space-and-terrestrial-security>

² Juliana Süss, interview with Ikram Rouainia, zoom video call, [04/05] 2026.

³ Moltz, *The Politics of Space Security*, 61–90; Bowen, *War in Space*, 9–20.

⁴ John Hickman, *Space Is Power: The Seven Rules of Territory* (Lanham, MD: Lexington Books, 2016), 1–10.

⁵ Brian Weeden, “The Militarization of Space and Proposed Governance Frameworks,” *Astropolitics* 17, no. 3 (2019): 150–165.

⁶ Dean Cheng, “China as a Military Space Competitor,” Heritage Foundation Report, January 2018, 3–5.

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a documented proliferation of counterspace capabilities. China's January 2007 kinetic ASAT test against the Fengyun-1C satellite at 865 km altitude generated over 3,500 trackable debris fragments, the single largest debris-generating event in orbital history, demonstrating that LEO was no longer a sanctuary.¹ The Secure World Foundation's 2025 Global Counterspace Capabilities report identifies twelve states actively developing counterspace systems, including five Chinese satellites assessed in 2024 as conducting rendezvous and proximity operations with potential offensive applications.² Russia's November 2021 kinetic ASAT test against Cosmos 1408 forced ISS crew members into emergency shelter and generated a debris cloud that will persist in active orbital bands for years.³

The structural risk of this proliferation is formalized by the Kessler Syndrome: once debris density crosses a critical threshold, fragment production outpaces atmospheric drag removal, and collisions cascade autonomously.⁴ ESA's 2025 Space Environment Report counts approximately 40,000 tracked objects in orbit, of which only 11,000 are active satellites, with an estimated 1.2 million fragments larger than one centimeter circling the planet.⁵

As of 2025, twelve states are actively developing counterspace capabilities across five categories: direct-ascent ASAT weapons, co-orbital systems, electronic warfare, directed energy, and cyber operations. Four states, the United States, China, Russia, and India, have physically destroyed satellites in orbit, generating long-lasting debris fields. China's 2007 Fengyun-1C test produced over 3,500 trackable fragments; Russia's 2021 Cosmos 1408 test forced ISS crew into an emergency shelter. The remaining eight states are at confirmed testing or early development stages. Counterspace competition is no longer a bilateral dynamic; it is a structural feature of the international security environment.⁶

¹ Brian Weeden and Victoria Samson, eds., *Global Counterspace Capabilities: An Open Source Assessment* (Washington, DC: Secure World Foundation, 2025), 1-1–1-10.

² Weeden and Samson, *Global Counterspace Capabilities*, 3-1–3-20.

³ NASA Orbital Debris Program Office, "Russian ASAT Test Creates Significant Debris Cloud," *Orbital Debris Quarterly News* 25, no. 4 (2021): 1–2.

⁴ Donald J. Kessler and Burton G. Cour-Palais, "Collision Frequency of Artificial Satellites: The Creation of a Debris Belt," *Journal of Geophysical Research* 83, no. A6 (1978): 2637–2646.

⁵ European Space Agency, *ESA Space Environment Report 2025* (Paris: ESA, 2025), 4–10.

⁶ Weeden and Samson, eds., *Global Counterspace Capabilities: An Open Source Assessment* (Washington, DC: SWF, 2025) https://cdn.prod.website-files.com/66dcc6872f6ed23bce1db235/690e30052993b5d301a5c1b8_Victoria%20Samson_Quad%20Nations%20Security%20Dialogue_Sept%2028%202025.pdf

Table 1: Counterspace Capability Categories by State, 2025.

State	Direct-Ascent ASAT	Co-Orbital	Electronic Warfare	Directed Energy	Cyber
United States	Demonstrated	Confirmed	Demonstrated	Confirmed	Demonstrated
China	Demonstrated	Confirmed	Demonstrated	Developing	Confirmed
Russia	Demonstrated	Confirmed	Demonstrated	Developing	Confirmed
India	Demonstrated	—	Developing	—	Developing
France	—	Confirmed	Confirmed	Developing	Confirmed
Japan	—	Developing	Confirmed	—	Confirmed
Israel	—	—	Confirmed	Developing	Confirmed
United Kingdom	—	—	Confirmed	Developing	Confirmed
North Korea	Developing	—	Confirmed	—	Confirmed
South Korea	—	—	Developing	—	Developing
Iran	—	—	Confirmed	—	Developing
Australia	—	—	Developing	—	Developing

Source: Adapted from Brian Weeden and Victoria Samson, eds., *Global Counterspace*

This is the security paradox that makes the governance dimension structurally necessary: actions taken to degrade an adversary's capabilities generate collective insecurity from which no actor, including the attacker, is insulated.

Dolman's astropolitical framework gives this dynamic its analytical grammar. His dictum encodes a Mahanian logic of positional chokepoints: control of the geostationary belt, Lagrange liberation points, and Hohmann transfer trajectories translates geographic position into strategic advantage as directly as Mahan's sea lanes translated naval geography into imperial power.¹ In interview, Dolman linked this logic explicitly to a Thucydidean understanding of hegemonic orders: a dominant power that allows a rival to rise unchecked will find that "fear and insecurity eventually push the hegemon toward confrontation."² Havercroft and Duvall's critical reading

¹ Dolman, interview, 04,05,2026; Dolman, *Astropolitik*, 8–12; Alfred Thayer Mahan, *The Influence of Sea Power upon History, 1660–1783* (Boston: Little, Brown, 1890), 25–89.

² Dolman, interview, 04,05,2026.

names what Dolman's framework implies: orbital control is a blueprint for hegemonic closure, a single power setting the terms of access for all others.¹ Hickman reinforces the structural warning from a different angle: the “unmistakable direction of international politics is toward encompassing ever more physical space as the territory of states,” and orbit is the next frontier in that expansion.²

2.2. The Economic Dimension: Infrastructure, Industry, and the Coming Resource Contest

The global space economy reached \$613 billion in 2024, a 7.8% year-on-year increase and the first time the sector has exceeded \$600 billion.³ The commercial sector accounted for 78% of that total (approximately \$478 billion), with government programs contributing 22% (\$132 billion); the United States alone invested \$77 billion across civil and national security space activities.⁴ The Space Foundation projects the sector will approach \$1 trillion by 2032.⁵

These figures describe infrastructure already load-bearing for the global economy. GPS alone has generated an estimated \$1.4 trillion in U.S. economic benefits since commercial availability; one study estimates that a seventy-two-hour GPS outage would cascade into financial-clearing failures and transport network breakdowns before any military consequence was felt.⁶ The commercialization of launch, SpaceX's Falcon 9 having achieved over 300 successful missions by 2026, reducing cost-per-kilogram to LEO by an order of magnitude, has enabled mega-constellations at scale.⁷

¹ Havercroft and Duvall, "Critical Astropolitics," 48–52.

² Hickman interview, 20,04,2026; Hickman, *Space Is Power*, 15–20.

³ Space Foundation, *The Space Report 2025 Q2* (Colorado Springs: Space Foundation, 2025), 1.

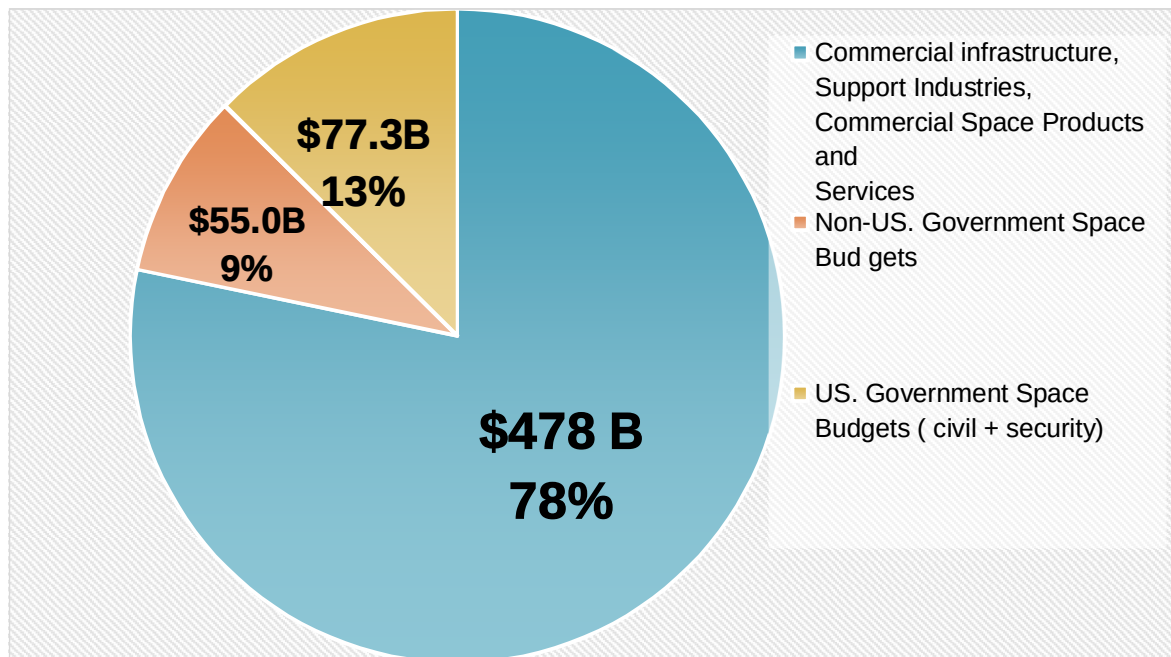
⁴ Space Foundation, *The Space Report 2025 Q2*, 2.

⁵ Space Foundation, *The Space Report 2025 Q2*, 3.

⁶ National Institute of Standards and Technology, *Economic Benefits of the Global Positioning System* (Washington, DC: NIST, 2019), 1–5. <https://nvlpubs.nist.gov/nistpubs/gcr/2025/NIST.GCR.25-062.pdf>.

⁷ SpaceX, "Falcon 9 Launch History," accessed May 2026, <https://www.spacex.com/vehicles/falcon-9/>.

Figure 2: Distribution of the global space economy by sector, 2024*.



Source: Space Foundation, *The Space Report 2025 Q2*, 2025

The economic and security dimensions converge without ambiguity: Starlink's direct military utility in Ukraine, providing resilient battlefield communications after Russian jamming degraded conventional options, demonstrated that commercial mega-constellations are simultaneously revenue-generating infrastructure and strategic assets in active conflict.¹ The distinction between commercial and military space has been operationally erased.

China's economic approach reinforces Dolman's Astro geographic logic in material terms. The CSIS Strategic Trajectories report assesses Beijing as targeting a crewed lunar landing by 2030, driven not by scientific prestige alone but by a resource calculus: helium-3, rare-earth elements, and water-ice deposits at the lunar south pole.² The American Foreign Policy Council has characterized China's lunar strategy as a structural parallel to its South China Sea approach, establishing physical presence to generate de facto territorial claims in the absence of legal

* The commercial sector accounts for 78% (\$478 billion) of the \$613 billion total, with government programs contributing 22% (\$132 billion), of which the United States alone invested \$77 billion.

¹ Center for Strategic and International Studies, "How Commercial Space Is Changing Modern Warfare," March 2023, <https://www.csis.org/analysis/how-commercial-space-changing-modern-warfare>.

² Center for Strategic and International Studies, *Strategic Competition in Space: The China Factor* (Washington, DC: CSIS, 2024), 12–18.

prohibitions.¹ The space-mining market is projected to reach approximately \$20 billion by 2035; Chinese government planners have framed lunar resource acquisition as a lever over future energy and advanced-manufacturing sectors.² Control of the lunar south pole, where both Artemis and the ILRS are targeting infrastructure, is a competition for the industrial sites that will anchor the cislunar economy.³ Süß tempers these forecasts, however, arguing that the "upfront cost of building the infrastructure" to mine and transport lunar resources means that, for the near term, these programs are driven more by prestige and strategic positioning than by commercial profitability.⁴

2.3. The Governance Dimension

The governance dimension is where the security and economic logics of space are most explicitly contested. The OST declared space the "province of all mankind" and prohibited national appropriation, a framework crafted for a world of two state actors with exclusively governmental programs.⁵ It now confronts over seventy states with national space regulations, hundreds of commercial entities, and two great powers engaged in systematic competition to construct the institutional architectures within which all others must operate.

Morin and Tepper's 2023 network analysis of 1,764 international space arrangements confirms that the United States retains significantly greater structural centrality: its commercial sector and international network have enabled the global diffusion of its preferred norms while simultaneously constraining China's cooperation network.⁶ The governance dimension also encompasses the unresolved question of space resource law. The U.S. Commercial Space Launch Competitiveness Act (2015) and the 2020 Executive Order on space-resource utilisation claim property rights over extracted resources while formally denying sovereignty over extraction sites

¹ American Foreign Policy Council, "China's Lunar Strategy and the South China Sea Parallel," *AFPC Policy Brief*, 2023, 4–6. <https://www.afpc.org/publications/articles/how-china-could-turn-the-moon-into-the-next-south-china-sea>.

² Morgan Stanley, *Space: Investing in the Final Frontier* (New York: Morgan Stanley Research, 2020), 15–20. <https://www.morganstanley.com/ideas/investing-in-space.html>.

³ Dolman, *Astropolitik*, 8–12; Dolman interview, 04/05/2026.

⁴ Juliana Süß, interview by Ikram Rouainia, 04/05/2026.

⁵ Treaty on Principles Governing the Activities of States, arts. I–IV. <https://legal.un.org/avl/ha/tos/tos.html>.

⁶ Roxane Pic, Chantal Evoy, and Jean-Frédéric Morin, "The Governance of Outer Space: A Fragmented Regime Complex," *Astropolitics* 21, no. 2 (2023): 95–118.

a distinction legal scholars continue to contest as potentially incompatible with OST Article II.¹ Hickman's territorial critique applies with direct force: his argument that human territoriality is "too basic to human nature to be denied" implies that the OST's non-appropriation norm will eventually be tested to breaking point by the material incentives of resource exploitation and the positional logic of cislunar competition.² In interview, he describes the OST as "a deeply deficient legal instrument" whose prohibition "actively disincentivizes the sustained investment required for serious lunar development," and interprets both the Artemis Accords and the ILRS as "parallel attempts to fill the governance vacuum that the Outer Space Treaty created."³

3. The Emergence of Space as a Contested Global Commons: The Hickman Critique, Territoriality as Extension, Not Exception

The OST prohibited national appropriation "by claim of sovereignty, by means of use or occupation, or by any other means."⁴ For most of the Cold War, this norm functioned as a stable, if implicit, bargain between two states whose mutual interest in transparency outweighed any advantage from enclosure. The norm no longer rests on those conditions. John Hickman's *Space Is Power: The Seven Rules of Territory* challenges, at the structural level, the assumption that it ever could: "territoriality is too basic to human nature to be denied and territorial sovereignty is too important to the survival of the modern state to be ignored," and "the unmistakable direction of international politics is toward encompassing ever more physical space as the territory of states."⁵ This is the core tension that organizes this chapter.

3.1. The Legal Architecture of the Commons, and Its Structural Weaknesses

The commons framing of outer space rests on three foundations. The first is legal: OST Articles I–IV collectively constitute a non-appropriation and open-access regime analogous to the *res communis* principle governing the high seas.⁶ The second is political: the non-appropriation

¹ U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114-90, §402 (2015); Executive Order on Encouraging International Support for the Recovery and Use of Space Resources, E.O. 13914, 85 Fed. Reg. 20381 (2020).

² Hickman, *Space Is Power*, 3; Hickman interview, 20,04,2026.

³ John Hickman, interview by the author, April 21, 2026.

⁴ Treaty on Principles Governing the Activities of States, art. II. <https://legal.un.org/avl/ha/tos/tos.html>.

⁵ Hickman, *Space Is Power*, 3; Hickman interview, 20,04,2026.

⁶ Treaty on Principles Governing the Activities of States, arts. I–IV.

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norm reflected the 1967 superpowers' shared interest in preventing the other from claiming lunar or orbital territory, a bilateral arrangement dressed in universalist language. The third is normative: the 1979 Moon Agreement extended the commons logic by characterizing natural resources of celestial bodies as the "common heritage of mankind."¹

Each foundation is weaker than it appears. The OST leaves entirely unresolved whether states or commercial actors may claim property rights over resources extracted from non-appropriated territory, the distinction exploited through the 2015 Commercial Space Launch Competitiveness Act.² The Moon Agreement's fate is the most revealing indicator of the commons framing's fragility: as of 2024, it has only seventeen state parties, none of them the United States, Russia, or China.³ Saudi Arabia, in a pointed signal, withdrew from the Moon Agreement within six months of signing the Artemis Accords in January 2023.⁴

In interview on 20 April 2026, Hickman characterized the OST as "a deeply deficient legal instrument" comparable to the Treaty of Tordesillas, "an exercise in geopolitical fantasy masquerading as international law," produced by diplomats with "little grounding in the physical sciences or engineering," negotiating for a domain they lacked the conceptual tools to understand.⁵ Süss reinforces this diagnostic from a different angle: the fundamental problem is institutional lag, space has become "a domain through which things happen" and "a domain in which things happen," with modern military and economic systems far more reliant on space-enabled capabilities than the OST's architects could have anticipated.⁶

3.2. Dolman's Positional Grammar: Why the Commons Framing Was Always Unstable

¹ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, December 18, 1979, 1363 U.N.T.S. 3, art. 11. <https://legal.un.org/avl/ha/agasmocb/agasmocb.html>.

² U.S. Commercial Space Launch Competitiveness Act, §402. <https://www.congress.gov/114/plaws/publ90/PLAW-114publ90.pdf>.

³ UNOOSA, "Status of International Agreements Relating to Activities in Outer Space," accessed May 2026, <https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/status/index.html>.

⁴ Ely Sandler, *Governing Outer Space: A Conference of the Parties for the Outer Space Treaty* (Washington, DC: Belfer Center, December 2025), 14. https://www.belfercenter.org/sites/default/files/2025-12/Sandler_Governing%20Outer%20Space_Final.pdf.

⁵ Hickman, interview, 20, 04, 2026.

⁶ Süss, interview.

Dolman does not engage with the commons framing on its own normative terms, and this is precisely his analytical contribution. His canonical dictum encodes a structural logic of positional chokepoints that renders the commons framing naïve rather than merely aspirational.¹ He is explicit that *Astropolitik* "does not advocate an astropolitical future for the exploration of space" but is "an analysis of what the future might be like, given the continuing nationalistic pursuit of outer space", a structural prediction, not a prescription.²

In the interview, Dolman elaborated that his argument was "deliberately provocative": if the United States truly wanted to avoid a war in space, "the worst thing it could do would be to sit still, allow competitors to close the gap, and then confront them from a position of relative decline."³ He locates the structural turning point precisely: "We passed that Rubicon sometime after China's 2007 anti-satellite test. By then, the window for unchallenged U.S. orbital dominance had essentially closed."⁴ His prescriptive conclusion, that the United States should "use current and near-term capabilities to seize military control of LEO" and establish "benign free-market sovereignty in space", is the logical endpoint of the positional argument.⁵ Whether or not one endorses the prescription, the descriptive logic is analytically indispensable: both U.S. and Chinese space strategies are more parsimoniously explained by this positional logic than by the normative commitments of the OST.

3.3. The Hickman Critique: Territoriality as the Deep Structure of Space Politics

Space Is Power challenges the intellectual conceits that "human territoriality is merely a social construct, that territorial sovereignty is atavistic, and that territorial annexation is always irrational."⁶ Hickman's counter-argument is historical and empirically grounded: wherever material incentives and strategic imperatives converge in a domain with weak enforcement, from Russia's annexation of Crimea to China's "nine-dash line", states generate functional equivalents of territorial sovereignty whether or not formal claims are legally permitted.⁷

¹ Dolman, *Astropolitik*, 8; Dolman, interview.

² Dolman, *New Frontiers, Old Realities*, 4; Dolman, interview.

³ Dolman, interview.

⁴ Everett Dolman, interview by Ikram Rouainia, zoom video call, 04,05,2026.

⁵ Dolman, *Astropolitik*, 155–158.

⁶ Hickman, *Space Is Power*, 1–3.

⁷ Hickman, *Space Is Power*, 15–40.

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In his April 2026 interview, Hickman argued that early IR scholarship had subjected outer space to "an almost quasi-religious or mythological framing, treated as 'the heavens,' as though the ordinary laws of physics and international competition do not apply there."¹ Both Hickman and Dolman insist that the special environment of space does not suspend the competitive logics of terrestrial politics, it extends them. Dolman confirms this convergence in interview: "We are moving back into a world of open great-power competition in space, more intense than when I was writing, at exactly the moment when space has become indispensable to military operations and the global economy, a dangerous combination."² The lunar south pole scenario crystallises the logic: Hickman observed that if China establishes a crewed base there first, "diplomatic protest alone places Washington in a structurally weak negotiating position, complaining from a distance while the other party is actively conducting operations on the surface."³ Former NASA Administrator Bill Nelson's 2023 warning that China might "declare it their territory, keeping others out" is not alarmism; it is a mainstream institutional acknowledgement that Hickman's structural argument is operationally relevant.⁴

3.4. The Commons Counter-Argument: Ostrom, Equity, and Institutional Possibility

Hickman's critique does not go uncontested. The commons framing retains normative force: the OST's "province of all mankind" principle and the Moon Agreement's "common heritage" concept remain the primary legal instruments through which states without independent space access, the majority of the international community, claim a share of space exploitation benefits.⁵ As Kaul argues, abandoning the commons framing would concentrate the gains of space resource extraction among a handful of technologically advanced states, reproducing in the cislunar environment the same inequity that characterized the colonial enclosure of terrestrial

¹ Hickman, interview, 04,02,2026.

² Dolman, interview, May,2026.

³ Hickman, interview.

⁴ Bill Nelson, quoted in Lara Seligman and Bryan Bender, "China Could Claim the Moon, NASA Chief Warns," *Politico*, January 2, 2023.

⁵ Treaty on Principles Governing the Activities of States, art. I; Agreement Governing the Activities of States on the Moon, art. 11.

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commons.¹ Süß adds an important empirical qualification: much current rhetoric about lunar resource extraction runs ahead of its economic viability, given that "the upfront cost of building the infrastructure" means that, for the near term, these programs are driven more by prestige and strategic positioning than by commercial profitability.²

Analytically, Elinor Ostrom's *Governing the Commons* (1990) demonstrated that Hardin's "tragedy of the commons" is not empirically universal.³ Applied to outer space, however, the diagnosis is unfavorable: boundaries are undefined, monitoring remains unilaterally American, sanctioning mechanisms are absent, and UNCOPUOS has produced no binding instrument since 1979.⁴ Ostrom's framework thus reinforces rather than contradicts Hickman's warning: the institutional conditions for sustainable commons governance are not presently in place. Morin, Pic, and Evoy's 2023 empirical analysis of 1,764 international space arrangements confirms that explicit "global commons" language is largely absent from recent major-power agreements, the normative claim is not translating into institutional practice.⁵

3.5. The Governance Vacuum and the Bifurcation Dynamic

In the interview, Hickman offered perhaps the most pointed characterization of where this structural failure leads. Asked about the Artemis Accords and the ILRS, he argued that both "represent parallel attempts to fill the governance vacuum that the Outer Space Treaty created, particularly with respect to property rights on the lunar surface." The Accords' formulations are "diplomatically elegant" but "carefully sidestep the unavoidable reality that any serious lunar development will require some form of territorial claim." Both frameworks are "in essence, mechanisms for achieving that objective, even if neither is prepared to articulate it plainly."⁶

Dolman's retrospective concurs: the drift toward isolationist and nationalist tendencies in U.S. domestic politics has "pushed other actors such as China, Russia, India, Europe, to invest

¹ Inge Kaul, "Space as a Global Commons: The Challenge of Equitable Governance," *Global Policy* 15, no. 2 (2024): 45–60.

² Süß, interview.

³ Elinor Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Action* (Cambridge: Cambridge University Press, 1990), 1–30.

⁴ UNOOSA, "Status of International Agreements."

<https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/status/index.html>.

⁵ Pic, Evoy, and Morin, "The Governance of Outer Space," 95–118.

⁶ Hickman, interview.

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more heavily in going their own way in space, reinforcing the very great-power rivalry I had hoped we might avoid through rules and cooperative regimes."¹ The result is a self-reinforcing bifurcation: U.S. credibility as the architect of a liberal space-governance order erodes at precisely the moment when China's alternative framework gains traction. Morin and Tepper's network analysis confirms this structurally: the United States retains significantly greater centrality in global space governance while China constructs alternative governance centers that partially² The path-dependency of these choices is analytically significant: as states join one bloc and build infrastructure compatible with its standards, switching costs rise and the prospect of convergence on a unified governance regime recedes. Whether the polycentric architecture emerging around the Artemis Accords and the ILRS is consolidating a commons order or fragmenting into competing territorial blocs is the empirical question subsequent chapters pursue.³

This thesis carries the commons-versus-territoriality tension forward as an open analytical problem. Hickman's "territoriality as extension, not exception" thesis, stated in his published work and refined in a direct interview, is treated as a realist structural warning derived from anthropological depth and comparative historical evidence.

Section Two: Theoretical Frameworks of International Space Rivalry

1. Realist and Neo-Realist Perspectives on Hegemonic Competition and Power Transition Theory

No theoretical cluster accounts as parsimoniously for the structural drivers of great-power behavior in the space domain as the realist tradition: the anarchic logic of self-help, the imperative of relative power maximization, and the lethal dynamics of hegemonic transition. This section applies two realist lineages, structural neo-realism (Waltz, Mearsheimer) and power transition theory (Organski, Allison), with Dolman's *New Frontiers, Old Realities* (2012) serving as the pivotal bridge text translating IR theory into the language of space strategy.

1.1. Mearsheimer's Offensive Realism and the Logic of Positional Maximisation

¹ Dolman, interview.

² Morin and Tepper, "The Geopolitics of Space Governance," 1–8.

³ Payload Space, "The Artemis Accords By the Numbers," January 27, 2026, <https://payloadspace.com/the-artemis-accords-by-the-numbers/>.

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John Mearsheimer's *The Tragedy of Great Power Politics* (2001) sharpens Waltz's structural argument with direct applicability to space. Mearsheimer departs from Waltz on one critical point: states can never be certain a rival has satisfied, rather than temporarily suppressed, its revisionist ambitions. This irreducible uncertainty drives states to maximize relative power, to seek hegemony rather than rest at comfortable sufficiency. "Even security-seeking great powers will nonetheless be forced to engage in competition and conflict with one another," because anarchy leaves no stable equilibrium short of preponderance.¹ Intentions are unknowable; capabilities are the only reliable currency.

Dolman grounds his astropolitical framework explicitly in this tradition: "If state power, expressed in terms of capacity for violence, is the *ultima ratio* of international relations, then geopolitical theory is extremely useful ... The state that does not protect itself will be overcome; that which does not grow will wither and die."² His dictum is the Mearsheimerian maximizing logic applied to the specific geometry of orbital geography: control of LEO translates into the structural capacity to deny adversaries the ISR, PNT, and communications on which modern military operations depend.³ In interview, Dolman described *Astropolitik* as a realist "Red Team exercise" designed to make "the strongest possible case for the realist position in space" so that both idealists and practitioners would be forced "to talk about the real issues rather than trading slogans."⁴

Dolman's analysis of the U.S.–China dyad in *New Frontiers, Old Realities* is the most concentrated application of offensive realism to the space rivalry in existing literature: "In every sphere but one, it seems, the two great powers are building toward peace ... That one incompatible, uncompromising realm is outer space."⁵ Economic interdependence, cultural goodwill, and diplomatic engagement may soften competition in every other domain, but space is exempt from those moderating forces because the positional stakes are too high and the governance framework too weak to constrain the self-help imperatives of both sides.

¹ John J. Mearsheimer, *The Tragedy of Great Power Politics* (New York: Norton, 2001), 3.

² Dolman, *Astropolitik*, 10–12; Dolman, interview.

³ Dolman, *Astropolitik*, 8.

⁴ Dolman, interview, April 2026.

⁵ Dolman, *New Frontiers, Old Realities*, 3.

1.2. Dolman on the PRC: Strategy, Timing, and the Great Wall in Orbit

Dolman identifies a fundamental disconnect between Western and Chinese strategic logics with direct implications for how the rivalry will unfold. "The essential disconnect between West and East in the conduct of war is in the difference between action and timing ... for the Eastern strategist, proper war making is a matter of timing ... Rather than force a change through positive actions, the Eastern strategist bides time until the moment to strike is ripe."¹ Where Western confidence-building rests on the logic that transparency reduces the security dilemma, Chinese strategic writings privilege opacity "letting an opponent know precisely one's strengths and weaknesses merely invites attack."² This epistemological incompatibility is precisely why space, above all domains, resists the confidence-building measures that have partially stabilized competition in the nuclear and conventional arenas.

Dolman's assessment of the 2007 ASAT test illustrates this logic: "The timing coincides perfectly with their perception that the United States is ill-positioned to respond with force ... China's ultimate goal appears to be to assert its regional supremacy and achieve coequal if not dominant status as a global power. Control of space is a critical step in that direction."³ In the interview, he judges that the United States "passed that 'Rubicon' sometime after China's 2007 anti-satellite test," by which point "the window for unchallenged U.S. orbital dominance had essentially closed."⁴ He further elaborates China's domestic political logic through the Great Wall analogy: a significant military presence in LEO serves simultaneously as a counterspace deterrent, a CCP legitimacy instrument, and a mechanism for keeping "foreign influences out of the Middle Kingdom."⁵ His prescriptive conclusion follows directly: "Seizing the initiative and securing low Earth orbit now, while the United States is dominant in space infrastructure, would do much to stabilize the international system and prevent an arms race in space."⁶ Whether or not one accepts

¹ Dolman, *New Frontiers, Old Realities*, 45–46.

² Dolman, *New Frontiers, Old Realities*, 46.

³ Dolman, *New Frontiers, Old Realities*, 58.

⁴ Dolman, interview, 04,05,2026.

⁵ Dolman, *New Frontiers, Old Realities*, 62.

⁶ Dolman, *Astropolitik*, 160; Dolman, interview.

the prescription, the descriptive logic explains why the United States has accelerated Space Force development, hardened satellite architectures, and built the Artemis Accords coalition rather than relying on the OST to manage Chinese space ambitions.

1.3. Power Transition Theory: Organski, Dissatisfaction, and the Structural Logic of Challenge

Power transition theory, developed by Organski in *World Politics* (1958) and extended by Organski and Kugler in *The War Ledger* (1980), provides the dynamic temporal logic that realism's structural floor cannot supply: not merely why states compete, but *when* the probability of conflict maximizes.¹ War is most likely not when power is equal but precisely *during* the transition, when a rising challenger approaches parity with the dominant power, which faces a structural choice: accept a negotiated redistribution of influence, or act to prevent the transition by force.

Dolman's "hegemon window" is an early astropolitical adaptation of this logic. In interview, he recalled that when he wrote *Astropolitik*, "there was a roughly 10 to 15 year window in which the United States could have established uncontested control of low Earth orbit" because it was "so far ahead technologically" while Russia was in post-Cold War decline and China was "not yet catching up at a rate that would close the gap in that decade."² Washington's failure to act has structurally transformed the rivalry from preponderance to power transition, with all the associated risks.

The variable distinguishing a manageable transition from a dangerous one is, for Organski, *satisfaction*: a rising power that perceives the existing order as broadly legitimate has little structural incentive to risk conflict.³ China's relationship with the space governance architecture is one of structured and compounding dissatisfaction: excluded from the ISS by the Wolf Amendment since 2011; marginalized in the ITU's first-come, first-served orbital slot allocation regime dominated by decades of American and European presence; and confronting an Artemis Accords coalition explicitly designed around normative principles incompatible with

¹ A. F. K. Organski, *World Politics* (New York: Knopf, 1958), 325–340; A. F. K. Organski and Jacek Kugler, *The War Ledger* (Chicago: University of Chicago Press, 1980), 13–63.

² Dolman, interview, 04,05,2026.

³ Organski and Kugler, *The War Ledger*, 19–25.

Chinese preferences.¹ This is not incidental friction, it is precisely the institutional landscape that power transition theory identifies as the breeding ground for revisionist challenge.

1.4. Graham Allison and the Thucydides Trap: From Theory to History to Space

Graham Allison's *Destined for War* (2017) extends Organski's framework into systematic historical application. Allison's foundation is Thucydides's explanation of the Peloponnesian War: "It was the rise of Athens and the fear that this instilled in Sparta that made war inevitable." He extracts from this the operational variables of the "Thucydides Trap", "the natural, inevitable discombobulation that occurs when a rising power threatens to displace a ruling power", and tests them across sixteen historical cases of power transition over five centuries. Twelve ended in war.²

The mechanism is not simple aggression but structural stress: "incidents or events that might otherwise be inconsequential or manageable turn out to be capable of triggering a cascade of consequences."³ Both variables are conspicuously operative in the space domain: the United States has formally designated space a "congested, contested, and competitive" environment, language whose anxiety is precisely the Spartan fear Allison identifies, while China's ASAT test, lunar program, and BeiDou constellation register as Athenian signals of rising capability and ambition.⁴ Dolman explicitly links his own hegemon window argument to this Thucydidean logic, describing his analysis as "very much informed by Thucydides and what people now call the 'Thucydides Trap,'" and confirming that "the Rubicon" was crossed after 2007.⁵ Allison models the space domain as one of the arenas in which the Thucydides dynamic most acutely operates, alongside the South China Sea, Taiwan, and cyber.⁶ Substitute "orbital incident" or "lunar south pole confrontation" for "accident at sea," and his formulation captures precisely the escalation

¹ Robert Jay Ronci, "Dividing Heaven: The Wolf Amendment and the Governance of the Outer Space Domain" (master's thesis, Naval Postgraduate School, 2022), 45–60.

² Graham T. Allison, *Destined for War: Can America and China Escape Thucydides's Trap?* (Boston: Houghton Mifflin Harcourt, 2017), 29, 39–42.

³ Allison, *Destined for War*, 40.

⁴ U.S. National Space Strategy (Washington, DC: The White House, 2018), 1–3.

⁵ Dolman, interview, April 2026.

⁶ Allison, *Destined for War*, 149–162.

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pathway created by the proliferation of counterspace capabilities in the absence of space-specific crisis management frameworks.

Allison's critical qualification must be preserved: war is not inevitable. "In four of the sixteen cases, including three from the twentieth century, imaginative statecraft averted war."¹ This is the analytical hinge on which the governance dimension of this thesis turns: whether the institutional architecture of the space domain can provide the "imaginative statecraft" Allison identifies as the only sustainable escape route.

Both neo-realism and power transition theory carry well-documented limitations in the space domain. Waltz's structural realism cannot account for why the same anarchic structure sometimes produces sustained cooperation, as in the Apollo-Soyuz rendezvous (1975) and the ISS partnership, and sometimes produces intensive competition. Power transition theory's binary of "satisfied" and "dissatisfied" challengers is too coarse to capture Chinese space strategy, which simultaneously seeks to revise the U.S.-led governance architecture and to participate selectively in it where advantageous. Allison's framework has been criticized for treating the war-to-peace ratio as a function of power transition alone, abstracting from the specific perceptions and domestic pressures that determined outcomes in each case.² These limitations do not disqualify the realist frameworks, they specify where supplementary analytical tools are needed. The realist tradition's irreplaceable contribution is to establish the structural floor: the baseline competitive logic from which any analysis of U.S.–China space rivalry must begin.

2. Liberal Institutionalism and the Prospects for Space Cooperation

Liberal institutionalism poses the most intellectually serious challenge to the claim that competitive logic is irreversible. Its central argument, that international institutions can sustain cooperation even among self-interested states under anarchy, is not naïve idealism but a theoretically grounded and empirically tested proposition. The space domain provides one of the most demanding tests the framework has ever faced: it combines material stakes high enough to

¹ Allison, *Destined for War*, 212.

² Dale Copeland, "Power Transition Theory and the Future of Sino-American Relations," in *China's Rise and the Balance of Influence in Asia*, ed. William Keller and Thomas Rawski (Pittsburgh: University of Pittsburgh Press, 2007), 14–20.

activate every competitive incentive realism identifies with governance institutions that predate the conditions they are now called upon to manage.

Süss captures the structural shift with precision: whereas the Cold War rivalry turned space into "a domain through which things happen," the contemporary rivalry has made it "a domain in which things happen, a transition from supporting domain to active warfighting and governance arena that no Cold War institutional instrument was designed to mana

2.1. The Theoretical Foundation: Keohane, Nye, and Cooperation Under Anarchy

Robert Keohane's *After Hegemony* (1984) accepts realism's structural premise "*The international environment is anarchic in that it lacks an authoritative government*," but argues that international regimes can sustain cooperation among self-interested states even without a hegemon.¹ The mechanism is information: regimes reduce the transaction costs of cooperation, provide symmetrical information attenuating the uncertainty driving states toward self-help, and establish focal points for reciprocity that extend the "shadow of the future" into the calculations of strategic actors.² Keohane and Nye's *Power and Interdependence* (1977) enriches this with the concept of complex interdependence: as transnational economic and technological links deepen, the utility of military force declines and the agenda of interstate relations diversifies.³ The space domain is an arena of intense complex interdependence: American and Chinese commercial satellites share the same **electromagnetic spectrum, compete for the same orbital slots, and contribute to the same cascading debris field**, precisely the kind of mutual vulnerability Keohane and Nye identify *as a foundation for cooperative institutional management*. The analytical challenge is not whether the theoretical case for space cooperation can be made; it clearly can, but whether the specific institutional architecture meets the conditions Keohane specifies as necessary for regimes to sustain cooperation when interests diverge.

2.2. The Outer Space Treaty: A Framework Convention Without a Framework

¹ Robert O. Keohane, *After Hegemony: Cooperation and Discord in the World Political Economy* (Princeton: Princeton University Press, 1984), 6.

² Keohane, *After Hegemony*, 85–109.

³ Robert O. Keohane and Joseph S. Nye Jr., *Power and Interdependence: World Politics in Transition* (Boston: Little, Brown, 1977), 8–19.

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The OST emerged from precisely the conditions liberal institutionalism identifies as most conducive to regime formation: two dominant states with overlapping interests, negotiating in the shadow of mutual nuclear deterrence.¹ Its core provisions reflect a Keohane-style regime: coordinated expectations, mutual information about intent, and a framework reducing the transaction costs of reciprocal restraint.²

Yet Hickman characterized the OST in his April 2026 interview as "a deeply deficient legal instrument" comparable to the Treaty of Tordesillas, "an exercise in geopolitical fantasy masquerading as international law."³ This is not merely a normative critique; it is a structural one. Unlike environmental agreements that pioneered the iterative Conference of the Parties model for progressive treaty development, the OST was not designed as a framework convention: it contains no standing mechanism for interpretation, adaptation, or revision; it produced no implementing institutions comparable to the IAEA; it defines "peaceful purposes" without specifying whether dual-use constellations qualify; and it prohibits "national appropriation" without specifying whether resource extraction constitutes appropriation.⁴

Süss offers a qualified defense from the opposite direction: "To really hurt the OST, you have to place a weapon of mass destruction into orbit. That's the baseline, right? So I think it's good that we have that baseline."⁵ She acknowledges, however, that "there's so much room for interpretation" that the international community "needs the OST as a basis" on which more specific instruments should be built, a task current governance dynamics are making progressively more difficult.⁶ The Belfer Center's 2025 analysis concludes that the OST's limitations "stem, at least in part, from the historical context of its signing": negotiated as a bilateral instrument dressed in multilateral language, it has accumulated 115 state parties without acquiring the institutional infrastructure needed to make those commitments operationally meaningful.⁷

2.3. UNCOPUOS: The Limits of Consensus-Based Multilateralism

¹ Sandler, *Governing Outer Space*, 8–12.

² Treaty on Principles Governing the Activities of States, arts. I–IX.

³ Hickman, interview, zoom video call, 20, 04, 2026.

⁴ Sandler, *Governing Outer Space*, 15–20.

⁵ Süss, interview.

⁶ Süss, interview.

⁷ Sandler, *Governing Outer Space*, 12.

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UNCOPUOS was established in 1959 as the primary multilateral forum for space governance, now comprising 102 member states. Its record is not trivial: it produced the five UN space treaties between 1967 and 1984 and adopted the Long-Term Sustainability Guidelines in 2019.¹ In Keohane's terms, it functions as an information-providing institution: standardising expectations, creating focal points for coordination, and maintaining a normative record that shapes how states justify or challenge each other's behavior.

The institutional diagnosis, however, is severe. UNCOPUOS operates by consensus, every member state holds a de facto veto, and has produced no binding instrument since the Moon Agreement of 1979.² The 2025 Legal Subcommittee session in Vienna illustrated the structural constraint: a proposal to establish merely a study group on space traffic management law was deferred without decision, despite support from twenty-one states.³ Süß confirms this from a practitioner's perspective: "When it comes to signing a dotted line, we're going to be at loggerheads, and I think that's just the situation right now."⁴ She identifies middle powers as the most credible normative entrepreneurs" because middle powers, especially those that haven't tested kinetic space weapons, there's a different air of credibility that comes with it", but acknowledges that great-power disagreement ultimately constrains what norm-setting from below can achieve.⁵

The U.S.–China dimension of UNCOPUOS dysfunction is structurally significant. China formally maintains a cooperative posture at COPUOS, yet analysis of its 2025 session demonstrates "a gap between official positions and operational behavior": China aligns its COPUOS diplomacy with national security priorities while simultaneously advancing the ILRS framework and the Space Silk Road that bypass the forum entirely.⁶ The United States, for its part, has increasingly treated COPUOS as a secondary venue, preferring the Artemis Accords' bilateral coalition model. Both major powers exhibit the "forum-shopping" behavior Keohane's framework identifies as a threat to regime effectiveness: participating instrumentally in COPUOS when its

¹ UNOOSA, "Committee on the Peaceful Uses of Outer Space: Membership," accessed May 2026, <https://www.unoosa.org/oosa/en/ourwork/copuos/members/evolution.html>.

² UNOOSA, "Status of International Agreements."

³ UNOOSA, *Report of the Legal Subcommittee on Its Sixty-Fourth Session* (Vienna: UNOOSA, 2025), 10–14. <https://www.unoosa.org/oosa/en/ourwork/copuos/lsc/2025/index.html>.

⁴ Süß, interview.

⁵ Süß, interview.

⁶ UNOOSA, *Report of the Committee on the Peaceful Uses of Outer Space: Sixty-Eighth Session* (Vienna: UNOOSA, 2025), 18–22.

outputs serve their interests, and constructing alternative governance arrangements when they do not.¹

2.4. The ITU and Spectrum Governance: Structural Power Through Institutional Design

The ITU's allocation of orbital slots and radio frequency spectrum represents the most consequential functional regime in the space governance order. Its first-come, first-served principle structurally advantages early-mover states, primarily the United States, Russia, and Europe, and structurally disadvantages later developers, including China, India, and the Global South.² China has responded through proactive registration: Chinese entities have filed notifications for mega-constellations, Guowang and Qianfan each envisioning over 10,000 satellites, that claim orbital and spectral resources before deployment capacity exists.³ This strategy uses the ITU's architecture not to cooperate with the existing governance order but to reshape the orbital environment within it, precisely the "forum-shopping" and institutional exploitation that Keohane's framework identifies as a pathology of regimes operating under conditions of major-power competition.⁴

3. Complex Systems Theory: Networks, Feedback Loops, and Non-Linearity

The realist and liberal institutionalist frameworks each operate from a common premise: that state behavior in the space domain is, in principle, predictable from structural conditions. Complex systems theory challenges that premise. It does not dispute the relevance of power or institutions; it disputes the assumption that their interactions produce linear, proportionate, and predictable outcomes. Applied to the U.S.–China space rivalry, it offers tools, feedback loops, path dependence, bifurcation points, particularly well suited to understanding how governance systems evolve under conditions of deep structural uncertainty, and it is presented here as a necessary complement to, not a replacement of, the frameworks already examined.

3.1. The Core Propositions of Complexity Theory

¹ Keohane, *After Hegemony*, 100–103.

² International Telecommunication Union, *Radio Regulations* (Geneva: ITU, 2020), art. 9.
<https://www.itu.int/en/publications/ITU-R/Pages/publications.aspx?parent=R-REG-RR-2020&media=electronic>

³ CSIS, *Strategic Competition in Space*, 22–25.

⁴ Keohane, *After Hegemony*, 100–103.

Complex systems, as Cudworth and Hobden define them, are "open, embedded within other systems, and influenced by non-linear causality," heavily path-dependent, and capable of adjusting to changes within themselves and in adjacent systems.¹ The dominant IR traditions share what Byrne and Callaghan describe as Newtonian assumptions: that social systems tend toward equilibrium and that inputs produce proportionate, predictable outputs.² Complexity theory denies this: equilibrium is an analytical fiction; social systems move constantly toward entropy; the most consequential dynamics are precisely those that cannot be predicted from a linear reading of prior inputs.³

The 2007 Chinese ASAT test illustrates this non-linear logic empirically. A single kinetic intercept at 865 km generated over 3,500 trackable debris fragments, triggered a fundamental recalibration of U.S. strategic assessments of orbital vulnerability, accelerated the institutional development of the Space Force, and contributed to the normative failure of arms control negotiations in the Conference on Disarmament.⁴ The same physical action, at a different point in the system's development, produced radically different systemic effects from Cold War-era ASAT tests, precisely as complexity theory predicts.

3.2. The Outer Space Governance System: a Complex Adaptive System

Following Ronci's framework, this thesis treats the global space governance order as a complex adaptive system: a multi-layered, open network of actors and institutions, UNCOPUOS, national space agencies, commercial launch providers, military space services, bilateral governance frameworks, whose interactions constitute the system's structure and whose patterns are sensitive to the history of the system itself. This complex-systems reading is grounded primarily in the established theoretical literature on complexity in the social sciences—notably Cudworth and Hobden, Byrne and Callaghan, and Acemoglu and Robinson on path dependence—with Ronci employed as a secondary, applied illustration rather than as the foundational source.⁵

¹ Erika Cudworth and Stephen Hobden, *Posthuman International Relations: Complexity, Ecologism and Global Politics* (London: Zed Books, 2011), 44.

² David Byrne and Gill Callaghan, *Complexity Theory and the Social Sciences: The State of the Art* (Abingdon: Routledge, 2014), 22–30.

³ Cudworth and Hobden, *Posthuman International Relations*, 44–50.

⁴ Weeden and Samson, *Global Counterspace Capabilities*, 1–3–1–5.

⁵ Ronci, "Dividing Heaven," 20–30.

The system is explicitly multi-actor and non-hierarchical in ways that distinguish it from the Cold War era. Then, two governmental actors dominated the system to a degree that permitted something approximating bilateral governance, tacit agreements on reconnaissance satellite overflights, the OST's non-appropriation norm. Today, the system encompasses over seventy states, hundreds of commercial actors, and governance frameworks whose normative premises are structurally incompatible.¹ As Jakhu and Pelton define it, global space governance is "the entirety of the agreements, laws, regulations and other mechanisms, mandatory and voluntary, in relation to outer space affairs," and in complexity terms, each of these mechanisms is a feedback source: reinforcing or attenuating the structural trajectories already in motion.²

3.3. Feedback Loops: Positive and Negative Dynamics in the Space Rivalry

The OST's non-appropriation norm has functioned for nearly six decades as a *negative* feedback mechanism: the treaty's formal prohibition, combined with the reputational costs of violation, has returned the system to the status quo ante whenever a state has been tempted to establish exclusive territorial control in orbit.³ The ITU's first-come, first-served allocation principle has similarly served as a stabilizing mechanism, channeling competitive behavior into procedural forms that reduce the risk of open conflict over scarce electromagnetic resources.

The Wolf Amendment of 2011 constitutes a textbook case of *positive* feedback, a single Congressional restriction that triggered a cascade of effects far larger than its authors anticipated. By excluding China from the ISS and forcing Chinese space ambitions onto a fully autonomous developmental trajectory, the Amendment generated the conditions for a strategic response: accelerated development of Tiangong, Chang'e, BeiDou, and ultimately the ILRS governance framework.⁴ The positive feedback dynamic is traceable: ***exclusion from the U.S.-led multilateral architecture → intensified Chinese investment in independent capabilities → accelerated Chinese capability development → growing U.S. strategic anxiety → further institutional decoupling via the Artemis Accords → deepening bifurcation of the governance order***. Each

¹ Ronci, "Dividing Heaven," 22.

² Ram S. Jakhu and Joseph N. Pelton, *Global Space Governance: An International Study* (Cham: Springer, 2017), 3.

³ Treaty on Principles Governing the Activities of States, art. II.

⁴ Ronci, "Dividing Heaven," 45–60.

step reinforced the next; the systemic outcome is the product of cascading positive feedback rather than of a single deliberate strategic choice by either side.

3.4. Path Dependence and the Importance of Early Decisions

Path dependence is the complexity concept with the most direct application to this thesis. The United States' decision in 1957 not to protest Sputnik's overflight established, by practice rather than negotiation, the legal principle that orbital overflight does not violate territorial sovereignty.¹ That single choice has constrained every subsequent discussion of satellite operations: it is now effectively impossible for any state to contest the right of foreign satellites to operate over its territory, irrespective of current strategic preferences.² As Marx wrote in a formulation repeatedly invoked by complexity researchers: "Men make their own history, but they do not make it as they please."³

The same logic applies to the bifurcated governance architecture emerging from the Artemis Accords–ILRS competition. Each state joining the Artemis Accords commits to transparency, interoperability, and resource-utilization norms materially incompatible with the ILRS framework; each infrastructure investment compatible with Artemis standards raises the cost of subsequent ILRS participation, and vice versa.⁴ As Acemoglu and Robinson demonstrated in the context of economic institutions, path-dependent processes need not produce optimal outcomes, they produce *durable* ones, and durability is not the same as desirability.⁵

3.5. Critical Turning Points in the Emerging Space Order

Bifurcation points are historical junctures at which the structural conditions of a system make multiple developmental trajectories simultaneously available, and the choice between them is exceptionally sensitive to the actions of a small number of influential actors.⁶ Ronci identifies three markers characterizing a critical juncture:

¹ Moltz, *The Politics of Space Security*, 50–55.

² Dolman, *Astropolitik*, 12–15.

³ Karl Marx, *The Eighteenth Brumaire of Louis Bonaparte* (New York: International Publishers, 1963), 15.

⁴ Ronci, "Dividing Heaven," 60–75.

⁵ Daron Acemoglu and James A. Robinson, *Why Nations Fail: The Origins of Power, Prosperity, and Poverty* (New York: Crown Publishers, 2012), 79–83.

⁶ David Byrne and Gill Callaghan, *Complexity Theory and the Social Sciences*, 44–52.

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1. the system is still in an initial stage of development;
2. significant technological change has opened new trajectory possibilities;
3. the institutional choices being made today will constrain the range of available choices for all subsequent actors.¹

All three conditions are currently met. The lunar south pole remains physically unoccupied by any crewed infrastructure. No binding legal framework for space resource extraction has been agreed. No state has yet acted militarily to contest another state's active satellite operations.

The Arctic-Antarctic comparison is analytically apt. The Antarctic Treaty System has produced a relatively stable, demilitarised governance order; the Arctic, lacking comparable institutional foundations, has become an arena of escalating military posturing and resource competition.² The critical difference is institutional architecture: Antarctica has "**firm treaties that clearly define responsibility**," while the Arctic has "**a system focused on national laws and a non-binding regulatory regime**."³ Outer space governance currently resembles the Arctic more closely than the Antarctic.

Complex systems theory occupies a specific analytical role within this thesis's theoretical architecture: it does not replace the structural logic of realism or the institutional analysis of liberal institutionalism, but provides the ability to trace how small institutional inputs produce disproportionate systemic effects (the Wolf Amendment), how path-dependent processes constrain future governance options (the Artemis/ILRS lock-in), and why the current moment represents a bifurcation point at which decisions of a small number of actors will shape the trajectory of the space governance order for decades. Dolman's own retrospective captures this complexity-theory sensibility precisely: "We are moving back into a world of open great-power competition in space, more intense than when I was writing, at exactly the moment when space has become indispensable to military operations and the global economy, a dangerous combination."⁴

4. Constructivist and Structural-Power Approaches: Identity, Norms, and the Architecture of Domination

¹ Ronci, "Dividing Heaven," 70–75.

² Ronci, "Dividing Heaven," 72–73.

³ Ronci, "Dividing Heaven," 73.

⁴ Dolman, interview, April 2026.

The realist tradition identifies the structural logic driving U.S.–China space competition. Complex systems theory maps the non-linear dynamics through which that competition generates self-reinforcing governance trajectories. Yet neither framework adequately accounts for two phenomena empirically central to the rivalry: first, the fundamentally different self-understandings the United States and China bring to the domain, the divergent identities, narratives, and normative frameworks through which each power constructs the meaning of space activity; and second, the mechanisms through which one power shapes the very frameworks within which all other actors must operate, independently of any given material confrontation. These two phenomena require, respectively, Wendt's constructivist theory of identity and Strange's theory of structural power.

4.1. Wendt: Anarchy, Identity, and the Social Construction of Space Rivalry

Alexander Wendt's "Anarchy is What States Make of It" (1992) opens with a proposition that is deceptively simple: "I argue that self-help and power politics do not follow either logically or causally from anarchy ... Anarchy is what states make of it."¹ The theoretical stakes determine whether the U.S.–China space rivalry is structurally determined, as Waltz and Mearsheimer would have it, or a historically contingent product of specific choices, interactions, and identity constructions that could, in principle, have been otherwise.

Wendt's mature constructivism maps three "cultures of anarchy", Hobbesian, Lockean, and Kantian, each representing a qualitatively different security environment produced by the dominant role-structure in the international system.² The current U.S.–China relationship in the space domain is operating within a Hobbesian-to-Lockean culture: both sides orient themselves as rivals whose gains in orbital capability are presumed to come at the other's expense, and both have developed capabilities explicitly designed to deny the other's space-based infrastructure. Yet this orientation is not, on Wendt's account, structurally determined; it is the product of specific identity

¹ Alexander Wendt, "Anarchy is What States Make of It: The Social Construction of Power Politics," *International Organization* 46, no. 2 (1992): 395.

² Alexander Wendt, *Social Theory of International Politics* (Cambridge: Cambridge University Press, 1999), 246–312.

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constructions reinforced by a cascade of policy choices, each of which has made the Hobbesian reading more self-confirming.

The Modern War Institute at West Point's analysis captures this dynamic: "Repeated antagonistic US-China interactions result in hostile interpretations of intent, fueling a vicious cycle of deeper mistrust and competition."¹ The 2007 ASAT test was interpreted as a hostile signal; the Wolf Amendment was interpreted as an exclusionary strategy; China's accelerated autonomous capability development was interpreted as confirmation of adversarial intent; the Artemis Accords were interpreted as an attempt to exclude China from lunar governance. Each interpretation, acted upon, produced the conditions making the next hostile interpretation more plausible. China's own identity in the space domain is frequently misunderstood in Western commentary: "The Chinese do not view themselves as a rising power; rather, the Chinese identity is that of a great power that is simply reclaiming what is rightfully theirs."² Süß reinforces this in interview, emphasizing that Beijing frames its space program as integral to the "China Dream" a vision of national ³

The normative contest over the OST illustrates the identity logic. The United States interprets "province of all mankind" as consistent with commercial resource extraction and has constructed the Artemis Accords to operationalise that reading. China interprets the same language as requiring collective governance centered on "shared destiny" and multilateral consensus.⁴ Constructivism reveals that this is not primarily a legal dispute, it is an identity and normative contest in which the two powers compete to constitute the meaning of the OST framework in ways that align with their respective self-understandings. Wendt's insistence that "the structures of human association are determined primarily by shared ideas rather than material forces" means that whichever normative framework achieves greater intersubjective acceptance will

¹ U.S. Military Academy, *Competing for the Upper Hand in the Ultimate High Ground: The Modern Space Race Between the U.S. and China*, ed. Mary Guenther (West Point, NY: USMA, 2023), 14.

https://www.progressivepolicy.org/wp-content/uploads/2025/04/PPI_Space-Race-Between-USA-and-China.pdf.

² Guenther, *Competing for the Upper Hand*, 16.

³ Süß, interview.

⁴ State Council of the People's Republic of China, *China's Space Activities in 2021* (Beijing: State Council Information Office, 2022), 3–5.

https://english.www.gov.cn/archive/whitepaper/202201/28/content_WS61f35b3dc6d09c94e48a467a.html.

progressively constitute the structure within which all actors must operate, regardless of the underlying balance of capabilities.¹

4.2. Strange: Structural Power and the Architecture of the Space Order

Susan Strange's theory of structural power, developed in *States and Markets* (1988), shifts the analysis of power from *relational* power, A compelling B to do something B would not otherwise do, to *structural* power: "the power to shape and determine the structures of the global political economy within which other states, their political institutions, their economic enterprises, and their professional people have to operate."² Structural power is "the power to decide how things will be done, the power to shape frameworks within which actors relate to each other."³ It is exercised through four primary structures, security, production, finance, and knowledge, and control of resources within these structures determines who exercises power in the international system, how it is deployed, and what choices are available to everyone else.

The United States has exercised structural power in all four of Strange's dimensions in space simultaneously. In the *security* structure, U.S. control of GPS has provided the foundational PNT infrastructure on which allied military operations and global commercial logistics depend, making every state that relies on GPS subject to U.S. discretion over access conditions.⁴ In the *production* structure, the United States, through NASA, DARPA, and the commercial ecosystem enabled by decades of public investment, has defined the technological standards and industrial architectures within which space systems are designed and operated globally.⁵ In the *finance* structure, U.S. investment capital, insurance markets, and satellite procurement contracts have determined who can afford to enter the space economy and on what terms. In the *knowledge* structure, identified by a recent Durham University paper as "Strange's weakest but potentially most consequential dimension", the United States has dominated the scientific and

¹ Wendt, *Social Theory of International Politics*, 92.

² Susan Strange, *States and Markets*, 2nd ed. (London: Pinter Publishers, 1988), 24–25.

³ Strange, *States and Markets*, 25.

⁴ National Institute of Standards and Technology, *Economic Benefits of the Global Positioning System*, 1–5. <https://nvlpubs.nist.gov/nistpubs/gcr/2025/NIST.GCR.25-062.pdf>.

⁵ NASA Office of International and Interagency Relations, *NASA Strategic Plan 2022* (Washington, DC: NASA, 2022), 10–15. https://www.nasa.gov/wp-content/uploads/2018/01/2022_nasa_strategic_plan_0.pdf.

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technological knowledge base defining what is known about space operations and what solutions are considered technically feasible.¹

Dolman makes this structural argument in directly geographical terms in interview: "whoever controls key orbital parameters, altitude, inclination, timing windows, is not just militarily dominant, they control the terms on which everyone else enters and operates in the domain. That is the GPS dependency argument made operational: if you rely on American PNT, American timing, American frequency allocations, you are structurally dependent on U.S. discretion, regardless of what any treaty says."² Süss's observation that "SpaceX wouldn't exist if it wasn't for significant government funding" captures the distinctive form this structural power takes: the ability of the American state to mobilize private-sector dynamism in the service of national strategic objectives in ways that competitors find difficult to replicate.³

China's challenge to U.S. structural power operates along all four of Strange's dimensions simultaneously, and it is this multi-dimensional quality that distinguishes China's space ambitions from any previous instance of technological catch-up in the space era. The development of BeiDou is the most visible expression of this strategy. China's official White Paper characterizes BeiDou as having "blazed a path for building a satellite navigation system with Chinese characteristics."⁴ In Strange's framework, BeiDou's significance is primarily structural: by developing an independent, globally competitive navigation system, China has reduced its vulnerability to U.S. discretion over GPS access, particularly salient after the United States selectively degraded GPS signals during the 1999 Kosovo crisis, while simultaneously offering an alternative PNT infrastructure to states preferring not to depend on a U.S.-controlled system.⁵ BeiDou is not merely a technical achievement; it is an act of structural power construction.

The Artemis Accords versus ILRS competition reveals a further dimension invisible to other analytical approaches: the contest is not only about which states join which coalition, but

¹ Matthew Rendall, "Structural Power and the Space Domain," *Durham Global Security Institute Working Paper* 12 (2024): 5.

² Dolman, interview.

³ Süss, interview

⁴ State Council of the People's Republic of China, *China's BeiDou Navigation Satellite System* (Beijing: State Council Information Office, 2016), 1. https://www.xinhuanet.com/english/2016-06/16/c_135441489.htm.

⁵ Dean Cheng, "China's Military Role in Space," *Strategic Studies Quarterly* 6, no. 1 (2012): 62. https://www.airuniversity.af.edu/Portals/10/SSQ/documents/Volume-06_Issue-1/Cheng.pdf.

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about which normative and institutional framework constitutes the baseline against which all future space activity is assessed. The Artemis Accords encode property rights, transparency, and interoperability norms designed to establish the default normative framework that future actors will find already in place when they arrive at the governance table.¹ This is structural power in its most refined operational form: not coercion, not persuasion, but the prior construction of the frameworks within which others make their choices.

Conclusion of Chapter One

Chapter One has provided the conceptual and theoretical framework for the rest of this thesis. The main finding is that no single theoretical approach is sufficient to explain the structural logic of the Sino-American space rivalry, and that the combined use of four frameworks, namely realism, liberal institutionalism, constructivism and structural-power analysis and complexity theory, creates an analytical tool adequate to understand the multi-dimensional nature of the rivalry.

The intellectual history of astropolitics, from Ratzel and Mahan to Dolman's Astropolitik, demonstrated that outer space has been perceived as an extension of earthly competition long before satellites made it technologically feasible. Dolman's astrogeographic hierarchy, with LEO as the critical strategic chokepoint, is not a historical concept; it is the strategic paradigm in which the United States and China are presently operating. Hickman's critique of the "commons" approach supported the chapter's larger argument: that the non-appropriation principle of the 1967 Outer Space Treaty was intended for two state actors in a world that no longer exists, and that the governance gap it created is not simply a failure of political will, but a structural result of institutions that no longer correspond with current realities.

As observed in Section Two, the four theoretical frameworks emphasized different aspects of the rivalry. The structural foundation was laid by realist and power-transition theories, the anarchic self-help system, the logic of maximizing strategic position, and the increased possibility of conflict that Allison's Thucydides framework finds throughout history. Liberal institutionalism exposed the limitations of the present governance system: the survival of cooperation in certain

¹ Payload Space, "The Artemis Accords By the Numbers." <https://payloadspace.com/the-artemis-accords-by-the-numbers/>.

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functional areas does not imply common norms where interests are irreconcilably opposed. Constructivist and structural-power approaches, inspired by Wendt and Strange, offered what realism and institutionalism alone cannot explain, namely the identities, discourses and structural positions by which each power shapes the frames within which other actors have to operate. Finally, complexity theory supplied the dynamic tools that explain why small decisions, from the non-protest of Sputnik's overflight in 1957 to the Wolf Amendment of 2011, generate systemic effects far beyond their initial scale.

Together, these frameworks do not predict the end outcome of the rivalry. Instead they illuminate how the rivalry has expanded as it has – why the decoupling has increased, why the governance crisis is not just a diplomatic failure but a structural consequence of two powers building competing orders simultaneously, and why the present moment is a bifurcation point in the words of Ronci's complexity framework, a decisive moment in which the institutional decisions of a small number of actors will determine the future of space governance for decades to come. The theoretical groundwork laid here paves the way for Chapter Two, which transitions from theory to the empirical reality by exploring the two models of space power, the structural dissonance of which is the primary impetus for this bifurcation.

Chapter Two: U.S. and Chinese Space Strategies: Models and Policy Evolutions

Space power is not produced by a single decision or doctrine. It is the cumulative product of institutional choices embedded in bureaucratic architectures and strategic philosophies that are extraordinarily difficult to reverse. Understanding the Sino-American rivalry requires understanding how each side built the system it now operates.

Section One traces the American model from its Cold War origins through the commercial revolution that made SpaceX the dominant launch provider on Earth, examining the four-pillar architecture, NASA, the U.S. Space Force, the NRO, and the commercial sector — as a system of distributed authority whose public-private logic represents a fundamentally different theory of state power from the one Beijing has adopted. Section Two examines the Chinese model: the whole-of-government philosophy of *zonghe guoli*, Military-Civil Fusion's erasure of civilian-military boundaries, and a full-spectrum space architecture designed not merely to match American capability but to eliminate every structural dependency American dominance had created.

These are not two variants of the same approach. They are two structurally incompatible theories of how states generate and exercise power in space, one distributing authority to harness market dynamism, the other concentrating it to direct national resources toward pre-defined strategic objectives. That incompatibility is not a design flaw. It is the source of the rivalry's depth.

Section One: The United States Model: Decentralized Innovation and Strategic Hegemony

1. Evolution and Institutional Architecture of U.S. Space Power

The United States space program did not emerge from a coherent strategic blueprint but from a sequence of reactive decisions taken under Cold War competitive pressure.¹ What began as a patchwork of overlapping jurisdictions has, over seven decades, consolidated into a multi-track system distributing authority across civilian exploration, national security intelligence, military warfighting, and a commercially operated sector.² Understanding this architecture is a precondition for assessing how the United States contests China's rise in the space domain.

1.1. Cold War Foundations: The Civilian Imperative and the Dual-Track Architecture

The institutional genesis of American space power is inseparable from 4 October 1957, when the Soviet Union launched Sputnik 1 into low Earth orbit.³ The satellite was not merely a scientific achievement; it demonstrated Soviet ICBM capability and called into question the credibility of the American nuclear deterrent.⁴ President Eisenhower's response was strategically decisive: resisting pressure to subordinate space entirely to the Department of Defense, he signed the National Aeronautics and Space Act of 1958 (Public Law 85-568) on 29 July 1958, establishing NASA from the predecessor NACA.⁵ The Act charged NASA with "the expansion of human knowledge of phenomena in the atmosphere and space", while simultaneously, under Section 102(c), requiring militarily relevant discoveries to be made available to national defense, NASA would project scientific openness before international audiences; the classified national-security architecture would pursue strategic imperatives in parallel.⁶

¹ U.S.-China Economic and Security Review Commission, *2025 Annual Report to Congress* (Washington, DC: U.S. Government Publishing Office, 2025), 318.

² U.S.-China Economic and Security Review Commission, 319.

³ James Clay Moltz, *The Politics of Space Security: Strategic Restraint and the Pursuit of National Interests*, 3rd ed. (Stanford, CA: Stanford University Press, 2019), 45.

⁴ Dwight D. Eisenhower, "Special Message to the Congress on Science and National Security," April 2, 1958.

⁵ National Aeronautics and Space Act of 1958, Pub. L. No. 85-568, 72 Stat. 426 (July 29, 1958).

⁶ National Aeronautics and Space Act of 1958, sec. 102(c).

https://www.senate.gov/artandhistory/history/resources/pdf/NASA_Act1958.pdf.

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That parallel architecture crystallized on 6 September 1961, when the National Reconnaissance Office was formally established to consolidate the Air Force's SAMOS program and the CIA's CORONA photo-intelligence operation.⁷ CORONA satellites, operational from August 1960, provided systematic photographic coverage of Soviet military installations; the NRO's existence remained officially classified until September 1992.⁸ Air Force Space Command, established on 1 September 1982, added a third institutional layer, consolidating ballistic missile warning, the Defense Meteorological Satellite Program, and the nascent NAVSTAR GPS.⁹ The result was a genuinely decentralized national security space architecture deriving resilience from redundancy and dynamism from interagency competition, at the cost of significant coordination overhead.¹⁰

Under President Kennedy, the civilian program was explicitly harnessed to great-power competition. His 25 May 1961 address to Congress and his Rice University speech of 12 September 1962 "We choose to go to the Moon... not because it is easy, but because it is hard" framed space not as science but as a terrain of prestige on which the superiority of democratic capitalism over Soviet communism would be demonstrated.¹¹ The U.S.-China Economic and Security Review Commission's 2025 Annual Report confirms that the Space Race was explicitly designed to show that "the U.S. model for economic development and technological innovation was superior to that of the USSR and worth emulating."¹² The Apollo 11 landing of 20 July 1969 delivered that demonstration and permanently fused space primacy with American strategic

⁷ Roswell L. Gilpatric to Allen W. Dulles, September 6, 1961; National Reconnaissance Office, "NRO Fact Sheet," 2013. <https://www.cia.gov/readingroom/>.

⁸ National Reconnaissance Office, "NRO Fact Sheet," 2. https://www.detailedpedia.com/wiki-National_Reconnaissance_Office.

⁹ U.S. Space Force, "History of Air Force Space Command," accessed May 2026. <https://www.dafhistory.af.mil/About-Us/Fact-Sheets/Display/Article/433549/air-force-space-command-usaf/>.

¹⁰ U.S.-China Economic and Security Review Commission, *2025 Annual Report to Congress*, 320. <https://www.uscc.gov/annual-report/2025-annual-report-congress>.

¹¹ John F. Kennedy, "Special Message to the Congress on Urgent National Needs," May 25, 1961; John F. Kennedy, "Address at Rice University on the Nation's Space Effort," September 12, 1962. <https://www.jfklibrary.org/archives/other-resources/john-f-kennedy-speeches/united-states-congress-special-message-19610525>.

¹² U.S.-China Economic and Security Review Commission, *2025 Annual Report to Congress*, 318.

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identity. As Dolman observed in his interview for this thesis, withdrawing from space competition, once entered, carries costs that extend far beyond the technical domain.¹

1.2. From Cold War to the Commercial Turn: Reagan, Challenger, and the Post-Cold War Decade

President Reagan's National Security Decision Directive 42 of 4 July 1982 established the expansion of private-sector involvement as a national goal.² The Presidential Directive on National Space Policy of 11 February 1988 formalized a three-sector structure Civil, National Security, and Commercial, that remains the organizational template of American space policy.³ The Challenger disaster of 28 January 1986, however, was the event that most decisively accelerated commercialization: Reagan's NSDD-254 banned commercial payloads from the Shuttle, removing the federal government as a competitor to private launch companies.⁴

The post-Cold War decade was a period of strategic drift. Clinton's National Space Transportation Policy of 5 August 1994 (NSTC-4) gave the DoD lead on evolved expendable launch vehicles but provided little integrated direction.⁵ GPS, opened to civilian aviation following Reagan's 1983 announcement and freed for universal civilian precision use when Clinton disabled Selective Availability on 1 May 2000, validated the foundational public-private logic: a military-built system, progressively transferred to civilian and commercial use, generating an estimated \$1.4 trillion in U.S. economic benefits and creating a structural dependency so deep that one disruption study estimates losses of approximately \$1 billion per day if the service were taken offline.⁶ The Commercial Space Act of 1998 (Public Law 105-303) and the genesis of what

¹ Everett C. Dolman, *Astropolitik: Classical Geopolitics in the Space Age* (London: Frank Cass, 2002), 8; Everett C. Dolman, interview by Ikram rouainia, zoom video call, 04/05/2026

² Ronald Reagan, National Security Decision Directive 42, "National Space Policy," July 4, 1982. <https://www.nasa.gov/history/national-security-decision-directive-number-42/>.

³ Ronald Reagan, "Presidential Directive on National Space Policy," February 11, 1988.

⁴ Ronald Reagan, National Security Decision Directive 254, August 1986.

⁵ William J. Clinton, Presidential Decision Directive/NSTC-4, "National Space Transportation Policy," August 5, 1994.

⁶ National Institute of Standards and Technology, *Economic Benefits of the Global Positioning System* (Washington, DC: U.S. Department of Commerce, 2019), 1–4. https://www.nist.gov/system/files/documents/2020/02/06/gps_finalreport618.pdf.

would become the COTS framework reflected bipartisan consensus that a thriving private sector, not federal monopoly, was the sustainable foundation of American space power.¹

1.3. The Structural Logic of the American Model

Two characteristics distinguish the American approach to space power from every other national model and deserve analytical attention as contextual background to the competitive dynamics examined in subsequent sections.

The first is **the institutional pluralism** of the American system. The American model distributes authority across NASA (civil exploration), the NRO (overhead intelligence), AFSPC/USSF (military operations), the Federal Aviation Administration (commercial launch licensing), the Federal Communications Commission (satellite communications spectrum), the National Oceanic and Atmospheric Administration (commercial remote sensing licensing), and the Department of Commerce (export controls).² This pluralism generates coordination costs and occasional policy incoherence, but also embeds space power in a broad range of institutional interests that make it politically durable and difficult for any single adversary action to neutralise. The U.S.-China Economic and Security Review Commission's 2025 Annual Report, while acknowledging China's rapid advances, explicitly identifies the United States' "technological ecosystem" diversity as a competitive advantage that a state-directed model cannot easily replicate.³

The second is the **public-private logic** that distinguishes the American model: the state funds the development of foundational technologies, creates the regulatory environment, anchors demand through procurement, and then progressively transfers operational responsibility to

¹ Commercial Space Act of 1998, Pub. L. No. 105-303, 112 Stat. 2843 (October 28, 1998).
<https://www.congress.gov/105/plaws/publ303/PLAW-105publ303.pdf>.

² U.S.-China Economic and Security Review Commission, *2025 Annual Report to Congress*, 371–372; U.S. Department of Defense, *2024 DoD Commercial Space Integration Strategy* (Washington, DC: Office of the Assistant Secretary of Defense for Space Policy, April 2, 2024), 3–5, <https://media.defense.gov/2024/Apr/02/2003427610/-1/-1/1/2024-DOD-COMMERCIAL-SPACE-INTEGRATION-STRATEGY.PDF>.

³ U.S.-China Economic and Security Review Commission, *2025 Annual Report to Congress*, 407–408.

commercial actors. This was the logic of GPS, built by the military, opened to civilian aviation by President Reagan's 1983 announcement, and freed for universal civilian precision use by President Clinton's 1 May 2000 order disabling Selective Availability.¹ It is the logic of COTS, Commercial Crew, and the broader "New Space" paradigm. As the April 2024 DoD Commercial Space Integration Strategy articulates, the goal is explicitly to harness the "speed, scale, and innovation of the commercial sector" for national security purposes, treating private enterprise as a strategic asset rather than a vendor.² Juliana Süß affirmed this assessment in her interview for this thesis: "SpaceX is a classic example, it would not exist in its current form without significant government contracts and public funding. But that combination has given the general space world innovation that we may not have seen if it had been all down to state actors."³ It is this model, rather than government monopoly, that the United States brings to its confrontation with China's state-directed space strategy.

1.4. The Return of Competition: 2007 and the Inflection Point

The decisive strategic inflection was not an American decision but a Chinese one. On 11 January 2007, China destroyed the FY-1C weather satellite at approximately 850 km altitude, generating more than 3,000 trackable debris fragments, the largest debris field in orbital history.⁴ General Saltzman, testifying before the U.S.-China Economic and Security Review Commission on 3 April 2025, described the test as "a pivot point that demonstrated China's destructive capability using an offensive missile in space."⁵ Dolman's interview for this thesis confirmed the strategic significance: "We passed that Rubicon sometime after China's 2007 anti-satellite test. By then, the window for unchallenged U.S. orbital dominance had essentially closed; China's program was accelerating, and others could no longer be dismissed."⁶

¹ Reagan, "Statement on the Availability of Global Positioning System Signals," September 16, 1983; White House OSTP, "Statement by the President Regarding GPS Accuracy," May 1, 2000; "A Brief History of GPS," Aerospace Corporation.

² U.S. Department of Defense, *2024 DoD Commercial Space Integration Strategy*, 1.

³ Juliana Süß, interview Ikram Rouainia, 04/05/2026.

⁴ Brian Weeden and Victoria Samson, eds., *Global Counterspace Capabilities: An Open Source Assessment* (Washington, DC: Secure World Foundation, 2025), 1-1.

⁵ Chance Saltzman, testimony before the U.S.-China Economic and Security Review Commission, April 3, 2025.

⁶ Dolman, interview by Ikram Rouainia, 04/05/2026.

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The Bush National Space Policy of 31 August 2006 had already moved to update doctrine, explicitly contemplating offensive counterspace operations for the first time in an unclassified document and rejecting "any limitations on the fundamental right of the United States to operate in and through space for national security purposes."¹ The Obama administration's 2010 policy pivoted rhetorically toward multilateral norms while accelerating investment in resilient architectures.² China's creation of the Strategic Support Force in December 2015, consolidating PLA space, cyber, and electronic warfare capabilities, and its reorganization as the Aerospace Force in April 2024, confirmed that Beijing had institutionalized space as a warfighting domain.³ As Hickman observed in his interview for this thesis, this period revealed that the cooperative governance paradigm was structurally contingent on a distribution of power that was rapidly dissolving.⁴

1.5. The Four-Pillar Architecture: NASA, USSF, NRO, and the Commercial Sector

The institutional landscape of American space power in 2026 is a four-pillar architecture, each pillar historically conditioned and operationally distinct, whose coordination has become one of the central challenges of American space governance.⁵

First Pillar: NASA and the Artemis Architecture

NASA has undergone its most fundamental strategic reorientation since the Apollo era. President Trump's Space Policy Directive-1 (SPD-1) of 11 December 2017 directed NASA to "lead an innovative and sustainable program of exploration with commercial and international partners," replacing the Obama asteroid-and-Mars trajectory with a lunar-first, commercially structured program.⁶ Where Apollo was government-owned and government-executed, Artemis is a public-

¹ George W. Bush, *U.S. National Space Policy*, August 31, 2006, 2.

² Barack Obama, *National Space Policy of the United States of America*, June 28, 2010, 3. https://obamawhitehouse.archives.gov/sites/default/files/national_space_policy_6-28-10.pdf.

³ U.S.-China Economic and Security Review Commission, *2025 Annual Report to Congress*, 322.

⁴ John Hickman, interview by the Ikram Rouainia, zoom video call, 20/04/2026.

⁵ John Hickman, interview.

⁶ Donald Trump, Space Policy Directive-1, December 11, 2017 <https://www.govinfo.gov/content/pkg/DCPD-201700902/pdf/DCPD-201700902.pdf>.

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private partnership in which commercial companies design, own, and operate critical transportation infrastructure under fixed-price contracts.¹

The Commercial Lunar Payload Services (CLPS) program, announced in April 2018, contracted with up to fourteen American companies to deliver payloads to the lunar surface under indefinite-delivery, indefinite-quantity agreements valued at up to \$2.6 billion through November 2024.² The first commercially successful lunar landing was achieved by Intuitive Machines' IM-1 mission on 22 February 2024, when its Odysseus lander touched down approximately 300 kilometres from the lunar south pole, the first U.S. return to the lunar surface since Apollo 17 in 1972 and the first commercial lunar landing in history.³ NASA subsequently contracted SpaceX Starship HLS for Artemis III and, in May 2023, awarded Blue Origin a firm-fixed-price contract of \$3.4 billion for Blue Moon as a second crewed lunar lander for Artemis V, establishing a competitive duopoly for crewed Moon access.⁴

Executive Order 14369 of 18 December 2025, "Ensuring American Space Superiority," set concrete milestones: a crewed lunar return by 2028, initial elements of a permanent lunar outpost by 2030, and deployment of nuclear power systems on the Moon and in orbit by end of decade.⁵ Its opening formulation, "*Superiority in space is a measure of national vision and willpower*", marks a deliberate shift from cooperative vocabulary toward explicit competitive discourse.⁶

Table 2: NASA Commercial Program Contract Awards, 2006–2025

Program	Contractor(s)	Value	Year	Strategic Milestone
COTS (Commercial Orbital Transport)	SpaceX	\$3.04B (total)	2006–2012	First milestone-based PPP; SpaceX retains IP
CRS-1 Cargo Resupply	SpaceX / Orbital Sciences	\$1.6B / \$1.9B	2008	12 + 8 ISS resupply missions

¹ NASA, "Artemis Program Overview," accessed May 2026.

² NASA, "Commercial Lunar Payload Services," accessed May 2026. <https://www.nasa.gov/commercial-lunar-payload-services/>.

³ Intuitive Machines, "IM-1 Mission Overview," February 2024; NASA, "Odysseus Lunar Landing," February 2024. <https://www.nasa.gov/humans-in-space/artemis/>.

⁴ NASA, "NASA Selects Blue Origin as Second Artemis Lunar Lander Provider," May 19, 2023. <https://www.nasa.gov/news-release/nasa-selects-blue-origin-as-second-artemis-lunar-lander-provider/>.

⁵ Donald Trump, Executive Order 14369, "Ensuring American Space Superiority," December 18, 2025.

⁶ National Defense Authorization Act for Fiscal Year 2020, Pub. L. No. 116-92, sec. 952 (December 20, 2019)

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CRS-2 Cargo Resupply	SpaceX, Orbital ATK, Sierra Nevada	Up to \$14B	2016–2024	Expanded commercial ISS logistics
Commercial Crew (Crew Dragon)	SpaceX	—	2020	First commercial human spaceflight certification
CLPS Lunar Payloads	Up to 14 companies	Up to \$2.6B	2018–2028	Commercial lunar surface delivery
IM-1 (Odysseus lander)	Intuitive Machines	—	Feb. 2024	First U.S. lunar landing since Apollo 17 (1972)
Artemis III HLS (Starship)	SpaceX	\$2.9B	2021	Crewed lunar landing vehicle
Artemis V HLS (Blue Moon)	Blue Origin	\$3.4B	May-23	Second crewed lunar lander; competitive duopoly
Commercial Space Stations	Blue Origin, Nanoracks	\$415.6M	Dec. 2021	Post-ISS LEO platform transition

Sources: NASA, *COTS Program Overview* (2012); NASA *Commercial Crew Program*; NASA press releases, 2018–2023; NASA *Human Landing System Award Announcement*, April 2021 and May 2023.

Second Pillar: The United States Space Force

The FY2020(Public Law 116-92), National Defense Authorization Act, signed by President Trump on 20 December 2019, established the USSF as the sixth branch of the armed forces and the first new military service since 1947. Its creation institutionalized what had been operationally demonstrated since the 1991 Gulf War: satellite infrastructure is not a support function to military operations but their operational foundation. USSF Space power doctrine (2020) articulates the doctrinal shift explicitly: "Guardians are, and always will be, warfighters," training specifically for operations "in, from, and to the space domain."¹ In Dolman's astropolitical terms, this is the formal institutional expression of the proposition that control of LEO is not a complement to terrestrial power, but it's necessary precondition.²

¹ U.S. Space Force, *Spacepower: Doctrine for Space Forces* (Washington, DC: Department of the Air Force, 2020), 1. <https://www.spaceforce.mil/News/Article/2306828/space-force-releases-1st-doctrine-defines-spacepower-as-distinct-form-of-milita/>.

² Dolman, *Astropolitik*, 8; Dolman, interview.

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The April 2025 *Space Warfighting: A Framework for Planners* provides the most comprehensive doctrinal articulation to date. Chief of Space Operations General Chance Saltzman writes: "It is the formative purpose of the Space Force to achieve space superiority, to ensure freedom of movement in space for our forces while denying the same to our adversaries." ¹ The framework defines **space superiority** as "the degree of dominance in space of one force over another that permits the conduct of operations... without prohibitive interference by the opposing force," making it an explicitly joint-force prerequisite. ² It categorises counterspace operations across three mission areas, orbital warfare, electromagnetic warfare, and cyberspace warfare, and is explicit that achieving space superiority requires both offensive and defensive action, including orbital strike. ³ Hickman, in his interview for this thesis, characterized the proposed cuts to NASA's budget, enacted in parallel with expanded USSF funding, as "almost punitive in character" and "strategically indefensible: sound strategy rewards demonstrated success. If NASA is performing well, the rational response is to increase its resourcing." This resonates with Dolman's broader concern that American domestic political retreat has pushed allied states to "invest more heavily in going their own way in space, reinforcing the very great-power rivalry the United States sought to avoid."

Dolman's path-dependence argument on the command-versus-market-economy question is directly relevant here: "A command economy can get you what you want faster than a market economy, at least for specific, priority projects. If the state decides 'we will have a space station or we will land at the lunar south pole by this date,' and it can direct resources without worrying about profit or public debate, it will often achieve that goal more quickly than a liberal market economy." However, he qualifies this: the real strategic question is "how effectively the U.S. government partners with and harnesses that system, rather than assuming the market will automatically deliver the desired national outcome."¹

The Third Pillar: The National Reconnaissance Office

The third pillar is the NRO, which has moved from its Cold War role as the secret developer of overhead reconnaissance systems to a more visible, though still partially classified, position as the intelligence community's primary space-based collection architecture. Established on 25

¹ Dolman, interview.

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August 1960 in the immediate aftermath of the first successful Corona reconnaissance satellite return, the NRO's existence was formally classified and not officially acknowledged by the United States government until September 1992.¹ It operates the reconnaissance satellite constellation that constitutes the intelligence backbone of American national security space power, providing signals intelligence to the NSA, imagery intelligence to the NGA, and measurement and signature intelligence to the DIA, through a hybrid workforce of approximately 3,000 government personnel supplemented by tens of thousands of defense contractor employees.²

The NRO's evolving posture intersects directly with the commercial space revolution. The April 2024 DoD Commercial Space Integration Strategy, the first such document ever released by the Department of Defense, explicitly endorsed the use of commercial satellite imagery, communications, and analytics by both the NRO and other intelligence community elements to augment government-owned architectures, both to increase resilience and to reduce cost.³ What this means operationally is that the intelligence boundary between government and commercial space has become structurally blurred: commercial optical satellites now produce imagery whose resolution rivals systems that were classified at the highest levels a decade ago, and the NRO increasingly purchases commercial data as a supplement to, and eventual partial substitute for, proprietary government systems.

Juliana Süß's observation is analytically clarifying here: the line between civilian and military in space is already "sufficiently blurred" for most purposes; what matters analytically is not whether a system is commercial or governmental, but what *function* that system serves.⁴ From an escalation-management perspective, Süß argues that nuclear command-and-control

¹"National Reconnaissance Office," *Wikipedia*, https://en.wikipedia.org/wiki/National_Reconnaissance_Office; National Security Archive, "The NRO Declassified," George Washington University, accessed May 2026, <https://nsarchive2.gwu.edu/NSAEBB/NSAEBB35/index.html>. The NRO was established by a classified agreement between Secretary of Defense Thomas S. Gates Jr. and Director of Central Intelligence Allen Dulles on 25 August 1960; its existence was officially declassified and acknowledged by Director of Central Intelligence R. James Woolsey on 18 September 1992.

² "National Reconnaissance Office," *Wikipedia*; "The Evolving Role of the NRO," Federation of American Scientists Intelligence Resource Program, accessed May 2026, <https://irp.fas.org/nro/commission/evolving.htm>.

³ U.S. Department of Defense, *2024 DoD Commercial Space Integration Strategy* (Washington, DC: Office of the Assistant Secretary of Defense for Space Policy, April 2, 2024), <https://media.defense.gov/2024/Apr/02/2003427610/-1/-1/1/2024-DOD-COMMERCIAL-SPACE-INTEGRATION-STRATEGY.PDF>; "New DOD Strategy Looks to Remove Barriers for Using Commercial Space Capabilities," *DefenseScoop*, April 2, 2024, <https://defensescoop.com/2024/04/02/dod-strategy-using-commercial-space-capabilities-military-ops/>.

⁴ Süß, interview.

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infrastructure and "national technical means" represent the genuinely inviolable red lines, interference with those systems would constitute major escalation, while attacks on commercial constellations serving broad communications functions, as occurred during the early stages of the Ukraine war, do not in themselves constitute a fundamental escalation threshold.¹

Fourth Pillar: The Commercial Sector as Strategic Asset

The fourth and most consequential pillar is the commercial sector: SpaceX, Blue Origin, Rocket Lab, and their downstream ecosystem of satellite operators, ground segment companies, and in-space services providers. SpaceX's Falcon 9 rocket surpassed 300 successful missions by early 2026 and reduced the cost-per-kilogram to low Earth orbit by an order of magnitude relative to legacy launch vehicles, enabling the construction of Starlink's constellation of 8,460 operational satellites by September 2025.² The strategic implications of this commercial capability became undeniable in February 2022, when SpaceX activated Starlink services in Ukraine in the immediate aftermath of Russia's full-scale invasion, providing Ukrainian military forces with resilient, encrypted, low-latency battlefield communications, demonstrating that a commercially operated satellite constellation could function as decisive military infrastructure in active great-power conflict.³

Blue Origin, having been excluded from the initial Human Landing System competition, was subsequently selected as a second crewed lunar lander provider under Artemis, while its New Glenn rocket progressed toward National Security Space Launch (NSSL) certification. The April 2024 DoD Commercial Space Integration Strategy formalises the dual-use reality in language of considerable legal and strategic significance:

¹ Süß, interview; U.S. Department of Defense, 2024 DoD Commercial Space Integration Strategy, 7.

² U.S.-China Economic and Security Review Commission, "Chapter 7: The Final Frontier, China's Ambitions to Dominate Space," in *2025 Annual Report to Congress* (Washington, DC: U.S. Government Publishing Office, 2025), 388; Rebecca Levy, interview by Ikram Rouainia, Microsoft teams video call, March, 10, 2026.

³ Caitlin Lee, "Starlink and the Russia-Ukraine War: A Case of Commercial Technology and Public Purpose," Harvard Kennedy School Belfer Center, March 8, 2023, <https://www.belfercenter.org/publication/starlink-and-russia-ukraine-war-case-commercial-technology-and-public-purpose> ; "Starlink in the Russo-Ukrainian War," *Wikipedia*, https://en.wikipedia.org/wiki/Starlink_in_the_Russo-Ukrainian_war.

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In appropriate circumstances, the use of military force to protect and defend commercial assets could be directed.¹

This formulation, the first of its kind in an official DoD strategy document, effectively extends the umbrella of U.S. military deterrence to private space infrastructure and erases any residual doctrinal distinction between governmental and commercial assets for the purposes of conflict law and escalation management.

1.6. Analytical Synthesis: Decentralization as Strategic Architecture

What emerges from this four-pillar analysis is a model that is decentralized in institutional form yet coherent in strategic logic.² NASA, USSF, NRO, and the commercial sector operate under different statutory authorities, budget processes, and strategic cultures; yet all four are organized around the same foundational premise, that American leadership in space is a prerequisite for security and prosperity, and that the combination of government investment, military capability, and commercial dynamism constitutes the United States' comparative advantage against China.³

The public-private logic is the model's defining structural feature: the state funds foundational technologies, creates the regulatory environment, anchors demand through procurement, then progressively transfers operational responsibility to commercial actors, the logic of GPS, COTS, Commercial Crew, and Artemis.⁴ Dolman identifies the structural risk: "The real strategic question is how effectively the U.S. government partners with and harnesses that system, rather than assuming the market will automatically deliver the desired national outcome."⁵ The U.S.-China Economic and Security Review Commission's 2025 Annual Report confirms that this "technological ecosystem diversity" constitutes a comparative advantage that a state-directed

¹ U.S. Department of Defense, *2024 DoD Commercial Space Integration Strategy*, 8; Marcus Weisgerber, "New DoD Commercial Space Strategy Opens Door to Military Financial Protection for Contractors," *Breaking Defense*, April 1, 2024, <https://breakingdefense.com/2024/04/new-dod-commercial-space-strategy-opens-door-to-military-financial-protection/>; "'Military Force' Could Be Directed to Protect Private Sector Orbital Assets, DoD Strategy Says," *Nextgov/FCW*, April 2, 2024, <https://www.nextgov.com/defense/2024/04/military-force-could-be-directed-protect-private-sector-orbital-assets-dod-strategy-says>.

² U.S.-China Economic and Security Review Commission, *2025 Annual Report to Congress*, 320.

³ U.S.-China Economic and Security Review Commission, *2025 Annual Report to Congress*, 3201; Rebecca Levy, interview.

⁴ U.S. Department of Defense, *Commercial Space Integration Strategy*, 2.

⁵ Dolman, interview by the Ikram Rouainia, zoom video call, 20/04, 2026.

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model cannot easily replicate, but also that its coordination remains a persistent structural challenge.¹

Table 3: The Four-Pillar Architecture of American Space Power, 2026*

NASA	USSF	NRO	Commercial Sector
Civil exploration & Artemis lunar program	Military space operations & warfighting doctrine	Overhead intelligence & signals collection	SpaceX · Blue Origin · ULA · Planet · Maxar
Public-private partnerships; fixed-price contracts	Space superiority; orbital, EW & cyber warfare	Classified + commercial imagery integration	Launch, comms, ISR; dual-use strategic assets
<i>SPD-1 (2017); EO 14369 (2025)</i>	<i>NDAA FY2020; Space Warfighting Framework (2025)</i>	<i>Est. 1960; DoD Comm. Strategy (2024)</i>	<i>COTS (2006); DoD Comm. Strategy (2024)</i>

Sources: DoD Commercial Space Integration Strategy (2024); USSC 2025 Annual Report; USSF Space Warfighting Framework (2025).

2. Privatization and Commercialization as Strategic Assets

The contemporary U.S. space model treats privatization and commercialization not as a retreat of the state, but as a deliberate strategy to turn private firms into instruments of national power.² After the Space Shuttle's retirement in 2011, NASA restructured its acquisition approach around public-private partnerships (PPPs), shifting from traditional cost-plus contracts to fixed-price, milestone-based agreements.³ NASA's retrospective history stresses that the Commercial Orbital Transportation Services (COTS) framework was designed to share risk and reward, injecting private capital into a domain previously monopolised by federal agencies. The U.S. government co-creates an industrial ecosystem, using anchor contracts to lower private actors' cost of capital and accelerate development timelines.⁴

¹ U.S.-China Economic and Security Review Commission, *2025 Annual Report to Congress*, 321.

* Each pillar operates under distinct statutory authority yet is organized around the shared premise that U.S. space leadership is a prerequisite for national security and prosperity.

² U.S. Department of Defense, *Commercial Space Integration Strategy* (Washington, DC: Department of Defense, April 2024), 2. <https://media.defense.gov/2024/Apr/02/2003427610/-1/-1/1/2024-DOD-COMMERCIAL-SPACE-INTEGRATION-STRATEGY.PDF>.

³ National Aeronautics and Space Administration, *Commercial Orbital Transportation Services: A New Era in Spaceflight*, NASA/SP-2014-617 (Washington, DC: NASA, 2014), 11–13. <https://www.nasa.gov/wp-content/uploads/2016/08/sp-2014-617.pdf>.

⁴ U.S. Government Accountability Office, *NASA's Management of the Commercial Crew Program*, IG-20-005 (Washington, DC: GAO, 2019), 6–8. <https://oig.nasa.gov/wp-content/uploads/2024/02/IG-20-005.pdf>

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Firms like SpaceX, Blue Origin, and United Launch Alliance (ULA) are tightly embedded in federal programs, drawing on U.S. government funding and military certification requirements at every stage. Juliana Süß underlines this reality: SpaceX "would not exist in its current form without significant government contracts and public funding," but this hybrid model has produced innovations impossible under state monopoly because "there is more creativity, more willingness to take risks, and a broader culture of startups and investment in the United States."¹ "NewSpace" is therefore the commercial arm of a consciously designed state–market hybrid.

This model yields three compounding strategic advantages. First, SpaceX's Falcon 9 reusability drives dramatic cost reductions and high launch cadence, allowing the U.S. to field satellite constellations at a fiscally unsustainable scale for legacy procurement.² Second, inter-firm competition creates a diversified innovation ecosystem that centrally directed models struggle to match over the long run.³ Third, commercial capabilities function as alliance instruments: exporting launch services and satellite communications deepens foreign dependence on U.S. infrastructure, reinforcing the coalition logic of the Artemis Accords.⁴

2.1. Private Sector Leadership: SpaceX, Blue Origin, ULA, and the PPP Model

NASA's COTS and Commercial Resupply Services (CRS) programs were the institutional hinges for private-sector leadership. The August 2006 COTS Space Act Agreement committed NASA to milestone payments while SpaceX assumed technical and cost risks.⁵ By paying for demonstrated capabilities rather than owning hardware, SpaceX retained its intellectual property.⁶ In August 2012, NASA confirmed SpaceX had completed its COTS milestones.⁷

NASA formalized cargo resupply in December 2008 with CRS-1 contracts: \$1.6 billion to SpaceX (twelve missions) and \$1.9 billion to Orbital Sciences (eight missions).⁸ This logic

¹Juliana Süß, interview by the author, April 2026.

²Center for Strategic and International Studies, "How Commercial Space Is Changing Modern Warfare," March 2023.

³Everett C. Dolman, interview by Ikram Rouainia, 04/05, 2026

⁴Institut français des relations internationales (IFRI), *Strategic Reflections on Shaping Space Governance* (Paris: IFRI, 2023), 8.

⁵NASA, *Commercial Orbital Transportation Services*, 42. <https://www.nasa.gov/wp-content/uploads/2016/08/sp-2014-617.pdf>.

⁶NASA, *Commercial Orbital Transportation Services*, 45.

⁷NASA, "NASA Administrator Announces SpaceX Completion of COTS Milestones," August 23, 2012.

⁸NASA, "NASA Awards Space Station Commercial Resupply Services Contracts," December 23, 2008.

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expanded in the January 2016 CRS-2 awards, allocating a maximum of \$14 billion to SpaceX, Orbital ATK, and Sierra Nevada through 2024.¹ Payments to SpaceX under CRS-1 eventually reached \$3.04 billion, demonstrating the vast public investment underpinning private-sector spaceflight.²

SpaceX's milestones fundamentally altered strategic capacity. On 21 December 2015, an orbital-class Falcon 9 first stage delivered eleven satellites and descended vertically to Cape Canaveral, a historic first.³ Repeated booster reflight compressed the cost per kilogram to low Earth orbit, far below any government-operated system.⁴ These economics enabled Starlink, which SpaceX activated in Ukraine in February 2022 following Russia's invasion, providing resilient communications vital to battlefield coordination.⁵ Starlink proved that a commercially operated constellation could function as **decisive military infrastructure** in great-power conflict.

Under the Commercial Crew Program, NASA certified Crew Dragon on 14 November 2020 as the first new human-rated spacecraft since the Shuttle.⁶ NASA's Phil McAllister called it "the first time in history there is a commercial capability from a private sector entity to safely and reliably transport people to space."⁷ In April 2021, NASA selected SpaceX's Starship for Artemis III, the first crewed lunar landing since 1972, and later awarded a \$1.15 billion option for Artemis IV.⁸

Blue Origin demonstrated suborbital reusability with New Shepard in November 2015 and embedded itself in national security supply chains by developing the BE-4 engine for ULA's Vulcan Centaur.⁹ In May 2023, NASA awarded Blue Origin a \$3.4 billion contract for the Blue Moon lunar lander for Artemis V, establishing a competitive duopoly for crewed Moon access.¹⁰

¹ NASA, "NASA Awards International Space Station Cargo Transport Contracts," January 14, 2016.

² NASA Office of Inspector General, *NASA's Response to SpaceX's June 2015 Launch Failure*, IG-16-025 (Washington, DC: NASA OIG, 2016), 4.

³ SpaceX, "Falcon 9 First Stage Landing," December 21, 2015.

⁴ Center for Strategic and International Studies, *Space Threat Assessment 2020* (Washington, DC: CSIS, 2020), 12.

⁵ Center for Strategic and International Studies, "How Commercial Space Is Changing Modern Warfare," March 2023.

⁶ NASA, "NASA and SpaceX Complete Certification of First Human-Rated Commercial Space System," November 10, 2020.; Levy, interview, 10/03/2026.

⁷ Phil McAllister, quoted in NASA press release, November 10, 2020; Levy, interview, 10/03/2026.

⁸ NASA, "NASA Selects SpaceX to Return U.S. Astronauts to the Moon," April 16, 2021; NASA, "NASA Awards SpaceX Second Contract Option for Artemis Moon Landing," November 15, 2022.

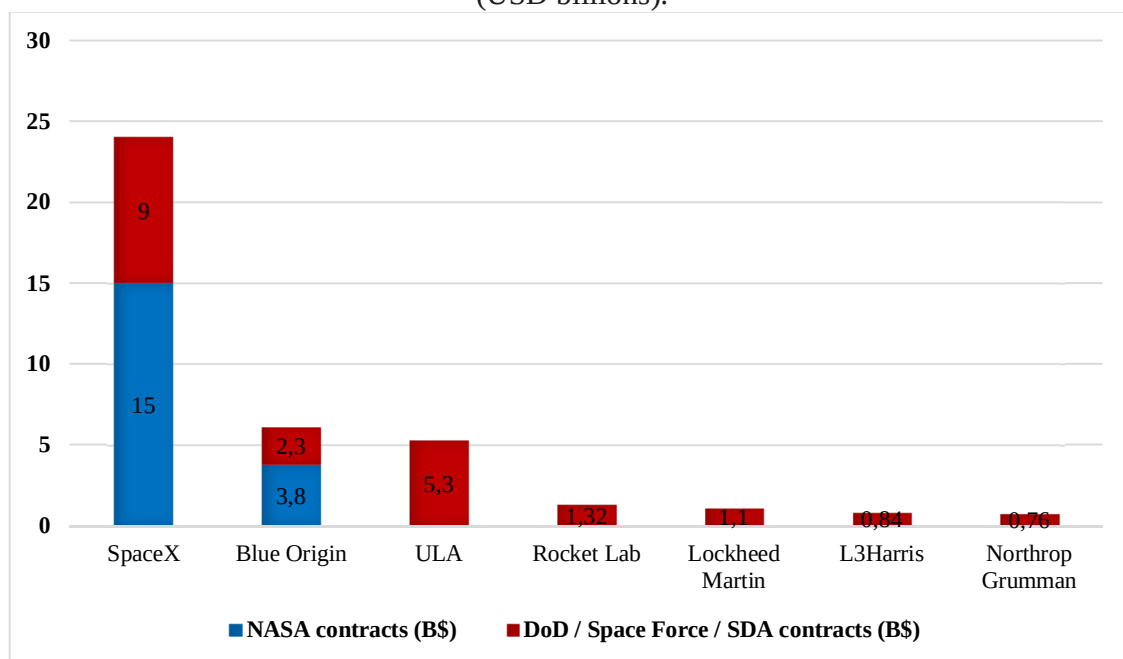
⁹ Blue Origin, "Historic Rocket Landing," November 24, 2015; Levy, interview, 10/03/2026.

¹⁰ NASA, "NASA Selects Blue Origin as Second Artemis Lunar Lander Provider," May 19, 2023.

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ULA occupies a distinct role as the government's high-reliability heritage provider for national security payloads.¹ Looking toward the future of Low Earth Orbit (LEO), NASA awarded \$415.6 million in December 2021 to commercial teams (including Blue Origin and Nanoracks) to transition from the government-owned ISS to privately operated platforms.² Together, SpaceX (disruptive innovator), Blue Origin (cislunar challenger), and ULA (heritage reliability) form a three-tier architecture unique to the United States.

Figure 3: U.S. Government Space Contracts to Private Companies, Cumulative 2006–2026 (USD billions).



Source: NASA, *Office of Inspector General, NASA's Response to SpaceX's June 2015 Launch Failure, IG-16-025* (Washington, DC, 2016); NASA, "NASA Awards Space Station Commercial Resupply Services Contracts," news release, December 23, 2008; U.S. Space Force, Space Systems Command, "National Security Space Launch (NSSL) Phase 3 Lane 1 Awards," April 4, 2025; Space Development Agency, "SDA Awards Tranche 3 Tracking Layer Contracts," December 19, 2025; Fed-Spend.com, "SpaceX Federal Contracts," accessed March 2026.

The FY2027 President's Budget reinforces this structural logic with empirical precision. While the administration proposes a reduction of NASA's civil discretionary budget to \$18.8 billion, a decrease of approximately twenty-three percent relative to the 2026 enacted level, it

¹ U.S. Space Force, *Space Warfighting: A Framework for Planners* (Washington, DC: Department of the Air Force, April 2025), 15.

² NASA, "NASA Selects Companies to Develop Commercial Destinations in Space," December 2, 2021.

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simultaneously requests a national-defense topline of \$1.5 trillion for 2027, a forty-four percent increase, while targeting all non-defense discretionary programs for a ten-percent cut.¹ The NASA chapter of the Budget justifies these reductions not as a retreat from space but as an acceleration of the commercial transition: "grossly over-budget" legacy government programs such as the Space Launch System and Orion are to be curtailed, while commercially procured launch services, commercial lunar landers, and privately operated space stations are to absorb their mission portfolios.² In budgetary terms as well as doctrine, the United States is not withdrawing from space; it is consolidating space resources under a defense-heavy, commercially executed model in which private firms supply capabilities that the state then deploys as instruments of national power, precisely the hybrid architecture that Juliana Süß identified when she observed that SpaceX "would not exist in its current form without significant government contracts and public funding."³

2.2. Efficiency, Innovation, and Reusability in U.S. Space Strategy

Reusability and PPP innovation translate directly into enhanced U.S. power projection. Reusable boosters and mass-produced satellites allow the U.S. to field proliferated constellations that are harder to degrade than Cold War-era exquisite platforms.⁴ By December 2025, SpaceX had landed its Falcon 9 booster 576 times, transforming launch into a routine industrial process and raising the cost to adversaries attempting attrition-based orbital denial.

The Starlink experience in Ukraine proved that privately financed constellations can serve as vital command-and-control continuity in warfare.⁵ U.S. doctrine formalized this reality in the April 2024 DoD *Commercial Space Integration Strategy*. Defense Secretary Lloyd Austin noted that integrating commercial solutions requires a doctrinal shift, explicitly stating: "In appropriate circumstances, the use of military force to protect and defend commercial assets could be

¹ U.S. Office of Management and Budget, *Budget of the United States Government, Fiscal Year 2027* (Washington, DC: U.S. Government Publishing Office, April 2026), 1–2, 67.

² U.S. Office of Management and Budget, 67–68. The NASA chapter specifies the elimination of the Mars Sample Return programme, a restructured approach to SLS and Orion consistent with commercial alternatives, and the acceleration of Commercial LEO Destinations contracts as cost-cutting measures.

³ Juliana Süß, interview by Ikram Rouainia, May, 2026.

⁴ CSIS, "How Commercial Space Is Changing Modern Warfare."; Levy, interview, 10/03/2026.

⁵ CSIS, "How Commercial Space Is Changing Modern Warfare."; Levy, interview, 10/03/2026.

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directed."¹ This extended U.S. deterrence to privately owned satellites performing national-security functions.²

Juliana Süss draws a functional distinction regarding escalation: the question is what function a system serves, not who owns it. Nuclear command and control and national technical means represent inviolable red lines; attacks on commercial broad-communications constellations do not cross that same threshold.³ Yet the U.S. reserves the right to defend critical commercial assets, deepening adversary uncertainty about American red lines. Professor John Hickman argued in his interview that this U.S. commercial ecosystem holds "structural advantages in innovation and diversity" that a command economy can only partially mimic at greater long-term cost.⁴

3. U.S. Policy Restrictions and Governance Initiatives: ITAR, the Wolf Amendment, and the Artemis Accords

U.S. space policy toward China rests on a dual logic: restrictive instruments that narrow bilateral cooperation channels and outward-facing governance initiatives that lock in U.S.-led standards before those channels harden into rival blocs.⁵

3.1. ITAR (1999 NDAA) and the Export-Control Layer

Section 1513 of the Strom Thurmond National Defense Authorization Act for Fiscal Year 1999 re-designated commercial satellites and related items on the U.S. Munitions List, subjecting them to ITAR from 15 March 1999 onward.⁶ The reclassification was driven by Congressional concerns following Chinese Long March rocket launch failures in 1995 and 1996 involving American-manufactured satellites.⁷ Its practical effects were two-fold: U.S. firms exporting satellite technology now required State Department licenses rather than Commerce Department approvals, significantly increasing compliance costs and review timelines; and joint satellite

¹ U.S. Department of Defense, *Commercial Space Integration Strategy*, 5.

² U.S. Department of Defense, *Commercial Space Integration Strategy*, 6.

³ Süss, interview by Ikram Rouainia, 04/05/2026.

⁴ John Hickman, interview by the author, April 20, 2026.

⁵ Roger Handberg and Zhen Li, *Chinese Space Policy: A Study in Domestic and International Politics* (Abingdon: Routledge, 2007), 45.

⁶ Strom Thurmond National Defense Authorization Act for Fiscal Year 1999, Pub. L. No. 105-261, sec. 1513 (October 17, 1998). <https://www.congress.gov/bill/105th-congress/house-bill/3616/text/ih>.

⁷ U.S.-China Economic and Security Review Commission, *2025 Annual Report to Congress*, 325.

development with China became politically and bureaucratically complex, reinforcing a trajectory in which Beijing would need to invest in indigenous capability rather than accessing Western hardware commercially.¹ Some restrictions were partially relaxed through the FY2013 NDAA, but the basic architecture of stringent export controls remained in place.²

3.2. The Wolf Amendment (2011) and the Bilateral Civil-Space Exclusion

If ITAR erected the commercial-export perimeter, the Wolf Amendment defined the civil-cooperation boundary. Enacted as Section 1340 of the Department of Defense and Full-Year Continuing Appropriations Act (Public Law 112-10) in April 2011, the Amendment prohibited NASA from using appropriated funds to develop, design, plan, or execute bilateral policy or programs with China or Chinese-owned companies, absent explicit Congressional authorization and FBI written certification of no national-security risk.³ Reinserted annually into the Commerce-Justice-Science appropriations bill ever since, it has become a durable, institutionalized constraint on U.S.–China civil space cooperation.⁴

CSIS assessed in 2019 that the Amendment "has neither discouraged Chinese space ambitions... nor altered China's behavior on human rights, it has only muddled our relationship with China and created an opening for a challenger to NASA's leadership role in space exploration."⁵ China launched Tiangong-1 in 2011 and Tiangong-2 in 2016 as ISS alternatives; the CSS core module Tianhe followed in 2021.⁶ Hickman, in his interview for this thesis, offered a dialectical assessment: China, "with an acute historical sensitivity to perceived humiliation rooted in the 'century of humiliation' political narrative, was particularly susceptible to interpreting the Wolf Amendment as a deliberate act of strategic exclusion. Yet paradoxically, the outcome has arguably been beneficial from a systemic perspective: it compelled China to invest more

¹ NASA Office of Inspector General, *NASA's Management of International Technology Transfer Controls*, IG-10-004 (Washington, DC: NASA, 2010), 5. <https://oig.nasa.gov>.

² National Defense Authorization Act for Fiscal Year 2013, Pub. L. No. 112-239, sec. 1514 (January 2, 2013). <https://www.congress.gov/112/plaws/publ239/PLAW-112publ239.pdf>.

³ Department of Defense and Full-Year Continuing Appropriations Act, 2011, Pub. L. No. 112-10, sec. 1340 (April 15, 2011). <https://www.congress.gov/112/plaws/publ10/PLAW-112publ10.pdf>.

⁴ Center for Strategic and International Studies, *China's Space Program: Emerging Competitor or Potential Partner?* (Washington, DC: CSIS, 2019), 3. <https://www.csis.org/analysis/strategic-trajectories-assessing-chinas-space-rise-and-risks-us-leadership>.

⁵ Center for Strategic and International Studies, 4.

⁶ U.S.–China Economic and Security Review Commission, *2025 Annual Report to Congress*, 326.

ambitiously in its own space program, which in turn generated competitive pressure that drove commensurate increases in American investment and ambition."¹ Süß reinforces this reading, drawing on Aaron Bateman's research: all major Cold War milestones in bilateral space cooperation followed diplomatic breakthroughs rather than causing them, "the improvement of diplomatic relations then led to an achievement in space, not the other way around."² Together, ITAR (1999) and the Wolf Amendment (2011) are not merely restrictions; they are generative instruments that have materially shaped the topology of the emerging dual-governance order.³ He characterizes the structural transition they helped produce as a shift from "negative" to "positive" cooperation: the OST specified what states may not do; the Artemis Accords and the ILRS specify what their respective coalitions will do, and whoever arrives first at the lunar south pole will be positioned to assert "exclusive scientific zones" that function as de facto semi-sovereign areas.⁴

3.3. From the ISS to the Artemis Accords: Two Generations of U.S. Space Governance

The ISS Intergovernmental Agreement, signed on 29 January 1998 by fifteen nations, constituted a binding treaty framework for the design, operation, and utilization of the station, NASA itself characterized it as "the largest and most complex international science and engineering project in history." Its governance model prioritized state-agency cooperation and collective management, with commercial roles modest and tightly controlled.⁵

The Artemis Accords, signed on 13 October 2020 by eight founding nations, operate on fundamentally different principles. They are non-binding political commitments co-led by NASA and the State Department, tethered to Artemis program objectives and built around commercial participation and resource utilization.⁶ Their ten founding principles introduce substantively new concepts the OST did not contemplate, most significantly "safety zones" around installations to

¹ Hickman, interview by the Ikram Rouainia, zoom video call, 20/04/2026; Rebecca Levy, interview by Ikram Rouainia, Microsoft teams video call, March, 10, 2026.

² Juliana Süß, interview by the author, April 2026; Aaron Bateman, "Keeping the Heavens Open: The Politics of Space Cooperation During the Cold War," *Diplomacy & Statecraft* 33, no. 3 (2022): 525–48.

³ Dolman, interview by Ikram Rouainia, zoom video call, 04/05/2026.

⁴ Dolman, interview.

⁵ NASA, "International Space Station Intergovernmental Agreement," January 29, 1998.

<https://www.nasa.gov/history/20-years-ago-station-partners-sign-intergovernmental-agreement-iga/>.

⁶ NASA, "The Artemis Accords," October 13, 2020. <https://www.nasa.gov/wp-content/uploads/2022/11/Artemis-Accords-signed-13Oct2020.pdf>.

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prevent harmful interference, a mechanism that, in Hickman's analysis, achieves functional territorial control on the Moon while carefully avoiding the plain language of territorial claim.¹ By 7 May 2026, 67 nations had signed the Accords; the rival ILRS had attracted 13 signatories, a disparity reflecting both U.S. diplomatic weight and the degree to which the Artemis coalition has become a structural organizing principle of U.S. space alliance management.² The French Institute of International Relations has characterized the Artemis Accords as "an American strategy for lunar governance," part of a coherent U.S. diplomatic strategy to promote a shared vision of space exploration aligned with American industrial and legal interests, "strongly contested by China and Russia."³

Hickman, whose intellectual trajectory from cooperation to competition mirrors the systemic shift Dolman describes, frames the four-pillar architecture as the product of a polity that has been building its space apparatus **"layer by layer, crisis by crisis, since the Sputnik shock of 1957."**⁴ The institutional complexity of the American space model, its multiple agencies, its civil-military hybridity, its public-private architecture is not a design feature. It is a structural artefact of that incremental accumulation; and it is this layered complexity, with all its coordination costs and coordination strengths, that must be held in comparative view against the architecturally simpler but strategically no less ambitious space enterprise of the People's Republic of China.

Section Two: The Chinese Model- Centralized State-Led Ambition and the "Space Dream"

1. Evolution and Governance of China's Space Program

1.1. Strategic Modernization and the Rise of China as a Space Power

China's space program was not a product of reform-era ambition alone; it was constructed, over decades, from a base of strategic insecurity, technological isolation, and Cold War ideological imperatives. As Handberg and Li document, for China as for the United States and Soviet Union,

¹ Hickman, interview by Ikram Rouainia, zoom video call, 20/04/2026.

² Payload Space, "The Artemis Accords by the Numbers," January 27, 2026

³ Institut français des relations internationales, *Strategic Reflections on Shaping Space Governance* (Paris: IFRI, 2023), 8.

⁴ Hickman, interview; Levy, interview, 10/03/2026.

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"building military rockets was their entry into the space age," and China's pursuit of ballistic missiles, the foundation of its eventual launch capability, was driven by the perceived threat of nuclear coercion at the hands of both superpowers.¹ From its institutional inception in 1956, the program simultaneously served as a defense technology project, a prestige instrument, and an expression of the state's ambition to restore China to what its leadership consistently described as its "rightful place" in the hierarchy of great powers.²

The program's trajectory was neither linear nor inevitable. The Cultural Revolution devastated the scientific cadres built under the early missile program, imposing delays requiring decades to repair.³ Yet the structural commitment to space as a component of comprehensive national power (*zonghe guoli*) was never abandoned. Deng Xiaoping's reforms enabled an "accelerating rise" from the mid-1980s onward.⁴ The milestones of this phase are significant: the Long March series completed 86 launch missions between 2011 and 2016 at a 97.67 percent success rate⁵, Shenzhou 5 placed Yang Liwei in orbit on 15 October 2003, elevating China to the exclusive club of states capable of independent human spaceflight,⁶ and the Chang'e program⁷. This is not catch-up; it is deliberate, sequenced, sovereign capability construction across every dimension of the space domain simultaneously.

The governance architecture sustaining this trajectory is itself a strategic instrument. China's space sector is organized around CNSA (established 1993) and CMSA for human spaceflight, with the industrial base dominated by two SOE conglomerates, CASC and CASIC, controlling design, manufacture, and operations across the full spectrum of space systems.⁸ This

¹ Roger Handberg and Zhen Li, *Chinese Space Policy: A Study in Domestic and International Politics* (London: Routledge, 2007), 5.

² Roger Handberg and Zhen Li, 2–3; Chinese State Council Information Office, "Full Text of White Paper on China's Space Activities in 2016," *China Daily*, December 28, 2016, Preamble.

³ Handberg and Li, *Chinese Space Policy*, 6.

⁴ https://api.pageplace.de/preview/DT0400.9781134214174_A25022970/preview-9781134214174_A25022970.pdf.

⁵ Handberg and Li, *Chinese Space Policy*, 6.

⁶ Chinese State Council Information Office, "Full Text of White Paper on China's Space Activities in 2016," sec. II.1.

⁷ Handberg and Li, *Chinese Space Policy*, 3–4.

⁸ John Hickman, "Outer Space," chap. 22 in *Routledge Handbook of International Relations* (London: Routledge, 2024), 280.

⁹ Emily Baughman and Mathieu Duchâtel, *Seeking Stability in Outer Space: Opportunities for China–UK Dialogue* (London: European Council on Foreign Relations / Stimson Center, February 2026), 3.

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institutional concentration ensures Party strategic priorities are transmitted directly into programmatic decisions, without the mediation of market signals or the congressional appropriations politics that periodically disrupts U.S. program continuity. As Dolman observed in his interview: "A command economy can get you what you want faster than a market economy, at least for specific, priority projects. If the state decides 'we will have a space station' or 'we will land at the lunar south pole by this date,' and it can direct resources without worrying about profit or public debate, it will often achieve that goal more quickly than a liberal market economy. China has clearly used that advantage."¹ The U.S.-China Economic and Security Review Commission's 2025 analysis confirms that China "has undertaken a rapid and multifaceted expansion across its military, civil, and commercial space sectors that is presenting a comprehensive challenge to U.S. space leadership," driven by a "broader strategic rivalry" in which both states view the space domain as critical to national security, economic growth, and global influence.²

1.2. The "Space Dream" and the Role of the Chinese Communist Party

The conceptual architecture organizing China's contemporary space ambitions is Xi Jinping's "China Dream" (*Zhōngguó mèng*, 中国梦), formally defined as the "great rejuvenation of the Chinese nation" (中华民族伟大复兴), articulated upon his assumption of the Party leadership in November 2012. The spatial dimension of this vision was stated explicitly at the Beijing Aerospace Control Center on 26 June 2013, when Xi declared that "to explore the vast cosmos, develop the space industry and build China into a space power is a dream we pursue unrelentingly."³ The "Space Dream" (*hángtiān mèng*, 航天梦), as an integral component of the China Dream, is reproduced verbatim in the opening section of the 2016 White Paper on Space Activities, its presence there confirming a status not of rhetorical embellishment but of formal state doctrine with the full normative weight of official policy.⁴

¹ Everett C. Dolman, interview by Ikram Rouainia, zoom video call, 04/05/2026.

² U.S.-China Economic and Security Review Commission, *2025 Annual Report to Congress* (Washington, DC: U.S. Government Publishing Office, 2025), 372.

³ Xi Jinping, address at the Beijing Aerospace Control Centre, June 26, 2013, cited in Chinese State Council Information Office, "Full Text of White Paper on China's Space Activities in 2016," *China Daily*, December 28, 2016, Preamble; CSIS, *Xi Jinping Speech Database*, <https://chinapower.csis.org/data/xjp-speech-database/>.

⁴ Chinese State Council Information Office, "Full Text of White Paper on China's Space Activities in 2016," *China Daily*, December 28, 2016, Preamble.

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The analytical significance of this embedding is structural and, from a comparative politics perspective, without parallel in any other major spacefaring nation. In the United States, space leadership is a strategic preference, a competitive ambition subject to political revision. In China, it is a constitutive element of regime legitimacy. China's space ambitions are constitutively linked to national identity, historical dignity, and the CCP's claim to domestic legitimacy in ways that have no structural equivalent in U.S. space policy. For Beijing, space is not merely a strategic domain or an economic frontier. It is, as Juliana Süß articulated in her interview, "firmly part of the China Dream" and inseparable from the Party's narrative of national restoration after the "century of humiliation" (*bǎinián qū'ǐ*, 百年屈辱), the period from the First Opium War (1839) to the founding of the PRC in 1949.¹ This identity dimension generates a structural commitment to space success that is not easily modulated by budget cycles, political transitions, or the domestic opposition that has repeatedly disrupted NASA's long-duration programs. Retreat from space ambition, in peacetime or in crisis, is structurally far more costly for Beijing than for Washington,

This identity framework also generates a particular and analytically consequential sensitivity to external exclusion. Hickman argues that China, "as an emerging revisionist power with an acute historical sensitivity to perceived humiliation," was especially susceptible to interpreting the 2011 Wolf Amendment, the U.S. Congressional prohibition on NASA–CNSA bilateral cooperation, as "a deliberate act of strategic exclusion" fitting "neatly into that broader narrative of external impediment."² The 2016 White Paper's repeated insistence on "self-reliance and independent innovation" (*zili gengsheng*, 自力更生) as the governing principles of Chinese space development is therefore not a mere technical preference; it is a direct political response to the experience of exclusion, a declaration that China will not be strategically dependent on external actors for the capabilities it defines as constitutive of its great-power identity.³ In this respect, the Wolf Amendment operated as a generative instrument: it did not deter Chinese ambition but channelled it, compelling the construction of an entirely autonomous national space architecture,

¹ Juliana Süß, interview by Ikram Rouainia, 04/05/2026; William A. Callahan, *China: The Pessoptimist Nation* (Oxford: Oxford University Press, 2010), chaps. 1–2.

² John Hickman, interview by Ikram Rouainia, zoom video call, 20/04/2026.

³ Chinese State Council Information Office, "Full Text of White Paper on China's Space Activities in 2016," sec. I.3, http://english.scio.gov.cn/whitepapers/2017-01/10/content_40535777.htm.

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stations, navigation systems, lunar probes, that now serves as the institutional foundation of China's challenge to U.S. space hegemony.

Under Xi, the CCP's integration of space into both military doctrine and domestic mobilization strategy has intensified with a coherence and velocity unmatched in the program's history. The 2015 Defense White Paper was the first official government document to describe outer space as "one of the new commanding heights in strategic competition," formally embedding space superiority into military modernization doctrine at the highest doctrinal level.¹ The December 2015 creation of the Strategic Support Force (SSF), consolidating the PLA's space, cyber, and electronic warfare capabilities under a unified command authority, and its subsequent reorganization as the Aerospace Force in April 2024, institutionalized direct Party command over the military dimensions of the space program at the operational apex.² The 2020 *Science of Military Strategy*, the authoritative PLA strategic textbook published by the National Defense University, states plainly: "without space control, information control would be impossible, and consequently air control, sea control, and land control would quickly fall one after another."³ Space dominance is thus not one dimension of military supremacy but its necessary precondition, a doctrinal formulation with direct Dolmanian resonance: the state that controls low Earth orbit commands the strategic high ground over all terrestrial domains.

The domestic mobilization function of space achievements deserves separate analytical attention, as it reveals the third dimension of the Space Dream beyond the strategic and the diplomatic. Under Xi, high-profile missions have been systematically deployed to "showcase Party leadership, reinforce domestic confidence, and signal China's rise as a global scientific and technological power."⁴ The construction and continuous crewed operation of the Tiangong Space Station, completed in 2022 at precisely the moment the ISS was approaching the end of its operational life, was not merely a technical achievement. It was a deliberately timed demonstration of Chinese self-sufficiency in the most symbolically potent and publicly visible dimension of

¹ U.S.-China Economic and Security Review Commission, *2025 Annual Report to Congress* (Washington, DC: U.S. Government Publishing Office, 2025), 376.

² U.S.-China Economic and Security Review Commission, 376.

³ Chinese People's Liberation Army, National Defence University, *Science of Military Strategy* (Beijing: NDU Press, 2020), as cited in U.S.-China Economic and Security Review Commission, *2025 Annual Report to Congress*, 376.

⁴ U.S.-China Economic and Security Review Commission, *2025 Annual Report to Congress*, 375.

human spaceflight, delivered precisely when the alternative Western-led platform was entering institutional decline. The geopolitical timing was not incidental; it was strategic punctuation.

The cumulative effect on the systemic balance is what Hickman identifies as a historic structural inversion. Beijing's declared program to land taikonauts on the Moon and establish a permanent crewed lunar base "compelled the United States to accelerate its own Artemis program for a return astronaut landing on the Moon."¹ For the first time in the history of the space age, it is the established hegemon, the United States, that is responding to the challenger's declared ambition rather than dictating the competitive agenda. From a power-transition perspective, this is precisely the dynamic Mearsheimer's offensive realism would predict: a rising power leveraging a narrowing capability gap to force the incumbent into reactive postures.

From a Dolmanian astropolitical perspective, it represents the moment at which the competition for cislunar space ceased to be asymmetric and became genuinely bipolar, with all the attendant instability, deterrence complexity, and governance fragmentation that bipolarity in contested domains historically generates.

2. China's Strategic Approach and Military–Civil Fusion

2.1. The Whole-of-Government Strategy and Military–Civil Integration

China's approach to space is not a sectoral policy, it is a total-state instrument. The 2016 White Paper states the governing principle explicitly: "China's space industry is subject to and serves the national overall development strategy," with all activities "coordinated under an overall plan of the state."² This is the operational expression of *zonghe guoli*, comprehensive national power, a Maoist-derived concept updated by Deng and refined by Xi into a doctrine that measures state strength not by any single capability but by the synergistic integration of economic, military, diplomatic, and technological assets toward long-term strategic objectives. Space is not one domain among many; it is the infrastructure that multiplies every other dimension of national power simultaneously.

¹ John Hickman, "Outer Space," chap. 22 in *Routledge Handbook of International Relations* (London: Routledge, 2024), 280.

² Chinese State Council Information Office, "Full Text of White Paper on China's Space Activities in 2016," *China Daily*, December 28, 2016, sec. I.3, http://www.xinhuanet.com/english/china/2016-12/27/c_135935416.htm.

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The mechanism translating this philosophy into institutional practice is *jūnmín rónghé* (军民融合), Military–Civil Fusion, formally elevated to national strategy by Xi Jinping and institutionalized through the Central Military–Civil Fusion Development Commission in January 2017, chaired by Xi personally.¹ This is a governance choice of first-order strategic significance: it erases, by design, the legal and institutional separation between civilian and military space activities that characterizes Western models. The result, as the U.S.-China Economic and Security Review Commission documents, is that China "leverages its civilian and commercial industries to advance national defense and security capabilities," with the effect that "many advancements and tests of space systems framed as having civil or commercial purposes may have potential military applications as well."² Dual-use is not an ambiguity to be managed, it is in fact a design principle.

The quantitative consequences are staggering. China's PLA operated more than 1,060 satellites in orbit as of December 2024, a **620% increase from end-2015**, a pace of proliferation no other state has approached.³ These assets form the backbone of what PLA strategists describe as a *space kill mesh*: an integrated, resilient targeting network that collects, processes, and distributes data to long-range precision weapons systems across all theatres. The 2020 *Science of Military Strategy* defines the doctrine plainly: "without space control, information control would be impossible, and consequently air control, sea control, and land control would quickly fall one after another."⁴ This is not aspirational language; it is operational doctrine. General Saltzman, Chief of Space Operations, described China's build-up before the Commission in April 2025 as "mind-boggling," warning that China's "potent and expanding arsenal of space-based capabilities multiplies its combat potential many times over and threatens the U.S. military's access to, and effective use of, space in conflict."⁵

¹ The Central Military–Civil Fusion Development Commission was established by the Standing Committee of the National People's Congress in January 2017, under Xi Jinping's personal chairmanship.

² U.S.-China Economic and Security Review Commission, *2025 Annual Report to Congress* (Washington, DC: U.S. Government Publishing Office, 2025), chap. 7, 378.

³ U.S.-China Economic and Security Review Commission, *2025 Annual Report to Congress* (Washington, DC: U.S. Government Publishing Office, 2025), chap. 7, 377.

⁴ Chinese People's Liberation Army, National Defence University, *Science of Military Strategy* (Beijing: NDU Press, 2020), as cited in U.S.-China Economic and Security Review Commission, *2025 Annual Report to Congress*, 376. https://www.uscc.gov/sites/default/files/2025-04/Chance_Saltzman_Testimony.pdf.

⁵ B. Chance Saltzman, testimony before the U.S.-China Economic and Security Review Commission, April 3, 2025, 375. https://www.uscc.gov/sites/default/files/2025-04/Chance_Saltzman_Testimony.pdf.

The most actively destabilizing consequence of this architecture is dual-use opacity. Juliana Süss, in her interview, identified it as the primary positive feedback loop in the current U.S.–China space relationship: the structural inability to distinguish civilian innovation from military capability development generates strategic uncertainty, which drives precautionary counterspace investment on both sides, which deepens the security dilemma rather than attenuating it.¹ The "blurry distinctions between state-owned enterprises and commercial companies", overlapping funding structures, SOE spinoffs, and firms founded by former state employees, ensure that this opacity is not a temporary ambiguity but a stable architectural feature of the Chinese space industrial ecosystem.

2.2. Military–Civil Fusion as Competitive Learning from the U.S. Model

A dimension insufficiently analyzed in Western scholarship is the *reactive* character of China's Military–Civil Fusion strategy in space: it is, at least in part, a competitive response to observed American governance innovation. As Daniels (2020) documents, "China's push for civil-military fusion, partially motivated by observations of U.S. government interactions with companies like SpaceX, has helped to allow China's first commercial space companies to appear and has created ties between those companies and the Chinese military."² Chinese defense planners observed the transformative economics of the COTS model from 2006 onward and drew two conclusions: commercial actors could generate capability faster and cheaper than purely state-directed enterprises; and commercial-military integration was a structural U.S. advantage that China needed to replicate on its own institutional terms.³

The policy response was rapid. Beginning with the 2014 State Council guidance on "innovating investment and financing mechanisms in key areas and encouraging social investment," China opened its previously monopolized space sector to private capital.⁴ New

¹ Juliana Süss, interview by Ikram Rouainia, zoom video call, 04/05/2026.

² Weston Daniels, "China's Military-Civil Fusion Strategy in Space," *Space Policy* 51 (2020): 5, [https://www.airuniversity.af.edu/Portals/10/CASI/documents/Research/Other-Topics/2020-06-15%20CASI China Military Civil Fusion Strategy.pdf](https://www.airuniversity.af.edu/Portals/10/CASI/documents/Research/Other-Topics/2020-06-15%20CASI%20China%20Military%20Civil%20Fusion%20Strategy.pdf).

³ Weston Daniels, *Space Policy* 51 (2020): 5; see also Paravano, Locatelli, and Trucco, "Evolution of Space Programs Governance," in *Research Handbook on the Governance of Projects* (Cheltenham: Edward Elgar, 2023), 411–428.

⁴ Chinese State Council, Guiding Opinions on Innovating Investment and Financing Mechanisms in Key Areas and Encouraging Social Investment, Guofa No. 60, November 26, 2014, as cited in Emily Baughman and Mathieu

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commercial entrants, LandSpace, Galactic Energy, Chang Guang Satellite Technology, are nominally private, yet operate within a governance ecosystem in which "the Party's oversight of commercial companies also gives it great influence in ensuring that commercial activities align with national policies and objectives."¹ Süß offers the analytically essential qualification: "Both the U.S. and Chinese models involve intimate relationships between state and commercial actors; the difference lies in the direction of the relationship."² In the United States, the state contracts with actors whose primary accountability runs to shareholders; in China, commercial actors operate within a framework in which Party priorities remain structurally determinative. As Hickman observed, this has produced "a substantial and growing private sector presence in China's space ecosystem, more directed and state-coordinated than the American equivalent, but far from negligible": a source of "innovative capacity entirely unavailable to the Soviet space program."³

From a systems perspective, what China has constructed is a hybrid that combines the command economy's capacity for directed resource mobilization with the market economy's capacity for distributed innovation, neutralizing what was previously a structural U.S. asymmetry. As Dolman assessed in his interview: "The real question is whether the U.S. government partners with and harnesses that system effectively, rather than assuming the market will automatically deliver the desired national outcome."⁴

2.3. Strategic Autonomy, Technological Independence, and Space Diplomacy

China's doctrine of *zili gengsheng* (自力更生), self-reliance, is not a technical preference but a political imperative rooted in the structural experience of isolation: excluded from U.S. technology transfer regimes, cut off from Soviet assistance after the Sino-Soviet split of the early 1960s, and forced to independently solve the foundational problems of rocketry and satellite engineering.⁵ The Wolf Amendment of 2011 reproduced this pattern in the contemporary era,

Duchâtel, *Seeking Stability in Outer Space: Opportunities for China–UK Dialogue* (London: ECFR / Stimson Center, February 2026), 7.

¹ U.S.–China Economic and Security Review Commission, *2025 Annual Report to Congress*, 378.

² Süß, interview by Ikram Rouainia, zoom video call, 04/05/2026.

³ John Hickman, interview by Ikram Rouainia, zoom video call, 20/04/2026.

⁴ Everett C. Dolman, interview by Ikram Rouainia, zoom video call, 04/05/2026.

⁵ Roger Handberg and Zhen Li, *Chinese Space Policy: A Study in Domestic and International Politics* (London: Routledge, 2007), 2–5, 57–83.

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prohibiting NASA–CNSA bilateral cooperation without specific Congressional approval.¹ Hickman's dialectical reading is indispensable: China, "with an acute historical sensitivity to perceived humiliation," interpreted the Amendment as "a deliberate act of strategic exclusion" fitting "neatly into that broader narrative of external impediment."² Yet the paradox is that its long-term systemic effect was "arguably beneficial": it "compelled China to invest more ambitiously in its own space program, which in turn generated competitive pressure that has driven commensurate increases in American investment and ambition."³

China's strategic autonomy is expressed not merely in technical self-sufficiency but in the active construction of an alternative governance architecture. The International Lunar Research Station (ILRS), jointly announced by China and Russia in 2021 and joined by Venezuela, Pakistan, South Africa, and Azerbaijan, constitutes the institutional counterpart to the Artemis Accords.⁴ At the multilateral level, China formally participates in UNCOPUOS and presents itself as a responsible space power committed to "equality and mutual benefit, peaceful utilisation, and inclusive development."⁵ Yet, as Exovera's 2025 analysis documents, a gap between official positions and operational behavior is consistently observable: China advances bilateral partnerships that bypass COPUOS precisely because the consensus-based forum does not allow it to shape norms at the speed its ambitions require.⁶ China's simultaneous filing of ITU frequency registrations for mega-constellations totalling over 200,000 satellites, while publicly advocating "equitable access" to orbital resources, is the representative illustration of this gap between multilateral rhetoric and unilateral strategic practice.⁷

¹ Department of Defense and Full-Year Continuing Appropriations Act, 2011, Pub. L. No. 112-10, sec. 1340 (April 15, 2011). <https://www.congress.gov/112/plaws/publ10/PLAW-112publ10.pdf>.

² John Hickman, interview by Ikram Rouainia, zoom video call, 20/04/2026.

³ John Hickman, interview, 20/04/2026; Rebecca Levy, interview by Ikram Rouainia, Microsoft teams video call, March, 10, 2026.

⁴ U.S.-China Economic and Security Review Commission, 2025 Annual Report to Congress, 401–403.

⁵ Chinese State Council Information Office, "Full Text of White Paper on China's Space Activities in 2016," sec. I.3, "Open Development."

⁶ Exovera, *Global Space Governance: Emerging Trends and Fractures* (Washington, DC: Exovera, 2025), 12–14.

⁷ Baughman and Duchâtel, *Seeking Stability in Outer Space*, 8, https://www.sipri.org/sites/default/files/2026-03/0226_rpp_chinese_perspectives_chinese.pdf; "China Launches First Satellites for GuoWang Project to Rival SpaceX's Starlink," *South China Morning Post*, December 16, 2024. <https://www.scmp.com/news/china/science/article/3290994/china-launches-first-satellites-guowang-project-rival-spacexs-starlink>.

3. Technological Milestones and Independent Architectures

3.1. The Tiangong Space Station and the Chang'e Lunar Program

Tiangong (天宫, "Heavenly Palace") is China's most consequential institutional achievement in human spaceflight. Assembled between April 2021 and November 2022 through sequential launches of the Tianhe core module and Wentian and Mengtian science modules, the station masses approximately 100 tonnes, comparable to the early ISS configuration, and has been continuously crewed since June 2021 on rotating six-month Shenzhou missions.¹ Its operational completion at the precise moment when ISS partnership dynamics were fragmenting, and when China remained structurally excluded from ISS participation, was not coincidental. It was a deliberate demonstration of institutional parity and self-sufficiency in the most publicly visible dimension of the space age. In Dolman's assessment: "the Chinese system is gonna get them to the South Pole", the command-economy model's capacity for directed resource mobilization gives China a structural advantage in achieving specific, well-defined, near-term objectives that market-economy dynamics are inherently less suited to deliver.²

The Chang'e program represents the most technically ambitious expression of China's deep-space architecture, executed through a methodical, sequential logic that has produced a succession of global firsts: Chang'e-3 (2013) achieved China's first soft lunar landing; Chang'e-4 (2018) became the first spacecraft in history to land on the Moon's far side; Chang'e-5 (2020) returned 1.7 kg of lunar samples, the first such return since the Soviet Luna 24 mission in 1976; and Chang'e-6 (2024) returned the first samples ever collected from the far side.³ The subsequent program continues in the same vein: Chang'e-7 will reconnoitre the lunar south pole for water ice; Chang'e-8 will test in-situ resource utilisation and habitat construction from local materials.⁴ These are not exploration missions in the conventional sense, they are systematic infrastructure reconnaissance for a permanently crewed International Lunar Research Station at the lunar south pole targeted by the early 2030s. As Dolman characterized the strategic logic in his interview,

¹ U.S.-China Economic and Security Review Commission, 2025 Annual Report to Congress, 393–396.

² Everett C. Dolman, interview by Ikram Rouainia, zoom video call, 04/05/2026.

³ U.S.-China Economic and Security Review Commission, 2025 Annual Report to Congress, 396–398, 372.

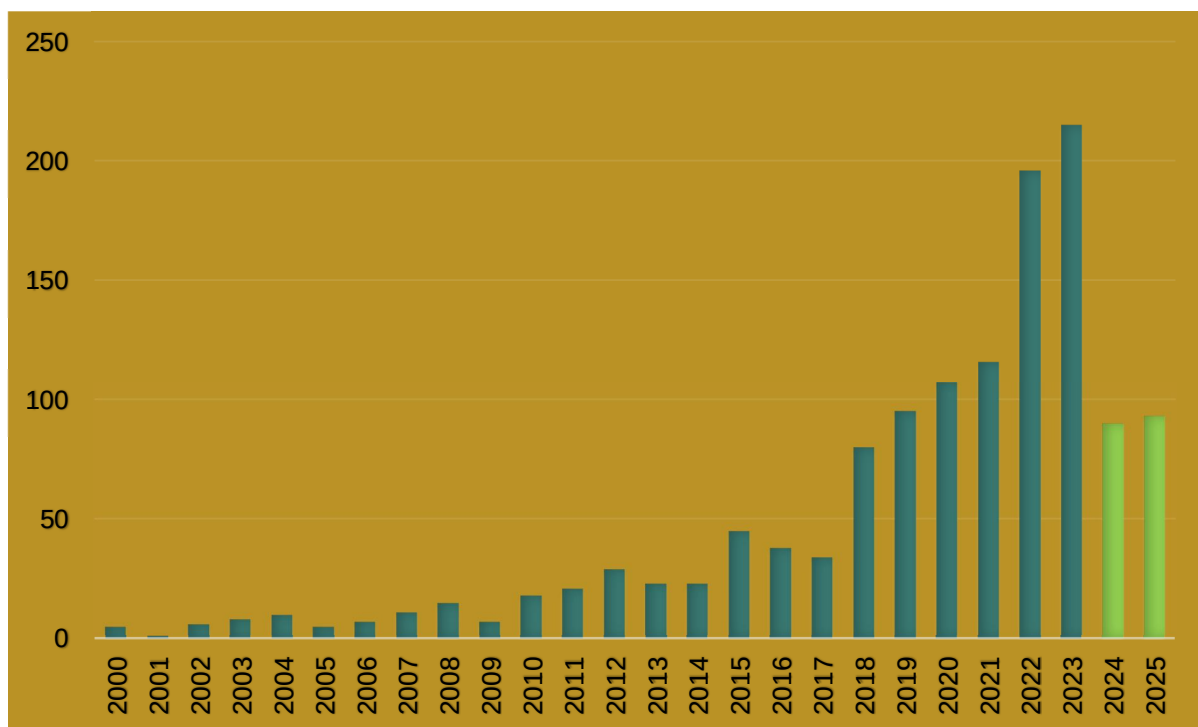
⁴ Chinese State Council Information Office, "Full Text of White Paper on China's Space Activities in 2016," sec. III.4; U.S.-China Economic and Security Review Commission, 2025 Annual Report to Congress, Figure 5, 404.

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whoever arrives first at the south pole will be positioned to assert "*exclusive scientific zones*" that function as de facto semi-sovereign areas, making Chang'e not merely a scientific program but a territorial positioning campaign conducted under the language of exploration.

China's launch cadence is one of the clearest ways to illustrate its evolution from a niche spacefaring nation to a near-peer launch power. In 2000, China conducted five orbital launches; in 2025, China set a new record with ninety-three orbital launches.

Figure 4: China Orbital Launches, Record Growth (2000-2025)



Sources: BryceTech (2024); CNSA (2026)

3.2. BeiDou: Structural Power Through Navigation Sovereignty

BeiDou (北斗) is arguably China's single most strategically consequential space achievement, and its systematic underanalysis in Western academic literature represents a significant gap. BeiDou is not merely a navigation system, it is, in Susan Strange's analytical register, an act of structural-power construction: the deliberate creation of an independent positioning, navigation, and timing (PNT) framework designed to eliminate China's strategic

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vulnerability to U.S. discretion while offering an alternative to states that prefer not to depend on U.S.-controlled infrastructure.

The strategic impetus is traceable to a specific episode: the U.S. selective degradation of GPS signal accuracy during the 1995–96 Taiwan Strait crisis and the 1999 Kosovo conflict, demonstrating to Chinese military planners that GPS access was not a global commons but a controlled resource that Washington could selectively deny.¹ The state's official BeiDou White Paper frames the response in characteristic terms: the system "has blazed a path for building a satellite navigation system with Chinese characteristics."² The third-generation BDS-3 achieved full global operational capability in July 2020 with 49 operational satellites, providing global all-weather PNT services to both civilian and military users, eliminating the GPS vulnerability that U.S. planners could previously exploit.

The military consequences are assessed by the USCC as profound: "BeiDou has increased the PLA's capabilities to conduct precision strikes globally and offers the PLA global coverage for coordinated operations and maneuver across multiple theatres."³ BeiDou's integrated short-message service, without a GPS equivalent, "could provide real-time updates for missile systems and allow military operators to provide commands to autonomous weapons, enhancing the PLA's global command and control." This eliminates a critical vulnerability in Chinese anti-access/area-denial (A2/AD) architecture: in any Taiwan contingency, precision-guided munitions no longer depend on a service the adversary controls.

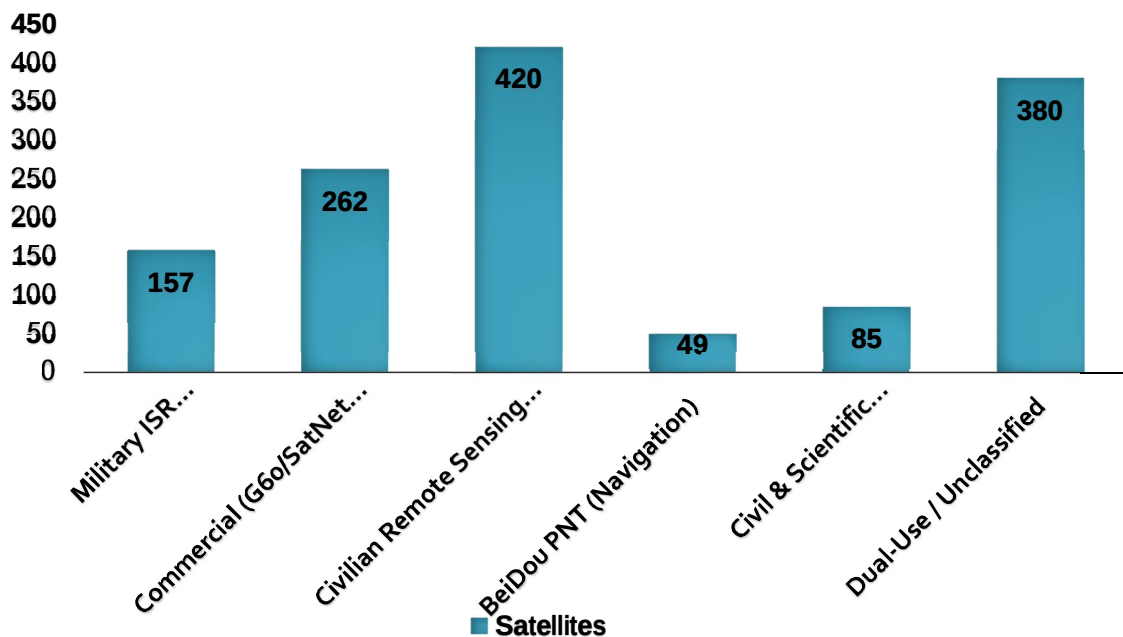
"BeiDou's military utility is best understood within China's broader full-spectrum satellite architecture, which by 2025 comprised approximately 1,060 operational satellites as of end-2024, rising to an estimated 1,353 by end-2025 across six strategic categories, as illustrated in Figure 11 below (the two figures reflect different reference dates and should be cited as such)."

¹ Kevin Pollpeter, *To Be More Precise: BeiDou* (China Aerospace Studies Institute, May 2024), 36–37.

² Chinese State Council Information Office, *China's BeiDou Navigation Satellite System*, White Paper (Beijing: SCIO, 2016), <http://en.beidou.gov.cn/SYSTEMS/WhitePaper/>.

³ U.S.-China Economic and Security Review Commission, *2025 Annual Report to Congress*, 377.

Figure 5: China's Active Satellite Fleet by Category, 2025.



Sources: U.S. Space Force, *Space Threat Fact Sheet (2025)*; U.S.-China Economic and Security Review Commission, *2025 Annual Report to Congress*; China National Space Administration, *January 2026*; World Population Review, *Military Satellites by Country 2026*

The geostrategic dimension extends beyond military applications into the architecture of global technology dependence. China has actively promoted BeiDou adoption across Belt and Road Initiative partner states, offering receiver technology, ground station infrastructure, and technical training. The 2016 White Paper explicitly committed to "start providing basic services to countries along the Silk Road Economic Belt and 21st-Century Maritime Silk Road in 2018."⁴ As Dolman observed in his interview: "if you take GPS alone, a couple of nuclear weapons exploded above the atmosphere at high altitude, GPS goes blind for years. The entire economy of any country that relies on GPS goes dark."⁵ By building BeiDou dependency into the PNT infrastructure of BRI partners, China is constructing precisely the structural leverage Strange identified as the most durable form of power, the capacity to shape the framework conditions within which all other actors operate. BeiDou's military utility is best understood within the broader architecture of China's full-spectrum satellite fleet, which by 2025 comprised over 1,060

⁴ Chinese State Council Information Office, "Full Text of White Paper on China's Space Activities in 2016," sec. III.3.

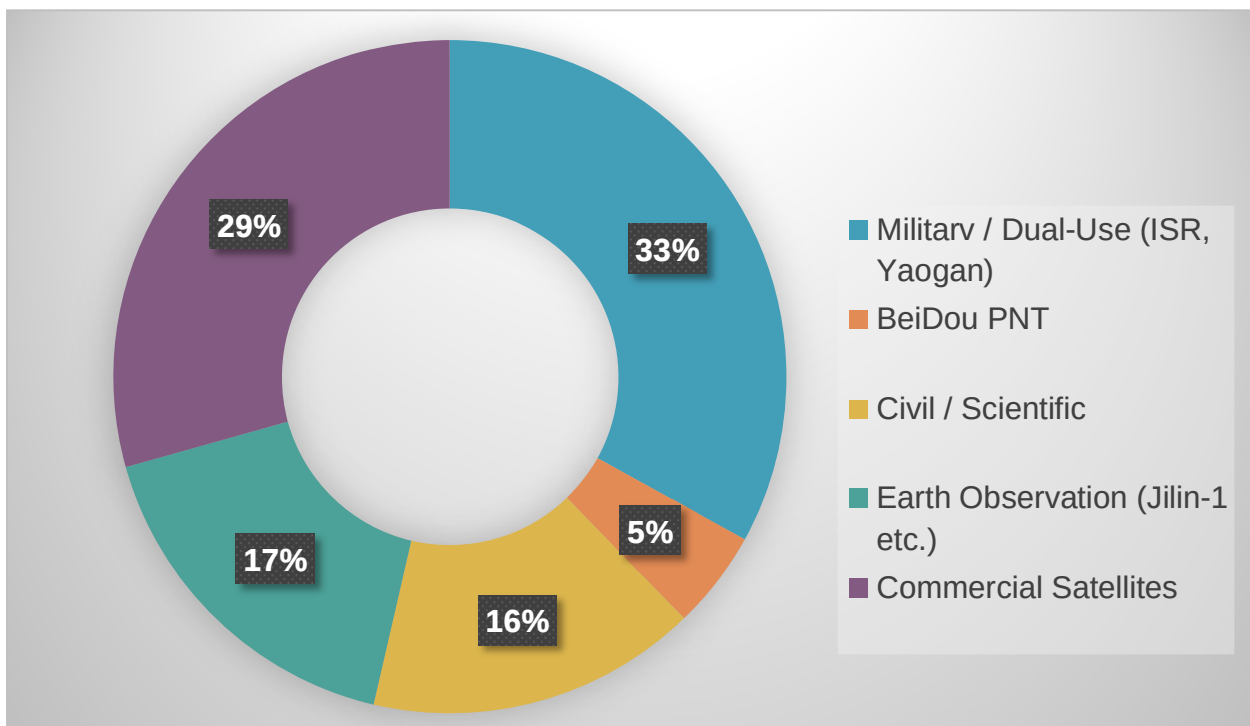
⁵ Dolman, interview

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operational satellites, of which approximately 350 serve confirmed military or dual-use ISR roles, a fleet composition that reflects the same MCF logic of deliberate structural ambiguity.

An earlier assessment, classified as part of this thesis's source corpus, argued that the funds invested in BeiDou "could probably have been better spent on other types of satellites that could provide asymmetric advantage."⁶ That judgement, analytically defensible in its period context, illustrates exactly the path-dependence logic that distinguishes China's command-economy approach: the willingness to absorb short-term opportunity cost for capabilities whose full strategic payoff lies one to two decades in the future. BDS-3's global operational maturity validates the investment in retrospect.

Figure 6: China Active Satellite Fleet by Function (2025)



Sources: CNSA (2026); *Indian Defense News* (2026) 1,060+ total operational satellites

3.3. Mars and Deep Space: From Catch-Up to Strategic Initiative

⁶ Charles Cunningham, "China as a Military Space Competitor," CSIS Analysis Paper (Washington, DC: Center for Strategic and International Studies, early 2000s), 3. https://csis-website-prod.s3.amazonaws.com/s3fs-public/legacy_files/files/media/csis/pubs/040801_china_space_competitor.pdf.

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China's entry into Mars exploration marks the transition from replication to proactive strategic initiative. Tianwen-1, launched July 2020, executed orbital insertion in February 2021 and deployed the Zhurong rover on 15 May 2021, making China only the second country in history to successfully land and operate a rover on Mars.⁷ The 2016 White Paper articulates the overarching telos of this program with ideological clarity: the goal is to "build China into a space power in all respects, with the capabilities to make innovations independently, to make scientific discovery at the cutting edge, to promote strong and sustained economic and social development, to effectively guarantee national security, to exercise sound and efficient governance, and to carry out mutually beneficial international exchanges."⁸

This multi-dimensional formulation, science, security, governance, and diplomacy as simultaneous and integrated objectives, is the operational definition of *zonghe guoli*: comprehensive national strength, synthesizing material capabilities and normative authority into the architecture of durable great-power status. Whether the near-term economic return on Mars exploration justifies its cost, a question Süss answered with characteristic scepticism regarding the short-term viability of extraterrestrial resource exploitation⁹, is analytically secondary to the long-term structural positioning that sustained, independent deep-space capability provides.

The subsequent program projects a Chinese Mars sample return mission with ascent and Earth re-entry capability, followed by crewed Mars missions in the 2030s–2040s timeframe.¹⁰

What distinguishes China's deep-space program from the Soviet precedent, and from what a simple capability-catching narrative would suggest, is the strategic inversion that Hickman identifies in his interview as "a development of considerable strategic significance": when the United States was pursuing the Lunar Gateway (an orbital station around the Moon) as its primary lunar architecture, China announced it would instead pursue a surface lunar base. "It was subsequently the United States that had to recalibrate its own strategy in response."¹¹ For the first time in the history of the space age, the established power was observing the challenger's declared

⁷ U.S.-China Economic and Security Review Commission, *2025 Annual Report to Congress*, 398–400.

⁸ Chinese State Council Information Office, "Full Text of White Paper on China's Space Activities in 2016," sec. I.2,

⁹ Süss, interview.

¹⁰ U.S.-China Economic and Security Review Commission, *2025 Annual Report to Congress*, Figure 5, 404.

¹¹ Hickman, interview.

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ambition and adapting accordingly, a structural inversion that signals the degree to which China's deep-space program has moved from reactive catch-up to proactive strategic initiative.

From the perspective of Dolman's astropolitical framework, the expansion into deep space is analytically consistent with the logic that underpins the entire Chinese space program: the systematic construction of sovereign presence across every domain that could become a "commanding height" of strategic competition. Whether the near-term economic return on Mars exploration justifies its cost, a question that Süss, in her interview, answered with characteristic scepticism regarding the short-term economic viability of extraterrestrial resource exploitation,¹² is from the Chinese state's perspective, analytically secondary to the long-term structural positioning that sustained independent deep-space capability provides. As the 2016 White Paper states, China's space activities are designed to "provide strong support for the realization of the Chinese Dream of the renewal of the Chinese nation, and make positive contributions to human civilization and progress"¹³, a formulation that encodes the long-term horizon of Chinese strategic planning, and the identity-constitutive character of the space program's role within it.

Conclusion of Chapter Two

Chapter Two demonstrated that the Sino-American space rivalry is not a competition between two versions of the same type of space power, but between two structurally incompatible models of how space capability is organized, governed and projected internationally. This incompatibility is the empirical foundation of the thesis's central argument: that bifurcation is not a diplomatic accident but a consequence inscribed in the design of both powers' space architectures.

The United States model disperses authority through institutional pluralism, commercial dynamism, policy restrictions, and alliance-based governance. NASA's commercial programs from COTS to Artemis reflect a strategic choice to leverage market innovation as a force multiplier for national space power. This model's structural influence is evidenced by SpaceX's dramatic cost reductions for LEO launches, Starlink's proven military utility, and the expansion of the Artemis Accords to sixty-seven signatories by May 2026. The United States remains central to global space

¹² Süss, interview; Rebecca Levy, interview by Ikram Rouainia, Microsoft teams video call, March, 10, 2026.

¹³ Chinese State Council Information Office, "Full Text of White Paper on China's Space Activities in 2016," China Daily, December 28, 2016, Section I.2. http://english.scio.gov.cn/whitepapers/2017-01/10/content_40535777.htm.

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governance, not just in financial resources but also in network centrality, standard-setting power, and the ability to shape the frameworks in which partners operate. But the Wolf Amendment is still the model's greatest structural flaw: a congressional restriction that, through cascading positive feedback effects, created the very strategic autonomy it was meant to prevent, rendering Chinese exclusion the ILRS governance problem that Washington now confronts.

China's model is the opposite in structure. Military-Civil Fusion is not simply a policy program but a structural principle that erodes the institutional separation of civilian and military development, mobilizing the national innovation system in support of strategic aims while constraining the transparency that would allow external actors to distinguish civilian from military intentions. The Space Dream provides the ideological setting in which BeiDou, Tiangong, the Chang'e programs, and the ILRS are not presented as separate accomplishments but as interlinked parts of a consistent alternative governance order. Each of the separate architecture navigation, space station capability and lunar surface access, lessens China's strategic dependence on U.S.-led systems while enhancing Beijing's structural ability to offer alternatives to states disaffected with the current order.

The comparative study shows that what looks like a competition of capabilities is, at a deeper level, a competition over the institutional arrangements through which future space activity will be organized. All four dimensions of structural power identified by Strange production, finance, security and knowledge, are contested in the space domain, and each struggle involves a contest over governance norms and standards. The asymmetry laid bare in Morin and Tepper's network analysis, the structural centrality of the U.S. and the formation of alternative hubs of governance by China, is the institutional manifestation of the model incompatibility discussed in this chapter. The governance incompatibility is not secondary or incidental but the principal mechanism by which bifurcation works. Chapter Three will examine the way that this mechanism manifests in

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Space is no longer a marginal domain; it is the primary structural arena in which U.S.-China hegemonic competition is fought operationally, institutionally, and normatively. This chapter applies the theoretical architecture of Chapter Two to the empirical record. Section One diagnoses the rivalry's structural logic and the feedback cascade accelerating decoupling since 2007. Section Two examines how China's milestones, Tiangong, BeiDou, and Chang'e, are deliberate acts of institutional self-sufficiency, not scientific exploration. Section Three charts four scenarios for the space order through 2030. The central claim: this is not a second Cold War race, but a contest over who makes the rules.

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Section One: The Nature of Contemporary Space Rivalry

1. The New Space Race

1.1. Space Rivalry From Sputnik to Satellites over Mars: The Second Space Race and the Thucydides Logic in Orbit

The Second Space Race is not a metaphor. It is a structural condition, a hegemonic transition playing out across the most strategically elevated terrain humanity has ever contested. Where the First Space Race was a bilateral propaganda contest between two ideologically opposed superpowers whose space programs were extensions of their nuclear missile infrastructure, the contemporary Sino-American competition is something more complex and more dangerous: a fight for the architectural control of a domain on which the entire operational logic of modern warfare, global commerce, and political power now depends. Precision-guided munitions, financial transactions, drone operations, logistics coordination, and intelligence collection now depend on orbital infrastructure (every intelligence assessment relies on satellites) control over that infrastructure has accordingly become a precondition of contemporary military and economic power, which is why the rivalry is best understood through the lens of structural competition rather than prestige.

Hickman identifies four features that make the Second Space Race more consequential and harder to manage than the First. China's terrestrial geography intensifies its vertical ambition: blocked by the First Island Chain, space is an operational escape from containment, not a prestige domain. The economic stakes are, without Cold War precedent, the space economy projected at \$1.8 trillion by 2035, and China's Space Silk Road embeds BeiDou, satellite communications, and ground station infrastructure across 100-plus states as structural-power creation whose effects outlast any bilateral agreement.¹⁴ China cannot be exhausted by competitive spending: Hickman is direct, "China is not a mirror of the Soviet Union but a fully integrated economic powerhouse."¹⁵ Finally, the governance architecture has fractured; the thin shared floor of the OST, ISS, and

¹⁴ Space Foundation, *The Space Report 2025 Q2* (Colorado Springs: Space Foundation, 2025), 4–6; USCC, *2025 Annual Report*, 383–387.

¹⁵ John Hickman, interview by Ikram Rouainia, Zoom video call, April 20, 2026.

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UNCOPUOS has been displaced by the bifurcated Artemis-ILRS order, and as Süss warns, drawing on Bateman's historical research, diplomatic breakthroughs precede space cooperation, never the reverse.¹⁶ No such breakthrough is on the horizon.

The actors themselves have abandoned euphemism. NASA Administrator Nelson declared in January 2024: "It is a space race, and we better watch out,"¹⁷ and General Saltzman testified before the USCC in April 2025 that China's capabilities now threaten US military operations across every domain because the satellite architecture underpinning them is genuinely at risk.¹⁸ China recruits developing states not through ideology but through infrastructure delivery that Washington, constrained by ITAR and budget contraction, cannot match at scale.¹⁹ Dolman's assessment is the most precise summary of where the system stands: "The shift away from supporting the post-1945 liberal order... has weakened the U.S. claim to be the reluctant sheriff, and pushed other actors to invest more heavily in going their own way in space, reinforcing the very great-power rivalry I had hoped we might avoid."²⁰ The Thucydides Trap requires neither side to want war, only that both sides act rationally on their fear of the other. In orbit and on the approach to the Moon, that is precisely what they are doing.

Graham Allison's Thucydides Trap and A.F.K. Organski's Power Transition Theory together furnish the most analytically precise framework for understanding this rivalry. Organski established that the most dangerous moment in international politics is not the gap between a dominant and a rising power but the narrowing of that gap, the moment when the challenger's accumulating capability makes the dominant power's structural advantage feel genuinely threatened.²¹ Allison's historical survey of sixteen hegemonic transitions over five centuries found that twelve ended in war, identifying as the common structural driver the fear that Athenian power inspired in Sparta: "It was the rise of Athens," Thucydides wrote, "and the fear that this inspired in

¹⁶ Juliana Süss, interview by Ikram Rouainia, Zoom video call, May 4, 2026, citing Aaron Bateman's historical analysis of US-Soviet space cooperation milestones.

¹⁷ Bill Nelson, quoted in Politico, "It's a Space Race and We Better Watch Out," January 2, 2024

¹⁸ B. Chance Saltzman, testimony before the U.S.-China Economic and Security Review Commission, April 3, 2025 (Washington, DC: USCC, 2025).

¹⁹ Hickman, "Outer Space," 281–282.

²⁰ Everett C. Dolman, interview by Ikram Rouainia, Zoom video call, May 4, 2026

²¹ A.F.K. Organski, *World Politics* (New York: Knopf, 1958), 338–376; Ronald L. Tammen et al., *Power Transitions: Strategies for the 21st Century* (New York: Chatham House, 2000), 6–21.

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Sparta, that made war inevitable."²² Applied to the space domain, the diagnosis is sobering. The United States has built and maintained a rules-based space order, the 1967 Outer Space Treaty's non-appropriation norm, GPS as global public infrastructure, the International Space Station partnership, and the Artemis Accords, all reflecting Washington's structural interest in open access, commercial exploitation, and American technological primacy.²³ China, as the dissatisfied challenger in Organski's taxonomy, has spent three decades systematically building the capabilities to contest that order, and is now doing so with a velocity and ambition that has no Cold War precedent.

Dolman, whose work on astropolitical theory anticipates precisely this dynamic, identified the decisive inflection point in his interview for this thesis: "*We passed that Rubicon sometime after China's 2007 anti-satellite test. By then, the window for unchallenged U.S. orbital dominance had essentially closed.*"²⁴ China's January 2007 destruction of the Fengyun-1C weather satellite at 865 km altitude, generating over 3,500 trackable debris fragments in a single strike, was not a technology demonstration. It was a strategic declaration: that the United States could no longer assume sanctuary in orbit. Every satellite it depended on was, from that moment forward, a potential target. Dolman's framing of the Thucydidean logic is precise: "The argument there is very much informed by Thucydides and what people now call the Thucydides Trap. If the hegemon waits until the challenger is close to parity, the temptation to use force to preserve its status becomes very strong, and the rising power in turn expects resistance."²⁵ This is not abstraction. It is the operational condition of the current rivalry.

1.2. The Satellite Gap and What It Actually Means

The quantitative narrowing of the US-China satellite gap since 2010 provides the empirical foundation for this assessment. The United States maintained commanding numerical superiority

²² ²Graham Allison, *Destined for War: Can America and China Escape Thucydides's Trap?* (Boston: Houghton Mifflin Harcourt, 2017), 29–30; Thucydides, *History of the Peloponnesian War*, trans. Rex Warner (London: Penguin, 1972), bk. 1, sec. 23.

²³ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, January 27, 1967, 610 U.N.T.S. 205; NASA and U.S. Department of State, *Artemis Accords* (Washington, DC, 2020).

²⁴ Everett C. Dolman, interview by Ikram Rouainia, Zoom video call, May 4, 2026.

²⁵ Dolman, interview.

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throughout the period, growing from approximately 470 active satellites in 2010 to 9,641 by October 2025, a figure inflated primarily by SpaceX's Starlink commercial mega-constellation. China expanded from 57 satellites in 2010 to 1,353 by end-2025, an increase of 2,272 percent.²⁶ Excluding Starlink, the underlying US government and commercial satellite count is approximately 1,275, at which level the gap narrows substantially and the closing-gap dynamic of Organski's framework becomes structurally visible. China's military satellite constellation, reconnaissance, signals intelligence, electronic intelligence, and missile early warning platforms, has undergone what the US Space Force's own 2025 Space Threat Fact Sheet describes as an "explosive surge," tripling between 2019 and 2025.²⁷

What those numbers represent operationally is not abstract. Satellites now constitute the operational backbone of modern military power rather than instruments of prestige, integrating intelligence, surveillance, reconnaissance, and precision targeting into a single dependency structure. Every US precision strike relies on GPS signal integrity. Every carrier strike group's situational awareness depends on satellite surveillance. Every Special Forces operation relies on satellite communications that cannot be intercepted by terrestrial means. Dolman made the dependency explicit: "If you take GPS alone, if nuclear weapons detonated in lower orbit and irradiated the Van Allen belts, wiping out geostationary orbits, the world would go into a massive depression. Half of our business is down. Uber, just-in-time supply chains, all of our internet capabilities are based on GPS timing signals."²⁸ China understands this. Its entire counterspace strategy, kinetic ASAT weapons, directed energy systems, electronic jamming, cyber intrusion into satellite ground stations, and co-orbital "inspector" satellites capable of physically disabling adversary platforms, is designed to exploit precisely that dependency at the moment of maximum strategic effect.²⁹

²⁶ Union of Concerned Scientists (UCS), *Satellite Database* (multiple annual editions, 2010–2023); Look Up × Le Point, *Space Barometer*, October 2025; "China's Military Space Program Has Undergone Explosive Surge," *Indian Defence News*, January 3, 2026.

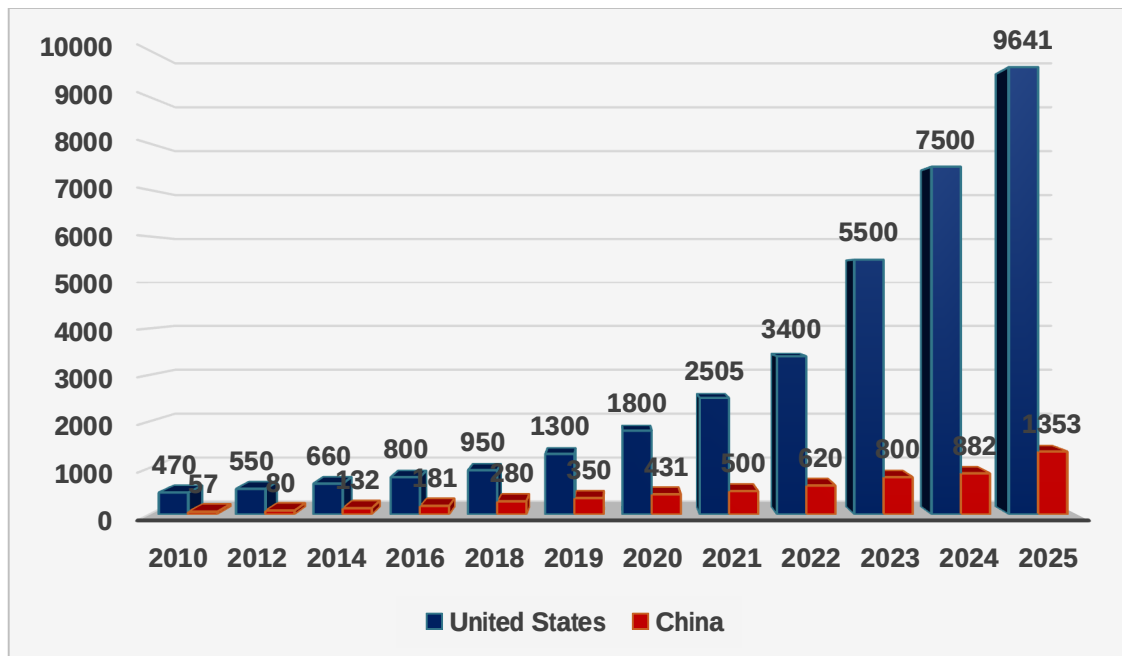
²⁷ U.S. Space Force, *Space Threat Assessment 2025* (Washington, DC: Department of the Air Force, 2025), 14–17.

²⁸ Dolman, interview.

²⁹ Brian Weeden and Victoria Samson, eds., *Global Counterspace Capabilities: An Open Source Assessment* (Washington, DC: Secure World Foundation, 2025), 1-1–1-28.

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Figure 7: U.S. vs. China: Active Satellites, Closing Gap (2010-2025).



Sources: *Union of Concerned Scientists (UCS) Satellite Database (multiple annual editions, 2010–2023); U.S. Space Force, Space Threat Fact Sheet (2025); Look Up × Le Point Space Barometer, October 2025; Indian Defense News, 'China's Military Space Program Has Undergone Explosive Surge,' January 3, 2026.*

The 2025 USCC Annual Report documents with unusual specificity China's development of ground-based laser systems capable of blinding reconnaissance satellites, high-powered microwave weapons designed to permanently damage satellite electronics, and a co-orbital satellite program in which Chinese platforms maneuver into proximity with US military satellites and remain there, a capability that functions simultaneously as intelligence collection, as intimidation, and as a pre-positioned strike asset.³⁰ These are not future capabilities. They are deployed, operational systems. These systems are already deployed and operational, indicating that counterspace competition is a present structural condition rather than a prospective scenario.

³⁰ U.S.-China Economic and Security Review Commission (USCC), *2025 Annual Report to Congress* (Washington, DC: U.S. Government Publishing Office, 2025), 377–382.

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The cybersecurity dimension is inseparable from the satellite competition. Satellite ground stations are soft targets: they run commercial software, connect to civilian internet infrastructure, and are operated by contractors with variable security cultures. In 2022, the Viasat cyberattack, attributed to Russian GRU, disabled tens of thousands of satellite terminals across Ukraine and Europe within hours of the invasion's launch, demonstrating that degrading space capabilities does not require a missile.¹ China's cyber operations against satellite ground infrastructure, documented by CISA and the NSA in their 2023 joint advisory, follow the same strategic logic: exploit the terrestrial vulnerability of an orbital system whose hardware is beyond reach. The satellite, the ground station, the datalink, and the user terminal form a single attack surface, and China's People's Liberation Army Strategic Support Force (PLASSF), whose Space Systems Department controls both offensive counterspace and cyber operations, is designed to exploit all four simultaneously.²

1.3. The Lunar South Pole: Water, Minerals, and the Next Strategic Frontier

The race for the lunar south pole is the competition's most consequential dimension and its most underrealized. The permanently shadowed craters of the south pole contain an estimated 600 billion kilograms of water ice, confirmed by NASA's LCROSS and LRO missions and India's Chandrayaan-1 radar data.³ Water ice, when electrolyzed, yields hydrogen and oxygen, rocket propellant. A state that establishes a permanent, fueled presence there controls the strategic high ground of the entire cislunar domain: propellant depots at the Lagrange points, rapid access to geosynchronous orbit, and long-term power-projection capacity toward Mars. Dolman's formulation is exact: "Who controls low-Earth orbit controls near-Earth space. Who controls near-Earth space dominates Terra. Who controls the Moon controls near-Earth space."⁴ The South Pole is the pivot of that entire hierarchy.

¹ Cybersecurity and Infrastructure Security Agency (CISA) and National Security Agency (NSA), Joint Advisory: *People's Republic of China State-Sponsored Cyber Actor Activity* (Washington, DC, 2023).

² USCC, *2025 Annual Report*, 377–382; U.S. Space Force, *Space Threat Assessment 2025*, 22–26.

³ NASA, "NASA's LCROSS Finds Water on the Moon," press release, November 13, 2009; M. Choukroun et al., "Water Ice in the Lunar South Pole Region," *Nature Geoscience* 15 (2022): 14–20.

⁴ Everett C. Dolman, *Astropolitik: Classical Geopolitics in the Space Age* (London: Frank Cass, 2002), 69.

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The resource case extends beyond water. The lunar regolith contains helium-3, a fusion fuel of exceptional energy density with a negligible terrestrial supply and rare earth elements whose terrestrial extraction carries severe environmental and geopolitical costs. China's Chang'e-5 mission returned 1.731 kilograms of lunar samples in December 2020, confirming the presence of water molecules in volcanic material and directly validating the case for crewed south pole operations.¹ Chang'e-7 (2026) will deploy a probe into permanently shadowed craters to directly sample water ice; Chang'e-8 (2028) will test in-situ resource extraction. The ILRS framework targets a permanent crewed south pole base by 2035 a timeline the NASA Inspector General and Government Accountability Office assess as more credible than Artemis III, whose target date has slipped to 2027 at earliest amid propulsion, spacesuit, and lander delays.² The Artemis Accords' normative architecture, establishing resource extraction as consistent with the OST's non-appropriation principle, was designed precisely to pre-empt Chinese occupation of the most valuable sites.³ NASA Administrator Nelson stated publicly in 2023: "We must be very concerned that China is landing on the Moon and saying it's theirs,"⁴ a statement that marks the Thucydidean fear dynamic becoming explicit at the institutional level.

2. Power Transition and Strategic Decoupling in Space

Strategic decoupling in space follows an identifiable causal logic. China's exclusion from the ISS, formalized through the Wolf Amendment of 2011, triggered the positive-feedback cascade Hickman identifies as transformative: "China, as an emerging revisionist power with an acute historical sensitivity to perceived humiliation, was particularly susceptible to interpreting the Wolf Amendment as a deliberate act of strategic exclusion."⁵ The sequence that followed was not reactive improvisation but structural reconfiguration: Tiangong-1 (2011), Tiangong-2 (2016), a permanently crewed national station (2022), and BeiDou's operational completion (2020),

¹ Hejiu Hui et al., "A Hydrated Upper Mantle of the Moon Imaged by Chang'E-5 Lunar Sample Return," *Nature Geoscience* 15 (2022): 12–13.

² NASA Office of Inspector General, *NASA's Management of the Artemis Missions* (Washington, DC, 2023), IG-24-002; USCC, *2025 Annual Report to Congress* (Washington, DC: U.S. Government Publishing Office, 2025), 389–391.

³ NASA and U.S. Department of State, *Artemis Accords* (Washington, DC, 2020), secs. 10–11.

⁴ Bill Nelson, quoted in Politico, "NASA Chief Warns of Chinese Moon Ambitions," January 2, 2024.

⁵ Hickman, interview.

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eliminating China's navigational dependency on GPS, a vulnerability Chinese strategists had identified as critical since the United States selectively degraded GPS signals during the 1999 Kosovo crisis.¹ In Strange's structural-power framework, BeiDou is not a navigation system; it is an act of leverage elimination and leverage creation simultaneously, a vector of U.S. control removed, a new vector of Chinese influence extended to the 120 states that had signed BeiDou cooperation agreements by 2019.² The Artemis Accords (2020) and the ILRS framework (2021) institutionalized the fracture normatively: two incompatible governance architectures, each encoding the preferences of its lead state, now competing for the allegiance of every actor yet to choose.

Russia's role in this decoupling dynamic requires precise qualification. As both Süss and Hickman emphasized, Russia is the junior and increasingly dependent partner in the China-Russia space axis not a co-equal. Süss was unambiguous: "Russia is still a space power, but its glory days are very much over. We see a declining space industry outdated capability, constellations that cannot be maintained, delayed projects, sanctions that restrict access to components, brain drain, corruption. China has overtaken Russia in pretty much every aspect."³ Hickman's categorization is equally direct: Russia fits the analytical profile of "the least of the great powers" a state lacking the structural capacity for autonomous great-power action, compelled to align with the stronger revisionist pole.⁴ Russia contributed nominal co-leadership to the ILRS founding and signed a nuclear reactor cooperation agreement with China for the lunar station in May 2025, but its contribution is increasingly legitimizing rather than technical: Russian co-sponsorship signals to Global South states that the China-led framework is not exclusively a Chinese project, lowering the political cost of alignment. As Dolman assessed, the structural drift is now self-reinforcing: "these changes have pushed other actors, China, Russia, India and Europe to invest more heavily in going their own way in space, reinforcing the very great-power rivalry I had hoped we might avoid."⁵ Russia accelerates that dynamic not by adding capability, but by adding cover.

¹ State Council, *China's BeiDou Navigation Satellite System* (Beijing, 2016).

² USCC, *2025 Annual Report to Congress*, 383–384.

³ Süss, interview.

⁴ Hickman, interview.

⁵ Dolman, interview.

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3. From Periphery to Participant: The Global South in the Emerging Space Order

The most consequential and analytically underexplored dimension of the contemporary space rivalry is the active competition for the institutional and strategic alignment of Global South states. In the Cold War, developing states were largely passive objects of superpower space diplomacy: beneficiaries of satellite communications assistance or symbolic gestures of scientific cooperation calibrated to serve great-power interests rather than developmental priorities.¹ Today, they are active participants: signatories of competing governance frameworks, recipients of rival infrastructure investments, and operational users of space technologies whose provider choice carries direct structural implications for the distribution of global power.² As Hickman observed, "Countries in the Global South cheering China's achievements are unlikely to emulate its regime structure in toto, though they might be tempted by the sophistication of its domestic surveillance apparatus", a judgment that simultaneously marks the ideological ceiling and the material floor of Chinese influence.³ The contest for Global South alignment is not a sideshow to U.S.-China space rivalry; it is increasingly its decisive theater.

3.1. The Artemis Accords: Normative Architecture as Structural Power

The Artemis Accords coalition's expansion into the Global South is a deliberate normative strategy, not merely diplomatic outreach. The founding eight signatories in October 2020 were all established spacefaring democracies aligned with Washington.⁴ The strategic turn to the developing world came in December 2022, when Nigeria and Rwanda became the first African signatories at the inaugural U.S.-Africa Space Forum in Washington. NASA Administrator Bill

¹ U.S.-China Economic and Security Review Commission, *2025 Annual Report to Congress* (Washington, DC: U.S. Government Publishing Office, 2025), 383.

² John Hickman, "Outer Space," in *The Return of Geopolitics*, ed. Albert J. Bergesen and Christian Suter (Berlin: LIT Verlag, 2018), 281.

³ John Hickman, "Outer Space," 281.

⁴ NASA, "NASA Welcomes Nigeria, Rwanda as Newest Artemis Accords Signatories," press release, December 13, 2022, <https://www.nasa.gov>.

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Nelson framed the moment with unmistakable intent: *"As the first African nations to sign the Artemis Accords, Nigeria and Rwanda exemplify the global reach of the accords and are demonstrating their leadership in space exploration."*¹ The White House simultaneously presented the signings as a component of a broader geopolitical reorientation strategy, signaling that space alignment was an instrument of statecraft, not merely science.²

Subsequent expansion has been systematic and geographically calibrated. Seventeen countries signed in 2024 alone. In October 2025, Malaysia and the Philippines signed during President Trump's visit to Kuala Lumpur for the ASEAN Summit, a deliberate deployment of presidential diplomatic capital in the Indo-Pacific theater.³ Hungary signed on October 22, 2025, during Foreign Minister Péter Szijjártó's Washington visit, demonstrating the Accords' dual function as both a governance instrument and a political alignment mechanism.⁴ The Gulf states reveal the Accords' expansion logic with particular clarity. Saudi Arabia, a signatory since 2022 signed a landmark bilateral framework with NASA in July 2024 across space science, Earth observation, and aeronautics, and in May 2025 agreed to fly its first satellite under the Artemis II mission dedicated to space weather research.⁵ The UAE, a founding signatory since 2020, pursued a more complex trajectory: it signed a memorandum of understanding to fly its Rashid II rover on China's Chang'e-7 mission, an agreement that subsequently collided with U.S. International Traffic in Arms Regulations (ITAR), illustrating with precision the structural tension inherent in Gulf states' hedging posture, the ambition to straddle both frameworks runs directly against U.S. export control law, which functions as a de facto constraint on multi-alignment.⁶

¹ NASA, "NASA Welcomes Nigeria, Rwanda as Newest Artemis Accords Signatories," press release, December 13, 2022, <https://www.nasa.gov>.

² White House, "Statement: Strengthening the U.S.-Africa Partnership in Space," December 13, 2022, <https://bidenwhitehouse.archives.gov/briefing-room/statements-releases/2022/12/13/statement-strengthening-the-u-s-africa-partnership-in-space/>.

³ NASA, "NASA Celebrates Five Years of Artemis Accords, Welcomes 3 New Nations," press release, November 19, 2025, <https://www.nasa.gov/organizations/oii/artemis-accords/>.

⁴ NASA, press release, November 19, 2025, <https://www.nasa.gov/organizations/oii/artemis-accords/>.

⁵ "Saudi Arabia, US Agree to Boost Bilateral Cooperation in Space for Peaceful Purposes," *Asharq Al-Awsat*, July 2024; "Saudi Arabia to Launch First Space Weather Satellite under Artemis II Mission," *Zawya*, May 14, 2025.

⁶ Bayly Winder, "Space Sector Developments across the GCC," Middle East Institute, November 2022; Minnie Chan, "UAE Straddles the Line between the U.S. and China in Space," *Axios*, October 11, 2022.

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The Accords' structural logic is prospective. By establishing transparency obligations, interoperability requirements, and resource-utilization norms before any actor has established physical presence on the Moon, the United States is constructing the governance architecture within which all future participants will find themselves already operating. States that sign before facts-on-the-ground are established participate in norm-shaping; states that sign after will accept norms they had no role in designing.

That logic has been operationally demonstrated in Ukraine. Since February 2022, Ukraine has relied on Starlink for military communications, drone operations, and civil service continuity.¹ In February 2026, at Ukraine's request, SpaceX deactivated all Starlink terminals in the conflict zone except those whitelisted by Ukraine's Defense Ministry, denying Russian forces satellite internet they had been exploiting for drone targeting and frontline coordination. Russian military bloggers reported the disruption reduced offensive capacity by approximately fifty percent in affected sectors.² The episode, a private corporation exercising structural power over the information environment of a great-power conflict illustrates precisely what Dolman described: "If nuclear weapons detonated in lower orbit and irradiated the Van Allen belts, wiping out geostationary orbits, the world would go into a massive depression. Half of our business is down. Uber, just-in-time supply chains, all of our internet capabilities are based on GPS timing signals."³ For Global South states observing this episode, the lesson is unambiguous: U.S.-aligned space infrastructure confers decisive operational capabilities, but creates dependencies whose terms are set in Washington, not in Abuja or Nairobi.

3.2. The ILRS Coalition: Infrastructure Dependency as Strategic Architecture

China's strategy for recruiting Global South partners to the International Lunar Research Station framework is architecturally different. Where the Accords rely on normative alignment, China's approach combines the ILRS governance framework with a dense prior web of bilateral satellite services, infrastructure investments, and technology-dependency creation through the Space Silk Road, the spatial dimension of the Belt and Road Initiative. The sequencing is

¹ BBC, "Musk Cuts Starlink Access to Russian Forces," February 18, 2026.

² CNN, "Starlink Terminals Used by Russia Disconnected," February 5, 2026.

³ Everett C. Dolman, interview with Ikram Rouainia, May 2026.

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deliberate: bilateral launch agreements, BeiDou integration, ground station hosting, and technology transfer precede ILRS membership, generating path-dependent relationships that render alignment with the Chinese framework the path of least resistance for states already embedded in China's technological ecosystem.¹ The ILRS is not the entry point of Chinese influence in the Global South; it is its institutionalization after influence has already been structurally embedded.

As of April 2025, seventeen countries and organizations had formally joined the ILRS alongside more than fifty research institutions.² The membership list is a systematic catalog of prior bilateral cultivation: Venezuela (July 2023, the first partner China launched its VRSS-2³ Each accession was preceded by existing bilateral space relationships; the ILRS expansion strategy is not a recruitment campaign but a formalization exercise, converting bilateral dependencies into multilateral institutional commitments.

China's ground infrastructure network is the most direct material expression of this structural-power strategy. The USCC's 2025 Annual Report documents Chinese-operated stations across South America, Africa, Asia, and the Middle East a geographic footprint that traces China's BRI investment portfolio with striking fidelity.⁴ The Neuquén station in Argentina, opened in 2017 under a fifty-year tax-free lease operated exclusively by China's CLTC closely linked to the PLA's Space Systems Department is paradigmatic: Argentina receives access to just ten percent of the facility's operational time, is contractually barred from interfering with its activities, and the site sits within a sixty-two-mile frequency exclusion zone under Chinese control.⁵ The host state provides territory and political legitimacy; China retains operational control and intelligence access.

¹ U.S.-China Economic and Security Review Commission, *2025 Annual Report*, 383–387.

² China National Space Administration, "International Lunar Research Station Attracts More Partners," press release, April 24, 2025.

³ Stephen Clark, "China Launches Remote Sensing Satellite for Venezuela," *Spaceflight Now*, October 9, 2017; Andrew Jones, "Senegal Among New Members of China's ILRS Moon Base Project," *SpaceNews*, September 5, 2024.

⁴ U.S.-China Economic and Security Review Commission, *2025 Annual Report*, 386.

⁵ Carlo J. V. Caro, "The Patagonian Enigma," *The Diplomat*, January 8, 2024.

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3.3. BeiDou as Geopolitical Instrument: From the Gulf to the Battlefield

General Saltzman's USCC testimony captures the structural logic with precision: "Other countries' choices to adopt BeiDou are not merely technology issues, but also reflect deeper geopolitical alignment."¹ By embedding BeiDou into third-country navigation infrastructure, agricultural monitoring, transportation logistics, and Internet of Things ecosystems, China creates long-term dependencies explicitly designed to displace the GPS dependencies that have historically served the same structural function for the United States.²

Across the Arab world, BeiDou's penetration is deep and institutionally anchored. China has convened five China-Arab States BeiDou Cooperation Forums since 2017, more than twice the frequency of equivalent forums with any other regional grouping.³ In Saudi Arabia and Iraq, BeiDou serves resource exploration and emergency management in the energy sector. In Kuwait and Qatar, vehicle navigation and port scheduling infrastructure, including logistics systems of the Gulf's major transshipment hubs operate on BeiDou. In Egypt and the UAE, BeiDou underpins smart city engineering surveying and machinery control. In Algeria, a national BeiDou Continuously Operating Reference Station (CORS) network delivers centimeter-level positioning accuracy, substantially exceeding GPS baseline performance.⁴ The December 2025 launch of Arab Satellite 813 the first joint Arab satellite project, led by the UAE's National Space Science and Technology Center and deployed by China's CAS Space aboard a Lijian-1 rocket from Jiuquan carried payloads for the UAE, Egypt, and Nepal, and was described by China's Shanghai Engineering Center for Microsatellites as "a new milestone in China-UAE space cooperation."⁵ The UAE's simultaneous status as a founding Artemis signatory is not incoherence but calibrated multi-alignment: extracting capabilities from each framework that the other cannot provide.

¹ B. Chance Saltzman, testimony before the U.S.-China Economic and Security Review Commission, April 3, 2025.

² Susan Strange, *States and Markets* (London: Pinter, 1988), 24–34; U.S.-China Economic and Security Review Commission, *2025 Annual Report*, 383–384.

³ Lin Luzhou, "China and Arab States Promote BeiDou via Space Silk Road," *China Daily*, November 7, 2025.

⁴ Lin Luzhou, *China Daily*, November 7, 2025.

⁵ "Arab Satellite 813: Middle East's First Hyperspectral Mission Launched," *SpaceTech Gulf*, December 9, 2025; "Satellite Launch Marks Milestone in China-UAE Space Cooperation," *China Daily*, December 13, 2025.

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The Iran case is the most analytically significant demonstration of BeiDou's operational-geopolitical function. In early 2025, Iran began migrating its national positioning infrastructure from GPS to BeiDou. Deputy Minister of Communications Ehsan Chitsaz stated publicly that "the BeiDou system not only has an advanced architecture and high positioning accuracy, but, crucially, its control lies entirely in China's hands, rather than being subject to U.S. oversight."¹ The rationale is unambiguous: BeiDou's operational continuity cannot be degraded by U.S. sanctions, export controls, or selective signal denial. By early 2026, Iranian military forces had substantially completed the transition to BeiDou-3 as their primary navigation system.² The operational consequences materialized directly during Iran's twelve-day conflict with Israel in June 2025. Former French intelligence director Alain Juillet assessed it "likely that Iran has been provided access to China's BeiDou satellite navigation system because its targeting has become much more accurate" Iranian ballistic and cruise missiles demonstrated markedly improved precision compared to 2023–2024 strikes, with several penetrating Israeli air defenses and striking targets in central Tel Aviv.³ Professor Bleddyn Bowen of Durham University corroborated the assessment: "This will significantly help Iran's targeting system if they are using China's chips and the BeiDou system."⁴ The technical dimension is decisive: BeiDou-3's B3A signal employs frequency-hopping and Navigation Message Authentication that render it effectively immune to the GPS jamming and spoofing Israel had successfully deployed against Iranian GPS-guided drones in 2025.⁵ The United States can deny Iranian forces GPS access; it possesses no equivalent capability against BeiDou. The Iran-BeiDou-Israel triangle demonstrates with operational precision that space infrastructure alignment is a strategic decision with direct kinetic consequences on the terrestrial battlefield.

3.4. The Competitive Dynamic: Vacuum, Hedging, and Path Dependence

¹ "Iran Ready to Ditch GPS for China's BeiDou," *The China Academy*, July 31, 2025.

² Iran International, "Iran Confirms GPS Jamming, Eyes Switch to Chinese System," January 5, 2026; Al Jazeera, "Could Iran Be Using China's Highly Accurate BeiDou Navigation System?," March 11, 2026.

³ Al Jazeera, "Could Iran Be Using China's Highly Accurate BeiDou Navigation System?," March 11, 2026.

⁴ National Security News, "Iranian Drone and Missile Accuracy Is Dependent on Russian and Chinese Satellites," April 26, 2026.

⁵ Patricia Marins, quoted in bne IntelliNews, cited in Al Jazeera, March 11, 2026.

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The competition for Global South partners has intensified as Trump administration budget cuts eroded U.S. soft power. A Reuters investigation published in May 2025 documented a systematic substitution dynamic: U.S. withdrawal from development assistance creates vacuums that Chinese space cooperation agreements are structurally positioned to fill.¹ Ethiopia is paradigmatic: China launched its first satellite in December 2019; two major Ethiopian space institutions joined the ILRS in April 2024, at precisely the moment U.S. aid relationships were being curtailed.²

Nigeria and Algeria illustrate the two principal strategies available to middle-tier developing states: hedging and path dependence. Nigeria signed the Artemis Accords in December 2022 while maintaining deep Chinese satellite cooperation China launched NigComSat-1, Nigeria's first communications satellite, in May 2007.³ This dual alignment represents rational optionality preservation: a deliberate refusal to foreclose either great-power relationship before the structure of the emerging order justifies irreversible commitment.

Algeria's trajectory illustrates path dependence with precision. China launched Alcomsat-1, Algeria's first telecommunications satellite, in December 2017, including engineer training that embedded Chinese technical standards into Algeria's space workforce.⁴ The relationship was formalized in the second five-year strategic cooperation plan signed by Foreign Ministers Lamamra and Wang Yi on November 9, 2022, explicitly identifying space as a priority domain.⁵ In July 2023, Algeria ordered ALSAT-3A and ALSAT-3B from CAST in partnership with CGWIC.⁶ Both were delivered in a single calendar month at the opening of 2026: ALSAT-3A on January 15, ALSAT-3B on January 30, both launched aboard Long March-2C rockets from

¹ Joey Roulette et al., "China Builds Space Alliances in Africa as Trump Cuts Foreign Aid," *Reuters*, May 21, 2025.

² Zhao Lei, "Chinese Rocket Sends Ethiopia's 1st Satellite into Space," *China Daily*, December 20, 2019; Ling Xin, "2 Major Space Institutes in Africa Join China-Led Moon Project," *South China Morning Post*, April 20, 2024.

³ Chris Bergin, "China Launches First Communications Satellite for Nigeria," *NASASpaceflight*, May 13, 2007; U.S.-China Economic and Security Review Commission, *2025 Annual Report*, 383–387.

⁴ *Satellite Today*, "Algeria Joins the Space Club with New Satellite in Orbit," December 11, 2017.

⁵ Ramtane Lamamra and Wang Yi, "Second Five-Year Comprehensive Strategic Cooperation Plan between Algeria and China 2022–2026," signed November 9, 2022 (Algiers: Algerian Ministry of Foreign Affairs, 2022),

<https://www.mfa.gov.dz>.

⁶ BroadcastPro ME, "Algeria Launches ALSAT-3A Earth Observation Satellite," January 2026, <https://www.broadcastprome.com>.

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Jiuquan.¹ Simultaneously, on January 26, 2026, Algeria Télécoms Satellite and ASAL signed two memoranda with Geespace covering satellite-connected IT devices and low-orbit satellite production cooperation.² Algeria has signed neither the Artemis Accords nor joined the ILRS as a formal partner it occupies the hedging position common among North African states while progressively deepening space infrastructure ties with China in ways that raise the cost of reorientation. Beijing's delivery of both satellites within a single month at the outset of intensifying great-power competition for Global South alignment is not incidental logistics: it is demonstration of delivery capacity as an instrument of strategic communication, addressed not only to Algiers but to every developing state watching the contest for its alignment.

Süss identified the deeper structural dynamic with precision: "Historically, major diplomatic breakthroughs on Earth often come first, and symbolic space cooperation follows—not the other way around."³ The battle for developing-world alignment in space is, at its foundation, a contest for economic dependency, diplomatic loyalty, and institutional membership that operates through space services and framework agreements a continuation, in a new domain, of the geopolitical competition that has structured international politics since decolonization, now extending from the Earth's surface to its orbital environment and, prospectively, to the surface of the Moon.⁴

Section Two: Implications for Global Leadership and Governance

1. Rethinking Global Power in the space Age.

1.1. From Terrestrial Hegemony to Orbital Structural Power

The emergence of outer space as a primary arena of great-power rivalry compels a fundamental revision of how power is theorized, measured, and contested. Classical definitions of hegemony centered on territorial control, military dominance, and economic productivity are no

¹ Space in Africa, "Algeria Launches Its Next Generation Earth Observation Satellite ALSAT-3A," January 15, 2026; *China Daily*, "China, Algeria Expand Space Cooperation with New Satellite," January 31, 2026.

² Algérie Presse Service, "Algeria, China Seal Two Cooperation Memoranda in Spatial Technologies," January 28, 2026, <https://www.aps.dz>.

³ Juliana Süss, interview with Ikram Rouainia, zoom video call, 04/05/2026.

⁴ Dolman, interview by Ikram Rouainia, zoom video call, 04/05/2026.

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longer analytically sufficient. As John Hickman argues, national space programs now function as indices of relative power comparable in strategic significance to the railroad and telegraph lines that decided the outcome of the Franco-Prussian War: the power that commands them commands the operational tempo of modern conflict and the architecture of the global information economy.¹ The transition from the first space race, a bipolar sprint for prestige and nuclear signaling to the current multipolar competition is not a quantitative escalation but a qualitative structural shift. Susan Strange's framework of structural power captures this shift with particular precision: the United States does not merely possess more satellites than its competitors; it has constructed the frameworks, GPS infrastructure, spectrum allocation norms, satellite insurance markets, and the Artemis Accords normative architecture, within which every other actor must² The challenge posed by China is accordingly not simply a capability challenge; it is a challenge to the structural frameworks themselves, waged simultaneously across the security, production, finance, and knowledge structures that Strange identifies as the four pillars of structural dominance.

This reconfiguration of structural power has a spatial and institutional dimension that traditional power-transition theory does not fully capture. Hickman's classical realist analysis identifies the Lunar South Pole and the Earth-Moon Lagrange points as the next decisive terrain: as Earth's orbit has rewarded the three great powers with prestige, resources, markets, and strategic position, cislunar space is positioned to do the same in the coming decade.³ Both the Artemis Accords and the International Lunar Research Station (ILRS) are, on this reading, not scientific programs but mechanisms for de facto territorial pre-emption, work-around responses to the 1967 Outer Space Treaty's prohibition on national appropriation that seek to establish facts on the ground before any binding legal framework governs their use.⁴ As Hickman noted in interview, both frameworks are, in essence, "mechanisms for achieving that objective, even if neither is

¹ John Hickman: Great Power Competition in Space, 2025–2030, in Strategic Assessment 2025–26, Chapter 6 (Washington, DC: NDU Press, 2025), 211.

² Matthew Daniels, The History and Future of US–China Competition and Cooperation in Space (Laurel, MD: Johns Hopkins University Applied Physics Laboratory, 2020), 5–8.

³ Hickman, GPC in Space, 214–215.

⁴ Hickman, GPC in Space, 216; John Hickman, "Outer Space," Chapter 22, in Handbook of Great Power Competition (Abingdon: Routledge, 2024), 281–282.

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prepared to articulate it plainly."¹ Everett Dolman concurs, observing that the political and institutional structures of space governance have yet to catch up with the material stakes they are supposed to govern: "we are moving back into a world of open great-power competition in space, more intense than when I was writing, at exactly the moment when space has become indispensable to military operations and the global economy."²

2. Risks of Strategic Competition: Militarization, Deterrence, and Conflict Escalation

2.1. The Militarization of the Orbital Domain

The militarization of outer space is not a future risk but a present structural condition. As of 2022, three great powers operate 502 of the world's 594 military satellites 84.5 % of the total with ³ The strategic significance of this concentration cannot be overstated. Dolman's observation that modern conflict in Ukraine and Iran has demonstrated how "over-the-horizon drones, GPS for targeting, intelligence from space for battle damage assessment" have transformed the relationship between space assets and terrestrial warfare is not merely descriptive; it identifies the mechanism through which the destruction or degradation of space infrastructure translates directly into military defeat on the ground.⁴ Juliana Süss reinforces this point structurally: "space has become deeply integrated into the conduct of modern warfare it is not only a domain through which operations are supported, but a domain in which conflict can take place."⁵

The security dilemma logic that governs terrestrial great-power competition is, however, not directly transposable to the space domain. Süss cautions against treating the current dynamic as a "**classic security dilemma**" in which tit-for-tat reciprocal arming is the dominant dynamic: the depth of mutual dependency on space-based infrastructure for civilian and military functions complicates traditional escalation logic.⁶ A state that degrades an adversary's communications satellites does not merely impose military costs; it disrupts global financial markets, navigational

¹ John Hickman, interview Ikram Rouainia, 20,04,2026.

² Everett C. Dolman, interview by the author, 2026.

³ Hickman, GPC in Space, Table 6.2, 212.

⁴ Dolman, interview.

⁵ Süss, interview.

⁶ Süss, interview.

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systems, and the command-and-control infrastructure of third parties, creating a spiral of unintended consequences that no rational actor fully controls. The dual-use opacity of space infrastructure is, in Süß's assessment, the single most destabilizing governance problem: the lack of transparency and communication around satellites that maneuver suspiciously close to others, potentially eavesdropping, collecting signals, or pre-positioning for future interference, raises the risk of misinterpretation and worst-case assumption-making in ways that debris or even direct-ascent ASAT tests do not.¹

2.2. Counterspace Capabilities and the Escalation Ladder

The counterspace threat environment encompasses a spectrum of capabilities that differ materially in their escalatory potential. Direct-ascent ASAT weapons, demonstrated by China in 2007 and Russia in 2021, produce debris fields that persist for decades at altitudes where the most strategically critical satellites operate, making their operational use an act of self-inflicted systemic damage as much as a military strike.² Cokinetic capabilities, jamming, spoofing, laser dazzling, cyberattacks, and close-proximity orbital maneuvering offer a lower threshold of attribution and lower immediate escalatory cost, but they generate precisely the transparency deficit that Süß identifies as the primary source of instability: an adversary that cannot distinguish between routine orbital operations and pre-attack positioning faces structural incentives to act preemptively. Hickman identifies a further dimension: the availability of proxy actors, North Korea in particular, offers great powers a mechanism for conducting covert space disruption while maintaining plausible deniability, exploiting that state's demonstrated indifference to collective-action considerations and its growing satellite and electronic warfare capabilities.³

Deterrence in this environment is both possible and structurally fragile. Hickman argues that it can function effectively "provided there exists sufficient technical consensus on both sides regarding attribution, a shared understanding among expert communities about what is actually occurring in contested incidents."⁴ This condition is, at present, partially met: space situational

¹ Süß, interview. See also Ronci, *Dividing Heaven*, 59–62.

² Hickman, "Outer Space," Chapter 22, 281; Hickman, *GPC in Space*, 212.

³ Hickman, interview; Hickman, *GPC in Space*, 212–213.

⁴ Hickman, interview.

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awareness (SSA) capabilities are sufficient to identify most orbital maneuvers, but attribution of intent, distinguishing intelligence collection from pre-attack positioning, remains contestable. What both Hickman and Dolman identify as a structurally underappreciated stabilizing factor is the mutual interest of great powers in avoiding direct attacks on each other's nuclear command-and-control satellites: interference with national technical means tied to strategic deterrence crosses a threshold that neither side has yet approached, and the reputational and escalatory costs of doing so create a de facto mutual restraint that parallels Cold War nuclear taboos.¹

2.3. The Governance Deficit and the Normative Contest

The institutional architecture for managing the risks of space militarization is, in Hickman's assessment, "a deeply deficient legal instrument comparable to the Treaty of Tordesillas", a framework negotiated by diplomats without grounding in physical science or engineering, that prohibits only weapons of mass destruction while leaving the full spectrum of dual-use, counterspace, and conventional military activities unregulated.² The United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) functions, in Keohanian terms, as an information-providing forum but has not produced a binding instrument since the Moon Agreement of 1979; its consensus requirement gives every member state a veto, making it structurally incapable of generating enforceable norms in conditions of great-power disagreement.³ Süss describes COPUOS as "a perfect mirror image of the current geopolitical dynamic", the arms control discussions taking place within it reproduce, with unusual transparency, the asymmetry and disagreements of the broader US-China-Russia relationship.⁴

The Outer Space Treaty survives, Süss defends it as a necessary "firm baseline", but its survival reflects the absence of a superior instrument rather than its own adequacy.⁵ For Hickman, the more fundamental problem is that neither the Artemis Accords nor the ILRS engage honestly

¹ Hickman, interview; Dolman, interview.

² Hickman, interview; Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, 27 January 1967, 610 U.N.T.S. 205, arts. I–IV.

³ Open Lunar Foundation, Report on the 64th Session of the UNCOPUOS Legal Subcommittee (San Francisco: Open Lunar Foundation, 2025), 3. <https://www.unoosa.org/oosa/en/ourwork/copuos/index.html>.

⁴ Süss, interview.

⁵ Süss, interview.

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with the territorial logic of lunar development: both are mechanisms for establishing de facto control while avoiding the diplomatic cost of formally denouncing the non-appropriation norm.¹ The normative contest over what the OST's "province of all mankind" language means, commercial resource extraction versus collective governance, is not primarily a legal dispute; it is, as Alexander Wendt's constructivist framework predicts, an identity and structural-power contest in which whichever framework achieves greater intersubjective acceptance through the adhesion of third states will progressively constitute the environment within which all actors must operate.²

3. Future scenarios through 2030.

The four scenarios that follow are not predictions. They are structured analytical trajectories, each internally consistent with a distinct combination of feedback mechanisms, path-dependencies, and actor choices identified in the preceding analysis. They are mutually exclusive as dominant outcomes but may coexist across spatial domains: what governs low Earth orbit may differ substantially from what governs cislunar space, as Hickman explicitly warns.³ The relevant question is not which scenario is "correct" but which variables, if shifted, would move the system from one trajectory to another.

Scenario A: Managed Competition

Structural conditions: Both powers sustain structured rivalry within mutually recognized operational boundaries; a thin normative floor, debris mitigation, radio-frequency coordination, Space Situational Awareness (SSA) data-sharing, survives competitive pressure; no catastrophic escalatory incident occurs before 2030.

The Artemis Accords and ILRS frameworks evolve into functionally parallel governance orders rather than openly antagonistic ones. The ITU continues to allocate spectrum and orbital slots under its first-come, first-served protocol, exploited strategically by both powers but not

¹ Hickman, interview; Hickman, GPC in Space, 216.

² Alexander Wendt, *Social Theory of International Politics* (Cambridge: Cambridge University Press, 1999), 246–312; Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, art. I; NASA and U.S. Department of State, Artemis Accords, sec. 10. <https://www.nasa.gov/wp-content/uploads/2022/11/Artemis-Accords-signed-13Oct2020.pdf>.

³ John Hickman, interview by Ikram Rouainia, zoom video call, April, 20, 2026

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repudiated, and operational deconfliction between Starlink and Guowang is managed bilaterally below the threshold of formal diplomatic engagement. The strategic stability condition Dolman identifies, "a point at which both sides are at a point where the threat of the others development doesn't feel too immediate"¹ has not yet been reached, but neither side crosses the threshold of direct satellite interference that would trigger escalatory response.

Critically, this scenario implies that cooperation follows, rather than precedes, diplomatic stabilization. Süß, drawing on Bateman's historical analysis, observes that "all of those [US-Soviet milestones] always took place after a diplomatic milestone was reached it wasn't that space was helping bring along diplomatic relations, it's that the improvement of diplomatic relations then led to an achievement in space, not the other way around."² Without prior terrestrial stabilization, any space cooperation remains structurally fragile.

The scenario's principal vulnerability is its dependence on the absence of a triggering incident. Süß is direct: "we could be very close to reaching some kind of agreement on arms control in space, and then one thing happens a spying situation, an interference situation and that trust is lost. A single incident could set discussions back by years."³ Managed competition is analytically plausible for LEO in 2025–2030, where mutual economic dependency creates structural incentives for restraint, but its survival requires deliberate confidence-building investment that neither capital has yet committed to institutionally.

Key indicators: No new destructive ASAT tests; ITU WRC-27 produces procedural rather than substantive US-China confrontation; bilateral SSA data-sharing established below the political threshold; Artemis and ILRS timelines slip without triggering formal diplomatic crisis.

Scenario B: Dual Orders

Structural conditions: Artemis Accords and ILRS frameworks harden into rival normative systems with incompatible property-right, transparency, and interoperability standards; third states are progressively forced into institutional alignment; no bridging mechanism emerges.

¹ Everett C. Dolman, interview by Ikram Rouainia, zoom video call, May,04.2026

² Juliana Süß, interview by by Ikram Rouainia, zoom video call, May,04.2026; citing Aaron Bateman's historical analysis of US-Soviet space cooperation milestones.

³ Süß, interview.

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This scenario represents the fuller realization of bifurcation already observable in adhesion patterns 67 states under Artemis and 17 under ILRS as of 2025, the two groupings broadly mapping onto liberal-democratic and authoritarian or non-aligned blocs. Space governance fragments not through chaos but through the parallel construction of two internally consistent but mutually incompatible systems: resource utilization norms, data-sharing standards, and interoperability protocols for human lunar operations diverge to the point where joint emergency operations become technically as well as politically impossible.

Hickman's observation that the Artemis Accords' "linguistically elegant" formulations "carefully sidestep the unavoidable reality that any serious lunar development will require some form of territorial claim"¹ applies with equal force to the ILRS: both frameworks are, in Strange's structural-power logic, attempts to construct the normative environment that all subsequent actors, including late-joining Global South states, will inherit rather than design. The Wolf Amendment's feedback dynamic, as Ronci documents in *Dividing Heaven*, provides the systemic template: exclusion produces self-reliant capability development, which produces competitive acceleration, which produces further institutional decoupling.² Hickman assesses this as ultimately having "been beneficial from a systemic perspective, it compelled China to invest more ambitiously in its own space program, which in turn generated competitive pressure that has driven commensurate increases in American investment and ambition,"³ but in Dual Orders, that dynamic consolidates rather than reverses.

This scenario is more probable for cislunar space than for LEO, where interdependencies remain too dense for clean institutional separation, and its emergence will be indexed by the pace of crewed lunar base development on both sides.

Key indicators: First crewed Chinese lunar surface mission; formal US or allied response to Chinese south pole occupation; Artemis signatories adopt binding resource extraction protocols;

¹ Hickman, interview; Strange, *States and Markets*, 24–34.

² Dario Ronci, *Dividing Heaven: The Wolf Amendment and the Fracture of US-China Space Relations* (London: Routledge, 2024), 57–62; Consolidated Appropriations Act, 2012, Pub. L. No. 112-55, § 539, 125 Stat. 552, 693 (2011).

³ Hickman, interview.

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ILRS announces governance framework incompatible with Artemis norms; WRC-27 produces spectrum allocation favoring Chinese mega-constellation deployment.

Scenario C: Fragmented Multipolarity

Structural conditions: Middle powers and emerging space actors accumulate sufficient independent capability to pursue interests diverging from both great-power alignments; no single normative framework achieves structural dominance; governance operates through overlapping, inconsistent, and locally negotiated arrangements.

Hickman identifies this as the most analytically plausible scenario for the post-2030 period, while cautioning that it should be understood as having "a more explicitly chaotic character" than the term multipolarity typically implies.¹ Fragmented multipolarity does not mean the absence of order; it means the presence of spatially and functionally differentiated orders, what Hickman terms "islands of deterrence and bilateral accommodation within a broader environment of competitive disorder."² The analogy he invokes is analytically precise: Britain and Nazi Germany maintained tacit mutual restraint on chemical weapons against civilian populations despite broader war, demonstrating that bounded restraint is possible within larger disorder. In the space domain, debris mitigation and frequency coordination, domains Süß identifies as generating consensus "much more easily"³ than questions of military infrastructure, may constitute precisely such islands of minimal governance.

The structural driver is the proliferation of actors with non-trivial independent capabilities. As of 2022, 70 states operated functioning satellites; 31 operated military satellites.⁴ The UAE's simultaneous participation in Artemis Accords and ILRS memoranda, Turkey's expression of interest in ILRS membership while remaining a NATO member, and Saudi Arabia's dual-track posture, Artemis signatory since 2022 while BeiDou simultaneously operates in Saudi oil fields for resource exploration and emergency management, collectively illustrate the practical incompatibility of bloc-discipline with opportunistic middle-power space strategies. Rebecca

¹ Hickman, interview.

² Hickman, interview.

³ Süß, interview.

⁴ John Hickman, *Great Power Competition in Space* (New York: Palgrave Macmillan, 2023), 209–213.

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Lévy's analytical framework reinforces this: the capacity of third states to leverage space alignment as a diplomatic bargaining instrument, rather than a commitment device, structurally undermines the coherence of both coalitions from within.¹ An economically and institutionally mobilized Europe, which Hickman assesses as a potentially decisive counterweight if it can overcome its tendency to free-ride on American space investment,² would introduce genuine multipolarity of a more structured and stabilizing kind, but that condition has not yet been met.

Key indicators: Number of states joining neither framework; ESA budget growth relative to GDP; independent Indian or Japanese lunar surface operations; proxy-attributed counterspace incidents in LEO; third-party governance proposals at COPUOS not originating from either bloc.

Scenario D: Functional Minimal Governance

Structural conditions: Broad competitive rivalry at the coalition and normative level persists, the bifurcation dynamic of Scenario B continues, but a minimal operational floor of functional cooperation survives in specific technical domains where shared interests override competitive logic.

This scenario is not a compromise between the others but a structurally distinct outcome. Daniels maps a "wide and finely delineated spectrum" of US-China civil space engagement options ranging from no engagement to full collaboration, and his analysis of the costs and benefits of maintaining narrow engagement, particularly in flight safety and SSA data exchange, rests not on normative preference for cooperation but on the strategic calculation that minimal coordination reduces the risk of miscalculation whose consequences would be catastrophic for both sides.³ If both states have lunar surface stations in the 2030s, emergency-assistance capability will require prior technical experience of operating together, a functional logic that transcends political hostility.

The floor is deliberately narrow and technically bounded. It requires not political trust or normative convergence, but only that both sides calculate that the operational benefits of minimal coordination outweigh the strategic risks of any information transfer. Weeden's analysis identifies

¹ Rebecca Lévy, interview by Ikram Rouainia, Microsoft teams video call, March, 10, 2026.

² Hickman, *Great Power Competition in Space*, 217; Hickman, interview.

³ Cody Daniels, *The History and Future of US-China Space Cooperation* (Washington, DC: CSIS, 2024), 13–16, Table 1: Potential US-China Civil Space Engagement.

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debris deconfliction and frequency coordination as the clearest candidates: they address genuinely shared vulnerabilities, orbital congestion, and electromagnetic interference, whose costs fall symmetrically on both sides and whose management requires no strategic transparency beyond the technical minimum.¹ Süss provides empirical grounding from active practitioner experience: "on issues like debris or basic safety for human spaceflight, there is a clearer shared interest in minimizing risk; those are areas where cooperation and consensus are easier to achieve."²

The scenario's principal vulnerability is that a serious counterspace incident, or a domestic political decision in either capital to weaponize even technical cooperation as a diplomatic lever, could collapse the functional floor entirely, reducing the system to a state below even minimal governance. That risk is not hypothetical: the pattern Süss identifies, where a single intelligence or interference incident can "set discussions back by years,"³ applies with equal force to the narrow technical channels on which this scenario depends.

Key indicators: SSA data-sharing protocols established at the operational level; debris-mitigation compliance by both Starlink and Guowang constellations; no weaponization of ITU procedures; informal flight-safety communication channels maintained during crewed lunar operations.

Table 4: Four Structural Scenarios for the Emerging Space Governance Order, 2025–2030+.

Scenario	Key Condition	Most Likely Domain	Risk Level	Key Indicator
A: Managed Competition	No triggering incident	LEO 2025–2030	Medium	No new ASAT tests
B: Dual Orders	Frameworks harden	Cislunar post-2027	High	First Chinese crewed lunar mission
C: Fragmented Multipolarity	Middle powers diverge	Post-2030	Very High	70+ independent satellite states

¹ Brian Weeden, testimony before the US-China Economic and Security Review Commission, April 25, 2013 (Washington, DC: USCC, 2013).

² Süss, interview.

³ Süss, interview.

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D: Functional Minimal Governance	Technical floor survives	All domains	Medium	SSA data-sharing protocols
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Source: Author's own construction, based on scenario analysis developed in Chapter Three.

Key conditions and risk assessments draw on Weeden and Samson, *Global Counterspace Capabilities: An Open-Source Assessment* (Washington, DC: Secure World Foundation, 2025); Space Foundation, *The Space Report 2025 Q2* (Colorado Springs: Space Foundation, 2025); and Morin and Tepper, "The Empire Strikes Back," *Global Studies Quarterly* 3, no. 4 (2023). Scenario indicators informed by elite interviews with Everett C. Dolman, John Hickman, and Juliana Süss, conducted April and May 2026.

Conclusion of Chapter three

Chapter Three has moved the thesis's central hypothesis from theoretical argument to empirical conclusion. The Sino-American space rivalry is not incidentally eroding the cooperative foundations of the existing space order; it is deliberately replacing them. The evidence is structurally convergent across every domain examined. China's exclusion from the ISS, formalized through the Wolf Amendment of 2011, triggered a positive-feedback cascade, Tiangong, BeiDou, Chang'e, the PLASSF, the ILRS, whose cumulative effect is the construction of a parallel space order designed not to reform the U.S.-led system but to displace it. BeiDou's operational reach across some 120 partner states, which open-source analysts assess as a likely contributor to the improved precision of Iranian strikes during the June 2025 conflict with Israel, illustrates General Saltzman's argument before the USCC that the adoption of navigation infrastructure is never merely a technical choice but an act of geopolitical alignment. The causal claim should be treated as an assessed likelihood rather than a settled fact, given the contested nature of the attribution. The lunar south pole crystallizes the stakes: 600 billion kilograms of water ice, the cislunar commanding heights, and two incompatible governance architectures, the Artemis Accords and the ILRS, racing to establish facts on the ground before any binding legal framework governs their use. The Global South is no longer a passive object of this rivalry; it is its decisive theater, and the Iran-BeiDou-Israel triangle, Algeria's layered path dependence, and Saudi Arabia's dual-track

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posture collectively demonstrate that the battle for developing-world alignment is being won, incrementally but measurably, through infrastructure delivery rather than ideological persuasion.

The four scenarios charted through 2030, Managed Competition, Dual Orders, Fragmented Multipolarity, and Functional Minimal Governance, are not equally probable. The weight of the structural evidence points toward Dual Orders in the cislunar domain and Fragmented Multipolarity in the broader multilateral environment, with a thin floor of Functional Minimal Governance surviving in debris mitigation and frequency coordination — not because the great powers trust each other, but because the costs of orbital congestion fall symmetrically on both sides. What is analytically foreclosed is a return to the thin shared institutional floor of the OST and UNCOPUOS that governed the Cold War race: as Süß established, diplomatic breakthroughs precede space cooperation and never follow from it, and no such breakthrough is on the horizon. The governance fracture is not a failure of diplomacy; it is the institutional expression of a power transition. Dolman's assessment remains the most precise summary of where the system stands: "The shift away from supporting the post-1945 liberal order... has weakened the U.S. claim to be the reluctant sheriff, and pushed other actors to invest more heavily in going their own way in space, reinforcing the very great-power rivalry I had hoped we might avoid."¹ The Thucydides Trap does not require that anyone wants war. It requires only that both sides act rationally on their fear of the other. In orbit, in the permanently shadowed craters of the lunar south pole, and in the infrastructure choices of states from Algiers to Tehran to Nairobi, that is precisely what they are now doing.

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Conclusion

This thesis set out to examine how the intensifying Sino-American space rivalry is transforming outer space from a cooperative global common into a bifurcated governance order, and what this transformation implies for the future of global governance. Across three chapters, the analysis has shown that outer space has already shifted from a marginal domain of scientific prestige into a central arena where security, economic, and normative structures of power are being simultaneously contested and reconstructed. The resulting order is neither a continuation of the Cold War model nor a stable cooperative regime, but an emerging configuration of partially decoupled governance systems whose trajectories remain contingent and, in important respects, still open.

At the conceptual level, Chapter One established that no single theoretical lens is sufficient. Power-transition theory and the Thucydides Trap illuminate the structural pressures generated as China approaches parity with the United States in a domain whose infrastructures underpin military and economic dominance. Liberal institutionalism reveals both the residual coordinating function and the deepening limits of legacy regimes, the Outer Space Treaty, UNCOPUOS, the ITU, when confronted with dual-use technologies and strategic distrust. Complexity theory captures the non-linear, feedback-driven dynamics through which seemingly bounded institutional decisions, such as the Wolf Amendment, the Artemis Accords, and the ILRS founding, produced systemic consequences disproportionate to their origins. Together, these frameworks argue that the rivalry is not a contingent policy failure but a structural outcome encoded in the architecture of the order itself.

Chapter Two translated this into an empirical comparison of two fundamentally incompatible models of space power. The United States operates through institutional pluralism, public-private partnership, and alliance-based governance, a model that distributes authority to harness market dynamism while entrenching American structural centrality in the security, production, finance, and knowledge dimensions of the space order. China advances a centralized, state-directed model in which Military-Civil Fusion, long-term planning, and infrastructural diplomacy converge to eliminate strategic dependencies and construct alternative governance

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hubs. Through BeiDou, Tiangong, Chang'e, and the ILRS, China is not merely competing for prestige; it is building the institutional and technical architecture of a parallel order.

Chapter Three showed how this competition manifests in governance. The Artemis Accords and the ILRS are crystallizing into rival governance constellations embodying incompatible normative assumptions about transparency, resource utilization, and territorial control. Path dependence is accelerating: as more states and commercial actors align with one framework, switching costs rise, and the probability of reconvergence on a unified governance regime declines. Key domains, lunar resource law, mega-constellation regulation, counterspace norms, and cyber operations against space infrastructure, remain dangerously under-institutionalized precisely when the need for agreed rules is most acute.

Taken together, the findings confirm and refine the central hypothesis. The Sino-American space rivalry is not merely eroding global governance; it is actively restructuring outer space into a bifurcated, partially decoupled system in which the United States retains structural centrality through its commercial ecosystem and alliance frameworks, while China constructs a parallel governance order, state-directed, infrastructurally grounded, and deliberately positioned as an alternative for states dissatisfied with or excluded from the U.S.-led architecture. The hypothesis is therefore supported as a directional claim rather than confirmed as a determinate outcome: read through power-transition theory and Strange's account of structural power, the commons language of the Outer Space Treaty now coexists uneasily with *de facto* enclosure through safety zones, infrastructural dominance, and competing rule-making coalitions, and that coexistence is becoming structurally unstable while remaining open to deliberate institutional correction.

The sub-questions can now be addressed directly. The evolution from neutral frontier to contested astropolitical domain is confirmed across every theoretical lens deployed. U.S. and Chinese strategies differ systematically in institutional design, economic logic, and grand-strategic integration. The rivalry manifests structurally in governance through competing constellations, GPS versus BeiDou, ISS versus Tiangong, Artemis versus ILRS, and through divergent approaches to spectrum, debris, and resource utilization. Intense rivalry can still coexist with limited issue-specific coordination in collision avoidance and basic safety norms, but the overall systemic drift is toward strategic decoupling rather than toward a shared governance regime. The plausible trajectories to 2030, from managed competition through dual overlapping orders to fragmented

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multipolarity, all depend on whether major actors invest political capital in stabilizing institutions or instrumentalize governance forums for competitive advantage.

Within this landscape, the position of the Global South, and Algeria in particular, becomes analytically crucial. For developing states, the dual architecture of Artemis and ILRS is not an abstract governance problem but a concrete strategic choice shaping access to orbits, frequencies, data, and capacity-building opportunities. The existence of competing governance projects simultaneously creates the risk of being reduced to rule-takers and opportunity, as smaller states can leverage great-power competition to secure more favorable terms, technology transfer, and participation in flagship missions. Algeria, not yet structurally tied to either framework, stands at a strategic crossroads whose resolution over the next decade will determine whether it remains a passive consumer of space services or an active participant in shaping the governance architecture of the domain.

The thesis has also underlined that this rivalry is conducted through tools and at speeds that existing governance frameworks were not designed to manage. The same infrastructures sustaining global connectivity are exposed to hypersonic delivery systems, offensive cyber operations against satellite buses, dual-use mega-constellations, and increasingly sophisticated anti-satellite capabilities. The traditional distinctions between peace and war, civilian and military, terrestrial and orbital are structurally blurred. A miscalculation in orbit can cascade into debris, escalation, and systemic disruption before any governance mechanism can intervene.

The trajectory traced in these pages, therefore, answers the central question in a qualified but unambiguous way: the Sino-American space rivalry is transforming outer space from a relatively cooperative commons into a bifurcated and contested governance environment, but this process is neither complete nor irreversible. It is being shaped, day by day, by institutional choices, technological paths, and the decisions of states on the periphery of the rivalry. For scholars and policymakers alike, this raises further lines of inquiry this thesis has not addressed. How might the accelerating privatization of cislunar infrastructure beyond SpaceX and Blue Origin to a new generation of asteroid-mining and in-orbit servicing firms create governance pressures that neither the Artemis nor the ILRS framework is equipped to absorb? To what extent could space-based solar power, if it becomes commercially viable in the 2030s, reconfigure the geopolitics of energy dependency and introduce entirely new vectors of structural power competition? And as artificial

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intelligence is integrated into satellite operations, targeting systems, and space traffic management, what new risks of automated escalation emerge in a domain where response times already compress human decision-making to the point of irrelevance? These questions extend beyond what any single thesis can resolve, but they are the questions the next generation of astropolitical scholarship will need to answer before the feedback loops already in motion foreclose more cooperative options entirely

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