

# The Continued Entanglement: The Nuclear Impact on Space Governance

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## Abstract

This research note argues that the regime of space governance has emerged and changed across time in part due to its close connection with strategic nuclear weapons. It charts this coexistence and entanglement across the Cold War development of space governance, the post-Cold War shift away from nuclear strategy, and the contemporary return to great power competition.

## Keywords

Space law, nuclear weapons, space exploration, international law

## 1. Introduction

In 1953, United States President Dwight D. Eisenhower set out his Atoms for Peace plan in a speech before the United Nations General Assembly.<sup>1</sup> As nuclear weapons rose to prominence in the wake of World War II, the US administration sought to build a normative framework around this technology. The Atoms for Peace plan sought to establish a framing norm that nuclear technologies would be used for peaceful purposes.<sup>2</sup> The Soviet Union, the prime target of this plan, rejected the proposal.<sup>3</sup> This came in the wake of their rejection of the Baruch plan due to their resistance to verification by on-site inspection in disarmament regimes.<sup>4</sup> A line can be drawn from the failed proposed nuclear regime to the governance regime that would soon be established for outer space. The opening up of space was transformative in many ways, but one of the most important was the way in which it transformed the pre-existing nuclear technology.

This research note will trace the historical entanglement that space and nuclear technologies have had and bring that narrative forward to demonstrate that they are still linked in the contemporary context. This exercise will show how nuclear capabilities are still influencing how we approach the governance of space. The core claim is that nuclear capabilities historically shaped and are still shaping the rules that govern space security. This is due to the significant issues caused by the cross-domain context and the way in which space capabilities transform the strategic value of nuclear armaments. This is not to say that the two governance regimes are entangled, but rather that the infusion of nuclear technologies and space capabilities pose significant issues that must be accommodated for in the context of space governance.

This research note will first give an account of the historical linkage of the space domain to nuclear technology. It will then trace these through the post-Cold War shift and into the contemporary world. It will use this analysis to create a narrative that demonstrates the proximity of space governance to strategic restraint. It will be looking at this specifically through the lenses of both normative and deterrent structures as complimentary methods of limiting state action.

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- 1 See "Atoms for Peace," Dwight D. Eisenhower Presidential Library (n.d.), <https://www.eisenhowerlibrary.gov/research/online-documents/atoms-peace> accessed 28 November 2025.
  - 2 Dwight D. Eisenhower, "Atoms for Peace," (8 December 1953), paras. 70–71., <https://voicesofdemocracy.umd.edu/eisenhower-atoms-for-peace-speech-text/> accessed 28 November 2025.
  - 3 Leonard Weiss, "Atoms for peace," *Bulletin of the Atomic Scientists* 59, no. 6 (2003): 34–44, 40.
  - 4 *Ibid.*, 37.

## 2. History: Article IV and National Technical Means of Verification (NTM)

The notions of verification and peaceful purposes in the nuclear regime would be drawn forward into the space regime, and these two touchpoints will be used to frame the historical analysis deployed in this section as they both became important in the initial normative development surrounding space.

After the US attempt to effectuate disarmament through a verifiable regime failed, the Eisenhower Administration sought to use the Atoms for Peace plan to create a normative framing around nuclear technology. Space presented a second opportunity to curb the potential use of nuclear weapons. In 1949 Vannevar Bush<sup>5</sup> wrote that there is “less reason to be terrified by the thought of the A-bomb delivered by fleets of bombers” in light of current defense technology.<sup>6</sup> Bush’s in-depth analysis of the state of military technology at the time reveals that a nuclear weapon, while massively destructive, still needed to get to its target, so it was only as good as its delivery system. Delivery by air, which had been the method for the two atom bombs that closed out World War II, was highly susceptible to interception considering contemporary air defense technologies. Space launch technology would change the potential for the delivery of these weapons, upsetting any stability premised on delivery by air. This section suggests that the initial normative order surrounding space was an attempt to govern the potential delivery system as an indirect way of governing the weapon itself. Interestingly, with space the notion of normative framing of peaceful purposes would come first as a way to preserve the potential for verification that space presented.

### A. Peaceful Purposes

Though peaceful purposes were rejected in the nuclear context, the idea would be reheated for the space context.<sup>7</sup> Framing space as a domain of peaceful action was core to the United States’ early strategy at establishing a normative construct for the domain, and this is directly linked to an aspiration of reducing the nuclear threat that space launch technology enhanced. In 1955, the United States announced its plans to launch a scientific

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5 Vannevar Bush was the head of the U.S. Office of Scientific Research and Development during World War II and was a key player in the development of the Manhattan Project. ‘Vannevar Bush’ (*The Manhattan Project: An Interactive History*, n.d.), <https://www.osti.gov/opennet/manhattan-project-history/People/Administrators/vannevar-bush.html> accessed 1 December 2025.

6 Vannevar Bush, *Modern Arms & Free Men* (MIT Press 1968), 100–101.

7 The notion of peaceful purposes is found in a number of areas of international law and has variable meaning across its applications. It would become part of the nuclear regime with the *Treaty on the Non-Proliferation of Nuclear Weapons* (adopted 1 July 1968, entered into force 5 March 1970) 729 UNTS 161: Preamble & Article III.

satellite for the International Geophysical Year (IGY).<sup>8</sup> The announcement emphasized the scientific purposes of this launch as a framing for space activities. This framing was then taken up by the Soviet Union as it followed suit and made a similar announcement, also with science as the emphasis, several days later.<sup>9</sup> To be clear, there was never the illusion that these technologies would not be used for military applications, but the pre-emptive framing in the context of science and peace may have had an ameliorating effect on future discussions concerning governance. One can imagine that if these states had both made announcements that they were launching spacecraft for military purposes, this would have foreclosed a number of discussions. The IGY announcements helped to ensure that the initial forays into space were not shows of force but rather displays of scientific prowess. They were at once competitive (i.e. between the superpowers) and cooperative (i.e. as part of the global IGY).

The United States' emphasis on science for its first launch was followed through with its insistence that its first launch would not be by the military.<sup>10</sup> In a meeting in the White House four days after the launch of Sputnik, US Secretary of Defense Donald A. Quarles told President Eisenhower that the Army could likely have "orbited a satellite a year or more ago," but there was a policy decision to wait for a civil launch "to stress the peaceful nature of the effort."<sup>11</sup> The United States' commitment to peaceful purposes as framing norm for space went so far as to include this framing in the national law establishing the National Aeronautics and Space Administration (NASA), its civil scientific space program. This 1958 law states that "Congress hereby declares that it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind."<sup>12</sup> This normative framing was then infused into the international framework through the United Nations General Assembly and the Space Treaty regime. It is found in United Nations General Assembly (UNGA) Resolution 1348, which is the first UNGA resolution and which established the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS), though only as an ad hoc committee at the time.<sup>13</sup> The framing is used

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8 NASA, 'International GeoPhysical Year--US Announcement' (*National Aeronautics and Space Administration*, 2 February 2005), <https://www.nasa.gov/history/sputnik/usannounce.html> accessed 1 December 2025.

9 David SF Portree, *NASA's Origins and the Dawn of the Space Age* (NASA 1998), <https://www.nasa.gov/history/monograph10/korspace.html> accessed 1 December 2025.

10 For a fuller account see PJ Blount, 'Peaceful Purposes for the Benefit of All Mankind: The Ethical Foundation of Space Security' in Cassandra Steer and Matthew Hersch (eds), *War and Peace in Outer Space* (Oxford University Press 2021).

11 Memorandum of Conference with the President (8 October 1957), <https://www.eisenhowerlibrary.gov/sites/default/files/research/online-documents/sputnik/10-9-57-early-memo.pdf> accessed 30 November 2025 [hereinafter Quarles Memo].

12 National Aeronautics and Space Act, Pub. Law 85-568 (1958), sec. 102.

13 United Nations General Assembly, Resolution 1348(XIII): Question of the Peaceful Use of Outer Space (13 December 1958).

consistently in UNGA resolutions and is a framing principle in the preambles of all the space treaties.<sup>14</sup>

The normative content of peaceful purposes was interpreted to mean nonmilitary for a brief time, but this meaning soon eroded to some form of nonaggression, reflecting a baseline from the UN Charter.<sup>15</sup> The goal was likely never to demilitarize space, as both superpowers were already pursuing military applications, but instead to open up space for normative development that could produce stability instead of conflict. If space launch was the key enabler of the nuclear threat, then opening up the opportunity for discourse and negotiation through a normative framing of peaceful purposes was key. The weapon itself resisted governance, but the system and domain of delivery seemingly did not. The peaceful purposes-framing helped to slow these states in their deployment of such technologies by pushing them in a different direction. The outcome being the public-facing civil space race between the United States and the USSR.

A clear outcome of this are also the two limitations on the use of nuclear weapons in the space domain. The first of these is the Limited Test Ban Treaty which bans the testing and detonation of nuclear weapons in outer space.<sup>16</sup> Early on in the space age both the United States and the Soviet Union detonated nuclear weapons in space. The destructiveness of these tests and the rising importance of human space exploration led states to ban these types of explosions.<sup>17</sup> The treaty did not need verification as it was assumed that the forbidden detonations would be obvious and open, making the treaty self-verifying.

The second outcome is Article IV of the Outer Space Treaty, which bans the placement of nuclear weapons in orbit. This is a fascinating treaty provision in that it is a substantive arms limitation that is not matched with verification measures. The provision is based on the significant risk of instability connected to the placement of nuclear weapons in orbit. Such placement reduces the attack time to such a minimum that it would be nearly impossible to defend against. A first deployer, then, would be incentivized to strike before its adversary could deploy a similar capability. Whereas nuclear ICBMs are an effective deterrent against attack, nuclear weapons in orbit around the Earth did not have the same

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14 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) 18 U.S.T. 2410, 610 U.N.T.S. 205; Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (1968) 19 UST 7570, 672 UNTS 119, 7 ILM 149; Convention on International Liability for Damage Caused by Space Objects (29 March 1972) 961 UNTS 187; Convention on Registration of Objects Launched into Outer Space (1976) 1023 UNTS 15; and Agreement governing the Activities of States on the Moon and Other Celestial Bodies (Dec 18, 1979) 1363 UNTS 3.

15 PJ Blount, 'The Shifting Sands of Space Security: The Politics and Law of the Peaceful Uses of Outer Space' (2019), *Indonesian Journal of International Law* 17(1), 4–5.

16 Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space, and under Water (10 October 1963).

17 For a detailed discussion of this see James Clay Moltz, *The Politics of Space Security: Strategic Restraint and the Pursuit of National Interests* (Stanford Security Studies 2008), 42–66.

deterrent effect since they incentivized offensive action over strategic defenses. The two superpowers at the time were able to agree that this should be avoided, and Article IV was deployed as law without verification. Arguably such an extraordinary provision could not have been achieved outside of the peaceful purposes-framing.

## **B. Verification**

The Soviet Union's rejection of on-site inspections made any sort of arms limitations talks untenable because there was no means to verify any agreed upon limitations. US intelligence on Soviet armaments at the time was based primarily on highly illegal overflights by the high altitude U2, which would end in 1960 with the shooting down of one of these aircraft.<sup>18</sup> The verification problem would be solved, in part, with the launch of Sputnik, which established free overflight of another state's territory. In the same White House meeting in the aftermath of the launch of Sputnik referenced above, Secretary Quarles told President Eisenhower "that the Russians have in fact done us a good turn, unintentionally, in establishing the concept of the freedom of international space."<sup>19</sup> What Quarles meant is that by overflying states around the world without those same states objecting, Sputnik showed that orbital movement did not violate the sovereignty of others in the same way that a reconnaissance flight violated sovereign air space. Shortly after this exchange, President Eisenhower inquired about the possibility of the development of a reconnaissance vehicle to take advantage of this vantage point.<sup>20</sup>

Whereas space launch capability was a key enabler of nuclear technologies by providing a system of delivery, the orbital movement it enabled was an antidote for this by providing the possibility of verification as it allowed observation without the need to enter the sovereign territory of the observed state. Both the US and the Soviet Union began to pursue remote sensing capabilities in the early 1960s to get a bird's eye view of each other's military deployments and infrastructure.

Once attained by both states, remote sensing capabilities gave the two nuclear powers the opening needed to engage in arms limitations talks connected to their nuclear arsenals. This would lead to the collection of bilateral treaties, such as the Anti-Ballistic Missiles Treaty (ABM Treaty), that served to structure the strategic stability between the US and the USSR.<sup>21</sup> These bilateral agreements incorporated the notion of National Technical Means

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18 'U-2 Overflights and the Capture of Francis Gary Powers, 1960' (*Milestones in the History of U.S. Foreign Relations*, n.d.), <https://history.state.gov/milestones/1953-1960/u2-incident> accessed 1 December 2025.

19 Quarles Memo, *supra* n.11.

20 *Ibid.*

21 Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems (3 October 1972) 23 UST 3435, TIAS No. 7503 [hereinafter ABM Treaty].

of Verification (NTM) as a way to include verification without revealing the specificities of state capabilities in detail. Though not exclusively, NTM were primarily constituted by remote sensing satellites.<sup>22</sup> The ABM Treaty is indicative. It adopts NTM as the means of verification and then obliges that parties do not interfere with the others' NTM.<sup>23</sup> This same pattern would be repeated in a number of these bilateral agreements. The NTM provisions served as a significant guarantor of security in space despite being only bilateral agreements. Due to the inability to be certain what capabilities were on board a given satellite platform, the states were forced to consider that any satellite in Earth orbit could have some NTM function.<sup>24</sup> This meant that these provisions went significantly further than intended in structuring the governance of outer space. In the Cold War context, the alignment of much of the world was structured around the binary of the superpowers and the risk of catastrophic conflict, meaning that multilateral extension of such norms was not necessary.

### 3. The Post-Cold War Shift

At the end of the Cold War there was a significant shift in the structure of global politics and in international peace and security. As the world transitioned from bipolarity into a moment of unipolarity and then settled into multipolarity, the way in which states approached security issues changed dramatically. In the immediate aftermath of the Cold War the enmity between the US and the former Soviet states seemed to dissolve almost immediately as the West pursued projects for democratization in these states. While nuclear threats were still a significant concern for states, in the post-Cold War period the nuclear threat faded into the background and terrorism and the threat of the non-state actor rose to prominence. This change was predicted by some commentators,<sup>25</sup> but it was truly solidified by the 9-11 attacks on the United States and the subsequent initiation of the US War on Terror.<sup>26</sup>

The shift in focus in international security created significant changes in how states approach their security stances during this time. The nuclear threat itself changed from

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22 Jimmy Carter, Remarks at the Congressional Space Medal of Honor Awards Ceremony. Kennedy Space Center Florida (October 1, 1978).

23 ABM Treaty, Art. XII.

24 Roger G. Harrison, *Space and Verification, Volume 1: Policy Implications* (Colorado: United States Air Force Academy, Eisenhower Center for Space and Defense Studies), 9.

25 For example, Alexandre de Marenches & David Andelman, *The Fourth World War: Diplomacy and Espionage in the Age of Terrorism* (Morrow 1992) and Samuel P. Huntington, 'The Clash of Civilizations?' (Summer 1993), *Foreign Affairs* 72(3), 22–49.

26 Ivo H. Daalder and James M. Lindsay, 'Nasty, Brutish and Long: America's War on Terrorism,' Brookings Institute (1 December 2001), <https://www.brookings.edu/articles/nasty-brutish-and-long-americas-war-on-terrorism/> accessed 1 December 2025.

a strategic threat wielded by states to one of the dirty bomb in the suitcase delivered to a city center by a terrorist.<sup>27</sup> One of the impacts of this shift was a retraction from the bilateral agreements that underpinned the nuclear arms limitations between Russia (as the primary successor to the Soviet Union) and the United States. The 2001 US withdrawal from the ABM treaty is indicative of this. The withdrawal, under the George W. Bush Administration, was clearly premised on the notion that the strategic threat had waned and a new non-state threat had emerged. In his speech on the withdrawal President Bush stated that “the greatest threats to both our countries come not from each other, or other big powers in the world, but from terrorists who strike without warning, or rogue states who seek weapons of mass destruction.”<sup>28</sup>

The net effect is that the protections granted by the NTM provisions have eroded significantly as these bilateral agreements have fallen to the wayside. While these are only bilateral agreements and thus binding on a limited number of parties, the changed context can be felt in the uptick in state demonstrations of capabilities to interfere with space activities. Most notable are the four kinetic anti-satellite weapons (ASAT) tests since 2007 by China (2007),<sup>29</sup> the United States (2008),<sup>30</sup> India (2019),<sup>31</sup> and Russia (2020).<sup>32</sup> In addition to these tests by the four major spacefaring nations, other states have begun to develop a variety of documented counterspace capabilities.<sup>33</sup> The foundation for this shift in the United States was established in the 2001 Rumsfeld Report, which explicitly called for the development of offensive space weapons.<sup>34</sup> Published just 8 months before the 9-11 attacks, the Rumsfeld Report signalled a change that, in the short term, would be dampened by the shift to terrorism and its intelligence driven security paradigm, which is significantly reliant on space assets. The same US administration would adopt a policy opposing any new restrictive rules in space and deadlock the Conference on Disarmament over the same

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27 “‘Suitcase Nukes:’ A Reassessment,” James Martin Center for Nonproliferation Studies (23 September 2004), <https://nonproliferation.org/suitcase-nukes-a-reassessment/> accessed 1 December 2025.

28 ‘U.S. Withdrawal from the ABM Treaty: President Bush’s Remarks and U.S. Diplomatic Notes,’ Arms Control Association (n.d.), <https://www.armscontrol.org/act/2002-01/us-withdrawal-abm-treaty-president-bushs-remarks-and-us-diplomatic-notes> accessed 1 December 2025.

29 ‘China confirms satellite downed,’ BBC (23 January 2007), <http://news.bbc.co.uk/2/hi/asia-pacific/6289519.stm> accessed 1 December 2025.

30 Dwayne Day, ‘Burning Frost, the View from the Ground: Shooting down a Spy Satellite in 2008,’ *The Space Review* (21 June 2021), <https://www.thespacereview.com/article/4198/1> accessed 1 December 2025.

31 Ajey Lele, ‘Indian ASAT: Mission Shakti Should Be a Comma, Not a Full Stop,’ *The Space Review* (27 March 2023), <https://www.thespacereview.com/article/4556/1> accessed 1 December 2025.

32 Fabian Hoffmann, ‘Russia Conducts Direct-Ascent Anti-Satellite Test,’ International Institute of Strategic Studies (25 November 2021), <https://www.iiss.org/online-analysis/online-analysis/2021/11/russia-conducts-direct-ascent-anti-satellite-test/> accessed 1 December 2025.

33 See Victoria Samson and Laetitia Cesari, eds., *2025 Global Counterspace Capabilities Report* (Secure World Foundation 2025).

34 Donald Rumsfeld and others, ‘Report of the Commission to Assess United States National Security Space Management and Organization’ (2001), 70.

issue.<sup>35</sup> As states shifted their focus to the threat of non-state actors, the rules connected to the space-nuclear nexus were neglected at best and actively dismantled at worst.

The transition from the Cold War security paradigm based on nuclear parity to the multipolar terrorist threat coincided with what is arguably an era of stagnation and erosion in international space law making. As the nuclear threat was being reimaged as one delivered by an individual dragging a wheelie case on the metro rather than a volley of missiles over the North Pole, the norms connected to the strategic threat became less important to states in this changing context.<sup>36</sup> Norm-building stagnated as states sought to adapt to the new threats that had come to center stage, and the normative structures that emerged from the Cold War were perceived to be a blockade to dealing with this new threat.

#### 4. Great Power Competition and Space Deterrence

The stagnation and in some respects outright opposition to enhancing the normative order bore the fruits of the contemporary approach to space security. As terrorism receded into the greater milieu of international security, commentators began to discuss the return to great power competition.<sup>37</sup> This shift focuses on the return of superpower politics with a focus on China, Russia, and the United States. This superpower-based perspective brought strategic nuclear threat back into the fore as a core international security challenge. This can be seen in the uncertainty that Russia has sought to infuse into its own nuclear stance in the wake of its invasion of Ukraine<sup>38</sup> – specifically, its withdrawal from the Limited Test Ban Treaty.<sup>39</sup> Similarly, President Trump recently suggested that the United States

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35 U.S. National Space Policy (31 August 2006), Sec. 2., <https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/national-space-policy-2006.pdf> accessed 1 December 2025. See also Rebecca Johnson, 'Conference Remains Deadlocked after First Part of 2002 Session' (May–June 2002), *Disarmament Diplomacy* 64.

36 This is evident in the close cooperation on counterterrorism between Russia and the United States after the 9-11 attacks. See Philip H. Gordon, 'Bush-Putin: The End of the End of the Cold War,' Brookings Institute (November 13, 2001), <https://www.brookings.edu/articles/bush-putin-the-end-of-the-end-of-the-cold-war/> accessed 13 December 2025.

37 Jonathan M. DiCicco and Tudor A. Onea, 'Great-Power Competition', *Oxford Research Encyclopedia of International Studies* (2023), <https://oxfordre.com/internationalstudies/display/10.1093/acrefore/9780190846626.001.0001/acrefore-9780190846626-e-756> accessed 1 December 2025.

38 Katarzyna Zysk, 'Russia's Nuclear Doctrine Amendments: Scare Tactics or Real Shift?', *United States Institute of Peace* (29 January 2025), <https://www.usip.org/publications/2025/01/russias-nuclear-doctrine-amendments-scare-tactics-or-real-shift> accessed 1 December 2025.

39 Andrew Osborn, 'Putin Revokes Russian Ratification of Global Nuclear Test Ban Treaty,' *Reuters* (2 November 2023), <https://www.reuters.com/world/europe/putin-revokes-russias-ratification-nuclear-test-ban-treaty-2023-11-02/> accessed 1 December 2025.

could resume nuclear weapons testing amongst numerous provocative statements about the United States' nuclear posture.<sup>40</sup>

This shift can be felt in space in the actions of these three competing great powers. China has reportedly deployed a fractional orbital bombardment system (FOBS) in the form of some sort of hypersonic weapon.<sup>41</sup> Russia has been accused of deploying nuclear ASAT capability.<sup>42</sup> The United States has announced its planned deployment of Golden Dome, a space-based missile defense system.<sup>43</sup> The return to these strategic technologies as the center-piece of state power has been felt in the system of space governance as well.

The degradation of the space normative regime that resulted from its sidelining allowed for the previously voluntary moratorium on ASAT testing to be brought to an end through the series of tests by China, the United States, India, and Russia. This was complemented by a shift towards more military-dominated stances as nations sought to more overtly define their space capabilities as seen in the trend toward the establishment of space forces. At the same time, there has been some return to a normative discourse around these technologies, a stalemated one, but a discourse nevertheless. One way to look at this is a divide on the form of the security arrangement. On one side is China and Russia with their desire for a legally binding arrangement represented by the introduction of the draft Prevention of the Placement of Weapons in Space Treaty (PPWT) in the deadlocked Conference on Disarmament.<sup>44</sup> Standing in opposition is the Western-led push for norms of responsible behavior, embodied in the UK's UN General Assembly resolution.<sup>45</sup> The opposition of these two stances is significantly centered on what form any adoption of rules should take. While both contingents are putting forward proposals, these proposals for the most part remain accepted only within their respective blocks.

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40 Georgia Cole, 'Russia and the US Put Nuclear Testing Back on the Table. Is Time Running out for Arms Control?', *Chatham House* (3 May 2024), <https://www.chathamhouse.org/2025/11/russia-and-us-put-nuclear-testing-back-table-time-running-out-arms-control> accessed 1 December 2025.

41 Dawn Stover, 'Orbital Hypersonic Delivery Systems Threaten Strategic Stability,' *Bulletin of the Atomic Scientists* (13 June 2023), <https://thebulletin.org/2023/06/orbital-hypersonic-delivery-systems-threaten-strategic-stability/> accessed 1 December 2025.

42 Christopher J Borgen, 'Russia's Alleged Nuclear Anti-Satellite Weapon: International Law and Political Rhetoric,' *Lieber Institute West Point* (31 July 2024), <https://lieber.westpoint.edu/russias-nuclear-anti-satellite-weapon-international-law/> accessed 1 December 2025.

43 Mike Stone and others, 'Trump Selects \$175 Billion Golden Dome Defense Shield Design, Appoints Leader,' *Reuters* (21 May 2025), <https://www.reuters.com/world/us/trump-make-golden-dome-announcement-tuesday-us-official-says-2025-05-20/> accessed 1 December 2025.

44 'Letter Dated 10 June 2014 from the Permanent Representative of the Russian Federation and the Permanent Representative of China to the Conference on Disarmament addressed to the Acting Secretary-General of the Conference Transmitting the Updated Russian and Chinese Texts of the Draft Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force Against Outer Space Objects (PPWT) introduced by the Russian Federation and China', UN Doc CD/1985 (12 June 2014).

45 See PJ Blount, 'The Future of PAROS: Building a Framework to Reduce Strategic Risk,' (2023) XLVII *Annals of Air and Space Law* 93.

A second way to view this is to see it from a perspective of strategy. The PPWT does not make kinetic surface-to-space missiles illegal, to which the United States objects.<sup>46</sup> However, China and Russia, the sponsoring states, are not contemplating a ground war in the US. They are contemplating US action inside of their claimed borders. The communications and intelligence that a forward deployed US military requires from the space segment is very vulnerable, and they can supply their military the same with ground infrastructure if needed. It does, however, seek to outlaw orbital weapons, which the US Golden Dome project would fall into. The US desire for missile defense is connected directly to its need to fortify itself from strategic arms while at the same time wielding them as a symbol of might in its global reach. The Golden Dome system could be vulnerable to kinetic ASATs depending on the orbital specifications.

The turn to great power competition has put strategic arms back in the forefront of international security, so the return to discourse at the normative level is not surprising. However, this is coming at a time when these same superpowers are challenging the bounds of international law and eroding core concepts. China's claims to the South China Sea,<sup>47</sup> Russia's invasion of Ukraine,<sup>48</sup> and the United States' undermining of international institutions<sup>49</sup> all reflect aspects of a core problem with international law. Legal systems depend on the governed society's belief in them. Powerful actors have the ability to demonstrate their disbelief in the system. Thus, the return to the strategic state coupled with vastly changed technologies opens significant uncertainty as states try to reconfigure their deterrence posture among these changing circumstances. Nevertheless, while states figure out how to maintain stability, there is still significant risk. When the law runs out, deterrence takes over, but if the deterrent lines themselves are blurry, then deterrence is uncertain. Cyber is a key example of this. Just as individuals in the modern world, states may run the risk of being "terminally online."

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46 'Note Verbale dated 2 September 2014 from the Delegation of the United States of America to the Conference on Disarmament addressed to the Acting Secretary-General of the Conference Transmitting the United States of America Analysis of the 2014 Russian-Chinese draft treaty on the prevention of the placement of weapons in outer space, the threat or use of force against outer space objects', UN Doc CD/1998 (3 September 2014).

47 Krista E. Wiegand, 'International Law and Conflict Disputes: The Case of the South China Sea,' *Perry World House* (19 May 2025), <https://perryworldhouse.upenn.edu/news-and-insight/international-law-and-conflict-disputes-the-case-of-the-south-china-sea/> accessed 1 December 2025.

48 John B Belinger, 'How Russia's Invasion of Ukraine Violates International Law,' *Council on Foreign Relations* (28 February 2022), <https://www.cfr.org/article/how-russias-invasion-ukraine-violates-international-law> accessed 1 December 2025.

49 White House, 'Withdrawing the United States from and Ending Funding to Certain United Nations Organizations and Reviewing United States Support to All International Organizations,' *The White House* (5 February 2025), <https://www.whitehouse.gov/presidential-actions/2025/02/withdrawing-the-united-states-from-and-ending-funding-to-certain-united-nations-organizations-and-reviewing-united-states-support-to-all-international-organizations/> accessed 1 December 2025.

This has implications for both nuclear deterrence and space governance principles. This is indicated by the three incidents referenced above. The Chinese FOBS system is a throwback to a Soviet tested system from the 1970s.<sup>50</sup> While it was agreed that this technology was legal at the time, the Soviets never made it an operationally deployed system. The Chinese technology adds a twist by bringing the payload in on a “hypersonic missile.”<sup>51</sup> This would allow the craft to deorbit a state’s radar fence and then fly into an adversary’s territory at a low altitude. This changes the nature of FOBS as a warhead delivery system, challenging the settled structure of deterrence. If Russia is thinking of deploying a nuclear anti-satellite weapon, this challenges the rules established in space law that impact nuclear deterrence. Russia’s withdrawal from the Limited Test Ban Treaty means that it has withdrawn from the central rule banning the detonation of a nuclear device in space. If such a device were orbital it would violate the core nuclear limitation in Article IV. While Golden Dome would certainly add to the United States’ overall deterrence posture, it would upend the decades-long structure in which states – except for very few occasions – have refrained from actually openly orbiting a clear weapon in the space domain. Though Golden Dome would be a significant undertaking in both development and costs, constellation technology and launch technology have changed significantly since the Reagan Administration looked at Brilliant Pebbles as part of the Strategic Defense Initiative (SDI) in the 1980s.<sup>52</sup> In their nuclear posturing, these states are explicitly flexing space technology and disrupting both the normative and deterrent realms.

This could not be more clearly stated than the adoption of the notion of “space as a warfighting domain.”<sup>53</sup> This rhetorical and semi-policy device legitimates military exploitation of space and in space in a seemingly wider array of technologies beyond those that are only supportive of terrestrial military action. The past stability in the space domain resulted from its perceived technological limitations and the legitimacy of the intertwined normative structure. As these capabilities have changed, so too has the normative structure. Nevertheless, at the core of much of this process is space’s ongoing entanglement with the strategic nuclear activities of states.

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50 See R.L. Garthoff, ‘Banning the bomb in outer space’ (1980), *International Security*, 5(3), 25–40.

51 Stover, ‘Orbital Hypersonic Systems’.

52 See David Wright et al., *The Physics of Space Security* (American Academy of Arts and Sciences, 2005).

53 Everett C. Dolman, ‘Space Is a Warfighting Domain’ (2022), *Æther: A Journal of Strategic Airpower & Spacepower* 1, 82.

## 5. Conclusion

Space has always been intertwined with nuclear technologies. Indeed, the normative regime for space certainly impacts nuclear stability. It remains uncertain how far these structures will be eroded in the current geopolitical context and what chance there will be for re-establishing them. The current trajectory is not necessarily a rosy one. While space war is not “inevitable,” the conditions that keep it that way can change dramatically. Artificial intelligence technologies are soon to be, if they are not already, part of the mix of strategic technologies complicating the uncertainty of states as they seek stability and/or dominance.

While changing technology often challenges existing normative structures, this is not the only source of normative decay. The de-legitimation of international law and international institutions is also stressing the system. The primary agents within the tripolar politics at play are undermining the system of which they are the architects and – as permanent members of the Security Council – in which they hold significant power. Space is not the only component in these changing circumstances, but it is a significant one.

We should, however, remember that space war in and of itself is not the danger. It is its deep connection with nuclear technologies that infuses the threat. It leads one to question whether a space war may necessarily be a nuclear war. One could potentially see a state detonating a nuclear device in orbit as the first wartime nuclear usage since 1945. This would be a dramatic occurrence and challenge the traditional reluctance to deploy these weapons due to the extreme cost in human life. Detonation in space would impact human life, but not directly (outside of a handful of astronauts). Such an act would rewrite our understanding of norms and deterrence in nuclear and space domains and risk opening up a new era of nuclear brinkmanship.