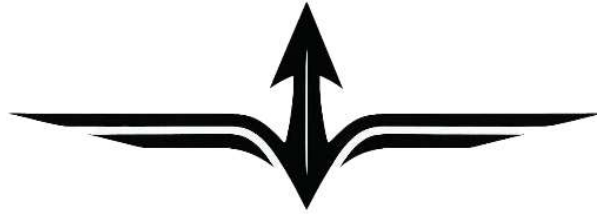


# Chapter 8



## Seizing the Orbital High Ground

Namrata Goswami

*“We must treat space like a warfighting domain....  
Because it very much is one.”<sup>2</sup>*

— General B. Chance Saltzman  
Chief, U.S. Space Operations, U.S. Space Force

### Introduction: Why Space Now

Warfare evolves with technology. As Clausewitz observed, the logic of war endures even as its grammar changes<sup>3</sup>—and today, spacepower defines that change. What once served as a supporting function has become a contested warfighting domain, directly shaping conflicts on Earth. U.S. joint operations—long-range precision strike, missile warning, command and control, navigation, and intelligence, surveillance, and reconnaissance (ISR)—are now

inseparable from space-based capabilities.<sup>4</sup> As the U.S. Space Force (USSF) doctrine states, “military spacepower is the ability to accomplish military objectives in, from, and to the space domain.”<sup>5</sup> In the Indo-Pacific, defined by vast distances, critical maritime chokepoints, and widely dispersed bases, this dependence is not merely significant; it is decisive.

Two conflicts illustrate this transformation. In 1991, Desert Storm revealed what space enables: GPS navigation,<sup>6</sup> precision-guided munitions,<sup>7</sup> and global communications gave U.S. forces unmatched speed, accuracy, and lethality. Three decades later, Russia’s 2022 invasion of Ukraine showed how space itself could be targeted: a cyberattack on Viasat disrupted Ukrainian communications,<sup>8</sup> while Starlink’s rapid deployment underscored both the vulnerability and resilience of distributed networks.<sup>9</sup>

The lesson is clear: control of the orbital high ground now determines operational tempo and strategic advantage. This chapter examines how the United States, China, and Russia conceptualize and contest space as a warfighting domain, the critical technologies and vulnerabilities at stake, and emerging U.S. approaches, including the Golden Dome initiative to harden deterrence through resilience and denial. Space warfare is not a distant prospect but an active front of strategic competition, and a core enabler of U.S. lethality in the Indo-Pacific.

### **U.S. Strategic Pivot: Space as a Warfighting Domain**

The U.S. recognition of space as a warfighting domain represents a decisive shift in defense policy and strategy.<sup>10</sup> In March 2025, the USSF released its *Space Warfighting: A Framework for Planners*,

which identified space superiority, space control, and counterspace operations as prerequisites for Joint Force success. Access to operate freely in space is now treated as a vital national interest. As USSF doctrine defines, space superiority means “a degree of control that allows forces to operate at a time and place of their choosing without prohibitive interference from space or counterspace threats, while also denying the same to an adversary.”<sup>11</sup>

For much of the Cold War, space was viewed primarily as a supporting environment, enabling land, sea, and air operations with navigation, communication, and reconnaissance.<sup>12</sup> Over the past decade, that perception has shifted. Space is now understood as an arena of direct competition and potential conflict, where control of orbital high ground offers enduring strategic advantage. This reflects what military theory has long recognized: the high ground confers visibility, reach, and security.<sup>13</sup> In space, it enables persistent surveillance, global communications, and the projection of force with unprecedented speed and precision.

Spacepower underpins U.S. global posture. ISR satellites operated by the National Reconnaissance Office (NRO) provide near-real-time coverage of adversary activities, enabling strategic warning and precise targeting. The Global Positioning System (GPS), maintained by the USSF, has revolutionized strike operations, delivering meter-level accuracy while reducing collateral damage and accelerating tempo. A new generation of capabilities—Ground Moving Target Indicators (GMTI) and Air Moving Target Indicators—is intended to enable real-time tracking of mobile threats via space-based sensors.<sup>14</sup> The NRO and the USSF are jointly pursuing this breakthrough, which, if achieved, would mark a true game-changer in modern warfare. China, too, is

developing GMTI and experimenting with on-orbit refueling through satellites such as *Shijian-21* and *Shijian-25*,<sup>15</sup> signaling long-term ambitions for maneuver warfare in space.

Beyond sensing, command and control depend on secure satellite networks such as Advanced Extremely High Frequency and Wideband Global SATCOM, which sustain global joint operations.<sup>16</sup> Missile warning and tracking satellites, exemplified by the Space-Based Infrared System, provide launch detection within seconds, which is critical for both deterrence and active defense.<sup>17</sup>

The institutional pivot was cemented in 2019 with the creation of the USSF and the reestablishment of U.S. Space Command. The 2020 *Defense Space Strategy* formally declared space a “distinct warfighting domain” in which the United States must be prepared to compete, deter, and, if necessary, prevail,<sup>18</sup> while the 2017 *National Security Strategy* underscored that “unfettered access to and freedom to operate in space [constitute] a vital [national] interest”—one that will be defended “at a time, place, manner, and domain of [U.S.] choosing.”<sup>19</sup>

Building on this foundation, U.S. Space Command’s 2025 publication *Elements of Victory* outlines the core conditions for success in space warfare: the ability to operate through a first strike, transition rapidly from crisis to conflict, and sustain operations through resilient basing, force posture, and international access agreements. It further emphasizes the integration and synchronization of joint, allied, and commercial effects, as well as the capacity to deploy, regenerate, and reconstitute space forces over the course of a protracted conflict. Sustained advantage ultimately depends on responsive launch, on-orbit maneuver, and space

logistics to ensure continuous operational availability and freedom of action.<sup>20</sup>

This shift was driven by rapid advances in counterspace by China and Russia. In 2007, China's destruction of its *Fengyun-1C* satellite with a direct-ascent anti-satellite weapon (ASAT) demonstrated both technical capacity and disregard for orbital debris. By 2015, Beijing consolidated space operations under the People's Liberation Army Strategic Support Force (PLASSF), tasked with targeting adversary command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) infrastructure at the outset of conflict. In 2024, PLASSF was replaced by the PLA Aerospace Force,<sup>21</sup> signaling a further institutionalization of space warfighting. Russia has likewise advanced its Nudol direct-ascent ASAT, tested in 2021, and deployed co-orbital satellites capable of close inspection or potentially disabling foreign spacecraft.<sup>22</sup>

In response, U.S. strategy has shifted toward architectures that emphasize resilience, redundancy, and adaptability. The Space Development Agency's (SDA) Proliferated Warfighter Space Architecture (PWSA) distributes capability across hundreds of satellites in low Earth orbit (LEO),<sup>23</sup> lowering the risk of a disabling first strike. Dynamic space operations, such as maneuvering satellites,<sup>24</sup> reconfiguring networks, and employing electronic protection measures, are now central to sustaining superiority. These capabilities are being woven into joint doctrine, ensuring that space remains not just an enabler but also a decisive domain of warfighting.

## Competing Schools of Space Weaponization and Deterrence

Debate over the military use of space has long revolved around two schools of thought: *space as a sanctuary* and *space as a weaponized domain*.<sup>25</sup> The sanctuary school emerged in the early Space Age, rooted in Cold War arms control. Advocates argued that space should remain free of weapons to preserve strategic stability, foster scientific cooperation, and avoid the risks of an arms race.<sup>26</sup> This view underpinned the 1967 *Outer Space Treaty*, which prohibited the placement of nuclear weapons or other weapons of mass destruction in orbit and restricted the militarization of celestial bodies. Although it left conventional weapons and ASAT systems untouched, the treaty enshrined the principle that space should primarily serve peaceful purposes.<sup>27</sup>

The weaponization school rejects this notion. It holds that space, like land, sea, air, and cyberspace, is inherently a domain of strategic competition, and therefore must be defended and, if necessary, dominated. Proponents argue that adversaries' counterspace capabilities make the sanctuary ideal obsolete. Given the centrality of space systems to precision strike, global communications, missile warning, and navigation, they contend that leaving these assets undefended invites disaster.<sup>28</sup> For them, control of the orbital high ground is as indispensable as control of the seas once was for Alfred Thayer Mahan's navy.

Deterrence theory in space borrows from broader strategic concepts but also has unique characteristics. Space deterrence seeks to convince adversaries that attacking space assets would be too costly, achieved through denial (hardening, dispersal, redundancy)

or punishment (threatening retaliation).<sup>29</sup> Space compellence aims to force an adversary to cease or reverse hostile actions in orbit through the threat or use of force.

The United States emphasizes deterrence through resilience and domain superiority. Official doctrine, articulated in the *Defense Space Strategy* and USSF planning documents, integrates multi-layered defenses, including proliferated LEO constellations, rapid reconstitution, and defensive counterspace measures, with limited offensive capabilities such as reversible jamming and dazzling. The goal is to deter aggression by demonstrating both survivability and credible response options.<sup>30</sup>

China approaches space through the lens of “active defense” and “systems destruction warfare.” In this framework, space is a decisive high ground whose control can shape the outcome of terrestrial wars. Chinese doctrine integrates counterspace, cyber, electronic, and information operations to paralyze an adversary’s command and control at the outset of hostilities. Its 2007 direct-ascent ASAT test and development of co-orbital rendezvous and proximity operations (RPO) reveal both kinetic and non-kinetic tools. China’s deterrence posture blends denial, through hardened BeiDou navigation and secure communications, with compellence, signaling readiness to hold adversary satellites at risk.<sup>31</sup>

Russia, inheriting Soviet-era counterspace programs, has doubled down on offensive capabilities. Moscow portrays space as a venue where “strategic deterrence” rests on threatening the survivability of adversary systems. Its arsenal includes the Nudol direct-ascent ASAT, ground-based jammers, and co-orbital “inspector” satellites with potential disabling payloads.<sup>32</sup> The 2021

destruction of *Cosmos 1408*, which created over 1,500 trackable debris pieces, signaled Russia's willingness to endure international condemnation to demonstrate capability.<sup>33</sup> U.S. officials now allege that Moscow is developing a nuclear, space-based weapon designed to disable vast swaths of satellites simultaneously. This escalatory move would threaten the stability of the entire orbital environment.<sup>34</sup>

While the sanctuary ideal retains rhetorical appeal, particularly among middle powers, at the United Nations, and in arms control forums, the trajectory of U.S., Chinese, and Russian doctrine suggests a contested, weaponized future. The central challenge for policymakers is balancing credible deterrence and compellence strategies with mechanisms that prevent destabilizing escalation or debris-generating conflicts that could imperil all nations' long-term access to space.

### **Enabling and Disruptive Technologies**

Modern warfare depends on space-based technologies that enable terrestrial power while creating new vulnerabilities. From LEO to the expanding cislunar frontier, these systems serve as force multipliers and lucrative targets. In an era of competitive multipolarity, the advantage belongs to the actor who can protect, disrupt, and recover the fastest.

ISR satellites form the backbone of strategic awareness and operational precision. Electro-optical, synthetic aperture radar, and signals intelligence platforms provide near-continuous global coverage. For the United States, ISR satellites support lethal targeting, battle damage assessment, and early warning. China's *Yaogan* constellation integrates multi-sensor maritime and land-

monitoring capabilities,<sup>35</sup> while Russia's *Persona* and *Bars-M* satellites deliver high-resolution imagery for strategic and tactical use.<sup>36</sup> ISR assets grant commanders a decisive tempo advantage by shortening the Observe-Orient-Decide-Act loop.

Global navigation satellite systems are equally indispensable,<sup>37</sup> providing positioning, navigation, and timing (PNT) for nearly every modern operation. The U.S. GPS has revolutionized warfare since 1993, enabling meter-level accuracy for guided munitions and synchronization of global communications. China's BeiDou, completed in 2020, offers enhanced accuracy across the Asia-Pacific, while Russia's GLONASS provides redundancy against interference and has supported operations since 2012.<sup>38</sup> These constellations multiply combat power but are also prime targets for jamming, spoofing, or direct attack, with potentially cascading effects on operational continuity.

Counterspace weapons exploit these vulnerabilities. Direct-ascent ASAT systems remain the most visible and escalatory threat. China's 2007 destruction of the *Fengyun-1C* satellite created thousands of debris fragments, while the United States demonstrated similar capability in 2008 with Operation *Burnt Frost*.<sup>39</sup> Russia continues to refine its Nudol system, underscoring a shared willingness to hold adversary satellites at risk. Such weapons are blunt instruments, highly effective but indiscriminate, as they create debris fields that endanger all actors. Non-kinetic means are subtler yet no less consequential: lasers that dazzle or blind optical sensors, electronic warfare systems that can jam navigation, or communications and cyber operations that can infiltrate satellite command links.<sup>40</sup> Their advantages lie in reversibility, scalability, and deniability. The United States and China invest in directed

energy systems for counterspace purposes, while Russia deploys mobile jammers to disrupt satellite uplinks and downlinks.

RPOs blur the line between servicing and sabotage. A satellite maneuvering nearby may signal inspection, repair, or intent to disable, capture, or destroy. The U.S. Geosynchronous Space Situational Awareness Program (GSSAP),<sup>41</sup> China's *Shijian* series, and Russia's *Cosmos* constellation all conduct RPOs, raising questions of intent. In May 2025, Russia launched *Cosmos 2588* into proximity with *USA 338*, part of the NRO's KH-series reconnaissance constellation,<sup>42</sup> demonstrating both the precision and the risks of such operations. In a crisis, RPOs could be used to conduct surgical strikes against high-value satellites in geosynchronous orbit (GEO) or in cislunar space.

The United States and its partners are investing in resilience to mitigate these threats. Proliferated constellations, such as the Space Development Agency's warfighting architecture, complicate adversary targeting by dispersing capabilities across hundreds of satellites. Maneuverable spacecraft and on-orbit servicing can extend mission life and adapt to threats. Advanced encryption, frequency hopping, and cyber hardening reduce susceptibility to non-kinetic attacks. Rapid-launch capabilities promise swift replacement of degraded or destroyed satellites, sustaining operational continuity under duress.

From an offensive perspective, disruptive technologies provide options across the escalatory ladder. Direct-ascent ASATs can permanently eliminate critical nodes, though at the cost of debris. Non-kinetic methods, like jamming or cyber intrusion, can temporarily weaken an adversary's capabilities and create windows

of advantage. RPOs can deliver precise, potentially deniable interference against high-value assets in orbits once considered secure. In a crisis, such measures could neutralize an opponent's missile warning, ISR, or command-and-control networks, altering the balance of multi-domain operations.

The competitive frontier is also extending outward. Cislunar space, the region between Earth and the Moon, is emerging as a strategic arena for ISR, navigation, and communications architectures, inevitably following civil and commercial ventures. Disruptive tools will follow in turn.<sup>43</sup> As I argued in 2024, “What happens if space-based counterspace capabilities are in the vicinity of the Moon, which threaten U.S. civil or commercial interests? What happens if an adversary installs counterspace capabilities on the Moon itself? In that case, the USSF will be blindsided because it does not have cislunar space domain awareness.”<sup>44</sup> Presence, resilience, and first-mover advantage in this domain will be critical.

Ultimately, nearly every space technology is dual-use. ISR satellites, navigation constellations, and RPO systems sustain legitimate civil and commercial activity, yet all can be repurposed for military ends. In this environment, maintaining superiority in enabling technologies while countering disruptive threats is essential to preserving freedom of action in the ultimate high ground.

### **Vulnerabilities, Resilience, and Escalation Dynamics**

Modern reliance on space assets delivers extraordinary operational benefits and concentrates risk. Legacy constellations often place unique missions, such as missile warning, strategic

communications, or high-resolution reconnaissance, on a few high-value satellites. This architecture creates exposure to a single point of failure: losing even one node can disproportionately degrade mission effectiveness. Congested orbits compound the problem. Accumulated debris from derelict hardware and past breakups heightens collision risks in low and geostationary orbits. A major fragmentation event could trigger a Kessler-style cascade that renders orbital shells unusable for years.<sup>45</sup> This environmental hazard is not merely technical but strategic, constraining maneuver options, narrowing crisis choices, and complicating military planning.

Escalation risk is embedded in both the physics and perceptions of space operations. Dual-use satellites support both civilian and military functions; interference with them can be perceived as escalatory, even when the effects are temporary. Intent is frequently ambiguous: a proximity maneuver that appears as a benign inspection to one actor may appear as hostile reconnaissance, or even a prelude to attack, by another. Non-kinetic “soft-kill” actions such as dazzling optical sensors, jamming communications, or spoofing signals are often designed to be reversible. Yet during tense periods, they may be interpreted as redline probes, increasing the risk of miscalculation.

Resilience aims to shift this cost calculus. The U.S. Space Development Agency’s PWSA disperses mission functions across hundreds of interoperable LEO satellites, many of which feature optical cross-links, allowing for graceful degradation in the event of catastrophic loss. Its first operational layer, Tranche 1, will form the orbital backbone for Joint All-Domain Command and Control (JADC2).<sup>46</sup> As SDA Director Derek Tournear said, “proliferation is

our biggest defense.”<sup>47</sup> Hybrid military-commercial networks add further redundancy, as demonstrated by Ukraine’s wartime reliance on commercial constellations such as Starlink, which supplemented degraded communications.

Rapid reconstitution is another pillar of resilience: The ability to replace lost satellites within days or hours ensures continuity of mission-critical functions after an attack. The USSF’s Tactically Responsive Space (TacRS) initiative, including the 2025 *Victus Sol* mission, demonstrates how commercial launch providers can field replacement assets on demand.<sup>48</sup> On-orbit servicing, including refueling, repair, and upgrades, extends satellite lifespans and restores functionality without waiting for new production and launch cycles. Together, these measures aim to deny an adversary the prospect of a decisive first strike in space.

Escalation in space can be visualized as a ladder. At the lower rungs are “blinding” actions, such as temporary jamming, spoofing, and laser dazzling, designed to signal capability without causing permanent damage. At the higher rungs, “bleeding” actions such as sensor damage, physical interference, and kinetic ASAT create lasting effects and generate debris. The most dangerous thresholds lie where space systems underpin nuclear deterrence: missile warning, strategic communications, and nuclear command and control. Interference at these levels may be interpreted as preparation for a nuclear first strike, compressing decision timelines and risking uncontrolled escalation.

Architectural design choices, therefore, have direct strategic consequences. Brittle constellations invite preemptive strikes by offering adversaries high payoffs for limited action, while

proliferated, resilient architectures blunt those incentives by denying quick or decisive gains. Resilience, however, is not solely a technical attribute. It must be paired with strategies that clarify redlines, improve attribution, and enable transparent communication under stress. Without these, even robust architectures cannot prevent misinterpretation in a domain where ambiguity is endemic.

The stakes are especially acute in the Indo-Pacific, where vast distances and compressed timelines magnify uncertainty. Resilient space architectures do more than preserve combat power in a degraded environment; they stabilize deterrence by ensuring that U.S. and allied forces can operate through disruption and project lethality across the theater. Resiliency in orbit has become a cornerstone of strategic stability in a region where escalation can move faster than diplomacy.

### **Comparative Strategies: United States, China, Russia**

The United States, China, and Russia each regard space as indispensable to modern warfighting, yet they operationalize it through distinct strategic cultures. Their doctrines reflect divergent approaches to integrating space into joint operations and shaping the tempo and character of conflict.

In the United States, space is viewed as a warfighting domain fully integrated across the joint force. The priority is resilience, speed, and tempo: compressing decision cycles, fusing space-derived intelligence into precision strike, and sustaining operations under attack. Washington is shifting from reliance on exquisite yet vulnerable platforms to proliferated, resilient constellations such as

PWSA. Its Tranche 1 transport and tracking layers are designed to serve as the backbone of JADC2, providing survivable connectivity and missile tracking even in degraded environments. In the Indo-Pacific, this architecture underwrites deterrence by denial, ensuring that targeting, missile warning, and communications remain viable in contested conditions.

China approaches space through its doctrine of “systems-destruction warfare,” which seeks to paralyze an adversary’s system-of-systems at the outset of conflict.<sup>49</sup> This vision fuses counterspace, cyber, and electronic warfare to disrupt C4ISR. Beijing has fielded direct-ascent ASAT weapons, co-orbital vehicles capable of RPO, and an array of non-kinetic tools, including jammers, lasers, and cyber exploits. The militarization of the BeiDou navigation system furnishes China with an independent, hardened PNT backbone for precision strike and joint maneuver, reducing reliance on GPS. Strategically, orbital dominance supports anti-access/area-denial (A2/AD) operations in the South China Sea and around Taiwan by degrading U.S. sensing, targeting, and communications.<sup>50</sup> Investments in cislunar awareness and deep space tracking further signal Beijing’s ambitions to extend positional advantage beyond GEO and to complicate U.S. domain awareness.<sup>51</sup>

Russia, by contrast, emphasizes asymmetric counterspace capabilities to blunt U.S. conventional superiority. Space is nested within Moscow’s concept of strategic deterrence, where holding U.S. space services at risk is intended to constrain American freedom of action. Russia fields a diverse toolkit, ranging from direct-ascent ASATs, such as the Nudol system, to co-orbital “inspector” satellites, powerful electronic warfare units, and

directed-energy programs like the *Peresvet* laser. Its record of destructive ASAT testing highlights a willingness to incur diplomatic and environmental costs to demonstrate capability. With fewer resources than the United States or China, Moscow prioritizes disruption over endurance, seeking to impose uncertainty on U.S. missile warning and command and control through selective, often reversible effects, rather than large-scale kinetic exchanges.<sup>52</sup>

Within this competitive environment, Washington has advanced the Golden Dome initiative as an evolution of defense strategy.<sup>53</sup> Initially envisioned as a homeland missile shield, the Golden Dome has evolved into a layered architecture that links ground, air, and space-based assets to counter missiles and space threats. Conceptually, space-based interceptors and persistent sensor coverage are envisioned as central to the architecture, enabling early warning, continuous tracking, and the prospect of boost-phase missile defense. Applied to the Indo-Pacific, such a system could protect forward-deployed forces, allied territories, and maritime chokepoints against missile salvos and hostile space activities.<sup>54</sup> Japan's 2025 *Space Domain Defense* guidelines, which emphasize real-time space tracking and integration with allied capabilities, illustrate growing alignment with this vision.<sup>55</sup>

Ultimately, while the United States emphasizes resilience, speed, and joint integration, China prioritizes offensive space control and denial, and Russia pursues disruptive counterspace operations to offset conventional inferiority. The interplay among these strategies will shape the character of future space competition and determine which power can command the ultimate high ground in a crisis.

## Legal and Normative Cross-Current

The legal framework governing military activity in outer space is rooted in the 1967 *Outer Space Treaty* (OST). The OST requires that space be used for peaceful purposes, prohibits the placement of nuclear weapons or other weapons of mass destruction in orbit or on celestial bodies, and bans military installations on such bodies. Yet the treaty leaves critical gaps: it does not restrict the development, testing, or deployment of non-nuclear ASAT weapons, allowing states to pursue counterspace programs that could jeopardize the stability and sustainability of the orbital environment.

China and Russia introduced the proposed Treaty on Prevention of the Placement of Weapons in Outer Space (PPWT) to address these omissions at the Conference on Disarmament in 2008.<sup>56</sup> While framed as a ban on space-based weapons, the PPWT has been criticized by the United States and others as fundamentally flawed, lacking verification mechanisms, and failing to address terrestrial-based ASAT systems,<sup>57</sup> the tools Moscow and Beijing are actively deploying. As former U.S. Ambassador Robert A. Wood noted in 2019, Russia was fielding the *Peresvet* combat laser, designed to disable satellites, even as it advocated for arms control measures that excluded such capabilities.<sup>58</sup>

Recognizing these shortcomings, Washington has shifted from threat-based approaches toward building norms and voluntary commitments.<sup>59</sup> Recent initiatives include an international moratorium on destructive ASAT testing,<sup>60</sup> discussions within the UN's Open-Ended Working Group (OEWG) on reducing space threats, and bilateral dialogues aimed at mitigating escalation risks in orbit.<sup>61</sup>

For the Indo-Pacific, the stakes are immediate. As China invests in offensive space control and Russia pursues disruptive counterspace tools, the United States emphasizes resilience, speed, and integration across joint forces. The outcome of this contest will determine not only whose technologies prevail in orbit but also whose rules and behaviors shape the future architecture of space security.

### **Future Trajectories and Scenarios**

Space has transitioned from a supporting domain to a contested battlespace. Once an adjunct to terrestrial operations, it is now central to great-power strategy. China's 2015 and 2021 *Military Strategic Guidelines* elevated space to a decisive component of multi-domain operations. The United States created the USSF and codified space as a warfighting domain. Russia has embedded counterspace into its framework of strategic deterrence. The next competition phase will be shaped less by declaratory doctrine than by architecture, automation, and escalation management.

Four trajectories are already visible. First, military activity is expanding beyond GEO into cislunar space, where relays, navigation points, logistics hubs, and space-domain awareness networks are acquiring operational value. Second, artificial intelligence, autonomy, and quantum-secured communications are compressing decision timelines, accelerating command cycles, and complicating attribution, making human-on-the-loop safeguards essential. Third, hybrid architectures that blend military, commercial, and allied constellations enhance resilience but blur thresholds, since strikes on dual-use assets could provoke military

responses. Fourth, layered defenses—exemplified by the Golden Dome initiative’s integration of proliferated LEO constellations, space-based sensors, and responsive launch—promise deterrence by denial if fully realized. These trajectories frame several plausible crisis scenarios.

*Scenario 1:*

*Gray-Zone ISR Disruption in the South China Sea*

A PLA co-orbital vehicle conducts unannounced proximity maneuvers near a U.S. GEO ISR satellite, temporarily blinding its sensors without creating debris. Intelligence feeds supporting a carrier strike group are degraded, forcing reliance on commercial imagery and SDA’s proliferated LEO assets. Beijing frames the maneuver as a benign inspection, while Washington sees it as coercive signaling. The ambiguity delays decisions, illustrating how reversible effects in orbit can paralyze crisis response.

*Scenario 2:*

*Russian ASAT Debris Crisis in Low Earth Orbit*

Amid a NATO standoff, Moscow destroys a defunct satellite with a Nudol interceptor, calling it a “scientific test.” The debris field spreads unpredictably, threatening military and commercial satellites, including Starlink terminals supporting NATO operations. Rapid reconstitution and on-orbit servicing blunt some damage, but debris-avoidance maneuvers drain fuel reserves. Insurers suspend coverage and allies push for binding ASAT test bans. Russia underscores its willingness to incur diplomatic and environmental costs to demonstrate capability.

*Scenario 3:  
Lunar Relay Standoff and the Golden Dome Response*

China deploys a relay satellite near the Lunar South Pole to support a crewed outpost and cislunar tracking. A PLA probe approaches a U.S. relay supporting Artemis operations. U.S. Space Command tasks Golden Dome-aligned assets to shadow the probe while Special Operations Forces in cislunar logistics hubs prepare contingency plans against Chinese ground nodes. Both sides hold back, but the standoff signals that lunar infrastructure has become a front line of deterrence, pushing norms far beyond GEO.

*Beyond the Scenarios*

Looking ahead, megaconstellations will make resilience practical yet targetable; a tactically responsive launch will reduce recovery timelines from months to days; on-orbit servicing will extend spacecraft lifespans while complicating intent assessments; quantum-secure links and PNT alternatives will harden networks against spoofing; and debris remediation will shift from an environmental virtue to a strategic necessity. The power that integrates these elements most effectively—protecting its orbital services while imposing friction on its rivals—will set the tempo of competition, especially in the Indo-Pacific, where vast distances compress warning time and magnify the premium on space-enabled command and control.

## **Conclusion: Commanding the Orbital High Ground**

The trajectory of military space competition clearly makes one fact unavoidable: space superiority will shape 21st-century war. Integrating orbital assets into joint operations compresses kill chains and accelerates decision cycles even as it heightens escalation risks. Emerging architectures, such as proliferate constellations, tactically responsive launch, and layered defenses akin to Golden Dome concepts, shift deterrence from punishment to denial by ensuring that sensing, PNT, and C2 remain available under attack.

Two imperatives stand out. First, for the United States, hybrid networks that blend military, commercial, and allied constellations must be secured without triggering inadvertent escalation, because dual-use systems blur thresholds, attribution, transparency, and “rules of the road” for proximity operations, which matter as much as hardening and redundancy. A gray-zone ISR disruption or a debris-creating ASAT “demonstration” could rapidly spill into terrestrial escalation, underscoring the fragility of deterrence in orbit. Second, the battlespace expands into cislunar space, where relay satellites, navigation points, logistics hubs, and space-domain awareness nodes will become operationally decisive. The United States’ campaign plans must assume cross-domain interactions in which orbital maneuvers and terrestrial actions, including special operations effects, are coordinated from LEO to the lunar surface.

Ambition must be tempered by realism. Layered-missile defense concepts promise powerful denial effects, but their technical demands, costs, and action-reaction dynamics require scrutiny. The most reliable gains lie in resilience: proliferated constellations with cross-links, spectrum agility, cyber hygiene, rapid reconstitution,

and on-orbit servicing. These measures reduce first-strike incentives and preserve combat power in a degraded environment.

Ultimately, space will not merely support terrestrial campaigns; it will set their tempo and terms. In the Indo-Pacific especially, the side that protects its orbital services, degrades its adversary's, and recovers faster than it is attacked will seize and command the orbital high ground.

## Endnotes

- <sup>1</sup> The author is solely responsible for the views expressed in this publication, which do not necessarily represent the official policy or position of the Daniel K. Inouye Asia-Pacific Center for Security Studies, the U.S. Department of War, or the U.S. government.
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