Atmospheric Command: Stratospheric ISR and Asymmetric Warfare for Multi-Domain Operations

America's Next Battlefield

This paper examines an emerging vulnerability in United States defense architecture created by the absence of a persistent operational layer in the near-space band between conventional airspace and orbit (approximately 60,000–330,000 feet). Using the Defense Intelligence Agency's 2025 Worldwide Threat Assessment as a primary lens, combined with internal force-structure analysis of the U.S. Air Force and open-source reporting on Chinese and Russian doctrine, it argues that the United States has evolved a vertically brittle C5ISR stack: dense sensing and infrastructure on the surface, exquisite but targetable constellations in space, and a structurally under-instrumented "space littoral" in between. Adversaries are explicitly coding against this gap, treating the stratosphere and lower thermosphere as a penetration corridor, ISR layer, and weapons employment zone for missiles, unmanned systems, and counter-space operations.

The analysis advances two main contributions. First, it formalizes atmospheric command as a design requirement for resilient, multi-domain kill chains, rather than a niche adjunct to air and space operations. Second, it proposes a stratospheric, software-defined layer built from proliferated hybrid heavier-than-air/lighter-than-air platforms (exemplified by Deimos-One's HALO concept) as an economically and operationally viable means to close the vertical seam. Representative mission mappings are developed for: (1) counter-UxS and cruise or hypersonic missile sensing; (2) resilience under partial loss of orbital assets; (3) homeland and border security against cartel and terrorist logistics; and (4) global trade protection at maritime chokepoints. An appendix outlines forward-leaning research vectors, including atmospheric shaping, non-kinetic effectors, electromagnetic deception, and stratospheric kill-aid staging, conditional on the prior fielding of a persistent near-space mesh. The central claim is that without a dedicated stratospheric layer, U.S. deterrence and defense remain contingent on a single fragile axis: continued, uncontested access to space.

For most of the post–Cold War era, American defense planning ran on a simple model:

Space was a sanctuary, immaculate, untouchable.

The homeland a deep rear area.

And the hard part was shifting power outward, not defending inward.

That model drove an entire generation of procurement and posture decisions.

We built a force that assumed the brain of the American war machine lived in orbit, the muscle lived on the surface, and everything in between was just “sky.”

But that world is gone.

What has changed is not merely the number of adversary missiles, satellites, or drones, but the entire shape of the problem.

AI, biotech, quantum, microelectronics, commercial space, cyber, autonomy, and cheap unmanned systems have collapsed the distance between “home games” and “away games.”

Capabilities that used to require national labs and black budgets now ride global supply chains and dual-use tech. A mid-tier state (or a cartel with good engineers) can now plug into the same sensors, compute, and manufacturing infrastructure as a superpower.

The result is an environment where U.S. forces, infrastructure, and citizens are all wired into a single, contested system-of-systems whether we like it or not.

In this new world, the most important question is no longer “who has the most badass airplane” or “who has the most satellites.”

The real question is: who owns the geometry of the battlespace.

Who sees first, and who sees longest.

Whose networks still move data when the spectrum is dirty.

Whose kill chains still close when entire layers are jammed, spoofed, or shot in the face.

Those are not abstractions.

They are architectural constraints.

They decide whether deterrence holds, whether escalation can be managed, and, in extreme cases, whether critical national functions survive contact with an intelligent adversary.

If you look at current U.S. posture through that lens, a pattern pops out: we have built a highly optimized bimodal stack.

• **At the bottom:** dense ground and low-altitude layers of radars, cameras, bases, critical infrastructure, and human networks.

• **At the top:** a relatively small number of exquisite satellites doing ISR, comms, and PNT.

Between those poles sits a huge altitude band our doctrine still treats as mostly empty sky.

Our adversaries do not share that hallucination.

Chinese and Russian war planners are actively writing to that band, treating the stratosphere and lower thermosphere as a penetration corridor, sensor platform, and weapons layer.

They understand something our architecture implicitly admits: if you put your nervous system in orbit and your muscle on the surface and leave the vertical middle thin, the system will snap in the middle when stressed.

Hypersonics, advanced cruise missiles, long-range unmanned systems, and high-altitude surveillance balloons are all, in different ways, exploit scripts for the same bug: the absence of a persistent, resilient, proliferated layer in the near-space band between conventional airpower and orbit.

The Defense Intelligence Agency's 2025 Worldwide Threat Assessment is, on the surface, a guided tour of that environment.

Read it like a policy brochure and it feels familiar.

Read it like a systems log and something sharper comes into focus.

It quietly concedes that the current architecture is incomplete, and that our primary competitors are already writing code against the missing layer.

The opening sections admit that AI, biotech, quantum, microelectronics, space, cyber, and unmanned systems are *"rapidly transforming the nature of conflict and the global threat landscape"* and that adversaries are building ways to blind, jam, or bypass traditional American strengths.

Translation: the U.S. defense stack is showing structural fatigue, and the opposition is pushing updates faster than we are.

The most interesting part of the entire document, though, is not what it emphasizes, but what it mostly ignores.

It devotes plenty of ink to space, cyber, air, maritime, ground, even gray-zone stuff.

What it does not seriously engage is the vertical band between traditional airpower and orbit.

In some of our earlier work with the United States Air Force, we started exploring what "atmospheric command" could look like in that gap of "empty sky," which is the near-space environment between the Armstrong limit (62,000 ft/ 18 km) and the Kármán line (330,000 ft/100 km).

We asked a simple question: what happens if you treat that "empty" region as an operational layer?

Not as sky, but as a mesh, where high-altitude balloons, autonomy, and AI turn the stratosphere into something closer to a mesh network than empty blue.

The reactions in the room were telling.

Nobody said "this is impossible."

But what we heard instead was *"we do not have a doctrinal home for this yet"* and *"there is no program element that owns this altitude"* but *"it sounds pretty cool though."*

At the time, that sounded like bureaucracy being bureaucracy.

Reading the DIA report now, it reads more like a timestamp: the moment where the architecture outgrew the model, and nobody wanted to be first to update the code.

In this paper, I'm going to break down the DIA assessment, which to me is more of a warning signal and not just another boring government press release.

Also, I will map its implied threat architecture against the actual state of U.S. defense capabilities, fold in our earlier work with the Air Force on atmospheric command in the stratosphere, and then trace what that geometry actually implies about future conflict, including the contours of any conflict serious enough to qualify as a Third World War.

The Problem

As currently postured, the U.S. military is at significant risk of not being able to defend America's vital national interests.

National defense is not a solved problem.

It is, at best, a partially satisfied constraint.

You do not find that sentence in the DIA report, but functionally that is exactly what it describes.

The picture is fairly straightforward: peer and near-peer adversaries are scaling long-range strike inventories, developing anti-satellite and counter-space systems, and proliferating unmanned platforms into every domain, with the explicit goal of complicating, degrading, or bypassing U.S. defenses.

Viewed as a system, that is not just a "more challenging threat environment," it is an adversary architecture specifically designed to strip assurance out of our planning.

The legacy U.S. force structure and C2 stack no longer guarantee that critical national interests remain protected under stress.

That risk shows up especially clearly in the air domain, where U.S. air-superiority doctrine has rested for decades on a set of now-shaky assumptions: uncontested forward basing, theater-wide freedom of maneuver, and persistent ISR and strike coverage.

In a world of dense A2/AD networks, long-range precision fires, and integrated counter-air and counter-space complexes, those assumptions are turning into liabilities.

You see, the world DIA is actually describing is not a set of discrete "conflicts."

It is a world of contested kill chains.

What matters is who can sense, decide, and deliver effects faster (and keep doing it) when everything is being jammed, spoofed, or attacked at once.

Let's start with homeland.

DIA's own language concedes that the United States now faces an "array of threats" from state competitors and non-state actors who seek not just to erode U.S. advantage abroad, but to hold U.S. territory, infrastructure, and citizens at risk directly.

You do not have to squint to see it.

Here are a few examples:

1. China and Russia are expanding their missile inventories and fielding new classes of ballistic, cruise, and hypersonic systems engineered to stress U.S. detection, tracking, and interception architectures.

2. North Korea has demonstrated an ICBM capability with sufficient range to hold the continental United States at risk.

3. Terrorism has become "dynamic and diffuse," with networks decentralizing operations, using encrypted comms, and exploiting migration flows. Recent ISIS-linked arrests at the southern border are not outliers; they are the pattern.

Underneath all the acronyms, the threat stack is conceptually simple: missiles, unmanned systems, cyber, transnational crime, terrorism, and foreign intelligence are all converging on the same target set—U.S. infrastructure, U.S. logistics, and the U.S. population.

Now drop unmanned systems into that picture.

DIA is explicit that the threat from Unmanned Systems (UxS) to U.S. interests and the homeland "probably will increase," driven by commercial proliferation, advancing enablers, and persistent attribution problems.

Cheap UxS platforms now effectively extend ISR and strike capability to actors who used to be stuck in the "AKs and pickup trucks" tier.

That is the core shift.

This is no longer a single-adversary, single-domain problem.

It is now a global kill-chain ecosystem in which:

- State actors scale missiles, hypersonics, EW, cyber operations, and counter-space.
- Non-state actors scale drones, terrorism, and organized crime.
- Both classes of actors ride the same AI, microelectronics, and data infrastructure, which compresses timelines, lowers barriers to entry, and makes their effects harder to detect, attribute, and counter.

DIA does not hedge on the technology piece.

It argues that global advances in AI, biotech, quantum, and microelectronics will continue to erode U.S. overmatch and “pose a significant threat” to any assumption of sustained American advantage.

In theory, that is a dual-use problem: the same tech that drives commercial value also shortens the distance between civilian hardware and weaponized capability.

Even weak states and non-state actors can now ride that curve.

We all watched it happen in Ukraine.

The theory played out live on TikTok: we saw Walmart grade quadcopters chasing soldiers through treelines; drones dropping 3D-printed fins and modified grenades into trenches; artillery cued in near real time; all stitched together by commercial sat internet (Starlink terminals bungee-cord strapped to pickup trucks), commercial satellite imagery, and off-the-shelf mapping and AI tools.

The end result is something very uncomfortable: a battalion-grade ISR–strike web assembled out of Walmart drones, consumer electronics, and open-source software inside a single campaign.

What used to require a national technical means stack was, in effect, rebuilt from retail drones and COTS connectivity and fielded as a coherent, battalion-grade kill chain.

So if you are still framing the problem as “big platforms versus big platforms,” you are already several versions behind on this stuff.

The game now is systems, not ships.

And the competition is between systems of systems: sensing, decision, and effects networks, not individual aircraft, or satellites.

Now, stack the external threat against the internal state of the force.

Decades of prolonged deployments, chronic underinvestment in key force elements, poorly defined priorities, shifting security policies, and ineffective program execution have left the armed forces (and the Air Force in particular) underprepared for the speed and character of emerging threats.

That baseline fragility is then loaded further by the significant and sustained resource strain caused by ongoing U.S. support for Ukraine’s defense against Russia’s invasion in 2023, a strain worsened by the limited willingness of European allies to assume a larger portion of the responsibility.

Tensions and resource draw increased further due to the Hamas–Israel conflict, which triggered the U.S. to provide additional flows of equipment, munitions, and missile defense assets into the region, placing additional pressure on America's already stressed defense posture.

You end up with a military that is not only stretched at the edge but backed by an industrial base that struggles to replenish what is being burned down across multiple theaters.

For the U.S., which has to do all of this while still defending the homeland and preserving capacity for other contingencies, this is not a comfortable equilibrium.

Now overlay that with a different class of signal.

The most surreal proof of concept floated over everyone's head in early 2023 when a Chinese surveillance balloon wandered over CONUS, over Montana missile fields and Midwestern cities, while the most powerful air force on Earth spent days arguing in public about when and how to shoot down a glorified gas bag.

NORAD was tracking, cable news was speculating, TikTok was making jokes, and buried underneath the spectacle was a harder truth: a slow, comparatively primitive platform had just exposed a blind spot in an architecture built for fast jets and ballistic arcs.

The embarrassment was not that an enemy balloon was flying uncontested over homeland.

The embarrassment was that our sensors and playbooks were not built for that geometry.

Keep in mind, these are not just curious, low-tech weather or party balloons.

They are sophisticated near-space platforms with advanced ISR payloads, and potentially kinetic or non-kinetic options, operating inside U.S. airspace.

They also illustrate, in a very public way, that the near-space band between roughly 60,000 and 330,000 feet is no longer an inert buffer.

It is contested.

Chinese doctrinal work has been explicit on this point.

As China's 2016 Aerospace Security Strategic Concept explicitly describes, the "space littoral" (i.e., the near-space environment at altitudes between the Armstrong limit and the Kármán line) is increasingly recognized as a critical domain for future military operations, and *"an important penetration channel for rapid and long-range strikes."*

The fact that balloon-borne platforms could penetrate and traverse U.S. airspace with limited warning or effective engagement raised the question in front of everyone: what else lives in this band that we do not see?

In a world where low-cost aerial systems are available to anyone with a credit card and a grudge, treating this as a mere curiosity is malpractice.

It is a structural hole in the architecture.

If the United States is serious about defending its territory and critical infrastructure in a contested global system, then persistent sensing, early warning, and a responsive multi-layer defense in and through near space are not wish-list items.

They are table stakes.

DIA's public discussion of homeland security effectively concedes the problem without explicitly naming the stratosphere as a primary future battle domain.

It talks about missiles that can hold the country at risk, UxS that extend regional actors' reach, and foreign ISR platforms probing U.S. defenses.

What it does not do is explicitly connect those lines to the altitude band that makes much of this workable.

The Chinese balloon incidents were not weird one-offs.

They were live-fire demos of a doctrine Beijing had already put in writing years earlier: treat near space as a penetration corridor into the seam between our air and space defenses.

Our current defensive stack only marginally touches that band, which is precisely why it is so attractive to a peer adversary.

As I have argued to the Air Force, you can summarize the situation like this: we are underweight in several mission-critical areas (ISR, EW, asymmetric warfare, resilient real-time communications) with the vulnerability most acute in the space littoral.

Our air and missile defense systems are tuned for two zones: lower-altitude threats and exo-atmospheric ones. They are not designed around the 60,000–330,000 foot regime.

That leaves a structural gap in our ability to sense, defend, and project power in precisely the region Chinese and Russian planners have flagged as a favorable corridor for ISR and strike.

The Chinese spy balloon incidents made this vulnerability clear and present.

The fact that multiple Chinese balloons transited U.S. airspace before being detected or properly classified is not just a national embarrassment; it is a clear indicator of a domain awareness failure in the exact band where our main competitors are most actively probing for advantage.

Chinese doctrine has been explicit about this vulnerability for nearly a decade.

China's 2016 Aerospace Security Strategic Concept states that *"At present and for a long time to come, the vast majority of air defense weapons will not threaten targets in near space."*

And:

Near space is *"a critical penetration corridor for rapid, long-range strikes."*

They are literally writing to the seam between legacy air defense and space control. And they are building hardware to match.

A 2018 Chinese state media report touted a high-altitude balloon test carrying hypersonic missiles.

Subsequent military writings have reinforced this commitment, highlighting near-space weapons as offering significantly expanded reconnaissance field of view and strike coverage, higher stealth, and harder detection.

Operating in that band makes detection and classification by conventional radar and IR sensors significantly harder.

Combine that with the naturally low radar cross-section and engagement weirdness of balloons, and you get a persistent threat to "blue-sky" airspace that is hard to service with legacy tools.

So: how real is the threat?

The Threat

It is not difficult to reverse-engineer what China and Russia are doing in space.

They are reading the same dependency graph we are.

For China, the pattern is simple.

The PLA is deliberately targeting U.S. space dependence: deterrence, power projection, and regional intervention all lean heavily on a relatively small set of orbital assets.

China is investing across the entire C5ISRT stack: space-based surveillance and recon, precision targeting, secure comms, PNT, weather, oceanography.

It now fields more than a thousand satellites, roughly half of them ISR, second only to the United States. And it is building large constellations aimed at competing with systems like Starlink to provide globally distributed, potentially hardened comms.

At the same time, it is not satisfied with just building its own stack; it is actively developing ways to break ours.

China already has operational direct-ascent ASAT missiles for LEO and is working its way up the belt to higher orbits, including GEO.

It fields dedicated electronic warfare systems to jam SATCOM and GPS.

It has deployed satellites such as Shijian-21 that can physically interfere with, reposition, or damage/destroy other satellites.

Russia is walking a similar path, but with a much nastier attitude.

Moscow is prioritizing counter-space capacities as a way to deter and coerce a West it sees as "space dependent." It is working on a satellite capable of carrying a nuclear device, which would threaten thousands of satellites across multiple orbits if ever used.

It is building ground-based lasers, ASAT missiles, and advanced EW—having already run an antisatellite test in very close proximity to a U.S. government spacecraft.

In other words, our adversaries understand that the U.S. joint force is fused through a relatively small number of fragile, expensive orbital nodes.

So they are building toolkits to blind, jam, dazzle, or, if necessary, smash and destroy that orbital "brain."

Our structural problem is that we let that concentration happen.

We pushed more and more of our advantage into a very concentrated and limited number of very capable, very high-value space assets.

But that is not resilience.

It’s efficiency turning into a fragile single point of failure.

In plain English: we rode the space layer from asymmetric advantage to a place where one damaged layer can compromise the entire system.

A future great-power war could easily be decided by a single point of failure.

And despite the strategic importance of this critical piece of sky, the overwhelming majority of existing American air and missile defense systems are simply not engineered to engage targets operating in the near-space environment.

That design gap effectively grants adversaries access to a relatively unpoliced corridor for ISR, long-range strike, and electronic warfare, which translates directly into elevated national security risk.

Without persistent ISR, EW, and asymmetric effects in near space, the U.S. is ceding positional and informational advantage to competitors who are actively building their own architectures there.

The 60,000–330,000 foot gap is no longer a diagram, it’s no longer a theoretical concern.

It is a live structural weakness.

Closing it will require more than incremental upgrades.

It will require modernized air and missile defenses and purpose-built near-space platforms that can restore deterrence and freedom of action in this emerging domain.

This is precisely the gap the DIA report leaves mostly implicit.

It spends pages on orbital constellations and counter-space. It spends pages on ground and conventional air. It says very little about the band in between.

And yet that is the band adversaries are betting our defenses are functionally blind.

Closing that seam is not a boutique science project. It is the difference between a genuinely layered architecture and a pair of disconnected endpoints with a void in the middle.

That said, what is most striking in the DIA narrative is not what it includes, but what it leaves out.

The report goes deep on ground and maritime: missiles, drones, criminal networks, terrorism, cyber, migration flows.

It goes deep on orbit: C5ISRT constellations, ASATs, nuclear space concepts, EW, quantum, AI-enabled effects.

What it does not really do is treat the layer in between—the space littoral as a first-class domain that ties those pieces together.

That intermediate band matters for some very practical reasons:

- It sits above most weather and conventional air traffic.
- It sits *inside* national airspace law, not in the outer space treaty regime.
- It offers enormous line-of-sight footprints over land and sea for sensing and comms.
- It is reachable with high-altitude balloons and hybrids at cost and timelines that are orders of magnitude lower than satellites.

From a systems perspective, this is the missing layer.

Right now the architecture looks like this:

- **Ground layer**: radars, cameras, HUMINT, fixed sensors, infrastructure, population centers.
- **Space layer**: satellites, PNT, global comms, strategic ISR.

Meanwhile, the world DIA describes is one where:

- Cheap, swarming unmanned systems get more dangerous as they plug into AI, big data, IoT, and 5G.
- Missiles are engineered to saturate, bypass, or outmaneuver traditional defenses.
- Cartels run a long-term logistics campaign via fentanyl and cocaine flows that killed more than 86,000 Americans in 2024.
- Maritime militants like the Houthis conduct nearly 200 attacks on merchant shipping, driving an estimated 70 percent reduction in Red Sea transit.

And in the middle of all that, there is no persistent, scalable, proliferated, attritable sensing and comms layer between the ground radars and the satellites. That is the gap.

Combat Capacity

When we ran our analysis with the Department of War, we tried to answer a blunt question:

If you had to fight a major war (or two) what is the real state of the Air Force?

We then evaluated its current force structure and readiness against contemporary major combat requirements.

On the basis of that analysis, the Air Force is best characterized as somewhere between “underpowered” and “Very Weak” in its ability to meet those demands.

Historically, the Air Force needed roughly 28 fighter squadrons (about 500 active fighters) to sustain a single major regional conflict.

Add a reasonable 20 percent margin for spares and attrition, and you land around 600 combat-coded fighters for one MRC.

Under a two-MRC construct (which is not fantasy if you imagine overlapping theaters in Ukraine and the Middle East) you are looking at something like 1,200 combat-coded fighters.

The current inventory is roughly 897.

That is about 75 percent of what you would like.

The bomber force is worse: around 64 percent of where it should be.

Tankers and strategic lift sit closer numerically (around 83 percent of a two-MRC benchmark), but their global spread makes rapid repositioning hard, and low mission-capable rates driven by maintenance shortfalls and personnel gaps raise questions about how well they can absorb losses and sustain high tempo over time.

In practice, the force looks sized and postured to manage only a single major fight plus a lot of improvisation, asset cannibalization, and global cross-leveling. That is not a robust posture.

Yes, production of F-35s and KC-46s continues. But new deliveries are not outpacing retirements fast enough to fix the structural problem.

Sortie rates remain low.

Less than half the pilots in top-end squadrons are assessed as ready for a meaningful fraction of their wartime tasking.

No fighter squadron can honestly claim full-spectrum, peer-war readiness.

The trend lines are negative.

The combined shortage of trained pilots and available flying hours has become a critical bottleneck that undermines the Air Force's ability to translate nominal platform counts into usable combat power.

Additionally, the Air Force has a finite set of exquisite, high-cost platforms, an industrial base under strain, and an ever-growing mission shopping list.

As a result, the overall combat capability of the United States Air Force is currently and appropriately assessed as "Very Weak."

Even if you imagined a miracle where every squadron suddenly hit "Very Strong" on readiness metrics, the geometry would not change.

You cannot fix a vertical gap in the stratosphere by flying more sorties with platforms that were never designed to live there.

A vertically brittle architecture that loads the ground and orbit layers while leaving the middle thin will predictably break in the middle.

That is what systems do.

Defense Requirements

Let's zoom back into the near-space layer.

The U.S. Air Force now faces real capability gaps in ISR, EW, and asymmetric effects in that 60,000–330,000 foot band.

The Chinese balloon saga did not create that problem. It just pushed it onto cable news.

For China, that band has already been upgraded from peripheral niche to first-class status: a primary operating regime mapped against U.S. blind spots.

It is at this point that the technical analysis and the operational reality finally converge.

Now we know the rest of their architecture: counter-space systems, long-range precision strike, proliferated unmanned platforms.

The common logic is simple:

Build kill chains that can see and touch U.S. forces from vantage points where we cannot see or touch them back, in areas where U.S. sensors and effectors are thin or nonexistent.

Then use those positional advantages to hold U.S. forces and critical infrastructure at risk at a structurally favorable cost ratio.

The U.S. ISR architecture, as built, does not close that gap.

High-altitude UAVs like MQ-9 and RQ-4 are sophisticated, but they run into physics and regulation around 50,000 feet.

Their endurance, basing, and airspace constraints make continuous regional coverage hard.

They can peer into the band.

But they cannot inhabit it at scale.

And they cannot impose any meaningful degree of control over activity inside it.

Space-based ISR covers the globe, but its cadence is controlled by orbital mechanics, not operational need. You get intermittent snapshots, not continuous real-time stare, and the revisit rates inevitably leave exploitable gaps.

Meanwhile, those constellations are becoming more vulnerable to kinetic ASATs, co-orbital “inspectors,” and advanced EW/cyber campaigns.

The Air Force’s own ISR Flight Plan quietly acknowledges this and moves “persistent ISR and EW in contested environments” from nice-to-have to critical requirement.

As the tempo of anti-satellite testing increases, and rendezvous/proximity operations become more normal, the implication is hard to ignore: if you keep most of your nervous system in orbit while your peers are building multiple ways to punch it, you cannot treat space as the one true high ground anymore.

A resilient architecture needs extra layers below orbit that can:

- Survive partial loss of the space layer.
- Be reconstituted quickly.
- Keep injecting good data, targeting, and C2 into the fight while space is degraded or under direct attack.

That is the role the near-space band should be playing.

Why This Matters

None of this is some brilliant new discovery. The United States has been flirting with the near-space problem for over twenty years. We just never promoted it from experimental curiosity to fielded layer.

The DIA’s assessment just puts into context, in retrospect, the magnitude of the opportunity cost embedded in that failure to institutionalize.

As early as 2001, the Army’s Space and Missile Defense Command was working on the High Altitude Airship (HAA)—a lighter-than-air platform intended to loiter around 65,000 feet for long durations. It was supposed to carry IR sensors, radar (steel-track concepts, etc.), and relay payloads, supporting NRO missions and ballistic missile defense.

Conops envisioned persistent coverage from 50 to 4,000 kilometers, depending on sensor suite.

Missions ranged from counterterrorism and border security to cruise and national missile defense.

There were real flight tests, real demos.

Technically, it was not fantasy.

The program, however, never transitioned into production or routine deployment.

It became an early, partially validated attempt to occupy near space that we simply never drove to architectural maturity, right when adversaries were starting to frame that altitude band as a core operational domain.

In the same era (late 90s and again in the early 2000s) the Department of Defense launched JLENS: the Joint Land Attack Cruise Missile Defense Elevated Netted Sensor program.

A mouthful, but the idea was simple: tethered aerostats with radar payloads for persistent, long-range surveillance and fire-control support against cruise missiles, UAS, and other airborne threats.

The notional system had two main radars, one for wide-area surveillance, and one for fire-control.

Together, they promised hundreds of miles of coverage. Operating around 10,000 feet, designed for up to 30 days on station, JLENS was supposed to offer continuous 360-degree coverage for theater and homeland defense.

It made it through multiple technical and operational tests.

But it did not make it to sustained, wide deployment.

When you zoom out you begin to see a pattern.

Over many decades, the U.S. military has tested a whole zoo of heavier-than-air, lighter-than-air, and hybrid platforms—TARS, REAP, RAID, JLENS, HAA, various experimental airships.

They all hit the real world and ran into a familiar bundle of problems: operational fit, weather vulnerability, survivability, cost, sustainment, reliability.

They flashed potential.

None became a default architectural layer.

And while we cycled through that loop, our enemies kept moving.

China, for example, has been leaning into stratospheric platforms, designing and developing massive fleets of near-space balloons that are cheap, operationally meaningful, and useful for ISR and potentially missile support.

Collectively, they form a new class of elevated sensing and targeting infrastructure that is hard and expensive for us to counter with legacy tools.

The story, put plainly, is this:

We saw the problem early, experimented, learned a lot, and then failed to institutionalize those lessons. Our adversaries did not make the same mistake.

The DIA report reads like the balance sheet of that decision.

Chinese near-space development.

Russian counter-space modernization.

Long-range precision strike proliferating across regions.

All of it converging on the same vertical seam we identified years ago, half-explored, then left unresolved.

That seam is now a potential pivot point in the distribution of global military advantage.

And the external trends collide with internal limitations.

It is no secret, the U.S. Air Force has real gaps in operating in near space.

The traditional tools (MALE UAVs like MQ-9, HALE UAVs like RQ-4, fifth-gen fighters like F-22 and F-35) all face some combination of altitude ceilings, limited power/endurance for true persistence, regulatory friction on beyond-line-of-sight ops, and non-trivial launch/sortie timelines.

They can interrogate the regime from below.

But they cannot live there.

At the platform level, the constraints are obvious.

MQ-9 is a capable medium-altitude RPAS, but:

- It’s heavily constrained by FAA rules on BLOS in U.S. airspace.
- It tops out around 50,000 feet.
- Its power/payload/endurance trade space, plus long mission prep and transit, make it a clumsy tool for rapid, persistent work in the near-space band.

F-22 can get higher (around the mid-60s in extremis) but it was designed for short tactical engagements, not long-duration presence.

Its fuel burn and tanker dependence at altitude make persistent near-space orbits both logistically painful and economically inefficient.

And both classes—MALE/HALE and fifth-gen fighters—carry the same friction layer:

- Heavy pre-flight overhead: planning, configuration, weapons/sensor loading, maintenance, briefing.
- Nested airspace deconfliction across civil, military, and allied stakeholders.
- Launch windows, tanker availability, air-refueling geometry.
- Lost-link procedures and BLOS rules that limit UAV employment, especially near domestic or allied airspace.

Once they land, the overhead continues: inspection cycles, maintenance man-hours, parts shortages, crew duty limits, weather windows, basing geometry, political risk.

They are great for episodic coverage and surge.

They are bad at continuous, theater-scale presence in near space.

The threat pattern in that band is fast, elastic, and persistent.

The force pattern is slow, discrete, and finite.

Given those constraints, it is fantasy to treat MALE/HALE UAVs or fifth-gen fighters as sufficient for continuous defense in near space. The physics, the regulations, and the economics disagree.

This is where the “kill chain” buzzword runs head-first into geometry.

Future strike architectures are going to look like this:

- Coordinated salvos of missiles.
- Unmanned swarms.
- Electronic and cyber attacks.

All stacked to saturate, confuse, or route around legacy defenses.

Trying to counter that with a small number of fast but short-legged fighters and a finite set of altitude-limited UAVs is like trying to run a modern data center on laptops.

Each box is impressive, but the topology is wrong. You need a layer designed for:

- Dwell time.
- Coverage.
- Resilience under attrition.

Not just raw speed or platform sex appeal.

This isn't a new idea. The need to defend U.S. soil and forward assets from cruise missiles has been forcing this conversation for years.

JLENS existed because low-flying cruise missiles exploited curvature and clutter in exactly the same way that modern UxS and hypersonics do.

High-end systems like AWACS and Aegis can see and kill them, but it is neither economically nor operationally feasible to keep E-3s and cruisers on 24/7 orbit just to close that geometry.

Add Chinese surveillance balloons to the mix and the picture gets worse: now the vulnerability has a vertical axis too. We are exposed both to low-altitude cruise and high-altitude penetrators.

Those two problem sets converge on the same conclusion: there is an under-instrumented, under-defended layer in the vertical battlespace, and it sits in near space.

That implies a requirement for a new class of HTA/LTA defensive platforms that can:

- Operate autonomously.
- Launch quickly.
- Sustain long-endurance missions at near-space altitudes.

They have to be engineered specifically to:

- Beat current altitude/power/launch-time constraints.
- Deliver rapid responsiveness *and* persistence at sane marginal cost.

Done right, an HTA/LTA layer can keep constant watch at far lower cost than traditional crewed assets, provide early over-the-horizon tracks for cruise missile defense, and eventually contribute in a serious way to hypersonic detection and intercept support.

HTA vs LTA

Once you get serious about near space, platform concepts naturally split into two families: heavier-than-air (HTA) and lighter-than-air (LTA).

HTA platforms are essentially high-altitude aircraft. They:

- Generate lift aerodynamically through wings.
- Require sustained forward velocity from propulsion.
- Use long, high aspect-ratio wings and big solar or power surfaces to stay alive in thin air.
- Live inside classic aerodynamic and propulsion constraints: wing loading, thrust-to-weight, Mach regime, power conversion at low dynamic pressure.

LTA platforms are buoyancy creatures. They:

- Use helium or hydrogen in large envelopes to generate lift.
- Control altitude via gas, ballast, and envelope management.
- Use propulsion and small aerodynamic surfaces for station-keeping and maneuver.
- Care more about envelope materials, gas management, solar loading, and environmental durability than about wing loading.

The trade is simple:

- HTA buys maneuverability, speed, and tight positional control. It pays in complexity, power, and endurance.
- LTA buys extreme dwell times and great payload-per-dollar economics. It pays in maneuver authority and sensitivity to the wind field.

Each comes with its own engineering headaches and failure modes.

So at Deimos-One, we have no interest in choosing one and discarding the other. We are fusing them.

The hybrid we are building, called HALO (High-Altitude Long-Duration Observation), is a modular, balloon-borne Earth observation and sensing platform that uses LTA for lift and HTA-like control and power systems to shape geometry.

It is designed to:

- Carry scientific and military payloads up to ~40 km (around 130,000 feet).

- Maintain enough control authority, power, and station-keeping to operate as a persistent layer in the space littoral, not as a disposable, one-and-done balloon.

Architecturally, HALO is best understood as a near-space combat platform.

It is explicitly built to inhabit the vertical seam current U.S. doctrine leaves under-served: stratospheric littoral between conventional airspace and orbit.

Operationally, HALO is meant to fly in the ~60,000–130,000 foot band:

- Above most weather and commercial traffic.

- With enormous line-of-sight footprints.

- Still inside national airspace regimes, not in outer space treaty land.

Unlike satellites, HALO does not require rockets, pad slots, or multi-year timelines. A single operator can launch from a small ground footprint in tens of minutes, not months.

The design emphasis is station-keeping and geometry control, not passive drift.

HALO integrates:

- Advanced control algorithms.

- Onboard propulsion.

- Altitude control systems.

All tuned to use stratospheric wind shears to hold position over areas of interest and maintain geometry in a multi-node mesh.

It is a reusable, multi-mission bus, not a sacrificial balloon. It is built to host:

- EO/IR sensors.
- Radar.
- RF and SIGINT payloads.
- Comms relay nodes.
- And, later, deployable drone swarms and other effectors.

From a systems standpoint, HALO is a C5ISR node, not just another sensor. It is a stratospheric server rack with persistent line-of-sight—an elevated compute-and-sensing layer at a uniquely powerful address in the network.

In theater, HALO rides with a mobile command element and is equipped with:

- Onboard distributed processing.
- Cloud connectivity.
- Edge compute capabilities.

That combination is designed to:

- Provide low-cost launch and ISR services.
- Accelerate near-space scientific and technology applications.
- Enable AI-assisted C2 from essentially anywhere on Earth.

Those are the raw architectural properties.

They become more interesting when you plug them back into the actual failure modes we have been talking about.

Use case 1: Insurance when the space layer is contested

China and Russia are not just using space. They are systematically preparing to break it.

China already has:

- Operational ASAT missiles.
- SATCOM and GPS jammers.
- On-orbit systems that can sidle up to other satellites and potentially harass or disable them.

And Russia is:

- Experimenting with a nuclear-capable space system.
- Fielding ground-launched ASAT and high-end EW.
- Already running antisatellite activity near U.S. birds.

Assuming a serious conflict will leave the orbital layer untouched is not analysis. It is wishful thinking.

The whole point of those toolkits is to create blind spots and force the U.S. to fight dumb and deaf.

HALO is designed as architectural insurance against exactly that failure mode.

A proliferated HALO mesh can:

- Provide regional ISR when orbital constellations are degraded, jammed, or partially destroyed—keeping eyes on high-priority theaters.
- Act as a high-altitude comms relay when SATCOM is unreliable—keeping JADC2 links alive between ground, air, and maritime forces.
- Be deployed and reconstituted in an attritable way: lose a node, launch another in hours or days, not five years and a billion dollars.

In a serious fight, you cannot accept a single cognitive layer in orbit as your primary backbone. Resilience means stacking redundancy at multiple altitudes.

HALO is meant to be the programmable near-space backstop in that stack.

Use case 2: Counter-UxS and low-altitude missile sensing

Unmanned systems are evolving in exactly the wrong direction for legacy defenses:

- More range.
- More speed.
- More payload.
- More autonomy.
- Lower cost.

The same tech stack driving our own concepts (AI, big data, IoT, 5G) will make adversary UxS:

- Smarter.
- More resistant to jamming.
- Easier to mass.

On top of that, we have a global inventory of cruise missiles, hypersonic glide vehicles, and other "we built this specifically to break your IADS" toys.

The result is not just a magazine depth problem.

It is a geometry problem.

Ground radars are locked to curvature and clutter.

Airborne assets are exquisite and finite.

Satellites see a lot, but not always with the angle or revisit you need for small, fast, terrain-hugging threats.

Put HALO in the 80–120k foot band, with the right sensor stack, and the geometry flips:

- It looks down over huge swaths of land and sea.
- It can track low-flying drones and cruise missiles as they dart through the seams between ground radars and space sensors.
- It can run AI on-board for correlation, classification, and anomaly detection, and push clean tracks straight into fire-control networks.

Missile defense and counter-UxS go from two sensing layers to three:

1. Ground sensors.
2. Stratospheric HALO.
3. Orbital ISR.

This tri-layered construct shifts the engagement problem from a two-layer 1980s radar architecture to a vertically integrated sensing stack aligned with twenty-first-century delivery systems.

You move key sensing into the littoral where physics finally favor the defender, rather than the attacker.

Use case 3: Homeland security, borders, and cartel wars

Modern cartels look less like street gangs and more like diversified logistics firms with violence as a service.

They:

- Exploit migration flows.
- Control key corridors near U.S. ports of entry.
- Corrupt nodes in shipping, trucking, and local government.

Fentanyl and precursors are routed via trucks, tunnels, small boats, and layered networks of middlemen.

The outcome of all this is tangible: tens of thousands of American deaths per year and a slow acid bath across public health, economic productivity, and social stability.

Our surveillance stack against this problem looks like a patchwork quilt:

- Ground radars, towers, and cameras with short legs and ugly terrain masking.
- Manned aircraft and occasional drones that are scarce, expensive, and constrained by weather and basing.
- Intel and law-enforcement units drowning in noisy, fragmented feeds instead of one coherent picture.

Drop a HALO layer into that problem and the math changes.

Deployed along key border segments, HALO can:

- Provide persistent ISR without burning pilot hours.
- Watch crossings continuously instead of via intermittent patrols.

Over the Gulf, Caribbean, and Pacific approaches, HALO can:

- Extend maritime domain awareness.
- Spot smuggling vessels, high-speed “go-fasts,” and mothership patterns that slip between coastal radars and episodic flights.

The payloads are modular:

- EO/IR.
- SAR.
- RF geolocation.
- AIS integration.

Plus the same platform doubles as a high-altitude comms relay, stitching together multi-agency, cross-border operations.

As cartels start to experiment with drones for surveillance and payload, the same HALO nodes can:

- Watch for hostile UxS probing energy facilities, ports, airports, and other infrastructure.

Net effect: one stratospheric layer underwriting multiple homeland missions (border security, counter-narcotics, and critical infrastructure defense) without building three separate architectures from the ground up.

Use case 4: Global trade and maritime chokepoints

You do not need a TS/SCI brief to see that global trade is brittle.

The Houthis already ran the demo as a live-fire stress test.

In under two years, a relatively small actor used missiles and drones to hit dozens of merchant ships, including tankers, and drove a massive reduction in Red Sea traffic.

That is strategic-level disruption at discount pricing.

Our current playbook leans on:

- Naval presence—destroyers, carriers, escorts.

- High-value airborne ISR.

- Satellites and commercial feeds to stitch together a regional picture.

All necessary.

All expensive.

All constrained by basing, weather, politics, and escalation risk.

No navy can maintain dense coverage over every chokepoint all the time.

Now drop a HALO layer over the Red Sea, Gulf of Aden, Strait of Hormuz, South China Sea routes, and the Atlantic and Pacific approaches to the Panama Canal.

From that vantage, HALO can:

- Provide continuous wide-area ISR over key sea lanes.
- Detect launch signatures of UAVs and missiles.
- Flag anomalous vessel behavior and dirty AIS patterns that often precede attacks or sanctions evasion.
- Rapidly re-task payloads—zoom in, switch modes, or cue other assets—when something looks off.

Because HALO is designed to be proliferated and attritable, you can:

- Push it closer to contested airspace with less political and emotional weight than a crewed ISR jet or a capital ship.
- Replace losses on industrial timescales, not acquisition timescales.

In a world where small actors can choke global trade with cheap drones and missiles, a stratospheric HALO mesh turns chokepoints from blind alleys into instrumented corridors.

Use case 5: Hypersonic and maneuvering missile defense

Hypersonics are built to humiliate legacy missile defense.

They:

- Fly below classic ballistic arcs but far faster than cruise.
- Execute substantial maneuver in glide.
- Spend a lot of their life exactly where our sensing is thinnest.

Ground radars lose them early to curvature, clutter, and terrain.

Space sensors can see them, but not always with the timing, angle, or continuity you want when the thing starts maneuvering aggressively.

That is, again, a geometry problem.

Populating the 80–120k foot band with HALO nodes carrying IR, RF, and radar payloads changes the equation:

- You get earlier, more persistent track custody during the boost-to-glide transition when hypersonics are hottest and easiest to distinguish.
- You get continuous midcourse tracking from above weather and below orbit, so lateral maneuvers do not instantly become “track lost, good luck.”
- You get clean, fire-control quality tracks to feed Aegis, THAAD, and future interceptors.
- You get an edge compute layer where HALO fuses multiple sensor feeds, scrubs clutter, and flags anomalous kinematics in real time.

HALO does not need to be the shooter.

Its job is to ensure shooters:

- See the target.
- Classify it.
- Stay locked long enough to matter.

Hypersonic and maneuvering threats are designed to live in the seam between ground and space sensing.

You plug that seam with a stratospheric sensing layer built for that fight to neutralize the problem set.

Appendix X: Advanced Concepts for Stratospheric Defeat Mechanisms

This is the sandbox. None of this is "we can do it tomorrow." These are analytically plausible, technically nontrivial concepts that emerge once you assume a persistent, software-defined platform resident in the near-space band. HALO's primary function is ISR, communications, and battle management. This appendix sketches what becomes possible when that same architecture is treated as an experimental scaffold for next-generation defeat mechanisms.

Note: *None of this sits in HALO's near-term roadmap or business case. These are research hypotheses that only become worth serious time once a stratospheric sensing/comms layer exists and starts generating real data. Treat them as R&D vectors, not promises.*

1. Atmospheric seeding and drag augmentation

First class of ideas: treat the stratosphere as a medium you can shape, not just fly through.

The general idea would be to use HALO platforms to manipulate the local atmosphere in front of or around high-speed threats (hypersonics, high-Mach cruise) so that:

- Drag increases.
- Flow fields destabilize.
- Vehicles are pushed into worse thermal and control regimes.

The goal is not "magic dust kills missile." It is "we create zones of bad air that make life harder for guidance and materials."

Conceptual mechanisms:

- **Particulate curtains:** HALO nodes releases controlled clouds of inert micro-particles into predicted threat corridors. At hypersonic speeds, even sparse densities can increase convective heating, tweak drag, and potentially cause surface erosion or boundary-layer transition.
- **Localized density/temperature shaping:** Seed layers with particles that change radiative or thermal properties, nudging temperature gradients and density profiles. Hypersonic lift/drag and control authority are extremely sensitive to these. Tiny shifts can translate into real penalties.
- **Flow-field disruption strips:** Use a mesh of HALO nodes to lay down elongated, perturbed bands that a maneuvering vehicle has to transit to stay on a decent trajectory. You are not promising kills; you are burning its margins.

The near-term realistic value is not an instant hypersonic shield. It is turning HALO into a physics lab—running controlled experiments on how specific atmospheric tweaks affect high-speed flight and feeding that data into future interceptor and kill-aid designs.

2. Stratospheric non-kinetic effectors (HPM / laser)

A second class: use HALO as a high-altitude hosting layer for non-kinetic effectors—high-power microwave first, maybe lasers later if power and beam control justify it.

From 80–120k feet you get:

- Better line-of-sight than ground systems.
- Less atmosphere to fight in certain bands.
- A great vantage point to look down on dense drone swarms or missile corridor traffic.

Concept:

Use HALO as a high-altitude mount for directional non-kinetic systems (primarily HPM in the near term) whose job is to disrupt guidance, comms, and onboard electronics of incoming threats and hostile UxS swarms, rather than destroy airframes.

Roles:

- **UxS swarm disruption:** HPM bursts into dense swarms to fry control electronics and links.
- **Missile seeker disruption:** Non-kinetic beams to confuse or degrade seekers or onboard processors midcourse or terminal.
- **Surgical comms denial:** Tight-beam jamming against specific links instead of carpet-bombing the spectrum.

The engineering challenges are obvious: power, pointing, thermal management on a balloon.

That is why this lives in an appendix, not in the main spec sheet.

But if you want to know what non-kinetic effects from near space are actually possible, you need a HALO-class platform as a testbed.

3. Stratospheric decoys, spoofing, and signature management

Once your stratospheric platforms are software-defined, they stop being just elevated cameras. They can start lying.

A HALO mesh can become a high-altitude deception layer that:

- Generates RF and IR signatures.
- Spoofs high-value assets.
- Throws off seekers.
- Pollutes enemy targeting algorithms with ghosts.

In practical terms, this means using HALO not simply to observe the battlespace, but to author parts of it.

Think heated panels and custom RF emitters that look like AWACS or ships from a seeker's point of view. Think dynamic EM "terrain" where the mesh bends the RF environment in real time.

Against hypersonics and advanced missiles, you are not using a balloon to vaporize the round. You are attacking its perception and its midcourse update chain so that:

- It spends cycles sorting decoys.
- It ingests conflicting data.
- It burns guidance margin chasing ghosts.

The kill mechanism is cognitive, not kinetic: you are attacking the weapon's ability to discriminate, not its airframe.

Concept vectors:

- **False RF emitters:** HALO nodes broadcast signatures tuned to mimic high-value assets or synthetic formations. By playing with frequency, pulse patterns, apparent motion, and spatial layout, you create phantom AWACS, fake radar sites, bogus naval groups.
- **IR/thermal decoys:** Carried panels or IR sources emulate aircraft or ship heat signatures from the seeker's perspective. At range, the weapon cannot easily tell real from fake.
- **Dynamic EM terrain shaping:** A distributed mesh uses jamming, deceptive waveforms, reflection, and absorption to create an artificial EM landscape—ghost returns, false Doppler cues, misleading range/angle—bending radar or data-linked weapons off true paths and corrupting track fusion.

The goal is to:

- Force seekers to devote processing and bandwidth to discrimination rather than homing.
- Inject ambiguity into midcourse updates.
- In some fraction of cases, induce enough guidance error or bad maneuvering to cause a miss or force the weapon into uglier terminal conditions.

In that sense, you are turning near space into a cognitive kill zone for the weapon's own sensing stack.

The physical trajectory remains the same; it is the interpretation of the battlespace, as seen by the incoming round and its supporting network, that is systematically attacked.

4. Balloon-deployed interceptors and kill-aids

The most aggressive variant is to treat HALO not just as a sensor or deception node, but as a forward staging point for effectors.

If you already have a platform living in the band where hypersonics and advanced cruise spend a lot of their life, there is no law that says it must stay passive/observational.

In principle, HALO could host:

- Loitering high-diver interceptors.
- Micro-kill vehicles.
- Decoy drones.
- Specialized kill-aids.

Instead of firing everything from the ground or from orbit, you start some of your tools at altitude and dive them into trusted tracks.

Effectors launched from near space can be dropped into pre-computed intercept baskets with reduced time-to-intercept, shorter terminal guidance windows, and potentially more favorable closing geometries, particularly against maneuvering threats that spend their midcourse phases in the 60,000–200,000 foot regime.

The logic is geometric:

- Ground/sea interceptors climb up into the engagement volume.
- Exo-atmospheric systems dive down.
- Stratospheric interceptors start alongside or above, reducing time-to-intercept and tightening geometry.

This does not mean turn every balloon into an arsenal ship. Payload mass and complexity will stay constrained.

The point is to add a new degree of freedom: staged effectors from the stratosphere. Then see which slices of layered defense actually benefit most from beginning the engagement above the fight instead of exclusively below it.

Conceptual frame:

Use HALO as a forward-deployed staging shelf for compact interceptors and kill-aids in specific corridors. Candidates:

- Loitering high-diver vehicles.
- Micro-interceptors.
- Pre-positioned micro-munitions optimized for the band where hypersonics and high-end cruise dwell.

Sketches:

- **Loitering high-divers:** Small interceptors hang off a HALO node in low-power standby state. Once a track is trusted, the interceptor cold-launches and dives on a pre-computed basket, using gravity and initial altitude to minimize reaction time and maximize closing speed.
- **Kill-aid dispensers:** HALO deploys dense chaff, decoy drones, or micro-interceptors into specific volumes. Those become pre-seeded engagement cells that complicate threat kinematics and provide cooperative effects with ground/sea interceptors.

Collectively, this turns the space littoral into not just an observational and comms layer, but a pre-positioned, altitude-advantaged launch shelf that you can weaponize where the physics justify it.

Final Thoughts

Atmospheric Command as a First-Order Design Variable:

If you read the DIA's 2025 *Worldwide Threat Assessment* as a list of scary technologies, you will miss the point.

If you read it as a systems document, however, it is basically an admission that the current U.S. architecture is missing a layer—and that adversaries know it.

They are building long-range strike complexes, counter-space kits, and cheap unmanned systems specifically to exploit that incompleteness.

The report does not literally say *"the U.S. force is vertically brittle—strong on the surface and in orbit, weak in the middle."*

But that is the shape of the story.

The important lesson is not “threats are growing.”

It is that the geometry of conflict has shifted.

The decisive variable is no longer who fields the most exquisite platform in one domain.

It is who can maintain a resilient kill chain—sense, decide, act—across domains when:

- Space is contested.
- The electromagnetic spectrum is dirty.
- The homeland is inside the battlespace.

In that world, the near-space band is not a side quest. It is the most underexploited degree of freedom in the entire architecture.

The history is clear: the U.S. saw this problem early and then failed to lock it in. HAA, JLENS, TARS, and other programs proved that persistent, elevated sensing and fire-control support were technically achievable.

But we never gave them the doctrinal and industrial backing to become permanent layers.

We walked away right as China, Russia, and others started treating the stratosphere and lower thermosphere as a penetration corridor and weapons employment zone.

The result is the vertical seam the DIA narrative keeps tracing without naming: a layer our adversaries treat as a freeway and we still treat as empty sky.

At the same time, the force elements we do have are stretched.

- Fighter and bomber fleets that cannot cover a two-MRC world.
- An industrial base that struggles to recapitalize and replace losses.
- ISR and EW constructs leaning hard on orbital nodes now under active counter-space pressure.

Put together, you get a very capable nervous system on the ground and in space—and a hollow middle that’s uninstrumented and undefended.

When orbital nodes are dazzled, jammed, or destroyed, the whole structure risks devolving from a coherent network into a collection of isolated, partially blind components.

From that point of view, a dedicated stratospheric layer stops being optional.

It becomes a first-order requirement.

From a capital perspective, that is not just a doctrinal correction, it is a market signal.

Any architecture gap this large, sitting at the intersection of defense, communications, logistics, and homeland security, does not stay empty forever.

Somebody is going to turn “persistent geometry in the stratosphere” into an infrastructure business, the same way previous generations turned GPS, SATCOM, and undersea cables into invisible utilities that everything else quietly depends on.

The only real questions are who gets there first, who owns the tasking and data spine, and who can manufacture and operate enough persistent platforms for the layer to become default rather than experimental.

Worth noting: a proliferated, software-defined HTA/LTA hybrid like HALO does not replace satellites or fighters.

It stitches them together.

It:

- Provides persistent theater ISR when orbital revisit rates are insufficient or space is degraded.
- Keeps JADC2 connective tissue alive when SATCOM is contested.
- Adds a third sensing layer to missile and UxS defense so hypersonics, cruise, and swarms can no longer hide in curvature and clutter gaps.
- Offers a common infrastructure for homeland security, border surveillance, cartel interdiction, and maritime chokepoints without forcing continuous deployment of exquisite crewed assets.

When looked at in this way, HALO is not a “program” so much as a category.

It is the first draft of a stratospheric operating system: hardware that lives in the geometry, software that orchestrates fleets and payloads, and data products that everyone downstream quietly comes to rely on.

Defense will be the first and loudest customer, but the same mesh is legible to insurers, ports, shippers, energy grids, and anyone else who cares about what is happening over their horizon in real time.

The value accrues to whoever can make that layer boring, reliable, and always on.

That said, the advanced concepts in the appendix (atmospheric seeding, non-kinetic effectors, EM deception, balloon-staged kill-aids) are not toys we'll be getting this Christmas.

But they do show how much unused physics is sitting in this band once you treat it as an active medium instead of dead air.

But step one is not to weaponize the stratosphere.

Step one is to own it as a sensing, compute, and communications layer.

Once that layer exists, the option space for deterrence and defense blows open.

The hard problems are real: station-keeping in weird wind fields, material degradation under UV and ozone, thermal extremes, regulatory integration, C2 for proliferated platforms.

But those are implementation problems.

The architectural vulnerability the DIA hints at will not self-correct.

You cannot fly your way out of the stratospheric gap with more sorties from short-legged fighters and altitude-limited UAVs.

You cannot brief your way out of fragile orbital dependence.

The wars of the future will not be decided solely in cyber trenches or orbital catalogs.

They will be decided by which side keeps its kill chains coherent when all those layers are under attack.

Atmospheric command of the stratosphere sits at the center of that question.

It is the difference between a force that loses its nervous system when space gets punched—and a force that degrades gracefully, reconstitutes quickly, and keeps seeing and acting at scale.

So the choice facing U.S. defense planners is not complicated.

It is just uncomfortable.

Either we:

- Deliberately occupy the space littoral with resilient, AI-enabled, proliferated platforms and treat atmospheric command as core to 21st-century power,

or we:

- Keep fighting from the bottom and the top and leave the middle open to whoever wants it the most.

HALO is our attempt to build into that middle on purpose, instead of by accident.

The physics, the threat vectors, and the DIA’s own bug report are all pointing the same way.

The only real question is whether we architect for that reality now, or wait until our enemies have already done it for us.

About the Author

Jamin Thompson is the Founder and CEO of Deimos-One, where he leads development of autonomous spacecraft and hybrid near-space platforms for defense, intelligence, and critical infrastructure applications.

About Deimos-One

Deimos-One designs and develops autonomous stratospheric spacecraft and near-space systems for defense, intelligence, and critical infrastructure protection. The company is developing HALO, a reusable observation platform that provides persistent ISR, communications, and battle management support in contested near-space environments.

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