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Aim Higher

The Intersection of Commercial Aviation & Space Travel

Image: SpaceX (Unsplash)

Included in this edition

Introduction

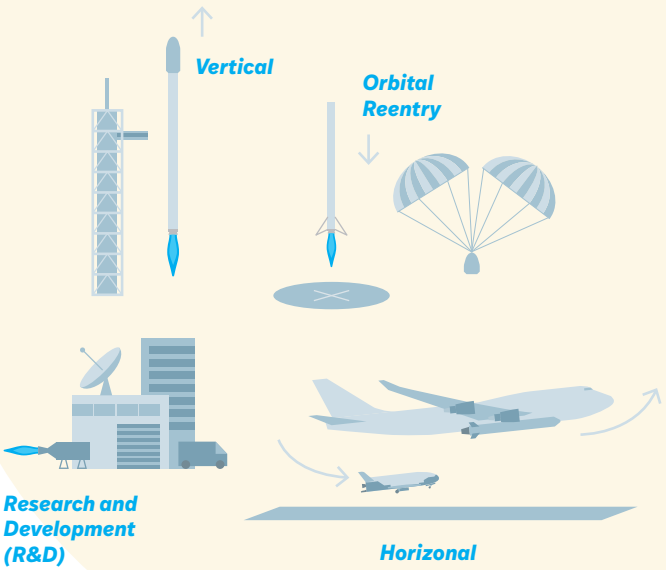
The growing overlap between space exploration and commercial air travel is prompting a reevaluation of how both industries share airspace, infrastructure, and regulatory frameworks. Previously dominated by the National Aeronautics and Space Administration (NASA) and the military, traveling to space now includes a growing number of private companies launching rockets—often near busy airports. While this is a global trend, this article focuses on the United States (U.S.), where commercial space operations are surging and putting new pressure on U.S. National Airspace System (NAS). This is not just about rocket launches but rather managing a shared, crowded airspace where traditional aviation and spaceflight must safely coexist. For airport sponsors and users, this convergence is not a theoretical future condition but rather a present challenge that warrants attention, awareness, and coordination.

One clear trend already underway in the spaceport industry is the strategic offshoring of launch facilities to equatorial coastal regions with fewer airspace

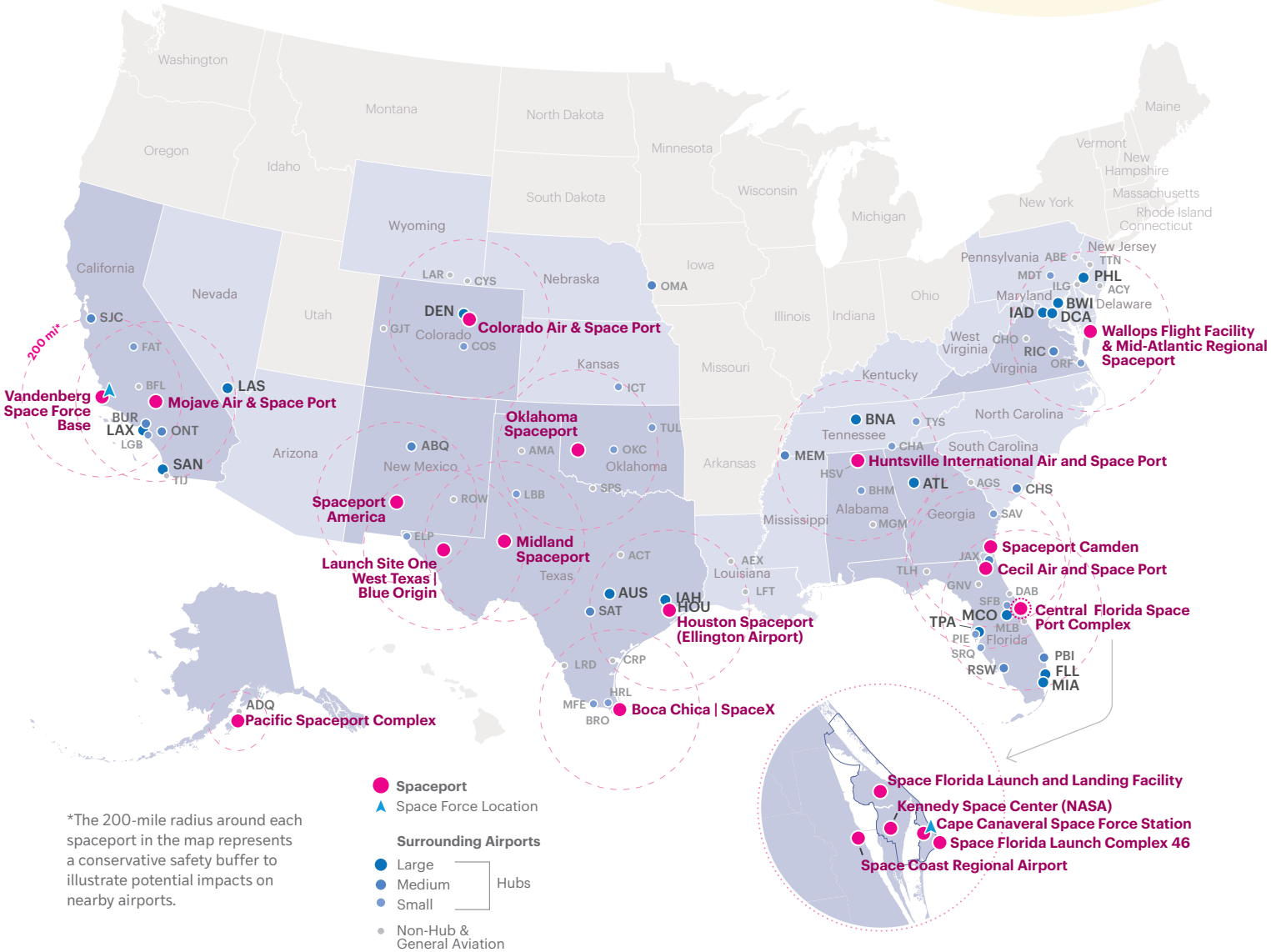
restrictions and minimal impact on populated areas. While this approach offers certain advantages, it is not a catch-all solution, as it introduces significant additional costs and logistical challenges—particularly when it comes to transporting equipment, personnel, and cargo to increasingly remote sites. The farther the launch site, the more time, complexity, and expense are involved.

As of 2025, the U.S. has nearly 20 federally recognized spaceports across 10 states, with more likely to be added in the coming years. Most are in the southern half of the country. These spaceports are closely integrated into the NAS, often surrounded by clusters of airports and are far from isolation. Although not all spaceports are currently launching vehicles, this does not mean they will not be in the future. Spaceports have the potential to provide a wide range of aeronautical and space-related services,

What type of spaceport is near you?



U.S. Airports Near Spaceports: A Proximity Analysis



*The 200-mile radius around each spaceport in the map represents a conservative safety buffer to illustrate potential impacts on nearby airports.

ranging from ground-based research and development to vertical launch and reentry of vehicles. On average, each U.S. spaceport has around eight airports operating within a 200-mile radius—a conservative buffer used to illustrate the potential airspace and operational impacts of spaceport activity on nearby aviation infrastructure Over 80% of the U.S. spaceports are near 5 or more airports and more than 30% are near 10 or more airports. This proximity underscores the need for strong coordination between spaceport operations and the broader NAS.

Growth in Commercial Air Travel

The Federal Aviation Administration's (FAA) 2024 Terminal Area Forecast (TAF) projects growth in U.S. airspace activity over the next two decades, driven by rising demand across commercial aviation, general aviation (GA), and emerging sectors such as commercial spaceflight and advanced air mobility (AAM). This growth is expected to exacerbate congestion, especially around major metropolitan areas.

As spaceport operations grow, their vertical launch and reentry corridors will increasingly overlap with conventional aviation routes, requiring careful coordination to maintain air traffic safety and efficiency. While the FAA continues to prepare for the future Info-Centric NAS with modernization efforts and trajectory-based operations (TBO) to reform airspace management, the planning and initiatives progress has been slow.

A key consideration is the anticipated growth in airport operations near existing spaceports, with air traffic in some regions expected to rise by more than 50%. This is largely due to population shifts, greater demand for travel to southern U.S. destinations, and the post-COVID recovery in passenger traffic. Emerging technologies are also contributing to this growth, enabling airlines to expand fleets and improve efficiency. Notable advancements include new aircraft, better fuel efficiency, digitalization, AAM, and enhanced passenger experiences.

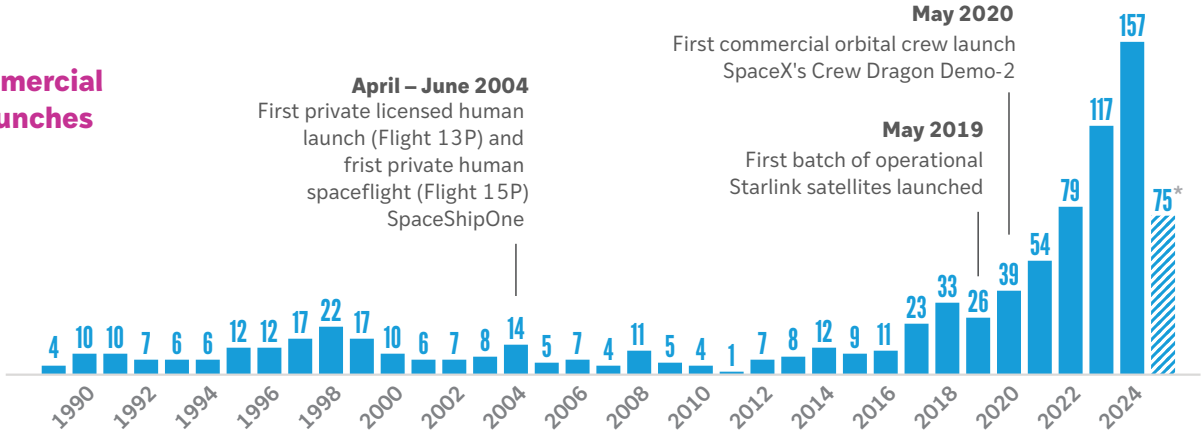
The table on this page represents projected airspace growth surrounding existing U.S. spaceports, exhibiting the increase in daily aircraft operations by 2050.

Surrounding Airports Airspace Impacts

Spaceport	State	Surrounding Airports (200 Miles)[5]	FAA Launch Type[2]	Surrounding Airports' Average Daily Operations		
				2023	2050[1]	% Increase
Vandenberg Space Force Base	CA	7	H, V	4,140	6,690	62%
Mojave Air & Space Port	CA	8	H	5,690	9,100	60%
Huntsville International Air and Space Port	AL	8	OR	4,570	7,180	57%
Colorado Air & Space Port	CO	5	H	2,500	3,930	57%
Central Florida Spaceport Complex[3]	FL	13	H, V, OR	7,930	12,320	55%
Houston Spaceport (Ellington Airport)	TX	8	H	3,500	5,350	53%
Spaceport Camden	GA	10	V	4,430	6,600	49%
Cecil Air and Space Port	FL	10	H	4,430	6,600	49%
Mid-Atlantic Regional Spaceport	VA	12	V	4,790	6,450	35%
Wallops Flight Facility	VA	12	V	4,790	6,450	35%
Launch Site One West Texas | Blue Origin	TX	3	Private[4]	330	440	33%
Spaceport America	NM	4	H, V	720	940	30%
Midland Spaceport	TX	5	V	680	830	22%
Oklahoma Spaceport	OK	6	H	1,730	2,040	18%
Boca Chica | SpaceX	TX	6	Private[4]	1,000	1,150	15%
Pacific Spaceport Complex	AK	1	V	69	70	2%

Source: 2024 FAA TAF; FAA Spaceports by State, March 2025; Landrum & Brown analysis, 2025.
1. Proposed daily operations estimated for 2050 based on 2024 FAA TAF
2. H - Horizontal, OR - Orbital Reentry, V - Vertical
3. Central Florida Spaceport Complex includes 5 spaceport facilities: Cape Canaveral Space Force Station, Kennedy Space Center, Launch Complex 46 operated by Space Florida, Space Florida Launch and Landing Facility, and the adjacent Space Coast Regional Airport
4. Operated under Private Licensed Exclusive Use Site license and launch type not specified by the FAA.
Note: Operation counts are estimated and rounded to the nearest 10, except for the Pacific Spaceport Complex, which is reported more precisely due to its relatively small percentage increase.
5. The 200-mile radius around each spaceport in the map represents a conservative safety buffer to illustrate potential impacts on nearby airports.

> “...space is now a commercial destination, not just a scientific frontier.”



The Dawn of Commercial Space Travel

The future airspace will no longer be the sole domain of earthbound aviation, as it will be shared by aircraft, reusable rockets, orbital vehicles, AAM vehicles, and eventually spaceplanes. This rapidly evolving landscape is being influenced not only by what is being launched into space, but also by methods and locations of these launches—factors that have a direct effect on airspace management and national aviation infrastructure.

Launch Complexes 39A and 39B at NASA’s Kennedy Space Center in Florida. Image: NASA/Ben Smegelsky

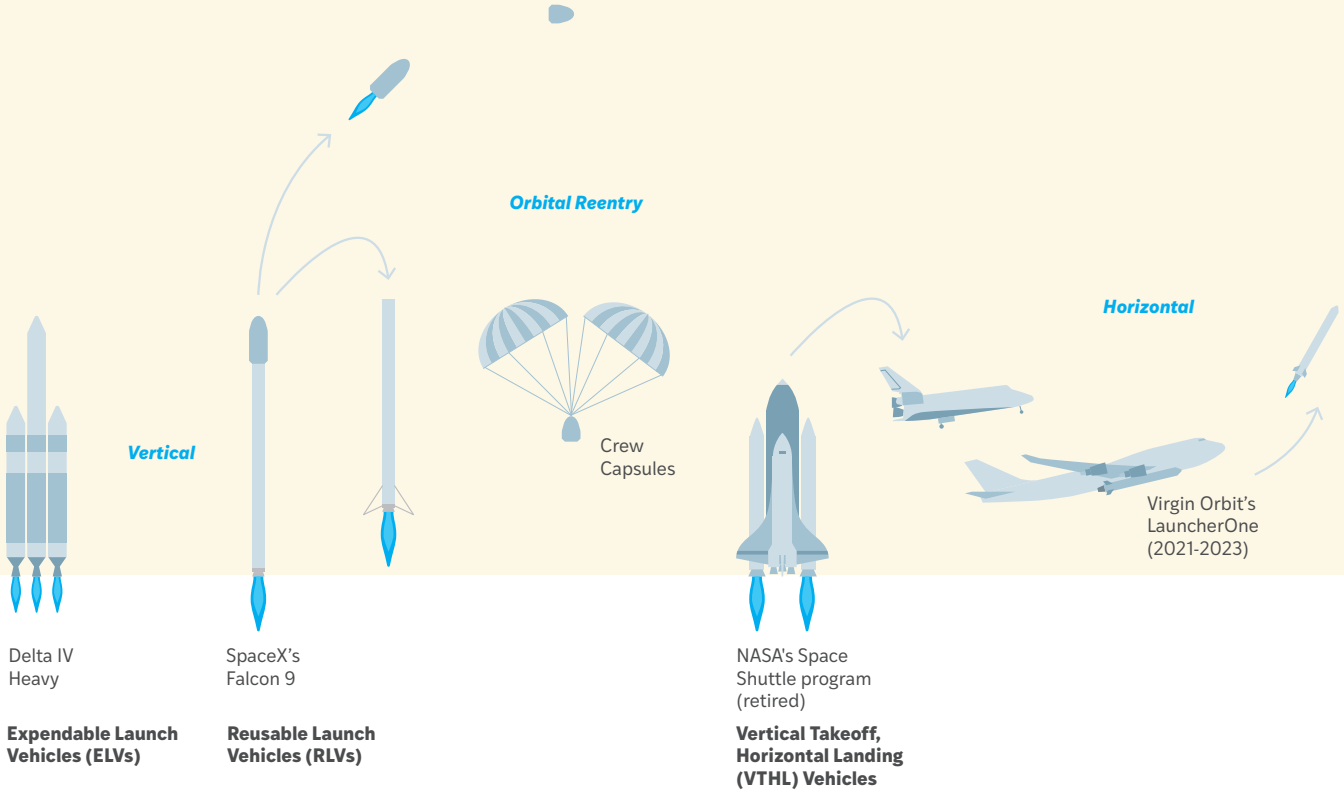
A 21st Century Space Race

The U.S. space sector has expanded far beyond its traditional defense and government missions. Launches today support a wide array of commercial and civilian purposes such as communication satellites, earth observation systems, weather monitoring, national security payloads, and an increasing number of crewed missions for both research and tourism.

Space tourism, once a sci-fi dream, is now a market reality with Blue Origin, Virgin Galactic, and SpaceX enabling suborbital and orbital missions for private citizens. These flights, while still infrequent, represent a critical shift, as **space is now a commercial destination, not just a scientific frontier**.

In 2024, the FAA documented 157 licensed launches.[1] A decade earlier, there were only 12 launch operations.[2] US orbital launches have tripled since 2020 and with the latest FAA projection, operations could double again before 2028.

Looking ahead, the industry is poised for further advancements, with ambitious projects such as lunar hotels, Mars expeditions, and hypersonic point-to-point travel on the horizon. As costs decline and technology advances, space flights could transition from an exclusive experience for the ultra-wealthy to a more widely accessible form of travel, reshaping humanity’s relationship with space.



Means of Reaching Orbit

Reaching orbit requires intricate strategies to overcome earth's gravitational pull and sustain orbital motion. The already achieved, emerging methods not only demonstrate technological challenges but also significantly impact airspace management, environmental considerations, safety concerns, land use implications, and the broader landscape of aeronautics and space travel.

Each method of space launch has unique implications for the NAS:

- **Traditional Expendable Launch Vehicles (ELVs)** require large swaths of temporarily restricted airspace, often covering areas up to 1,000 square miles and altitudes exceeding 100,000 feet.[3] The Falcon Heavy test launch in 2018, for instance, triggered the delay or rerouting of more than 500 commercial flights due to the airspace closures that were required.[4]
- **Reusable Launch Vehicles (RLVs)**, such as SpaceX's Starship and Blue Origin's New Glenn, offer operational and cost advantages but add complexity to airspace management. These vehicles not only require clearance for ascent corridors but also for booster returns and reentry paths. Failures—like Starship's explosive test flight in March 2025—can dramatically affect nearby flight schedules and demand real-time coordination with the FAA.[5]
- **Vertical Takeoff, Horizontal Landing (VTHL)**, vehicles like NASA's retired Space Shuttle and future concepts such as Horizontal Takeoff / Horizontal Landing (HTHL) spaceplanes further blur the lines between aviation and aerospace. Their trajectories often share airspace with commercial aircraft during launch, reentry, and landing, intensifying the need for precision deconfliction, but also potentially allowing for a more seamless integration of these launch systems into the NAS.

Challenges Ahead

Space travel, like commercial aviation, faces growth challenges in areas such as social acceptance, financial viability, and environmental impact. Once exclusive to highly trained astronauts, space travel is now accessible to civilians, including celebrities. Space travel will soon become a common topic of discussion at aviation industry conferences, academia, and even family dinner tables transforming what was once a distant dream into reality.

Limited Destinations: Space travel's appeal is limited by the lack of destinations. Unlike aviation, which connects countless origins and destinations, space travel currently offers only brief, suborbital experiences. Industry will need to evolve to maintain interest, much like the rapid development of transportation options in the 19th and 20th centuries. Advances in space technology could eventually lead to new destinations in orbit, on the moon, and beyond.

Affordabiltiy, High Fares: Space travel is not cheap. While suborbital and orbital flights are becoming more accessible in terms of technology, the cost of a seat is still far beyond what most people can afford. To date, only a small segment of wealthy individuals is both able and willing to pay for the experience. The question remains, how many truly desire this experience? The actual demand for space travel is unclear and an eventual balance between ticket prices and the number of people willing to pay will need to be determined.

Environmental Costs: A key factor to the growth of space travel is how it will impact the earth's environment and climate change. The effects of Greenhouse Gases (GHG) (e.g., carbon dioxide, nitrogen oxides, water vapor) on climate change are well documented, especially due to sources like commercial aviation. However, the effects of the rapid growth of rocket launches and space travel on climate change are new areas of research. A recent NASA research study concluded that Black Carbon, that is created by space travel, plays a critical role as a heating agent of the stratosphere and its true impact on future climate change as space travel grows is not clearly understood, and therefore, information for policymakers is limited.[6]

Safety risks: Space launches pose safety risks, including potential debris scattered from failures, leading to airspace closures and disruptions to commercial aviation. Effective hazard analyses and regulatory oversight are essential.

Land Use: Space launch operations require specialized infrastructure often near coastlines or sparsely populated areas. This competes with residential, agricultural, environmental preservation, and aviation facility needs, complicating land use management.

Why This Matters Now

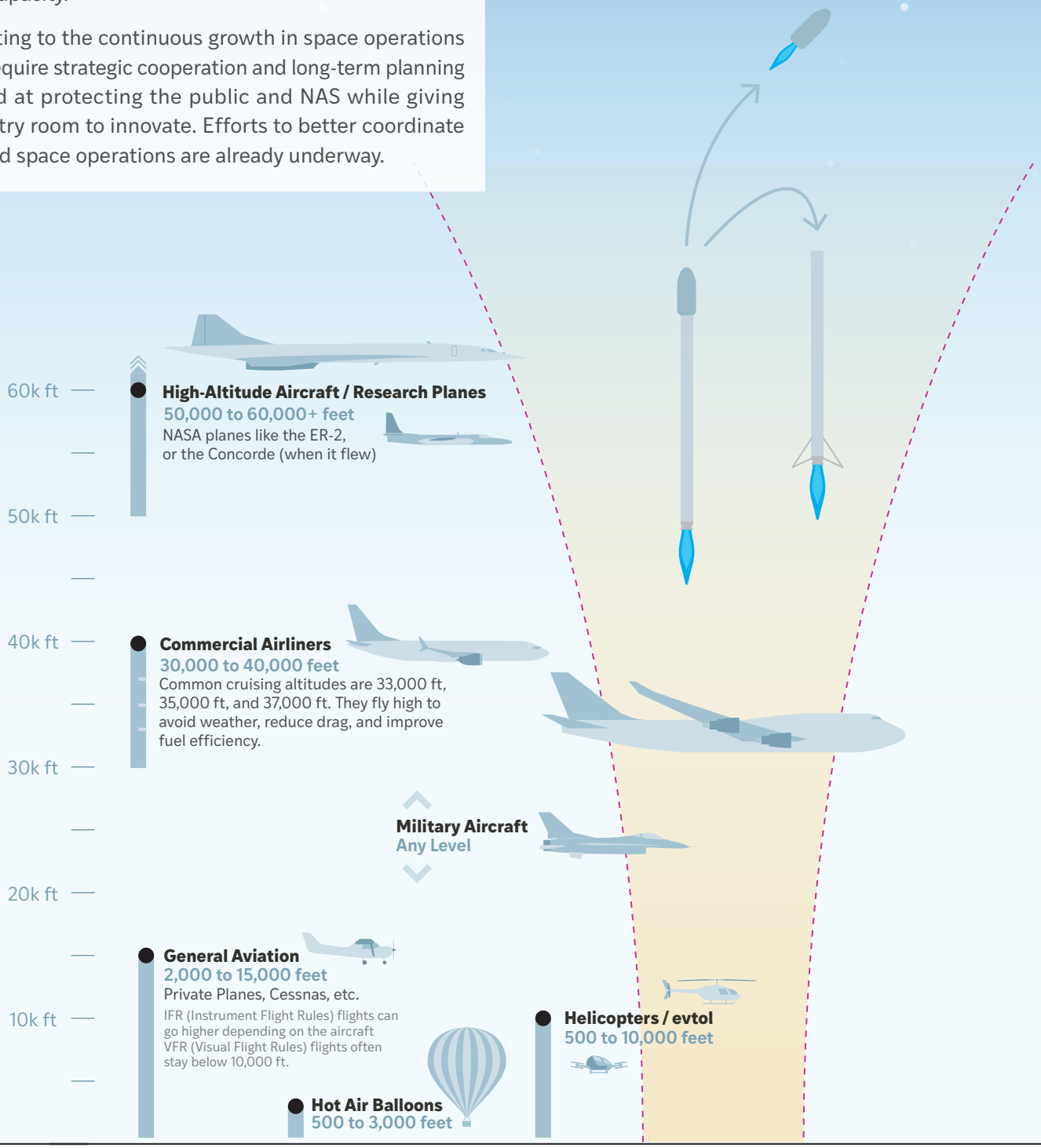
These trends lead to one undeniable conclusion: the future of flight is no longer confined to the stratosphere. Commercial aviation and space launches continue to grow in volume and variety in a shared airspace. Spaceports and airports are no longer separate systems. Preparing for the convergence will be essential to ensuring the integration of aircraft and spacecraft, minimizing disruption of commercial air travel, and maintaining the U.S. leadership in both global aviation and space access.

> "These trends lead to one undeniable conclusion: the future of flight is no longer confined to the stratosphere."

Towards a Shared Airspace

In the past, space operations were infrequent, and FAA accommodated them on an as-needed basis through temporary flight restrictions (TFRs). However, the number of commercial operations (launches + reentries) has grown by more than 900%, from 2015 to an all-time high in 2024. This management strategy is not tenable as it places limits on NAS efficiency, effectiveness, and capacity. [7]

Adapting to the continuous growth in space operations will require strategic cooperation and long-term planning aimed at protecting the public and NAS while giving industry room to innovate. Efforts to better coordinate air and space operations are already underway.



The NAS Impacts of Vertical Space Launch Systems

Vertical spaceflight operations introduce complex demands on NAS. Both launches and atmospheric reentries involve dynamic flight profiles and safety buffers that can temporarily restrict commercial air traffic across wide regions. As commercial space activity accelerates, more last-minute route changes and short-notice ground stops will ripple through NAS.

When launch failures occur, the consequences can be far-reaching. A recent launch failure in early 2025, falling debris warning forced the FAA to halt traffic into 4 major Florida airports, delaying 240 flights (28 minutes each), diverting 28 flights, and 40 airborne flights were held.[8]

While current space operations are not overwhelming the NAS, airports must prepare for future conflicts. Effective communication with airlines, tenants, FAA, air traffic control (ATC), and the Office of Commercial Space Transportation (AST) is essential to coordinate flight restrictions and emergency planning. Sharing accurate information, consistent training, and clear protocols helps all stakeholders respond effectively to incidents, minimizing delays and broader disruptions.

Mitigation and Coordination of Space/Air Operations, Early Days

The FAA's AST licenses and regulates U.S. commercial space activities. AST works in partnership with all FAA lines of-business, to support the safe and efficient integration of commercial launch and reentry operations through the NAS and its system of airports.[9]

Airspace planning already includes numerous variables, and commercial space flight will increase those variables. The planning process includes:

- Reducing size and duration of restricted airspace.
- Rerouting only the aircraft directly affected by the operation.
- Tracking space vehicles in near-real-time during flight.
- Responding quickly to missions experiencing an anomaly.

FAA currently prepares a dedicated Airspace Management Plan for each mission to ensure safe and efficient operations. To guide future integration, the FAA developed the Commercial Space Integration into the NAS (CSINAS) Concept of Operations.[10]

A view of the Artemis I Space Launch System (SLS) and Orion spacecraft atop the mobile launcher on Launch Pad 39B at NASA's Kennedy Space Center in Florida. Image: NASA/Jason Parrish

Additionally, licensing is governed by Part 450, a performance-based rule that consolidates previous regulations. It streamlines reviews, supports innovations like reusable boosters, and addresses the growing pace of commercial space activity. [11] The FAA has issued 7 Part 450 licenses, including Astra Space, ABL Space, Inversion Space, Relativity Space, SpaceX, Stratolaunch and Varda Space.[12]

Continued education and awareness of evolving licensing and regulations will be critical to maintaining proper channels of communication and coordination between stakeholders.

Alternative Space Launch Systems

Recent technologies are redefining access to space, promising smoother integration into the NAS and existing aviation infrastructure. Innovations such as **Air Launch Systems** (e.g., Virgin Orbit's LauncherOne), aim to reduce airspace disruption by using standard airports and routes.

Cutting-edge approaches like **Hypersonic Air-Breathing Technology** (e.g., the U.S. Air Force's X-51 Waverider) pose new challenges and opportunities, requiring advanced air traffic management systems capable of handling high-speed, high-altitude travel. Concepts like **Rotating Skyhooks**, orbital tethers accelerate spacecraft at lower altitudes, could reduce the need for propellant and influence future airspace use.

Theoretical proposals like **Space Elevators** and **Magnetic Launch Systems** aim to revolutionize space access. Space Elevators could eliminate rockets but require massive infrastructure and no-fly zones, while Magnetic Launch Systems could reduce propellant needs but complicate land use and airspace management. Nuclear propulsion technologies, like **Nuclear Thermal and Fusion Propulsion**, offer high efficiency but raise safety and regulatory concerns, requiring isolated airspace for launch operations.

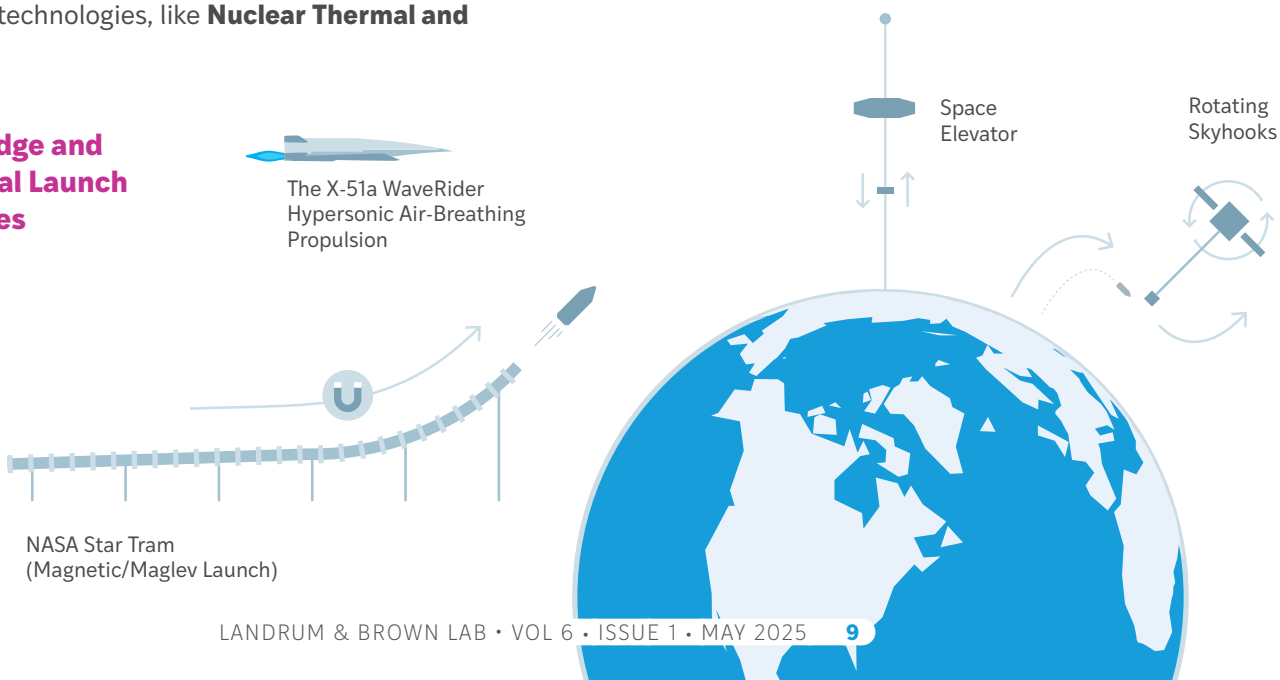
The experimental X-51A Waverider. Image: U.S. Air Force/Pinner Paul

Currently, vertical rocket launches disrupt airspace significantly, but alternatives like horizontal launch aircraft and spaceplanes could have a smaller impact and integrate more seamlessly into the NAS. Other cutting-edge approaches, as mentioned above, may concentrate operations in specific areas, reducing overall airspace disruption.

The Future, Integrated Operations?

With advanced airspace management and recent technologies, future commercial air and space operations are poised to merge into a seamlessly integrated environment. Close proximity between airports and spaceports could result in greater economic benefits, including new revenue streams, aerospace innovation, and joint workforce development.

Cutting-edge and Theoretical Launch approaches



Final Thoughts

Airports will play a key role in the emerging Space Renaissance as private sector space travel grows, leading to more space launches that may strain airspace and commercial aviation. It is crucial for governments, space operators, and airports to work together to prepare and find ways to harmonize these modes of travel.

As commercial space operations go forward, airports near spaceports should consider these actions:

- Collaborate with FAA, ATC, and spaceport operators to plan for TFRs and closures.
- Work with spaceports on joint airspace procedures for launches, reentries, and aborts.
- Analyze potential delays, rerouting, and airspace restrictions.
- Coordinate with airlines and tenants to minimize operational disruptions.
- Plan for temporary spikes in activity and resource demand around launch times.
- Invest in dual-use infrastructure if near a spaceport.
- Crosstrain with spaceport personnel for emergency planning.
- Incorporate debris impact assessments and risk management into planning.
- Stay updated on FAA Part 450 rules for launch/reentry and airspace.
- Understand insurance, liability, and indemnification policies for space operations.
- Explore economic benefits from proximity to a spaceport, such as new revenue streams and workforce development.

As space travel becomes increasingly accessible, airports that act early and collaborate effectively will not only minimize disruption but position themselves as leaders in this transformative shift in the aviation and aerospace industry. The integration of space and aircraft operations is not just a challenge; it is a generational opportunity to redefine the role of the airport in the 21st century.

Endnotes

1 Commercial Space Data, calendar year 2025 | Federal Aviation Administration https://www.faa.gov/data_research/commercial_space_data
2 FAA-Licensed Commercial Space Operations https://www.faa.gov/newsroom/new-record-faa-licensed-commercial-space-operations-aerospace-rulemaking-committee
3 Code 417 Launch Safety | 14 CFR Appendix-A-to-Part-417(c)(1)(ii) https://www.ecfr.gov/current/title-14/part-417#p-Appendix-A-to-Part-417(c)(1)(ii)
4 Commercial space launches are making life complicated for airlines. https://www.latimes.com/business/la-fi-airlines-space-launches-20180627-story.html?utm_
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6 Composition and Climate Impacts of increasing launches to Low Earth Orbit https://ntrs.nasa.gov/api/citations/20240000319/downloads/KTsigaridisAIAACompositionReprint.pdf
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8 SpaceX Starship failure prompts diversions, Florida airports ground stops | Reuters https://www.reuters.com/science/spacex-starship-failure-prompts-diversions-florida-airports-ground-stops-2025-03-07/
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What is the Landrum & Brown LAB?

The LAB is Landrum & Brown's research and development unit. Our mission is to harness decades worth of industry knowledge and expertise to develop innovative solutions that support our clients along with promoting industry thought leadership.

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