# Beyond Earth: Deep Research on the Most Important Breakthroughs and News in Space and Aerospace from the Past 7 Days

**Date:** October 24, 2025

| **Table 1: Summary of Key Technological and Commercial Announcements (October 17-24, 2025)** |
|---|
| **Announcement/Event** |
| RDRE Investment |
| European Joint Venture |
| In-Space Biomanufacturing Update |
| Starship Test Flight 11 |
| ROS Orbital Realignment |
| 3i/ATLAS Flyby Opportunity |

## 1. Introduction: The Week in Perspective – Enabling the Future Space Economy

The past seven days in the space and aerospace sectors have been characterized by foundational shifts that reinforce the industry's trajectory toward a robust "Beyond Earth" economy. This week's most critical developments were not isolated events but deeply interconnected advancements in the enabling technologies that define what is possible in orbit and the strategic industrial realignments that will determine who leads this new era. The narrative of the week is best understood through two primary pillars: first, the validation and acceleration of next-generation technologies, particularly in advanced propulsion and in-space manufacturing, that serve as the physical engines of progress; and second, the significant strategic and geopolitical recalibrations by major global players, which are reshaping the competitive landscape for decades to come.

Key developments underscore this theme. A landmark investment in a revolutionary detonation engine technology signals a new phase in the race for hypersonic and space superiority. The formal consolidation of Europe's three largest aerospace primes into a single space-focused entity marks a definitive response to overwhelming market pressures from new-space competitors. Concurrently, progress in orbital biomanufacturing highlights the tangible maturation of the low-Earth orbit (LEO) economy, moving from research to commercially viable production. These technological and commercial milestones are set against a backdrop of strategic repositioning by national space agencies, with Roscosmos making a pivotal decision about its post-ISS future that prioritizes international collaboration over national-centric objectives. Together, these events illustrate a sector in dynamic transition, where foundational capabilities are being solidified, and the global architecture for future space commerce and exploration is being actively constructed.[1] This report will provide a detailed analysis of these breakthroughs and their far-reaching implications.

# 2. Key Technological Breakthroughs: Powering and Building in Orbit

This week witnessed significant progress in two domains critical to the future of space operations: advanced propulsion and in-space manufacturing. These areas represent the core capabilities required to both travel to and build sustainable infrastructure beyond Earth.

## 2.1 The Detonation Engine Era Accelerates: Venus Aerospace and the RDRE Breakthrough

A major strategic development in advanced propulsion emerged this week with the announcement that Lockheed Martin Ventures, the venture capital arm of the defense giant, has made a significant investment in Venus Aerospace. The funding is aimed at accelerating the development and scaling of Venus's flight-proven Rotating Detonation Rocket Engine (RDRE).[4] This follows Venus Aerospace's historic flight test in May 2025, which marked the first successful flight of a high-thrust RDRE in the United States, validating the technology's performance under real-world conditions.[6]

The technical significance of the RDRE cannot be overstated. Unlike conventional rocket engines that rely on deflagration—a controlled, subsonic burning of propellants—an RDRE utilizes a continuous, supersonic detonation wave that travels within a ring-shaped (annular) chamber. This process produces significantly higher pressure and thermal efficiency, resulting in greater thrust from less propellant.[7] The technology, theorized for decades, has now been demonstrated as a viable and highly disruptive alternative to traditional chemical propulsion.

The investment by Lockheed Martin serves as more than just capital; it is a powerful market signal that validates the RDRE as a strategically critical technology. For an established defense prime to invest in, rather than attempt to acquire, a startup with a disruptive technology indicates a fundamental shift in innovation strategy. It reflects an understanding that leveraging the agility and focused expertise of startups is a more efficient path to accessing game-changing capabilities. Lockheed Martin's stated intent to explore "potential approaches to scale and integrate Venus's technology within critical systems" confirms that this is not a passive investment but a direct pathway to integrating RDREs into future defense and space platforms.[5] This move effectively de-risks the technology for other investors and potential government and commercial customers, accelerating its path to market.

Furthermore, the RDRE is a pivotal "dual-use" technology with the potential to simultaneously disrupt multiple multi-billion-dollar markets. For the defense sector, it offers a direct solution for the rapidly growing hypersonics market, which is projected to approach $12 billion by 2032.[5] For the space industry, it promises more efficient and compact engines for both launch vehicles and in-space propulsion. For commercial aviation, it revives the potential for high-Mach passenger and cargo transport.[8] This ability to serve three distinct, high-value markets from a single core technology provides Venus Aerospace and its backers with a uniquely diversified and resilient business model, insulating it from the cyclical demands of any single sector.

## 2.2 The Orbital Factory: Redwire Advances In-Space Biomanufacturing

The commercial viability of the LEO economy took a tangible step forward this week with new analysis highlighting a paradigm shift in space-based biomanufacturing. A perspectives article published in the peer-reviewed journal *Stem Cell Reports*, co-authored by Redwire's Chief Scientist Ken Savin, details the industry's move from pure research to commercially focused production in microgravity.[9] Redwire has been a pioneer in this field, conducting dozens of experiments aboard the International Space Station (ISS) using its Pharmaceutical In Space Laboratory (PIL-BOX). These experiments have consistently demonstrated that crystals of pharmaceutical compounds grown in microgravity are larger and possess a more highly ordered molecular structure than their terrestrial counterparts.[9]

The unique value of the microgravity environment stems from the absence of convection and sedimentation. This allows molecules to self-assemble into near-perfect crystalline structures, a process that is often impossible to achieve on Earth. This has profound implications for the pharmaceutical industry, where the specific crystalline form (polymorph) of a drug can affect its stability, shelf life, and bioavailability. Redwire's work has also extended to 3D bioprinting, where the lack of gravity allows for the fabrication of complex cellular structures, such as organoids and tissues, without the need for scaffolding.[9]

The most significant development highlighted is the strategic shift from using space for basic research to using it for industrial manufacturing. Specifically, Redwire has demonstrated the ability to use superior crystals grown in space as "seeds" to replicate those perfect crystalline forms back in terrestrial labs.[9] This breakthrough overcomes the primary logistical and economic hurdle for in-space manufacturing: the prohibitive cost of producing large quantities of a product in orbit. Instead of manufacturing the final drug in space, companies can now produce a high-value, intermediate product—the "master template" crystal—and use it to optimize and control mass production on Earth. This creates a highly scalable and commercially realistic business model, transforming the microgravity environment into a unique industrial tool for generating intellectual property that can improve the manufacturing of pharmaceuticals on a global scale. The launch of Redwire's SpaceMD subsidiary, dedicated to the commercialization of these on-orbit capabilities, further signals that this market is transitioning from a speculative concept to an operational business sector.[9]

## 3. Mission and Commercial Developments: A Shifting Global Landscape

The past week has been marked by a relentless operational tempo from commercial leaders, major industrial consolidation in Europe, and steady progress from national space agencies, all set against the backdrop of a unique scientific opportunity presented by an interstellar visitor.

## 3.1 Launch Cadence and Heavy-Lift Maturation: The SpaceX Paradigm

SpaceX continued to demonstrate its dominance in launch operations, conducting its 11th integrated test flight of the Super Heavy-Starship system from its Starbase facility in Texas.[11] These iterative tests are rapidly advancing the development of the world's first fully reusable super-heavy launch vehicle, a system poised to fundamentally redefine the economics of space access.

In parallel with this developmental work, the company's operational launch cadence remains unprecedented. This week, SpaceX launched its 134th orbital mission of 2025, successfully matching its entire 2024 launch total with more than two months remaining in the year.[12] Among these missions was the launch of the SpainSat NG 2 secure communications satellite for Hisdesat. This mission notably utilized an expendable Falcon 9 booster, forgoing recovery to maximize the rocket's performance and deliver the heavy satellite to a high-energy geosynchronous transfer orbit.[12] This decision highlights the operational flexibility of the Falcon 9 system, where reusability can be traded for performance when mission requirements demand it.

This dual-pronged strategy—aggressively developing next-generation technology with Starship while operating the current Falcon 9 fleet at a factory-like pace—creates a powerful competitive pressure on the global launch market. The high cadence and resulting low cost of Falcon 9 are forcing traditional providers to adapt or become uncompetitive, a key driver behind the industrial consolidation seen in Europe. At the same time, the imminent operational status of Starship, with its promised order-of-magnitude reduction in launch costs and massive payload capacity, is compelling the entire space industry to design for a new logistics paradigm. Developers of commercial space stations, lunar habitats, and large satellite constellations are increasingly basing their future architectures on the assumption of Starship's availability. Consequently, SpaceX is not merely competing within the launch market; it is actively defining the economic and logistical boundary conditions for the entire future space economy.

## 3.2 Formation of a European Titan: The Airbus-Leonardo-Thales Consolidation

In one of the most significant strategic moves in the European aerospace sector in decades, Airbus, Leonardo, and Thales announced on October 23, 2025, the signing of a Memorandum of Understanding (MoU) to merge their respective space activities into a single, unified company.[14] This landmark agreement aims to create a pan-European space champion with the scale and integration necessary to enhance Europe's strategic autonomy and compete effectively against vertically integrated American giants like SpaceX and state-backed Chinese enterprises.[15] The new entity, which could be operational by 2027 pending regulatory approvals, is expected to have a combined value of approximately €10 billion.[15]

This consolidation is a direct and necessary response to profound shifts in the global space market. The rise of low-cost, high-cadence launch providers and the development of mega-constellations have rendered the fragmented, nationally-focused European industrial base increasingly uncompetitive.[16] The decision to merge signals that the external competitive threat and the geopolitical imperative for European sovereignty have finally superseded the long-standing national rivalries that have historically prevented such a large-scale integration.[15]

Critically, the venture is being explicitly modeled on the successful MBDA missile consortium, which is jointly owned by Airbus, BAE Systems, and Leonardo.[16] This precedent is vital, as it provides a proven framework for balancing the need for pan-European industrial efficiency with the necessity of protecting sensitive national defense interests. The MBDA model allows for integrated development and production while maintaining sovereign control over nationally critical assets and technologies. The adoption of this structure was likely the key to securing the political consensus from France, Italy, and Germany, which was essential for the deal to proceed. This move is therefore more than a simple corporate merger; it is the industrial embodiment of a newly unified and pragmatic European space strategy.

## 3.3 Agency Program Updates: ESA and ISRO

The European Space Agency (ESA) and the Indian Space Research Organisation (ISRO) both made notable announcements this week, highlighting their distinct strategic priorities and stages of development.

Following its 337th Council meeting, ESA announced several key initiatives focused on leveraging space technology for terrestrial benefits and international scientific cooperation. These include a new five-year partnership with the World Food Programme to use Earth observation data for food security and emergency relief, the advancement of its "Destination Earth" initiative to create a high-fidelity digital twin of the planet for climate modeling, and a Memorandum of Understanding with NASA for the provision of a key instrument for ESA's Vigil space weather mission.[18]

In contrast, ISRO's announcements centered on the expansion of its core operational capabilities. ISRO Chairman V Narayanan confirmed the upcoming launch of the CMS-03 communication satellite on November 2, to be followed by a commercial LVM-3 mission to launch the American BlueBird-6 satellite by year-end.[20] He also emphasized the strategic importance of the government's approval for a third launch pad, which will significantly increase India's launch capacity, and reiterated the success of the SPADEx (Space Docking Experiment) mission conducted in January 2025. The SPADEx mission made India only the fourth country to demonstrate autonomous on-orbit docking, a critical technology for building future space stations and conducting complex in-space logistics.[22]

The differing focus of these announcements reveals the distinct evolutionary stages of the two agencies. ESA, a mature space power with decades of established infrastructure, is increasingly acting as a service provider to solve global challenges and as a key partner in international scientific endeavors. ISRO, a rapidly ascending power, is focused on vertical integration and mastering the foundational technologies—from launch and satellite deployment to in-space rendezvous and docking—that are prerequisites for a fully autonomous and commercially competitive national space program.

### 3.4 An Interstellar Windfall: The 3i/ATLAS Flyby Opportunity

A unique technological opportunity has emerged with the prediction that NASA's Europa Clipper spacecraft will intersect the tail of the interstellar comet 3I/ATLAS between October 30 and November 6.[24] Discovered in July 2025, 3I/ATLAS is only the third known object to have entered our solar system from interstellar space.[25] The chance encounter offers a scientifically priceless opportunity to sample pristine material from another star system without the immense cost and complexity of a dedicated intercept mission.[24]

While the primary mission of Europa Clipper is to conduct detailed reconnaissance of Jupiter's icy moon Europa, its sophisticated suite of instruments, including plasma and dust detectors, can be repurposed to analyze the composition of the cometary tail. This event serves as a powerful demonstration of mission adaptability—a critical technological and operational capability in modern space exploration. The ability to retask a multi-billion-dollar asset in deep space to capitalize on a transient and scientifically significant phenomenon showcases the advanced nature of today's mission planning, navigation, and command-and-control systems. It effectively transforms a single-purpose spacecraft into a dynamic, multi-purpose exploration platform, dramatically increasing the scientific return on investment. This capacity for opportunistic science will be indispensable for future long-duration missions where unexpected discoveries are not just possible, but probable. The significant public and media interest, including widespread online speculation about the nature of the object, also underscores the growing challenge for space agencies in communicating complex scientific operations and managing public expectations in an age of instantaneous information.[25]

# 4. Space Infrastructure and Logistics: The Architecture of LEO and Beyond

The development of a sustainable off-world economy depends on the establishment of reliable and accessible in-orbit infrastructure. This week brought key developments in the planning for future space stations and the maturation of the logistics services required to maintain them.

## 4.1 The Post-ISS Political Orbit: Roscosmos Realigns the Russian Orbital Station (ROS)

In a significant strategic reversal, Russia's state space corporation, Roscosmos, announced this week that its planned Russian Orbital Station (ROS) will be placed into a 51.6-degree orbital inclination.[26] This orbit is identical to that of the International Space Station. The decision marks a departure from the previously stated plan to deploy ROS into a near-polar orbit of 97-98 degrees, which would have maximized observational coverage of Russian territory—a key objective for both civilian and national security purposes.[26]

The rationale for this change is explicitly diplomatic. According to reports, the move is intended to "maintain open channels of cooperation with traditional space exploration players, starting with the United States".[26] This decision to sacrifice a primary national security objective for compatibility with international partners is a powerful testament to the "network effect" created by the two-decade-long operation of the ISS. The entire global human spaceflight ecosystem—including crew and cargo launch systems (like Soyuz, Dragon, and Starliner), ground control networks, and astronaut training protocols—has been built around servicing a station at a 51.6-degree inclination.

By aligning ROS with this de facto international standard, Roscosmos ensures that future vehicles from both Russia and potential international or commercial partners can access its station without requiring entirely new launch trajectories, performance specifications, or operational procedures. It is a pragmatic calculation that continued access to this global logistics network is strategically more valuable in the post-ISS era than the benefits of a bespoke, nationally-focused polar station. The decision signals a clear intent by Russia to remain a central player in international human spaceflight, prioritizing continued relevance and partnership opportunities over a more isolationist, security-oriented path.

### 4.2 Toward a Sustainable Orbit: Astroscale's On-Orbit Servicing (OOS) Roadmap

The market for in-space logistics and sustainability continues to mature, with on-orbit servicing leader Astroscale making several strategic moves. The company, which specializes in technologies for space debris removal and satellite life extension, announced the opening of a new office in Paris to house its European policy and business development teams, complementing its R&D hub in Toulouse.[27] This expansion reflects the growing importance of the European market and the regulatory frameworks being developed there.

Astroscale is advancing a portfolio of technology demonstration missions designed to prove out its core capabilities. The company's flight-proven Rendezvous and Proximity Operations (RPO) technology, successfully demonstrated during its ADRAS-J mission to inspect a piece of large space debris, forms the foundation of its service offerings.[28] Future missions, such as COSMIC, will build on this heritage by incorporating a robotic arm to physically capture and de-orbit defunct satellites.[30] The company is developing a full suite of services, including inspection, life extension (refueling and repair), and active debris removal (ADR).[31]

The steady progress of companies like Astroscale signifies the emergence of a critical "second-layer" infrastructure market essential for the long-term viability of the space economy. If the first layer consists of launch providers and satellite operators, this second layer provides the essential maintenance and logistics services—analogous to the terrestrial economy's gas stations, tow trucks, and waste management systems. The development of a robust OOS market is a leading indicator of the overall health of the LEO economy. Its success is not only a commercial opportunity but a strategic necessity to manage orbital congestion, mitigate the risk of Kessler syndrome, and ensure that orbital pathways remain safe and accessible for future generations.

## 5. Challenges and Considerations: Navigating Headwinds

Despite the week's significant technological and commercial advancements, the space sector continues to face persistent challenges related to funding stability and the integrity of public information.

## 5.1 The Specter of Austerity: Funding Uncertainty for Public Programs

A recurring challenge for the aerospace industry is its vulnerability to shifting political priorities and budgetary constraints. This week, public demonstrations, including by prominent science advocates like Bill Nye, highlighted concerns over proposed cuts to NASA's budget.[11] The central argument is that reduced public investment in space exploration and technology development risks ceding U.S. leadership to international competitors who may benefit from more consistent, long-term state support.

While the commercial space sector is experiencing unprecedented growth, foundational research and development, deep-space exploration missions like Artemis, and large-scale scientific observatories remain heavily dependent on stable, multi-year government funding. Budgetary uncertainty can lead to significant program delays, cost overruns, and the loss of highly skilled technical talent. This creates a precarious operating environment for both the government agencies planning these ambitious undertakings and the vast ecosystem of private contractors and suppliers that execute them. Navigating these fiscal headwinds remains a primary strategic challenge for public space programs globally.

## 5.2 The Signal and the Noise: Information Integrity in the New Space Age

The close flyby of the interstellar object 3I/ATLAS has brought another, more modern challenge into sharp focus: maintaining information integrity in an era of instantaneous global communication. The event has been accompanied by a wave of online speculation and misinformation, with unsubstantiated social media claims suggesting that space agencies are concealing data, or that the object is of artificial origin.[25]

As space activities become more frequent and visually spectacular, the public appetite for information often outpaces the rigorous, time-consuming process of scientific data collection, processing, and peer review. This information vacuum can be quickly filled by speculation and conspiracy theories, which can erode public trust in scientific institutions. For space agencies and commercial operators, this presents a complex communications dilemma. They must balance the imperative for scientific accuracy and thorough verification against the public's demand for immediate updates and transparency. Managing public expectations and effectively communicating the nuances and timelines of space operations is becoming an increasingly critical, though often underappreciated, component of mission success in the 21st century.

# 6. Future Outlook: Projecting the Trajectory

The developments of the past seven days confirm that the global space industry is at a critical inflection point. The foundational technologies required to build and sustain a true off-world economy are moving from theoretical concepts to flight-proven hardware, and the international industrial landscape is undergoing a fundamental reorganization in response to these new capabilities.

**Near-Term Projections:**

- **Advanced Propulsion Race:** The strategic investment by Lockheed Martin into Venus Aerospace's RDRE technology is likely to trigger an acceleration of investment in the advanced propulsion sector. Other major defense and aerospace primes, now seeing the validated potential and competitive threat, will likely seek to secure their own positions by investing in or partnering with other startups in the fields of detonation engines, nuclear thermal, and advanced electric propulsion.
- **European Integration:** The newly announced Airbus-Leonardo-Thales joint venture will now enter a complex, multi-year phase of regulatory scrutiny and internal integration. Its first major test will be its ability to present a unified and competitive bid for Europe's next-generation sovereign satellite constellations, such as the $IRIS^2$ secure connectivity program. Its success or failure in these early competitions will be a key indicator of the venture's long-term viability.
- **Post-ISS Geopolitics:** Roscosmos's decision to align the Russian Orbital Station's orbit with the ISS standard will likely be followed by formal invitations to international partners to participate in the project. This will serve as a crucial test of the geopolitical alignments of the post-ISS era, determining whether traditional partners like ESA and NASA engage, or if Russia forms a new human spaceflight bloc with partners such as China and other BRICS nations.

**Strategic Implications:**

The overarching takeaway from this week is that the relentless pace of technological disruption, driven primarily by the U.S. commercial space sector, is now forcing strategic, once-in-a-generation realignments across the globe. The economic and operational paradigm established by SpaceX's reusable launch systems has created a competitive environment where business-as-usual is no longer a viable strategy.

The evidence is clear: European industrial giants must consolidate to achieve the scale necessary to compete. Legacy space agencies must continue to evolve their roles from primary developers to customers and enablers of commercial industry. Rising space powers like India must focus on mastering the foundational operational capabilities—launch, rendezvous, docking, and in-space servicing—that are the prerequisites for participation in the LEO economy. The technological systems and industrial structures being forged today are not merely incremental improvements; they are the cornerstones that will define the leaders and followers of the "Beyond Earth" economy for the remainder of this century.

**Works cited**


1. A Transformative Year in Aerospace, accessed October 24, 2025, https://aerospaceamerica.aiaa.org/departments/a-transformative-year-in-aerospace/
2. From AI to Orbit: Five Initiatives Shaping the Future of Aerospace - Altair, accessed October 24, 2025, https://altair.com/blog/articles/from-ai-to-orbit-five-initiatives-shaping-the-future-of-aerospace
3. Emerging Technologies and Trends in the Aerospace Industry - AZoM, accessed October 24, 2025, https://www.azom.com/article.aspx?ArticleID=22933
4. Venus Aerospace Announces Investment From Lockheed Martin to ..., accessed October 24, 2025, https://www.designdevelopmenttoday.com/industries/aerospace/news/22953262/venus-aerospace-announces-investment-from-lockheed-martin-to-accelerate-nextgeneration-propulsion
5. Lockheed Martin Invests in Venus Aerospace to Advance Rocket Propulsion Technology, accessed October 24, 2025, https://www.executivebiz.com/articles/lockheed-venus-rocket-propulsion
6. Venus Aerospace Completes Historic U.S. Hypersonic Engine Flight Test - PR Newswire, accessed October 24, 2025, https://www.prnewswire.com/news-releases/venus-aerospace-completes-historic-us-hypersonic-engine-flight-test-302455690.html
7. Venus Aerospace debuts potentially revolutionary rocket engine with landmark 1st flight (video) | Space, accessed October 24, 2025, https://www.space.com/technology/venus-aerospace-debuts-potentially-revolutionary-rocket-engine-with-landmark-1st-flight-video
8. Venus Aerospace conducts first U.S. flight test of rotating detonation rocket engine, accessed October 24, 2025, https://www.militaryaerospace.com/commercial-aerospace/article/55290679/venus-aerospace-conducts-first-us-flight-test-of-rotating-detonation-rocket-engine
9. Space-Based Biomanufacturing Ushers in New Era: Crystals, Cells, and Collaboration in Low Earth Orbit, accessed October 24, 2025,

https://rdw.com/newsroom/space-based-biomanufacturing-ushers-in-new-era-crystals-cells-and-collaboration-in-low-earth-orbit/
10. NASA's SpaceX-33 Mission Brings 3D Printing Technologies to Space - 3Dnatives, accessed October 24, 2025, https://www.3dnatives.com/en/nasas-spacex-33-mission-brings-3d-printing-technologies-to-space-03092025/
11. Latest space news, headlines, analysis - CBS News, accessed October 24, 2025, https://www.cbsnews.com/space/
12. SpaceX expends Falcon 9 booster to launch Spainsat NG 2 communications satellite, accessed October 24, 2025, https://spaceflightnow.com/2025/10/23/live-coverage-spacex-to-expend-falcon-9-booster-to-launch-spainsat-ng-2-communications-satellite/
13. Spaceflight Now – The leading source for online space news, accessed October 24, 2025, https://spaceflightnow.com/
14. Airbus, Leonardo and Thales sign Memorandum of Understanding to create a leading European player in space, accessed October 24, 2025, https://www.airbus.com/en/newsroom/press-releases/2025-10-airbus-leonardo-and-thales-sign-memorandum-of-understanding-to
15. Airbus, Leonardo, Thales plan for €10bn satellite merger - Aerospace Tech Review, accessed October 24, 2025, https://aerospacetechreview.com/airbus-leonardo-thales-plan-for-e10bn-satellite-merger/
16. Thales-Leonardo-Airbus Joint Venture could debut in 2025 | Space Voyaging, accessed October 24, 2025, https://www.spacevoyaging.com/news/2025/09/18/thales-leonardo-airbus-joint-venture-could-debut-in-2025/
17. Airbus, Thales, and Leonardo are working on a satellite manufacturer - Techzine Global, accessed October 24, 2025, https://www.techzine.eu/news/infrastructure/134605/airbus-thales-and-leonardo-are-working-on-a-satellite-manufacturer/
18. Decisions and announcements following the 337th ESA Council - SatNews, accessed October 24, 2025, https://news.satnews.com/2025/10/23/decisions-and-announcements-following-the-337th-esa-council/
19. ESA Council Approves Key International Partnerships and Program ..., accessed October 24, 2025, https://spaceanddefense.io/esa-council-approves-key-international-partnerships-and-program-milestones/
20. ISRO to launch CMS-03 satellite in November 2025: Chairman V Narayanan, accessed October 24, 2025, https://www.deccanherald.com/science/isro-to-launch-cms-03-satellite-in-november-2025-chairman-v-narayanan-3773201
21. LVM-3 to launch CMS-03 on November 2; Nisar to begin operations soon, accessed October 24, 2025, https://timesofindia.indiatimes.com/science/lvm-3-to-launch-cms-03-on-novem

ber-2-nisar-to-begin-operations-soon/articleshow/124758812.cms
22. Indian space sector saw remarkable achievements, over 200 significant milestones recorded in 2025: ISRO Chief Narayanan, accessed October 24, 2025, https://www.aninews.in/news/national/politics/indian-space-sector-saw-remarkable-achievements-over-200-significant-milestones-recorded-in-2025-isro-chief-narayanan20251023135937
23. Indian space sector saw remarkable achievements, over 200 ..., accessed October 24, 2025, https://www.aninews.in/news/national/politics/indian-space-sector-saw-remarkable-achievements-over-200-significant-milestones-recorded-in-2025-isro-chief-narayanan20251023135937/
24. NASA's Europa clipper could soon cross the tail of a comet. Why scientists are watching closely, accessed October 24, 2025, https://indianexpress.com/article/technology/science/nasas-europa-clipper-could-soon-cross-the-tail-of-a-comet-why-scientists-are-watching-closely-10323103/
25. China Exposes What NASA Hid? Truth Behind Mysterious 3I/ATLAS Images That Suddenly Went Dark | IBTimes UK, accessed October 24, 2025, https://www.ibtimes.co.uk/china-exposes-what-nasa-hid-truth-behind-mysterious-3i-atlas-images-that-suddenly-went-dark-1749661
26. Russia: Roscosmos changes plans for new orbital station to facilitate ..., accessed October 24, 2025, https://www.agenzianova.com/en/news/Russia%27s-Roscosmos-changes-plans-for-a-new-orbital-station-to-facilitate-cooperation-with-the-US./
27. Astroscale Docks In France - Again! - Orbital Today, accessed October 24, 2025, https://orbitaltoday.com/2025/10/18/astroscale-docks-in-france-again/
28. Astroscale | Space for Tomorrow, accessed October 24, 2025, https://www.astroscale.com/
29. ADRAS-J Mission | Astroscale's Debris Inspection Milestone, accessed October 24, 2025, https://www.astroscale.com/missions/adras-j
30. COSMIC | Astroscale's UK-Led Robotic Debris Removal Mission, accessed October 24, 2025, https://www.astroscale.com/missions/cosmic
31. Space Technology | Aviation Week Network - Aviation Week, accessed October 24, 2025, https://aviationweek.com/AWST
32. Astroscale Missions | Advancing Orbital Sustainability, accessed October 24, 2025, https://www.astroscale.com/missions