Space Activities

(An ISpA Summary)

2025

INDIAN SPACE ASSOCIATION

Bhumandal Se Brahmaand Tak

Space Activities: Year-2025

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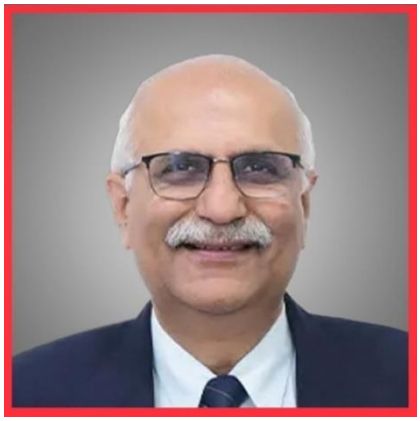


Chairman's Message

Mr Arun T Ramchandani
Sr VP & Head - L&T Precision Engineering & Systems

The Indian space sector stands today at an inflection point, and 2025 will be remembered as a year when intent was matched by execution. The Indian Space Association was established to support precisely this moment-to enable private industry to become a strong partner in India's space journey and to ensure that national capability, commercial opportunity, and strategic vision advance together.

Over the course of the year, India's space ecosystem demonstrated increasing confidence and maturity. Major government initiatives continued to create an enabling environment for private participation, while institutions such as ISRO, IN-SPACe and NSIL worked closely with industry to expand access, streamline processes and encourage innovation. The results are now visible in the form of operational missions, commercial contracts and expanding industrial capacity.

ISpA's engagement during 2025 reflected this evolving landscape. The Association was actively involved in policy consultations, defence-space dialogue and international engagements, ensuring that industry perspectives were articulated clearly and constructively. ISpA's growing presence across national and global forums highlighted India's emergence as a serious and reliable space partner, not only for launches and satellites, but also for services, systems and solutions.

The progress made by Indian private companies and startups during the year deserves particular recognition. From launch vehicle development and satellite manufacturing to Earth observation, communications and space-enabled services, Indian enterprises demonstrated technological credibility and commercial ambition. Their ability to attract partnerships, investments and global interest signals a strong foundation for future growth.

At the same time, the year reinforced the importance of coordination, sustainability, and long-term planning. As space becomes increasingly congested and competitive, responsible behaviour, regulatory clarity and international cooperation will be critical. ISpA will continue to work with all stakeholders to promote these principles while safeguarding industry growth and national interests.

As Chairman of the Indian Space Association, I remain confident that India's space sector is on a robust and irreversible growth trajectory. With continued policy support, institutional collaboration and industry initiative, India is well positioned to emerge as a major global hub for space technology, manufacturing and services in the years ahead.

Vice Chairman's Message

Mr Rahul Vatts
Chief Regulatory Officer, Bharti Airtel

The year 2025 has firmly established satellite communications as a critical pillar of India's national connectivity and security infrastructure. As Vice Chairman of the Indian Space Association, and as a professional engaged in regulatory frameworks governing large-scale communications networks, I see this period as pivotal in aligning India's space ambitions particularly in SATCOM with its long-term digital, defence, and infrastructure priorities.

SATCOM infrastructure, spanning LEO, MEO, and GEO systems, is integral to universal broadband access, disaster resilience, secure government and defence communications and emerging machine-to-machine and IoT services – thus, effectively complementing the already widespread terrestrial connectivity. This recognition has sharpened regulatory focus on spectrum management, gateway deployment, licensing and security, necessitating close coordination across space, telecom, and defence policy domains.

From a regulatory perspective, progress in 2025 has been encouraging. Continued implementation of the Indian Space Policy and TRAI Recommendations on spectrum assignment for SATCOM services have improved clarity and given hope to the industry. Such clarity is essential to enable investment in satellite constellations, ground gateways, user terminals and SATCOM networks, while safeguarding national security and sovereign interests.

ISpA's engagement throughout the year reflected these priorities. The Association worked closely with policymakers, regulators and institutions to articulate industry perspectives on spectrum bands, pricing, gateway licensing, cross-border coordination and defence-related requirements. Our objective has been to support regulatory outcomes that balance the interests of consumers, service providers, technology vendors, and government, while fostering a competitive and innovation-friendly SATCOM ecosystem.

The increasing convergence of SATCOM and defence-space applications further underscores the need for coherent regulatory design. Secure satellite connectivity, resilient navigation, Earth observation, and space situational awareness are now essential enablers of modern military operations. As private industry plays a larger role in delivering these capabilities, regulatory frameworks must support speed and reliability while ensuring accountability, data protection, and operational continuity.

Looking ahead, immediate spectrum assignment for NGSO-based SATCOM services would facilitate an early rollout. Further, an enabling light-touch policy for use of Indian gateways for services outside India would provide the necessary impetus for the Indian industry to take the lead at the regional/global level.

The progress achieved by Indian companies and startups in 2025 demonstrates the value of regulatory stability. Their ability to attract global partnerships, scale infrastructure, and move toward operational deployment reflects growing confidence in India's policy environment. Sustaining this momentum will require continued dialogue to ensure regulation evolves in step with technology and market realities.

As Vice Chairman of ISpA, I remain committed to the principle that sound regulation enables scale and innovation. By fostering clarity, consistency, and collaboration across space, telecom, and defence domains, India is well positioned to build a resilient, secure, and globally competitive SATCOM ecosystem.

Director General's Message

Lt Gen AK Bhatt (Retd)
PVSM UYSM AVSM SM VSM
Chairperson, Board of Governors, IIIT Kota & IIIT Ranchi
(Former DGMO, MS & GOC 15 Corps)

The year 2025 has been a defining one for the Indian space ecosystem, marked by visible progress, deeper industry participation, and growing global recognition of India's private space capabilities. As Director General of the Indian Space Association, I am pleased to note that ISpA has continued to play a constructive and credible role as the collective voice of the Indian space industry during this important phase of sectoral transformation.

Over the past year, ISpA's engagement with the Government of India, regulatory bodies, and space institutions has steadily matured. Our close interaction with ISRO, IN-SPACe, NSIL, the Ministry of Defence, and other key stakeholders has helped translate policy intent into practical outcomes for industry. The increasing frequency with which ISpA was consulted on regulatory frameworks, technology roadmaps, and industry concerns reflects the growing trust placed in the Association as a representative and responsible industry body.

2025 also witnessed significant momentum within the private space sector. Indian companies and startups demonstrated credible progress across launch vehicles, satellite manufacturing, Earth observation, communications, subsystems, and downstream services. Several firms moved from development to deployment, while others expanded their international footprint through partnerships, exports, and commercial contracts. This progress underscores the depth of talent and innovation now present within India's space industry.

ISpA's role during the year extended beyond policy advocacy. Through flagship platforms such as industry dialogues, defence–space interactions, international conferences, and structured engagements with global partners, the Association facilitated meaningful collaboration between government, industry, and academia. These forums enabled candid discussions on capability gaps, market opportunities, and long-term strategic priorities, helping align national objectives with industry readiness. Equally encouraging has been the growth of India's space startup ecosystem. New enterprises entered the sector with innovative solutions in launch services, satellite technologies, data analytics, and enabling systems, supported by increasing investor confidence and institutional backing. This entrepreneurial energy is essential for sustaining long-term competitiveness and technological leadership.

As we present this Year End Activity Report, it is clear that India's space sector is transitioning from promise to performance. ISpA remains committed to supporting this journey by advocating stable policies, fostering collaboration, and enabling industry to contribute meaningfully to national growth, security, and global space activities.

2025 at a Glance – Overview

The year 2025 marked a decisive and transformative phase for both the global and Indian space ecosystems. Worldwide, space activity accelerated across commercialisation, technological advancement, and strategic security, reinforcing space as a critical domain of national power, digital infrastructure, and economic growth. Investment surged in Earth observation, satellite communications, deep-space exploration, in-space manufacturing, defence-oriented assets, and low-Earth orbit (LEO) constellations supporting broadband, imaging, IoT, ISR, weather intelligence, and secure communications.

Geopolitically, space gained heightened strategic importance. Competition in LEO and cislunar space intensified, prompting nations to strengthen space situational awareness (SSA), space traffic management, orbital resilience, and counter-space preparedness. Regulatory frameworks evolved to address higher launch cadence, private-sector participation, spectrum management, cybersecurity, and sustainability, particularly debris mitigation and long-term orbital stewardship.

Against this backdrop, India emerged as a dynamic and credible force in the global space sector. 2025 marked an inflection point, shifting from policy articulation to measurable execution, asset creation, and early commercial validation. Progress rested on three pillars: institutional reform, technological achievement, and industry expansion.

Institutionally, implementation of the Indian Space Policy, stronger IN-SPACe authorisation mechanisms, liberalised FDI norms, and alignment with the Telecommunications Act, 2023 and updated SATCOM rules created a more predictable, industry-oriented environment. The Government of India increasingly acted as an anchor customer, expanding demand for space-based services across governance, digital infrastructure, disaster management, agriculture, climate monitoring, and national security.

Technologically, ISRO achieved major milestones, including its 100th launch, the NASA–ISRO NISAR mission, and advances in human spaceflight, robotics, in-orbit operations, navigation, Earth observation, and launch services. Progress in SSA, satellite communications modernisation, and secure government and defence services strengthened India's strategic capabilities.

The most significant structural shift was the maturation of India's private space industry. With over 300 startups across launch vehicles, satellites, propulsion, robotics, manufacturing, SSA, analytics, and downstream applications, India became one of the fastest-growing private space markets globally. Companies moved from demonstration to deployment, secured international contracts, expanded manufacturing, and deepened collaboration with ISRO, defence agencies, and global partners. Despite global funding headwinds, investment improved, and a stronger component supply chain enhanced India's competitiveness in aerospace manufacturing.

Internationally, India expanded cooperation with the United States, France, Japan, Australia, and emerging spacefaring nations across technology, commercial mobility, infrastructure resilience, and exploration. Active participation in the United Nations, Quad mechanisms, and Indo-Pacific security frameworks underscored its growing strategic footprint.

At the same time, 2025 highlighted persistent constraints: manufacturing scale limits, import dependencies, spectrum pricing uncertainties, and PPP execution gaps. These challenges underscore the need for focused reforms in 2026, particularly in industrial scale-up, export enablement, spectrum rationalisation, and institutionalised PPP models. Overall, 2025 stands as a transition year defined not merely by intent, but by delivery. The breadth and maturity achieved across government, ISRO, industry, and international engagement signal a clear trajectory: India is no longer simply participating in the global space revolution, it is increasingly shaping it.

I. Policy & Governance Highlights

Establishing the Regulatory Framework for India's Space Century - The governance of India's extra-terrestrial ambitions in 2025 focused on operationalizing the **Indian Space Policy 2023** and removing commercial bottlenecks through liberalized investment and regulatory maturity.

A. Regulatory and Licensing Reforms

- **The Telecommunications Act 2023 Implementation:** The year saw the formalization of administrative (non-auction) spectrum assignment for satellite services. Key TRAI and DoT consultation papers defined service authorizations and spectrum pricing, including the high-stakes debate where TRAI recommended a **4% Adjusted Gross Revenue (AGR)** model to ensure satellite broadband viability.
- **Spectrum Management:** The Cabinet approved the refarming of **1,100 MHz of spectrum** across various bands. Advocacy continued for immediate allocation to enable market entry for major players like Starlink and Eutelsat OneWeb, which reached final security clearance stages in December 2025.
- **Licensing Liberalization:** The DoT significantly lowered entry barriers by removing numerical caps on SATCOM users, instead linking service provisions to bandwidth capacity and IN-SPACe authorizations.
- **Unified Licensing & NOCs:** New draft guidelines were issued for granting No Objection Certificates (NOC) to Unified Licensees for GMPCS services, alongside **draft rules for Main Telecommunication and Miscellaneous Services**.
- Mandatory security norms were tightened, requiring SATCOM operators to host international gateways within India and complete security certifications prior to commercial launch.

TRAI Consultation Papers & Frameworks

The **Telecom Regulatory Authority of India (TRAI)** issued several high-impact papers defining the future of SATCOM:

- *Recommendations on Terms and Conditions for Assignment of Spectrum for Certain Satellite-Based Commercial Communication Services-*
- *Consultation Paper on Assignment of Microwave Spectrum in Multiple Bands -Included 6 GHz, 7 GHz, 13-21 GHz, E-band and V-band*
- *Consultation Paper on Terms and Conditions for the Assignment of Spectrum for Certain Satellite-Based Commercial Communication Services*
- *Terms and Conditions of Network Authorisations under the Telecommunications Act, 2023*

Department of Telecommunications (DoT) Draft Rules 2025

- *Draft Telecommunications (Authorisation for Telecommunication Network) Rules, 2025*
- *Draft Telecommunications (Telecom Cyber Security) Amendment Rules, 2025 (June 2025)*
- *Draft **National Telecom Policy (NTP) 2025** (24 July 2025)*
- *Draft Guidelines for Grant of No Objection Certificate (NOC) to a Unified Licensee with GMPCS Authorisation (29 July 2025)*

Draft Rules under the Telecommunications Act

- ***Draft Telecommunications Authorisation for Provision of Main Telecommunication Services Rules, 2025***
- ***Draft Telecommunications (Miscellaneous Services) Rules, 2025***
- *Draft Telecommunications* ***Rules on Spectrum Sharing, Trading & Leasing*** *Released by the Government of India*

B. Investment and Economic Enablers

- **Fiscal Incentives: FM Nirmala Sitharaman announced customs duty exemption for space related equipment during union budget 2025-26.**
    - Union Budget 2025–26 announced Basic Customs Duty (BCD) exemption on specified goods for launch vehicles, satellites, and ground/test infrastructure.
    - Covers satellite components, launch vehicle parts, payload integration equipment, and specialised capital goods.
    - Aims to reduce input costs, enhance competitiveness, and support scale-up of indigenous space manufacturing, especially for startups and private industry.
    - Additionally, an extension under Section 80-IAC allowed space startups to claim 100% tax deductions for three successive years.

IN-SPACe: The Single-Window Evolution-Regulatory Frameworks

- IN-SPACe released the definitive *Report on the Projection of SATCOM Capacity over India for the Next 5 Years*.
- **IN-SPACe issued frameworks addressing the legal and safety pillars of private space activity:**
    - ***Draft Guidelines for Space Situational Awareness (SSA) and Related Activities-*** Establishing protocols for tracking and collision avoidance.
    - ***Draft Policy Framework & Guidelines Addressing State's Liability Towards Third-party Damage.*:** Addressing the legal framework for third-party damage in alignment with international treaties.
    - ***Draft Safety and Security Guidelines for Space Activities* :** Making safety core conditions for all space-activity authorizations.

C. State-Level Industrial Policies

2025 marked the **"Rise of the States,"** with regional governments aligning with national goals, year saw states move to align with national priorities through dedicated sectoral policies:

- ***Gujarat:*** *Unveiled the dedicated state sectoral policy -SpaceTech Policy 2025-2030*
- ***Tamil Nadu:*** *Approved its Space Industrial Policy 2025, targeting ₹10,000 crore in investments.*
- ***Karnataka:*** *Released the draft Space Technology Policy 2024-29, aiming to capture 50% of the national market.*
- ***Andhra Pradesh:*** *Launched Space Policy (4.0) 2025–30 to drive space-tech investment, manufacturing, and innovation through incentives, Space Parks, single-window clearances, and downstream space-data applications.*
- ***Maharashtra:*** *Announced a dedicated Space Policy is currently under release.*

Brief overview of the following state-level space and IT policies which have been officially released:

	Telangana SpaceTech Framework (2021)	Kerala (Space Park, 2023)	Gujarat SpaceTech Policy (2025–30)	Tamil Nadu Space Industrial Policy (2025)	Karnataka SpaceTech Draft (2024–29)
Incentives	Grants and incubation support; IP generation, licensing, and technology transfer support	Land at subsidized rates; tax incentives in SEZ zones	100% SGST refund for 7 years; up to INR 5 Cr for R&D and capex grants; IP filing support up to INR 50 lakh	Land cost subsidy; up to INR 1 Cr IP grant; 25% R&D reimbursement	25–100% land rebate; up to INR 2 Cr support per project; patent grants
Job Creation Target	2,000+ skilled jobs; focus on development of upskilling programs	3,000+ direct jobs across manufacturing, research, and data analytics	25,000 jobs (as confirmed by state sources)	10,000 high-value jobs in launch services, satellite systems, and data analytics	5,000 trained professionals (including ~1,500 women); placement target across 50+ firms
Investment Target	No fixed figure; aligned with Telangana Innovation Policy	Part of broader INR 50,000 Cr IT investment target (2023–28)	USD 5 billion over 5 years from space startups and manufacturing	INR 10,000 Cr investment goal with major anchor tenants	USD 3 billion FDI plus domestic investment; driven via PPPs and outreach events
Startup Support	Access to HPC infrastructure, T-Hub, Telangana Innovation Hub, and seed funding	Support via Kerala Startup Mission; product development and infrastructure access	Space park at Sanand with infrastructure, testing facilities, and industry–academia collaboration	INR 500 Cr corpus to support new ventures	500 startups to be incubated; 50 indigenized satellite projects
Infrastructure Development	Dedicated innovation clusters; testing infrastructure via T-Hub	Space Park in Trivandrum with design, fabrication, and integration facilities	Capital subsidies up to 25% on eligible fixed capital investments	Dedicated "Space Bays" in southern Tamil Nadu; multimodal logistics	Dedicated parks in Bengaluru, Tumakuru, and Hubballi; public–private testing hubs
Skill Development	Academia–industry linkages via TASK and TSIC programs	ICT Academy-led training; partnerships with C-DAC and ISRO units	Skill centres with ISRO and ITIs; satellite integration modules	SpaceTech Finishing School and hands-on labs with IIT-Madras and VIT	MoUs with ISRO, IIST, and MSME department; blended offline–online skilling

II. Major Government Initiatives

Operationalizing the Vision of a Space-Faring Nation- In 2025, the Indian government successfully integrated space technology into a **"Whole-of-Government"** framework. This strategic shift ensured that orbital assets were no longer just scientific tools but core drivers of national infrastructure, defence, and public welfare.

A. Expanding the National Launch Pipeline

- **A Busy Manifest:** At the start of the year, the Union Minister for Space announced an ambitious pipeline of half a dozen major launches for the first half of 2025 alone. Key missions included the **NVS-02** navigation satellite, the **Vyommitra** humanoid robot (a precursor to Gaganyaan), and the high-stakes **NISAR** mission.

- **Third Launch Pad (TLP),** Sriharikota: In a historic decision on January 16, 2025, the same day ISRO successfully demonstrated the SpaDeX docking experiment, the Union Cabinet approved ₹3,984.86 crore for a Third Launch Pad. Designed to be universal, the TLP will support the Next Generation Launch Vehicle (NGLV) and heavy-lift requirements for the future Bharatiya Antariksha Station.

- **SSLV Launch Complex, Kulasekarapattinam:** On **August 27, 2025**, the foundation stone for the dedicated launch pad was laid by ISRO Chairman Dr. V. Narayanan. With 32 of 33 facilities in advanced stages, the complex is positioned to become the global hub for private and commercial small-sat launches.

Prime Minister Narendra Modi with Japan PM Shigeru Ishiba

- **Chandrayaan-5 -** LUPEX Collaboration: During Prime Minister Narendra Modi's visit to Japan (29–30 August 2025), India and Japan reaffirmed lunar cooperation under LUPEX, aligned with the Cabinet Committee on Security–approved Chandrayaan-5. Implemented by ISRO with launch by Japan Aerospace Exploration Agency, the mission will deploy a heavy lunar lander and advanced rover for south polar exploration, advancing lunar science, water-ice studies, and deep-space.

- **Bharatiya Antariksha Station (BAS) & Gaganyaan Programme**: Prime Minister Narendra Modi reaffirmed India's human spaceflight roadmap to 2040, covering Gaganyaan (crewed Earth-orbit mission), establishment of the Bharatiya Antariksha Station (BAS) by 2035, and a crewed lunar landing by 2040. Gaganyaan preparedness was significantly advanced through the Axiom-4 Mission (June–July 2025), under which Group Captain Shubhanshu Shukla flew to the ISS aboard a SpaceX Crew Dragon, launched from NASA's Kennedy Space Center, in collaboration with ISRO, NASA, Axiom Space, and European Space Agency. The mission delivered hands-on crew operations, microgravity experiments, and human-factors insights, marking India's return to human spaceflight after four decades, strengthening ISRO's crewed-mission capability, and accelerating readiness for indigenous crewed missions under Gaganyaan.

B. Institutional and Financial Enablement

- **1000 Cr Fund with SIDBI Ventures:** Small Industries Development Bank of India (SIDBI) Ventures in partnership with the Department of Space (DoS)/IN-SPACe launched a dedicated ₹1,000 crore SpaceTech Venture Fund to support early-stage startups.

- Complementing this, the **Technology Adoption Fund (TAF) with a corpus of ₹500 crore ($57.58 million)** was launched for transforming early-stage technologies (TRL-3/4) into commercially viable products (TRL-8/9) and to co-invest in the indigenization of critical components and reduce import dependence.

C. Mainstreaming Space in Governance and Infrastructure

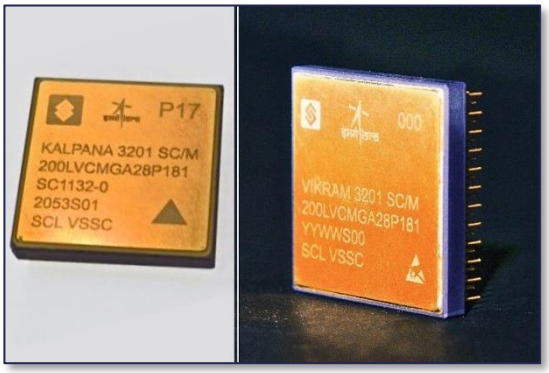
- **National Geospatial Mission:** Aligned with PM Gati Shakti, this ₹100 crore mission moved to modernize land records and geospatial infrastructure, aiming for a high-resolution Digital Elevation Model (DEM) of the entire country.
- **National Meet 2025:** On August 22, at Bharat Mandapam, over 60 government departments interacted to identify hundreds of use cases for implementing space tools in sectors ranging from agriculture to healthcare.
- **Naval and Defence Support:** The MOSDAC-IN web portal was launched on April 14, 2025, providing the Indian Navy with customised satellite-derived meteorological and oceanographic data for maritime security.

D. Outreach, Education, and Science

- **NE-SPARKS Program:** ISRO's North East student outreach program hosted **800 students** across eight batches in 2025, providing immersive experiences at ISRO centres in Bengaluru to inspire the next generation of STEM leaders.
- **Antariksh Hackathon 2025:** The second edition was launched on **June 18**, challenging students to solve 14 real-world problem statements in AI/ML, space debris, and geospatial domains.
- **Antariksh Prayogshala:** IN-SPACe issued an RFP in December 2025 to establish dedicated **Space Labs** in select universities, creating a bridge between academic theory and industrial application.

E. Indigenous Space-Grade Hardware

In a major stride toward *Atmanirbhar Bharat*, the **Semiconductor Laboratory (SCL)**, Chandigarh, achieved a critical breakthrough. On **March 5**, the first flight-qualified batches of 32-bit microprocessors-**VIKRAM3201** and **KALPANA3201**.were officially handed over to ISRO. This milestone marks India's transition to utilizing homegrown silicon for satellite on-board computers, significantly reducing dependence on international semiconductor supply chains.



F. Leadership in Global Disaster Management

India's leadership in humanitarian space applications was solidified as it assumed the six-month lead role for the **"International Charter Space and Major Disasters"** in April. Under this mandate, the **National Remote Sensing Centre (NRSC)** hosted the Charter's 53rd meeting in Hyderabad. The event brought together 22 foreign delegates from premier global space agencies to streamline satellite data sharing for emergency response and disaster mitigation.

G. Strategic MSME and STEM Support (Foundational Reforms)

To fortify the industrial base supporting the space sector, the government implemented broad economic and educational reforms:

- **MSME Structural Support:** Investment limits for MSMEs were increased by **2.5 times** and turnover limits by **2 times**. This reform provided significant fiscal breathing room for the thousands of small-scale vendors that form the backbone of India's space manufacturing ecosystem.
- **STEM Innovation (Atal Tinkering Labs):** The government announced the establishment of **50,000 new ATLs** across India, designed to foster a culture of innovation and space-tech curiosity among the nation's youth.

H. Institutional Capacity Building (NIT Rourkela)

Expanding the footprint of space research in academia, a new **Space Technology Incubation Centre (STIC)** was inaugurated at **NIT Rourkela**. The center is dedicated to building specialized infrastructure and developing high-caliber human resources tailored to the specific technical demands of the Indian space programme.

III. Defence & National Security Space Developments

Strategic Shift: Space as an Integrated Defence Enabler

- In 2025, India's military space posture underwent a structural shift, moving from predominantly passive surveillance toward an increasingly integrated, network-centric architecture supporting operational decision-making. Regional security challenges accelerated this transition, reinforcing space as a critical pillar of India's defence and national security framework.
- Senior military leadership formally articulated that space is no longer a supporting domain but an operational warfighting enabler, integral to deterrence, intelligence dominance, and joint force planning. Space-based capabilities, particularly Earth Observation (EO), Space Situational Awareness (SSA), secure SATCOM, and advanced analytics, underpinned intelligence collection, surveillance, mission planning, and precision operations across services.
- Defence-linked innovation mechanisms such as **iDEX** continued to channel funding toward startups working in EO, analytics, sensing technologies, and secure communications aligned with national security priorities, strengthening the defence-industry innovation pipeline.

Joint Military Space Doctrine was announced by CDS

- In **April 2025**, Chief of Defence Staff **Anil Chauhan** advanced India's recognition of **space as a distinct military domain** by initiating the formulation and imminent release of a **Joint Military Space Doctrine**. The doctrine will guide the Defence Space Agency and the Indian Armed Forces on space situational awareness, protection of space assets, threat response, command-and-control, civil–military coordination, and integration of space-based ISR, communications, navigation, and targeting into joint operations, reinforcing a resilient, defensive, and stability-oriented defence space posture.

- The **Defence Space Agency (DSA)** continued to evolve as the nodal body for coordinating military space activities, contributing doctrinal inputs, threat assessments, and joint operational planning while strengthening coordination with civilian space institutions.

Operational Integration: Operation Sindoor (May 2025)

- Following the terrorist attack in Pahalgam, the Indian Armed Forces launched **Operation Sindoor** in May 2025, marking a visible demonstration of space-enabled operational integration.

A constellation of satellites operated by Indian Space Research Organisation (ISRO), including the **Cartosat-2 series** (high-resolution optical imaging) and the **RISAT-2B series** (synthetic aperture radar for all-weather surveillance), has supported India's intelligence, surveillance and reconnaissance (ISR) capabilities.

The operation also highlighted the expanding role of commercial and private-sector space capabilities. Private Space industry including **Suhora, Maxar, Micronet (Airbus), Kawa Space, Kepler Aerospace, KaleidEO, and GalaxEye**, supported imagery analysis and post-strike assessment.

Space-Based Surveillance Expansion: SBS Phase-III

- In the aftermath of Operation Sindoor, the Government of India fast-tracked the Space-Based Surveillance Phase-III (SBS-III) programme. The programme envisages the deployment of 52 dedicated surveillance satellites by 2029, with 31 satellites to be built by private Indian industry, signalling a major expansion of defence-industry collaboration. SBS-III is designed to deliver persistent monitoring, early warning, and enhanced strategic awareness across land and maritime domains.

Launch Systems & Mission Outcome: PSLV-C61 / EOS-09

- The **PSLV-C61 mission**, ISRO's **101st launch attempt**, aimed to deploy the 1,696 kg EOS-09 Earth Observation Satellite into a 505 **km Sun-Synchronous Polar Orbit**. EOS-09 was designed to strengthen India's all-weather radar imaging capabilities, supporting agriculture, disaster management, and strategic surveillance requirements.

- PSLV-C61 marked the **63rd flight of the Polar Satellite Launch Vehicle** and the 27th mission using the PSLV-XL configuration. The launch was attempted on 18 May 2025. While vehicle performance remained nominal through the second stage, an anomaly observed during third-stage operation prevented the satellite from reaching its intended orbit, resulting in partial mission failure.

PSLV-C61/EOS-09 Mission - Pre Launch Image

Maritime and Coastal Security Applications: Space-enabled systems played an increasingly important role in maritime and coastal security during 2025:

- **Avantel** secured a **₹43.25 crore order from NSIL** to supply over **45,000 Xponder devices** for installation on marine fishing vessels, strengthening coastal monitoring and vessel identification.
- **Suhora Technologies** received seed funding from **IN-SPACe** to deploy satellite data and AI-based analytics for detecting illegal maritime activities, including the identification of "dark ships" operating without active transponders.

Space Domain Awareness and Surveillance Intelligence : India advanced its space-domain monitoring capabilities through both institutional and industry-led initiatives:

- Dr. V. Narayanan, Chairman, ISRO/ Secretary, DOS, released the **Indian Space Situational Assessment Report (ISSAR)** for 2024 compiled by ISRO System for Safe and Sustainable Space Operations Management (IS4OM) on 22nd April 2025 focusing on debris tracking, orbital safety, and responsible space operations.
- Private-sector contributions included **Digantara Research and Technologies**, which developed an indigenous electro-optical imaging and tracking system

for space surveillance and has launched commercial space situational awareness satellites, and **Kepler Aero**, which has won an iDEX Prime defence contract to develop a six-satellite autonomous Intelligence, Surveillance and Reconnaissance (ISR) constellation with advanced AI-enabled coordination for rapid threat detection and minimal ground intervention.

Indigenous Payloads, Secure Connectivity, and Industry Growth

- Defence and secure connectivity technology development gained momentum in 2025.
- Bengaluru-based **Pixxel secured a second iDEX SPARK** grant to develop advanced hyperspectral and mid-wave infrared (MWIR) payloads tailored to the Indian Air Force, strengthening indigenous defence imaging capabilities.
- **Astra Microwave Products** forecasted approximately 25 % revenue growth in FY 2026, driven by sustained global and domestic defence demand and an expanding order book.
- Meanwhile, **Astrome Technologies** and **Kepler Aerospace** signed a strategic partnership to co-develop secure, mission-critical satellite communication solutions that support defence, disaster-response and remote connectivity use cases across evolving multi-orbit architectures

DefSpace Challenge & iDEX Engagements (2025)

- Throughout 2025, Mission DefSpace, in coordination with Innovations for Defence Excellence (iDEX), continued to drive defence-space innovation through rolling challenge calls and structured development contracts. Indian startups remained actively engaged in funding, development, and validation of capabilities spanning SAR and hyperspectral payloads, space domain awareness, autonomous surveillance swarms, secure satellite platforms, and on-orbit inspection technologies.
- Winners of these challenges -**Azista, BEL, L&T, Pixxel, Bellatrix Aerospace, TASL, FleetRF, Avantel, Dhruva Space, TSC Technologies, Upgraha Space Technologies, Kepler Aerospace, Manastu Space Tech, InseCity Space, Kawa Space, ADTL, GalaxEye, Omnipresent Technologies, Digantara, SISIR Radar, Paras Anti-Drone Tech, Inspecity, Agnikul, and Deftek Innovations**, were awarded development contracts and support to transition their solutions into operational capability.

Strategic Context and Global Trends

- Strategic assessments during 2025 pointed to a broader global shift toward **dual-use space technologies**, with major powers expanding constellations capable of both civilian and military applications. These trends reinforced India’s urgency to strengthen indigenous capabilities, accelerate surveillance deployment, and deepen civil-military-industry collaboration.
- The **Indian DefSpace Symposium 2025** organised by **ISpA ,** echoed these priorities, emphasising rapid capability development, resilient architectures, and tighter integration between defence forces and the private space ecosystem.

IV. ISRO Highlights

A Landmark Year for Bharat's Space Odyssey

The year 2025 stands as a transformative chapter in India's space journey, characterised by the successful execution of complex orbital manoeuvres, the deepening of international collaborations, and critical strides toward the Gaganyaan human spaceflight program. From the historic 100th launch at Sriharikota to the first Indian presence on the International Space Station (ISS) in the 21st century, ISRO has solidified India's position as a premier global space power.

A. Human Spaceflight & Exploration

The Axiom-04 Mission: India's Return to Human Spaceflight

- In a historic milestone for the **Gaganyaan** program, ISRO astronaut (Gaganyatri) **Shubhanshu Shukla** successfully completed an 18-day mission aboard the International Space Station (ISS). Launched on June 25, 2025, via a SpaceX Dragon, the mission was a collaborative triumph involving NASA, Axiom Space, and ESA.
- **Scientific Suite:** Completed seven microgravity experiments under HSFC coordination, including:
  - **Myogenesis:** Muscle regeneration in space.
  - **CROPS-2:** Algal growth and crop viability.
  - **Bio-monitoring:** Cognitive performance and microbial survivability (cyanobacteria).
- **National Impact:** The mission featured a live interaction with Hon'ble PM Narendra Modi and extensive outreach to Indian youth, marking a new era of Indian presence in Low Earth Orbit (LEO).

Himalayan Outpost for Planetary Exploration (HOPE)

- On July 31, 2025, ISRO inaugurated the **HOPE Analog Mission** in Ladakh's Tso Kar Valley.
  - **Simulation:** The valley's high UV flux, low pressure, and saline permafrost mimic the environments of early Mars and the Moon.
  - **The Habitat:** Features an 8-meter diameter Habitat Module for crew and a 5-meter Utility Module.
  - **Collaborations:** National institutes (IIST, IIT Bombay, IIT Hyderabad, RGCB) conducted genomic and psychological studies on two crew members to refine protocols for future crewed lunar landings (Vision 2040).

Gaganyaan Progress: Integrated Air Drop Test (IADT-01)

- On August 24, 2025, ISRO successfully executed **IADT-01** at SDSC, Sriharikota.
    - **The Test:** A 5-tonne simulated Crew Module was dropped from a Chinook helicopter to validate the complex parachute-based deceleration system.
    - **Parachute Sequence:** Tested the deployment of 10 parachutes in total, including 2 Apex Cover Separation (ACS), 2 Drogue, 3 Pilot, and 3 Main parachutes (25m diameter).

B. Satellite Missions & Orbital Excellence

NISAR: A Milestone in Indo-US Collaboration

- Launched on July 30, 2025, aboard the **GSLV-F16**, the **NASA-ISRO Synthetic Aperture Radar (NISAR)** represents a decade of technical synergy.
    - **Technology:** It is the first satellite to utilize dual-frequency (L-band and S-band) SweepSAR technology to map the entire globe every 12 days.
    - **Application:** NISAR provides unprecedented data on ground deformation, ice-sheet movement, and disaster response.

LVM3-M5: Bahubali Mission

- On November 02, 2025, the **LVM3-M5** mission successfully injected **CMS-03**, India's heaviest communication satellite (4400kg), into GTO.
- **Strategic Feat:** For the first time, the **C25 Cryogenic Stage** performed an in-space restart after the primary satellite separation, demonstrating India's capability for multi-orbit deployments in a single mission.

The 100th Launch from Sriharikota: GSLV-F15

On January 29, 2025, ISRO celebrated its 100th launch from the spaceport. While the **NVS-02** satellite was accurately injected into GTO, a valve malfunction in the thrusters prevented subsequent orbit-raising to Geostationary orbit. The satellite remains healthy and functional in an elliptical orbit for alternate navigation strategies.

C. Technological Breakthroughs & "Make-in-India"

SpaDeX: Mastering Space Docking

- In January 2025, India achieved a technological milestone that placed it in the elite tier of spacefaring nations. The **Space Docking Experiment (SpaDeX)** mission was successfully executed in LEO.

- **Mission Mechanics:** The mission involved two satellites, "Chaser" and "Target," launched aboard a single PSLV rocket. Upon reaching orbit, the Chaser performed a series of autonomous maneuvers to approach the Target. Utilizing indigenous laser ranging sensors and guidance algorithms, the two spacecraft successfully docked, creating a rigid connection.
- **Undocking and Re-docking:** In a demonstration of system robustness, the spacecraft later performed an undocking maneuver, separated to a safe distance, and then re-docked autonomously.
- **Significance:** This technology is the absolute prerequisite for India's proposed **Bharatiya Antariksh Station (BAS)**, planned for 2035. It also opens the door for future on-orbit servicing (OOS) missions, allowing India to refuel or repair satellites in orbit.

POEM-4: The Orbital Laboratory

The **PSLV Orbital Experimental Module (POEM-4)** completed 1,000 orbits on March 4, 2025.

- **Innovation:** It hosted 24 payloads, including an **in-orbit AI lab** from a space startup and experiments in green propulsion.
- **Impact:** POEM continues to be the world's most cost-effective platform for NGEs (Non-Governmental Entities) to gain space heritage.

D. Propulsion & Infrastructure

CE20 Engine and Semi-Cryogenic Engine Development

ISRO achieved three successful hot tests of the **Semi-Cryogenic Power Head Test Article (PHTA)** between March and May 2025. Operating at 60% of its rated power, the engine is critical for the SC120 stage, set to replace the L110 stage of the LVM3, significantly boosting future payload capacities. ISRO successfully conducted a **critical ignition trial of the CE-20 cryogenic engine**, marking an important milestone in strengthening India's heavy-lift launch capability. The CE-20 engine, which powers the **cryogenic upper stage of the Gaganyaan Human-Rated Launch Vehicle (HLVM-3)** and advanced Gaganyaan missions, continues to play a critical role in strengthening India's heavy-lift launch capabilities.

Electric Propulsion Milestone

Stationary Plasma Thruster (SPT): Completed a 1000-hour life test on March 27, 2025. This 300mN thruster offers 6x the specific impulse of chemical systems, enabling massive mass savings for future communication satellites.

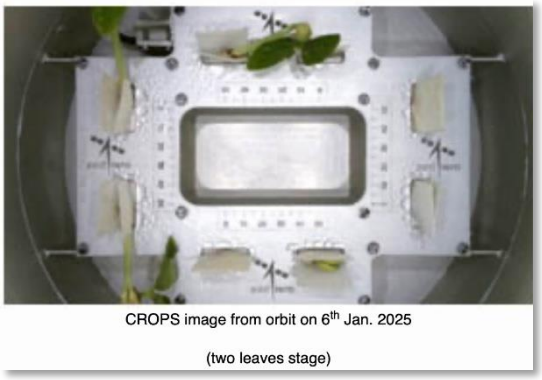
New Facilities

In September 2025, ISRO inaugurated two critical facilities at Tumakuru, Karnataka:

1. **MPTTF:** Dedicated to qualifying monopropellant hydrazine thrusters for satellite attitude control.
2. **ITPF:** A state-of-the-art facility for producing lightweight **Titanium Alloy Propellant Tanks**, supporting high-precision electron beam welding and cleanroom assembly.

The achievements of 2025 underscore ISRO's transition from a mission-oriented agency to a technology-pioneering powerhouse, fostering a robust "New Space" ecosystem while pushing the frontiers of human exploration.

E. Biological Experiments: CROPS-1 - A Leap in Space Agriculture


CROPS image from orbit on 6th Jan. 2025

(two leaves stage)

Compact Research Module for Orbital Plant Studies (CROPS) is an unmanned experimental module designed to build indigenous capabilities for life-support systems in space.

- **Mission Profile:** The maiden mission, **CROPS-1**, was launched as a payload on the **POEM-4** platform during the **PSLV-C60** mission. It aimed to demonstrate seed germination and growth up to the two-leaf stage in orbit over a 5 to 7-day duration.
- **Technical Execution: Cowpea (*Vigna unguiculata*)** was selected as the test species due to its rapid germination. Following the separation of the primary satellite, the POEM platform lowered to a 350 km orbit.
- **In-Orbit Operations:** All systems functioned optimally, maintaining internal temperatures strictly between **20°C and 30°C**. Ninety minutes post-launch, ground controllers activated an electric valve to hydrate the soil.
- **Biological Success:** Successive data showed rising CO_2 levels, signaling active germination. By the fourth day, sprouts emerged from the enclosed tissue strips, and by the fifth day, the transition to the two-leaf stage was visually confirmed, fulfilling all mission objectives.

F. Remote Sensing: ISRO Forecasts National Wheat Production

ISRO utilized its advanced remote sensing constellation to provide a definitive assessment of India’s wheat output for the 2024-25 Rabi season.

- **The CROP Framework:** Developed by NRSC/ISRO, the **Comprehensive Remote Sensing Observation on Crop Progress (CROP)** is a semi-automated, scalable framework for near real-time monitoring of sowing and harvesting.
- **Satellite Integration:** The study integrated Optical and Synthetic Aperture Radar (SAR) datasets from **EOS-04 (RISAT-1A)**, **EOS-06 (Oceansat-3)**, and **Resourcesat-2A**.
- **Key Findings:** As of March 31, 2025, the total wheat production from eight major states was estimated at **122.724 million tonnes**.

- **Accuracy & Resolution:** The wheat-sown area was measured at **330.8 lakh hectares**, aligning closely with the Ministry of Agriculture's February figure (324.38 lakh hectares). Assessments were conducted at a high spatial resolution using process-based crop growth simulation models.

G. PRL/ISRO Exoplanet Discovery - TOI-6038A b (2025)

Scientists at **the Physical Research Laboratory (PRL),** Ahmedabad, discovered a new exoplanet, **TOI-6038A b**, a dense sub-Saturn-sized planet with a mass of 78.5 Earth masses and a radius of 6.41 Earth radii, orbiting a bright, metal-rich F-type star every 5.83 days in a circular orbit. Classified as a **Sub-Saturn**, this planet lies in the transition region between Neptune-like and gas giant exoplanets , a category absent in the Solar System, offering unique insights into planetary formation and evolution. This marks the **second exoplanet discovery** using the advanced **PARAS-2 spectrograph** at PRL's 2.5-meter Mount Abu telescope and the **fifth detection overall** from the combined PARAS-1 and PARAS-2 efforts. The discovery underscores India's growing capabilities in **high-resolution astronomical instrumentation**, with PARAS-2 being the **highest-resolution stabilized radial velocity spectrograph in Asia**.

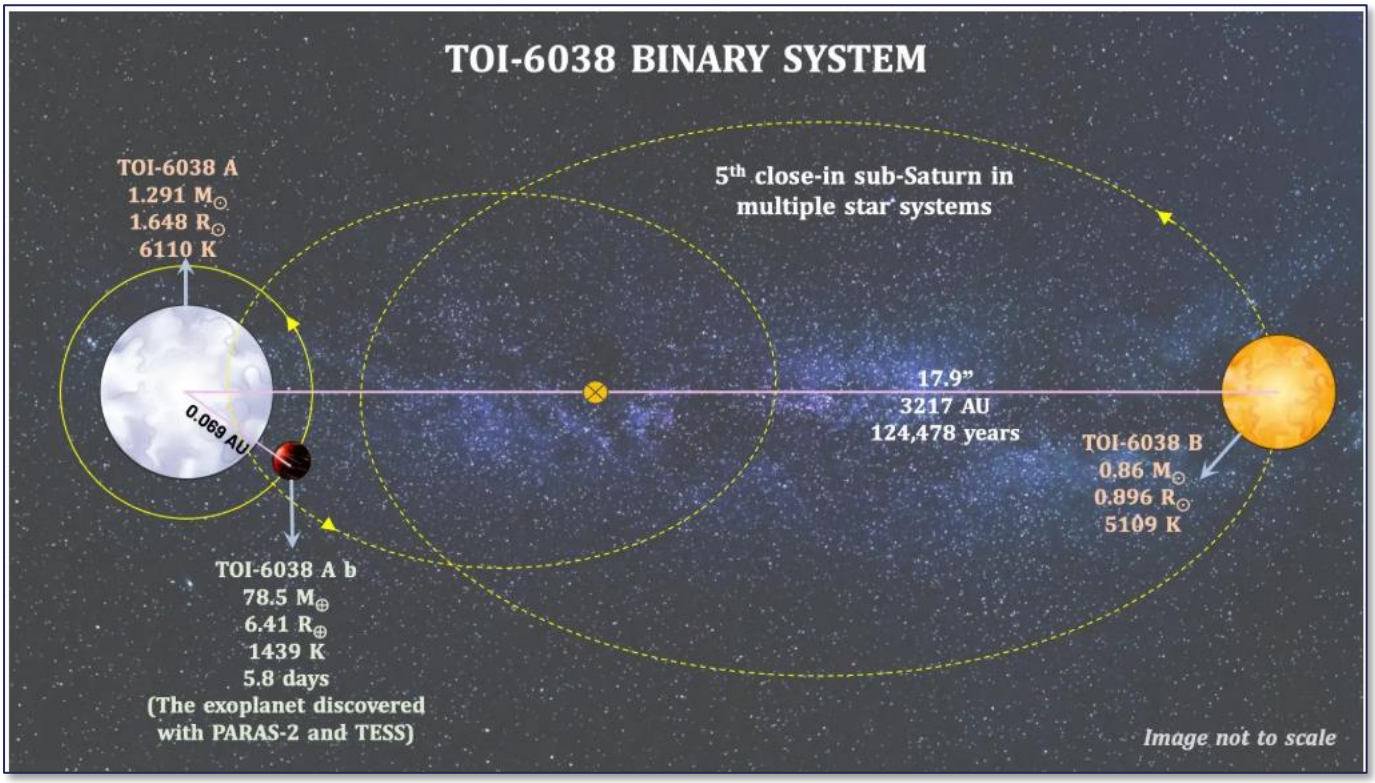


Image Credit : ISRO

V. IN-SPACe Highlights

The year **2025** represented a defining phase in the institutional and ecosystem journey of **IN-SPACe (Indian National Space Promotion and Authorisation Centre)**. With more than **three and a half years of operations completed**, IN-SPACe demonstrated measurable outcomes across regulation, private sector enablement, technology transfer, capacity building, and international engagement, marking a clear shift from framework creation to ecosystem-scale execution.

A. Regulatory Authorisations and Ease of Doing Business

The growing maturity of India's private space ecosystem was clearly reflected in the authorisations issued during the year.

- **112 authorisations** have been issued by IN-SPACe since inception.
- **81 authorisations (nearly 70%)** have been granted to **Non-Governmental Entities (NGEs)**.
- **40 authorisations** were issued during **2025 alone**, across both government and non-government entities, indicating a sharp increase in space activity nationwide.

Alongside authorisations, IN-SPACe focused on improving the **ease of doing business** by streamlining internal processes, enhancing clarity and predictability, and strengthening structured stakeholder engagement. Coordination through the **SC-IMC mechanism** with relevant ministries and departments continued with the objective of progressing towards a **single-window interface** for authorisation of space activities by NGEs. These measures increasingly translated into improved industry confidence. During the year, work also progressed on finalising **Space Situational Awareness (SSA)** and **Safety and Security guidelines**.

B. Strategic Public-Private Programmes and National Capability Building

A major milestone in 2025 was the **award of the Earth Observation constellation under Public-Private Partnership (PPP) mode** to **India's first private space consortium led by Pixxel** with Dhruva Space, SatSure, and PierSight as partners, to develop India's first fully indigenous commercial Earth observation satellite network. The consortium will invest over ₹1,200 crore to deploy a 12-satellite LEO constellation over four to five years, integrating panchromatic, multispectral, hyperspectral, and SAR payloads. The programme strengthens India's geospatial data sovereignty, reduces reliance on foreign imagery, and supports critical applications across disaster management, agriculture, climate monitoring, infrastructure planning, maritime surveillance, and national security, marking a major step in private-sector–led EO capability development.

Satellite Bus as a Service (SBaaS)

*The **Satellite Bus as a Service (SBaaS)** initiative, is aimed at creating a **standardised, modular satellite platform ecosystem** to enable faster, more cost-effective development of space missions by Indian users. Under this framework, selected Indian private companies are authorised to design, manufacture, qualify, and offer satellite bus platforms of predefined classes (small, medium, and micro satellites) as a service, which can be readily integrated with user-specific payloads.*

C. Technology Transfer, Launch Enablement and Space Standards

- On September 10, 2025, a landmark agreement was signed between **NSIL, ISRO, IN-SPACe, and HAL** for the transfer of SSLV technology, signalling the full commercialisation of the launch vehicle for the private sector, representing a decisive step towards **industry-led launch capabilities** in India.
- Broader technology transfer initiatives continued to gain momentum, supporting Indian companies in **commercialising indigenous space technologies**.
- In parallel, IN-SPACe made consistent progress in institutionalising quality and safety frameworks. **66 Indian Space Standards** have been released to date, providing a strong foundation for **quality, reliability, safety, and sustainable growth** of space operations.

D. IN-SPACe Technical Centre and Mission Enablement

The **IN-SPACe Technical Centre** played a critical role in 2025 by enabling **testing, validation, and system readiness**, with **increasing utilisation by private space companies**.

During the year, several Indian private companies successfully achieved spaceflight milestones, including launches of spacecraft, satellites, and payloads by **Pixxel**, **Digantara**, **XDLINX**, and **HEX20**, with multiple additional missions under preparation.

SSLV Technology Transfer Agreement with HAL

E. Human Capital, Skilling and Academic Outreach

Human capital development remained a core priority.

- **Model Rocketry and CanSat competitions** held at **Kushinagar** witnessed enthusiastic participation from students nationwide, reinforcing the importance of early exposure to hands-on space education.
- **14 short-term skill development courses** were completed across a wide range of space technologies and applications.
- **Over 750 individuals** have been **certified to date** under IN-SPACe skill programmes.

A key institutional milestone was the recognition of IN-SPACe by **NCVET** as both an **awarding body and assessing body**, significantly strengthening the formal skilling ecosystem for the space sector.

F. Demand Creation, Applications and Investor Outreach

To drive long-term demand for space solutions, IN-SPACe continued engagement through **Space Applications Adoption Workshops (SAAWs)** in collaboration with ministries, state governments, and industry. These efforts aimed to increase awareness and adoption of space-based solutions among user ministries and public agencies.

The **Invest Space campaign** complemented these initiatives by strengthening awareness and engagement with the **investor community**, helping bridge the gap between space startups and capital markets.

G. International Engagement and Global Positioning

Indian private space companies continued to gain visibility and credibility in global markets. IN-SPACe facilitated **Space Days**, international delegations, and structured engagements that enabled interaction between Indian and foreign space companies.

Indian industry participation in global forums such as the **International Astronautical Congress (IAC)** and bilateral engagements with **Australia, Japan, Italy, Singapore, Sweden, and the Netherlands** enhanced international awareness of India's space capabilities and opened new collaboration avenues.

H. Investment Momentum and Ecosystem Scale

2025 recorded **the highest ever investment inflow into India's private space sector in a single year**.

- Indian space startups raised **over USD 150 million** during the year.
- The **top ten space startups** together represent a combined valuation of **approximately USD 2 billion**.
- The **₹1,000 crore Venture Capital Fund for the space sector** became operational, significantly strengthening access to institutional risk capital.

Collectively, these developments contributed to a rapidly expanding ecosystem, with **more than 380 space startups** now active across the value chain. Indian companies increasingly moved **up the value chain**, building globally relevant capabilities.

I. Strategic Outlook Anchored in 2025 Achievements

The progress achieved in 2025 positioned IN-SPACe to focus on enabling the ecosystem's transition from **technology validation to scale and execution**, aligned with India's **decadal vision of growing the space economy to USD 44 billion by 2033**.

IN-SPACe and the Small Industries Development Bank of India Venture Capital Ltd (SIDBI Venture Capital Fund) signed the Contribution Agreement to operationalise the ₹1,000 crore Venture

VI. ISpA Highlights

A. Policy Advocacy & Regulatory Engagement

Engagement with TRAI Consultations under the Telecommunications Act, 2023

- **Consultation Paper on the Framework for Service Authorisations to be Granted Under the Telecommunications Act, 2023:** ISpA submitted comprehensive inputs advocating:
  - A **Unified Service Authorisation ("One Nation–One Authorisation")** framework
  - Explicit inclusion of **satellite-based services (VSAT FSS, GMPCS)**
  - Removal of **CUG restrictions** for VSAT operations
  - A clear **migration framework** for existing licensees
  - Simplified compliance to promote **ease of doing business**

- **Consultation Paper on the Assignment of Spectrum for Satellite-Based Communication Services:** ISpA recommended:
  - **Administrative spectrum assignment** for NGSO-FSS and GSO/NGSO-MSS
  - Long-term, **investment-friendly spectrum certainty**
  - **AGR-based Spectrum Usage Fee (≤1%)**
  - **Block-based assignments** with 20-year validity, co-terminus with licences
  - Flexible **Ka-band usage** and recognition of **Q/V bands**
  - Coordination-based **GSO–NGSO earth station co-location**
  - **Single-window clearance** with defined timelines and simplified terminal licensing
  - Safeguards against **predatory pricing** in urban B2C markets
  - Strategic use of SATCOM for **rural connectivity, defence, disaster response, IFMC, and backhaul**

- **Consultation Paper on the Regulatory Framework for Network Authorisations:** ISpA proposed**:**
  - Introduction of new authorisation categories: **SESG, Infrastructure Provider, DCIP, IXP, CTNaaS**
  - Linking satellite spectrum to service authorisation
  - **AGR-based annual authorisation fee of 4%**
  - Exemption for **Ground Segment as a Service (GSaaS)** when regulated by IN-SPACe
  - A modular, **single-window, time-bound authorisation framework**

Engagement with DoT Draft Policies and Rules

- **Draft National Telecom Policy, 2025:** ISpA advocated:
  - Formal integration of SATCOM into national connectivity and disaster-response programmes
  - Recognition of SATCOM as **critical national infrastructure**
  - Policy certainty on licensing, spectrum, and pricing
  - Strategic deployment across **defence, security, UAV connectivity, and resilient networks**

- **Draft Guidelines for Grant of No Objection Certificate (NOC) for GMPCS Services:** ISpA recommended:
  - **Light-touch regulation** to enable Indian SESGs as regional/global gateways

- Removal of foreign TSP agreement and foreign regulator NOC requirements
- Adoption of a **declaration-based, country-list approval model**
- Enablement of enterprise connectivity via **local breakout, IPLC alternatives, and direct VSAT**

- **Draft Telecommunications (Authorisation) Rules, 2025:** ISpA proposed:

  - A **separate Satellite Communication Authorisation**, distinct from Access and Internet Services
  - Continued **administrative spectrum assignment**
  - Clear migration and one-to-one licence mapping
  - Relaxation of **cross-holding norms** for NSOs and VNOs
  - Expanded VNO scope (IFMC, NGSO, backhaul, private networks, local breakout)
  - **Incentive-based indigenisation** instead of mandatory localisation

- **Draft Telecommunications (Miscellaneous Services) Rules, 2025 – In-Flight and Maritime Connectivity (IFMC):** ISpA recommended:

  - Flexible eligibility for IFMC through Access, Internet, or Unified Authorisation
  - Allowing service provision via agreements instead of multiple licences
  - Removal of the **3,000-metre altitude restriction** for in-flight connectivity
  - Alignment with global practices using **PFD-based interference management**
  - Reduced compliance burden for faster IFMC adoption

- **Engagement with IN-SPACe Regulatory and Policy Frameworks:** ISpA emphasised:

  - Demand generation for SATCOM through **government procurement and programmes**
  - Simplified approvals and licensing
  - Recognition of SATCOM as **strategic infrastructure**
  - Multi-ministry adoption of satellite-enabled use cases
  - Positioning India as a **regional SATCOM hub** within a converged space economy

- **Draft Space Situational Awareness (SSA) Guidelines,** ISpA provided inputs on:

  - Mandatory SSA compliance for all space activities
  - **Risk-based, mission-specific obligations**, with relaxations for low-risk missions
  - Collision avoidance, debris mitigation, and re-entry risk management
  - IN-SPACe authorisation for SSA sensors and services
  - Strong provisions on **security, data governance, audits, and government access**

- **Draft Framework on State Liability and Third-Party Damage Arising from Space Activities:** ISpA recommended:

  - Clear articulation of India's obligations as a **Launching State**
  - Mandatory **third-party insurance** for private launches (risk-based MPL, capped at ₹500 crore)
  - Structured methodology for MPL assessment
  - **Government backstop** beyond insured limits
  - No insurance mandate for government launches; focus on debris mitigation and registration

- **Draft Safety and Security Guidelines for Space Activities:** ISpA advocated:

  - Safety and security as **core authorisation conditions**

- Lifecycle-based risk identification and mitigation
- Mandatory **cyber, physical, and information security controls**
- IN-SPACe oversight through audits, inspections, and incident reporting
- Government authority to intervene or assume control in **national interest or emergencies**

Pre-Budget Recommendations - Union Budget 2026-27

ISpA seeks fiscal backing for private space sector

Bengaluru: Indian Space Association (ISpA) has urged Centre to use Union Budget 2026–27 to deliver a targeted fiscal and regulatory push that can anchor the country's ambition of becoming a leading global space power, with private industry as a core driver of growth.

In recommendations submitted to govt, ISpA said while Space Policy 2023 has enabled private participation, the sector now needs structural support to overcome its capital-intensive nature and long gestation cycles of five to seven years.

"India stands at a defining moment in its space journey. By recognising space as critical infrastructure, mandating private sector participation, rationalising taxes, incentivising R&D, and strengthening regulatory certainty, the budget can decisively shift govt's role from provider to partner and anchor buyer," ISpA director-general Lt Gen (retd) A K Bhatt said. TNN

ISpA, in collaboration with Deloitte, submitted **recommendations for the Space Sector**, advocating:

- Recognition of the space sector as **Critical Infrastructure**
- Inclusion of **"Space & Satellite Infrastructure**" under the Harmonised Master List
- Access to long-term financing, infrastructure bonds, VGF, insurance and credit-enhanced instruments
- 50% Government procurement mandate for space-based services and systems from Indian NGEs
- Secure empanelment and use of satellite imagery and geospatial data
- PLI schemes, tax holidays, R&D tax credits, accelerated depreciation and GST zero-rating with ITC
- SEZ-like benefits for space manufacturing and exports
- Interest subvention for space infrastructure and R&D
- FDI liberalisation and export incentives
- Enactment of a comprehensive Space Act and statutory authority for IN-SPACe

B. International Collaborations

In 2025, the Indian Space Association (ISpA) strengthened international cooperation across **commercial, defence, and civil space domains** through sustained engagement with foreign governments, space agencies, industry bodies, and diplomatic missions.

Bilateral Engagements

ISpA conducted bilateral engagements with counterparts from the **United States, France, Italy, Australia, South Korea, Japan, Germany, Hungary, Netherlands, Luxembourg, Taiwan, United Kingdom, Finland, Sweden, and Israel**. Engagements included embassy-level interactions, meetings with defence and space agencies, participation in business and technology forums, and industry roundtables.

Key activities included:

- Participation in **France–India space industry engagements and industry roundtables** involving French space companies (May 2025).
- Participation in the **Italy–India Business, Science and Technology Forum** and space cooperation roundtable (April 2025).
- Engagements with **Australian trade and defence bodies** on Australia–India space and defence cooperation.

- Participation of ISpA leadership in the **Global Space Industry Conference, South Korea** (May 2025).
- Presentations on the Indian space ecosystem to **Indo-German and European industry delegations**, focusing on collaboration opportunities and exports.
- Ongoing engagements with embassies and industry stakeholders from **Japan, Netherlands, Luxembourg, Taiwan, United Kingdom, Finland, Sweden, and Israel** on space and defence-space collaboration.

C. MoUs Executed (2025)

1. **Data Security Council of India (DSCI):** Collaboration on space-enabled research and co-education in national security, defence, cybersecurity, and strategic studies.
2. **ATREDS Limited (Invoicemart):** Partnership to advance space-based research and co-education aligned with national security and MSME ecosystem enablement.
3. **Information & Technology for Society (Infotér), Hungary:** Bilateral cooperation on space research, co-education, and ecosystem linkages across government, academia, and industry.
4. **Korea Association for Space Technology Promotion (KASP):** Industry collaboration and expertise exchange on New Space initiatives and the India–Korea Space Forum.
5. **Bramha Research Foundation (BRF):** Collaboration on space sector cluster development, research, capacity building, and skills aligned with NEP 2020 and IKS.
6. **Codimaths:** Partnership to promote space science education and outreach through Olympiads, hackathons, curriculum development, and rural inclusion.
7. **European Space Agency (ESA) – Letter of Intent:** Framework to explore industrial, research, academic, and ecosystem-level cooperation.
8. **Novaspace:** Collaboration on international market access, industry engagement, research collaboration, and strategic dialogue in space and defence.
9. **Amity Universities and Institutions:** Cooperation on space and defence-space research, exploration, and strategic domain studies.

European Space Agency (ESA) & ISpA LOI at IISC 2025

D. Governance and Advisory Meetings

5th National Advisory Committee (NAC) Meeting

Held on 16 July 2025, the meeting reviewed geopolitical developments, defence-space priorities, regulatory and spectrum challenges, startup ecosystem gaps, and international engagement. Key highlights included a tribute to Late Shri Shekhar Dutt, assessment of India's strategic space posture (ISR, NavIC, China), emphasis on TRL–MRL readiness for startups, and the need to strengthen sovereign technologies, defence R&D, and global collaboration.

4th Annual General Meeting (AGM)

The 4th AGM of ISpA was held on 29 July 2025 in New Delhi, with member participation in hybrid mode. Mr Arun Ramchandani was elected Chairman, and Mr Rahul Vatts was re-elected Vice Chairman. A new Executive Council for a two-year term was elected, with the

4th Annual General Meeting (AGM) of ISpA

Council expanded from seven to eight members, including two startup representatives selected through a draw of lots.

E. ISpA Events and Workshops - 2025

In 2025, the Indian Space Association (ISpA) organised and supported multiple conferences, symposia, workshops, and governance meetings focused on defence space, policy, industry enablement, and international cooperation. **Major Flagship Events are -**

Indian DefSpace Symposium (IDS 2025)

Held from **7-9 April 2025** at **MP-IDSA, New Delhi**, the 3rd Indian DefSpace Symposium was hosted by ISpA. The event brought together senior leadership from the Armed Forces, government, industry, startups, and academia. Key discussions covered military space doctrine, ISR satellite constellations, secure communications, PNT, space domain awareness, and the role of emerging technologies such as AI, quantum technologies, and small satellites. Technology exhibitions showcased indigenous defence and space solutions.

The Symposium also featured Key Exhibitors from L&T, Azista Industries, TASL, Pixxel, Digantara, GalaxEye, Cyran AI, SatLeo Labs, Altem, Positronics, Indian Aerospace Defence Bulletin (IADB), Geospatial World Forum, showcasing their cutting edge technology in defence and space sector.

Some of the notable dignitaries were, Gen Anil Chauhan PVSM UYSM AVSM SM VSM, Chief of Defence Staff, Indian Armed Forces; AVM Pawan Kumar VM, DG, DSA; Air Chief Marshal V.R. Chaudhari (Retd) PVSM AVSM VM; Amb. Sujan R. Chinoy, DG, MP-IDSA; Lt Gen N.S. Raja Subramani PVSM AVSM SM VSM, Vice Chief of the Army Staff; Lt Gen VG Khandare PVSM AVSM SM (Retd), Principal Adviser, MoD; Vice Admiral SN Ghormade PVSM AVSM NM (Retd); Lt Gen DS Rana PVSM AVSM YSM SM PhD, DG DIA & DACIDS (Int); Air Marshal SP Dharkar PVSM AVSM SM VSM (Retd), Former Vice Chief of the Air Staff; Lt Gen R.S. Raman AVSM YSM, DG MI; Lt Gen Manish Erry UYSM AVSM SM, DG SP, etc.

Aero India 2025

During **Aero India 2025**, ISpA hosted a seminar titled *"Mission DefSpace: From Vision to Reality - A Progress Report"* on **10 February 2025** at Air Force Station Yelahanka, Bengaluru. The session focused on Mission DefSpace progress, defence space testing ecosystems, policy challenges, and technology integration, with participation from the Armed Forces, ISRO, IN-SPACe, and industry.

Italy-India Aerospace Roadshow 2025

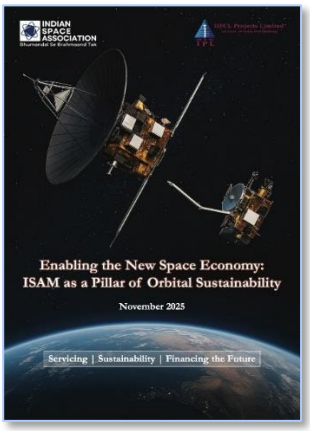
Conducted from **22-26 September 2025**, organised by ITA, ASI, ISRO, and IN-SPACe, with ISpA as a key partner. The roadshow included government interactions, IN-SPACe engagement, B2B sessions in Hyderabad, Bengaluru, and Delhi, and site visits to Indian space companies. The programme focused on identifying collaboration opportunities between Indian and Italian space industries. ISpA also facilitated exclusive visits and presentations at our pioneering member companies; Dhruva Space, Astra Microwave Products Limited, Skyroot Aerospace, Bellatrix Aerospace, GalaxEye, Ananth Technologies, Pixxel and Bharat Electronics Limited; in Hyderabad, Bengaluru and Delhi.

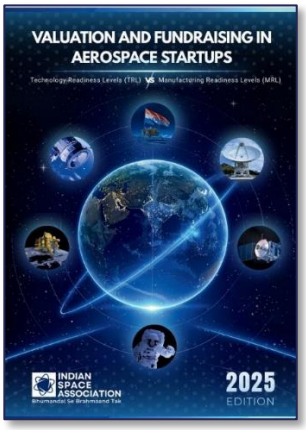
India International Space Conclave (IISC 2025)

Held on **18-19 November 2025** at **The Lalit, New Delhi**, with ISRO and IN-SPACe as co-hosts. The Conclave saw participation from over **1,000 stakeholders**, including policymakers, industry leaders, startups, academia, and international delegates from **15+ countries**. The event featured **75+ speakers**, **17+ sessions**, exhibitions, MoU signings, release of industry reports, and the launch of **Novaspace India**. Discussions covered NewSpace ecosystem development, financing, governance, sustainability, space economy, and international cooperation.

F. ISpA Latest Publications

- Enabling the New Space Economy**: ISAM as a Pillar of Orbital Sustainability**
- Valuation and Fundraising in Aerospace Startups: **TRL vs. MRL**, India's Road to Space Industrialization
- **India DefSpace Symposium** 2025 – Technical Report
- India's **Sovereign AgriStack:** Powering the Future of Agriculture from Farmers to the Cloud





G. Workshops and Knowledge Sessions

- **ISpA-IN-SPACe Technology Adoption Fund (TAF) Workshop** (11 March 2025):

  Introduced the ₹500 crore TAF scheme supporting startups, MSMEs, and research institutions, covering eligibility, funding structure, and application processes.

- **Workshop on "Implementation of NavIC Timing"** with Elena Geo Systems(1 August 2025, New Delhi):

  Focused on technical and operational aspects of NavIC timing adoption.

- **ISpA SpaceTech Expert Talk Webinar Series:**

  Sessions covered state space policies and emerging technologies, including:

  - Tamil Nadu Space Policy (13 May 2025)
  - Karnataka Space Technology Ecosystem (28 May 2025)
  - AI and its impact on space technologies (8 July 2025)

VII. Private Sector Achievements-2025

Agnikul Cosmos

- Agnikul advanced post-flight maturation , India's first privately developed semi-cryogenic launch vehicle.
- The company progressed Agnilet engine development through additional ground tests and achieved a major propulsion breakthrough with the first electric motor-driven, throttable semi-cryogenic engine test (23 May 2025), enabling precise thrust control using largely 3D-printed pump subsystems manufactured at its AS9100D-certified Rocket Factory 1 (IIT Madras Research Park).
- Agnikul also operationalised private launch infrastructure at Satish Dhawan Space Centre, including the Agnikul Launch Pedestal, mobile Dhanush platform, and in-house mission control, supporting a responsive launch architecture for "anywhere, anytime" smallsat access.
- To scale for orbital missions, it commissioned India's first large-format aerospace additive manufacturing facility in Chennai and raised ₹150 crore (~$17 million) in late 2025 at a $500 million valuation.
- With government backing (TDB–DST) to commercialise Agnibaan-a modular two-stage launcher for 30–300 kg payloads to ~700 km orbits, the company is maturing a reusable rocket architecture, aiming for an orbital debut by end FY 2025, customer flights from CY 2025, and scaling toward ~50 launches per year by 2028, supported by a 200+ engineer team and guidance from ~45 former ISRO scientists.

Aidin Technologies

- Contributed to the successful GSAT-7R mission through fabrication and testing of the C-band transponder, supporting secure naval communications.
- Successfully designed and developed the Airborne Data Link and Ground Control System (GCS) for Defence Research and Development Organisation's ABHYAS High Speed Expendable Aerial Target (HEAT) programme, which completed 10 successful developmental trials.
- Awarded the first pilot production contract for manufacture of airborne transmitters under an Electronic Warfare (EW) upgrade programme for a military aircraft.
- Recognised in DRDO's "Technology Focus" for the successful development of India's first indigenous GaN-based Solid State Power Amplifier (SSPA) for radar and EW applications.
- Expanded counter-drone systems capability through a renewed strategic partnership with Jugapro India Pvt. Ltd., delivering AI-enabled, field-validated anti-drone solutions aligned with Atmanirbhar Bharat.
- Honoured with the SME Innovation Award – Electronics Hardware Manufacturing & Services at the **50th ELCINA Awards** for Excellence.

- Received the Outstanding Contribution to Naval Systems Award, recognising sustained excellence in RF & Microwave, Custom Power Supplies, and Electronic Warfare solutions for defence applications.

Alpha Design Technologies

- Successfully completed digitisation, upgrade, and live missile firing of the Pechora Surface-to-Air Missile system, becoming the first private Indian company to achieve operational SAM launches against aerial targets.
- Through its joint venture Alpha-Elbit Advanced Systems India, partnered with Elbit Systems for indigenous manufacturing and integration of the SkyStriker loitering munition in India.
- Delivered the first rear fuselage for the Light Combat Aircraft (LCA) Mk1A through wholly owned subsidiary Alpha Tocol Engineering Services Pvt. Ltd. to Hindustan Aeronautics Limited.

Ananth Technologies (ATL)

In 2025, Ananth Technologies Limited secured approval from IN-SPACe to develop and operate India's first private geostationary satellite broadband system, committing an investment of approximately ₹3,000 crore toward a ~4-tonne GEO communication satellite with planned throughput of up to 100 Gbps, targeting launch by 2028, while continuing its role as a strategic supplier to sovereign missions by delivering nine critical subsystems for the NASA–ISRO NISAR Mission, reinforcing its long-standing contribution to ISRO's national and international space programmes.

Key milestones:

- Satellite Docking Experiment (SPADEX): Delivered two 400 kg satellites to ISRO, supporting future space station and Chandrayaan-4.
- ISRO 100th Satellite Launch (Jan 2025): Provided critical attitude/orbit control, data units, transponders, and power modules.
- Launch Vehicle Support: Manufactured 55 modules for GSLV F14, including navigation electronics, telemetry, and safety units.

Astra Microwave

Astra Microwave Products strengthened India's indigenous RF, microwave, and high-frequency electronic capabilities in 2025, supplying microwave and RF subsystems for satellite and defence applications, including components integrated on ISRO satellite platforms and advanced radar and electronic warfare systems, and formalised collaboration with Bharat Electronics Limited on joint development of radar, EW, and satellite electronics, thereby reinforcing domestic expertise in high-frequency electronics across SATCOM, space, and defence systems.

Astrogate Labs

Astrogate Labs achieved its first commercial optical inter-satellite link (OISL) demonstration, advancing high-speed, secure laser communication for small satellites. Its Astro-Link 1 Gbps terminals completed terrestrial and space-grade qualification, and the company secured USD 1.3 million in pre-Series funding. Astrogate partnered with SatSure/KaleidEO to integrate laser communication into a four-satellite constellation, overcoming RF spectrum limits and enabling 20× faster Earth Observation data downlinks.

(L to R) Subhajit Chakraborty Nitish Singh and Yogeshwaran J
Astrogate Labs' Team
Image credit :www.indianstartupnews.com

Astrome Technologies

- Secured USD 10 million in Series A funding to scale satellite communications (SATCOM) and 5G backhaul solutions.
- Operationalised GigaMesh, India's first commercial E-band wireless product, enabling high-capacity connectivity across 100+ villages in partnership with BSNL.
- Completed final trials of GigaSat, a flat-panel SATCOM terminal developed for the Indian Navy.
- Advanced multi-band SATCOM modernisation, delivering resilient Ka-band and L-band connectivity for Indian defence forces.
- Deployed space products to multiple customers during 2025.
- Opened a dedicated clean room for satellite AIT and payload development.
- Achieved registered MSME status (June 2025), strengthening domestic manufacturing, job creation, and alignment with Atmanirbhar Bharat; marked 10 years of operations.
- Expanded global presence by joining WISPA (July 2025), collaborating with 1,000+ ISPs in the United States.
- Awards & Recognition (2025):
    - Indigenous Solution Award at Aero India, presented by the Raksha Mantri.
    - Indian Innovation Icon Award (Business Category) by the Marico Innovation Foundation.
    - **Startup World Cup – India winner at India Mobile Congress 2025.**
    - Woman Leader of the Year Award by The Fast Mode.

Augsense Labs

- Advanced cutting-edge sensing and atmospheric profiling technologies for disaster prediction and defence applications.
- Awarded a contract to build a Hyper-Local Atmospheric Profiling System in Kerala using GNSS tomography and drone-based radio occultation for landslide, flash flood, and cloudburst mitigation (Mar 2025).
- Established a Quantum Sensing Lab in Thiruvananthapuram to develop quantum-enhanced ELINT, Ground Penetrating Radar, and Synthetic Aperture Radar solutions.
- Secured an iDEX contract with the Ministry of Defence to deliver next-generation sensing solutions using quantum technologies for strategic applications.
- Selected under the iDEX (Indian Air Force) programme for the development and validation of quantum-enhanced sensing technologies in FY 2025–26.
- Awarded a collaborative project with K-DISC and KSDMA to develop an N-Sonde GNSS-tomography–based hyper-local weather sensing system for early warning and landslide risk assessment in the Western Ghats.

Avantel Limited

- In 2025, reinforced its position as a key indigenous SATCOM and defence supplier, securing multiple contracts:
- Ministry of Defence: ₹4.16 crore for satellite communication systems.
- NewSpace India Limited (NSIL):
    - ₹11.19 crore for transponder systems.
    - ₹43.25 crore (Feb 2025) for 45,252 Xponder devices for marine vessels.

- Bharat Electronics Ltd: ₹17.7 crore for 1 kW HF Software Defined Radios (May 2025).
- Goa Shipyard Ltd: ₹11.37 crore for SATCOM integration on Indian Navy NGOPVs (Apr 2025).
- Mazagon Dock & DRDO: ₹24.73 crore for indigenous defence electronics (Jun 2025).

Azista Space *(formerly Azista Industries)*

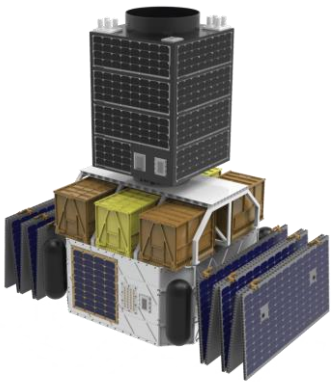
- In 2025, rebranded as Azista Space, strengthening its position as a leading private satellite manufacturer in India.
- Partnered with Suhora Technologies to onboard data from its ABA First Runner (AFR-1) satellite onto the SPADE platform.
- Delivered high-quality Earth observation data for defence, maritime surveillance, agriculture, and disaster management.
- Previously successfully launched Azista-BST's satellite (2023).
- Became a founding member of the Bharat Space Collective (BSC) alongside Kawa Space and Kepler Aerospace for collaborative satellite and launch ecosystem development.

BES Space Pvt Ltd

- Selected for the AWS Space Accelerator: APJ 2025 programme.
- Chosen among 67 startups, including 42 from India.
- Received up to USD 100,000 in AWS credits.
- Recognised for the SAFER platform and AI-based satellite anomaly prediction.

Bellatrix Aerospace

- In 2025, advanced green propulsion and in-space mobility technologies, including microwave plasma thrusters and orbital transfer vehicles.
- Rudra 1.0 green propulsion system test-fired on PSLV-C60 for 50+ seconds, marking India's first high-performance eco-friendly propulsion system.
- Project 200: Developing Ultra-Low Earth Orbit (180–250 km) satellite deployment for Earth observation, telecom, and research.
- Signed an MoU with NSIL for Pushpak Orbital Transfer Vehicle integration.
- Entered a collaboration with Astroscale Japan (Mar 2025) for debris removal and satellite servicing.
- Established a U.S. subsidiary in Delaware (Apr 2025) to manufacture propulsion systems locally.
- First Indian company to develop high-performance green propulsion systems and heater-less hollow cathodes for Hall-effect thrusters.



Pushpak-Orbital Transport Vehicle

BEML Limited

- In 2025, expanded its aerospace manufacturing footprint.
- Delivered Strap-On Base Shroud (SBS) airborne structures for LVM3-M6, a mission-critical component of the Launch Vehicle Mark-3.
- Supported the successful LVM3-M6 launch from Satish Dhawan Space Centre.

- Executed additional LVM3 programme structural assemblies as part of its ongoing role in India's space industrial supply chain.

Bharat Electronics Limited

- Completed assembly, integration, and testing (AIT) for multiple RISAT satellites in 2025.
- Advanced indigenous Travelling Wave Tube Amplifiers (TWTAs) for satellite communications, navigation, and radar payloads through technology transfer with SAC-ISRO.
- Supplied critical operational subsystems for India's strategic space programmes.
- Secured additional defence orders worth over ₹585 crore across fire control systems, missile sighting systems, communication equipment, electronic warfare systems, spares, and services.
- Signed a Joint Venture Cooperation Agreement with Safran Electronics & Defence for indigenous production of HAMMER precision-guided weapons in India.

Awards & Recognitions (2025):

- Outstanding Contribution to Naval Systems Award – Aerospace & Defence Awards.
- ESC National Export Excellence Award – Strategic / Defence Electronics.
- Five Governance Now PSU Awards (Finance Leadership, Operations Leadership, Excellence in Innovation, Best R&D Initiative, Best Use of Automation & Digital Technologies).
- Golden Peacock Quality Award – BEL Bengaluru.
- PSE Excellence Award – Cyber Security.
- Governance Now PSU IT Award – Cyber Security and Data Protection.
- "Adoption of Smart Governance" Gold Award – ET PSU Leadership & Excellence Awards.

Bharat Forge *(Agneyastra Energetics)*

- Incorporated Agneyastra Energetics Limited and acquired approximately 950 acres in Andhra Pradesh for an integrated defence energetics complex.
- Signed a strategic MoU with Windracers (UK) at DSEI UK 2025 for localisation of heavy-lift UAV systems.
- Presented advanced aerospace and defence technologies at Dubai Airshow 2025.
- **Baba Kalyani honoured with the CNN-News18 Indian of the Year Award 2025 .**
- Bharat Forge Aluminum USA, Inc. received the 2025 Manufacturing Excellence Award in North Carolina.
- Announced major international collaborations strengthening global defence engagement.

Bharti Airtel

- Remained central to India's satellite communications ecosystem in 2025 through strategic alignment with Eutelsat OneWeb and continued engagement with global SATCOM providers.

- Airtel-supported OneWeb services were deployed for low-latency connectivity during disaster relief operations.
- Advanced preparations for broader LEO-based satellite broadband rollout across retail and enterprise segments, positioning Airtel as a key commercial gateway for satellite-enabled connectivity.
- Satellite Connectivity (March 2025): Partnered with SpaceX to bring Starlink services to India, marking Starlink's first formal collaboration in the country; Airtel plans to integrate Starlink into its satellite broadband offerings and distribute hardware through its retail network.
- Spectrum Expansion (April 2025): Acquired 400 MHz of 26 GHz spectrum across six telecom circles from Adani Data Networks, strengthening its 5G and enterprise connectivity portfolio.
- Airtel Africa – Starlink Partnership (May 2025): Entered into an agreement with SpaceX to bring Starlink's high-speed internet services to customers in Africa, targeting enterprises, businesses, and socio-economic institutions such as schools and health centres in rural regions.
- Direct-to-Cell Satellite Services in Africa (Dec 2025): Airtel Africa announced an agreement with SpaceX to introduce Starlink direct-to-cell satellite connectivity, enabling customers with compatible smartphones in regions without terrestrial coverage to access network services; the satellite-to-mobile service is expected to begin in 2026, initially supporting data for select applications and text messaging.

BQP Technologies *(BosonQ Psi)*

- In 2025, raised an oversubscribed USD 5 million seed funding round, bringing total investment to approximately USD 6.6 million.
- Funding aimed to scale its quantum-accelerated digital twin platform, BQPhy®, targeting mission-critical simulation in aerospace, defence, and semiconductors.
- The raise followed a Cooperative Research and Development Agreement (CRADA) with the Air Force Research Laboratory to accelerate mission-critical modelling.
- Continued partnerships with the Ministry of Heavy Industries and multiple Tier-I aerospace and technology partners.
- Validated quantum-inspired simulation algorithms delivering performance improvements of up to 10× on existing computing architectures.

Broadcast Engineering Consultants India Limited

- Executed critical satellite broadcast and ground network projects in 2025 for government and public-sector clients.
- Delivered turnkey satellite broadcast networks, including uplink and downlink systems, spectrum planning, and digital broadcast infrastructure.
- In late 2025, issued empanelment and execution frameworks to streamline the management of large-scale government communication and satellite-enabled broadcast projects.
- Reinforced its role as a strategic systems integrator within India's space and communication ecosystem.

Caliche

- Specialized in the downstream space data economy in 2025, launching AI-driven analytics platforms using hyperspectral data for precision agriculture and climate monitoring.
- Recognized as a key enabler for ESG (Environmental, Social, and Governance) reporting for Indian corporations through satellite-derived carbon sequestration metrics.
- Recognized as the most awarded startup in the oil and gas sector.
- Built the largest repository of extreme-environment microbes.

- Recipient of prestigious industry recognitions, including KPMG, India Energy Week (IEW) – Best Startup, Federation of Indian Petroleum Industry (FIPI) Awards, and multiple other industry-specific honours.
- Built a strong intellectual property portfolio, with 50+ patents filed.

Capella Space

- Achieved a major milestone in 2025 with the launch of the Acadia 6 satellite, delivering high-resolution SAR imagery for all-weather Earth observation.
- Supported maritime monitoring, disaster response, and environmental assessment through its SAR constellation.
- June 23, 2025: Launched Capella 17 ("No Cloudy Days") aboard SpaceX Transporter-14, expanding the SAR constellation.
- Capella 17 established contact within 90 minutes and featured Orbion's Hall-effect propulsion system for InSAR and Coherent Change Detection (CCD).
- Key technology advancements included:
  - 700 MHz radar bandwidth
  - Optical inter-satellite links
  - Low-drag mode (increasing satellite lifespan by ~24%)
  - Colorized sub-aperture imagery
  - Faster automated tasking
  - Advanced analytics demonstrations
- Acquired by IonQ, with the combined entity working toward the world's first space-based quantum-secure communications network using Quantum Key Distribution (QKD).

CE Info Systems *(MapmyIndia)*

- Delivered a landmark downstream geospatial success in 2025 by integrating satellite imagery, GIS, and AI-driven analytics.
- Enabled applications across infrastructure planning, mobility, logistics, disaster response, and governance.
- Launched the **ClarityX AI analytics platform.**
- Enhanced the Mappls App with support for nine regional Indian languages.
- Secured a ₹233 crore licensing deal for map data over seven years.
- Integrated DIGIPIN with India Post.
- CEO Rakesh Verma received the Lifetime Achievement Award at the Geospatial World Leadership Awards 2025.

Centum Electronics

- Strengthened its position as a leading private supplier of space-qualified electronics and avionics in 2025.
- Delivered 350+ mission-critical modules for major satellite and launch vehicle programmes, including NASA–ISRO NISAR.
- Supported private satellite manufacturers with integrated avionics solutions.
- Selected by Thales for PCB assemblies.
- Commissioned an advanced SMT line with AI-powered quality assurance and high-speed Pick & Place systems.
- Maintained a strong order book of ₹1,736 crore.
- Filed 12+ patents, including custom IP developed for OEM partners.

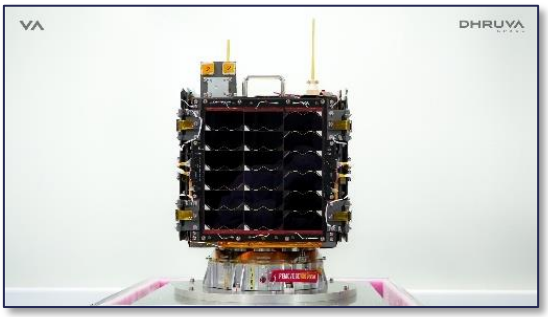
CodiMaths

- Conducted the International Space Science Olympiad (ISSO) 2025, a global space science and astronomy competition aimed at inspiring students worldwide in STEM and space disciplines.
- Signed a strategic MoU with the Indian Space Association (ISpA) to expand space science education outreach in India, including mentorship, curriculum support, and industry exposure.

Cyran AI Solutions

- Made significant strides in geospatial and defence AI technologies in 2025.
- Registered on GeM as a CLASS-1 Local OEM for Made-in-India GeoAI products.
- Winner of the Operation Dronagiri Challenge (growth-stage startups).
- Signed an iDEX ADITI 1.0 contract with the Ministry of Defence.
- Showcased solutions at NAVDEX 2025 (UAE) under the Indian Pavilion.

Dhruva Space



- Advanced full-stack spacecraft integration and manufacturing capabilities in 2025.
- LEAP-1 commercial satellite launched aboard SpaceX, marking the company's first international commercial launch.
- Progressed production of P-30 and P-60 satellite platforms, supported by expanded assembly, integration, and testing (AIT) infrastructure in Hyderabad.
- Enabled parallel satellite builds and faster delivery cycles.
- Integrated solar panels for Pixxel's constellation.
- Completed a 280,000 sq ft spacecraft integration facility capable of handling satellites up to 500 kg.

Funding:

- Series A funding of ₹123 crore (~USD 15M)
- ₹14 crore from Technology Development Board (TDB) for a space-grade solar array facility
- ₹10 crore from SIDBI

- **Thybolt Mission:**
  - Thybolt-1 and Thybolt-2 completed 15,000 orbits and were securely de-orbited, concluding the mission launched in November 2022.

Partnerships & Collaborations:

- Kinéis (France): Provided IoT services in India via P-30 satellite payload
- Infostellar (Japan): Integrated 3.8 m S/X-band antenna into the StellarStation platform
- ResearchSAT & Nirma University: MoU for Space Medicine and Life Sciences research and skill development
- SatSure: EOaaS alliance

Digantara

- Solidified its position as a tier-1 space intelligence provider in 2025.
- Successfully launched SCOT (Space Camera for Object Tracking), the world's first commercial space surveillance satellite capable of tracking objects as small as 5 cm in LEO.
- SCOT launched aboard SpaceX Transporter-12 (Jan 2025) and was commissioned in March 2025, capturing its first image over South America.

- December 2025: Secured USD 50 million Series B funding to scale the AIRA platform and expand into missile warning and defence-grade space intelligence.
- Operates from Colorado Springs (USA) and Singapore, with strategic cislunar partnerships with ispace Japan and Astroscale.
- Targeting a constellation of 15+ satellites to enable global multidomain awareness by 2027.

Strategic Global Expansion:

- Opened operations in Colorado, investing USD 1M+ in spacecraft manufacturing and optics, with plans to scale to USD 15M.
- Signed an MoU with ArianeGroup to enhance global space traffic management using a distributed sensor network.

Defence & Commercial Impact:

- Selected by the U.S. Rapid Capabilities Office for pioneering own-ship awareness using SSA technology.
- Targeting USD 25–30M revenue over the next two years, addressing the USD 60B global space surveillance market.

Achievements:

- Forbes 30 Under 30 Asia 2025 – All founders
- Forbes 30 Under 30 India 2025 – Anirudh Sharma
- Selected as WEF Technology Pioneer 2025
- Anirudh Sharma selected for the Motwani Jadeja Global Leaders Cohort, WEF Davos 2025
- Anirudh Sharma serves as an expert member of UNOOSA's Space Traffic Coordination Committee and was a panellist at the UNOOSA Space Bridge Dialogue (2024 & 2025)

Elena Geo Systems

- Advanced indigenous Positioning, Navigation & Timing (PNT) capabilities across defence, government, and commercial sectors using NavIC-enabled semiconductors and devices.
- FY 2024–25 saw deeper operational adoption and progress under Defence Communication & Information Systems (DCIS) programmes.
- April 2025: Launched India's first NavIC Timing Server, designed to replace foreign GPS-based timing for telecom, power grids, and financial networks.
- Supported by ₹12 crore in cumulative grants.
- Recipient of the Pandit Deendayal Upadhyaya Telecom Excellence Award.

Esri India

- Reinforced leadership in GIS and geospatial intelligence in 2025 with a ₹150 crore investment in a GIS & AI Competency Centre.
- **Partnered with Dhruva Space to integrate AstraView satellite imagery into ArcGIS.**
- Collaborated with AWS to embed Generative AI into GIS workflows, enabling access to 200+ satellite constellations for government and defence users.

Mr. Agendra Kumar, Managing Director, Esri India, with Mr. Krishna Teja Penamakuru, Chief Operating Officer & Co-founder, Dhruva Space, at the Esri User Conference Hyderabad on 10 September 2025 where the MoU was officially formalised

- Delivered ArcGIS-powered enterprise GIS solutions to 6,500+ organisations, with a user base exceeding 1 million.

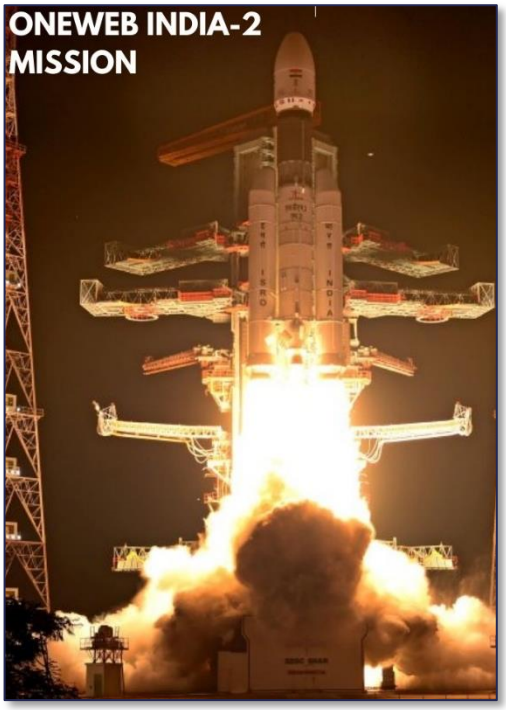
Key Achievements:

- Supports all major national programmes and most mapping agencies in India.
- Serves 800+ colleges and universities, 15+ State Forest Departments, 20+ State Power Distribution Corporations, and 100+ Municipal Corporations / 500+ ULBs.
- Curated the Indo ArcGIS Living Atlas with 100+ categories of authoritative geospatial content for India.
- Achieved CMMI Maturity Level 5 appraisal.

Awards (2025):

- ASSOCHAM National Water Award – Innovative Water Product/Technology (OneMCGM Sewerage Operations Application)
- Geospatial Platform of the Year Award – Indo ArcGIS Living Atlas (GeoSmart India 2025)

Eutelsat OneWeb



- Reached a key milestone with 72 LEO satellites deployed via ISRO LVM3-M2 and M3 missions.
- Secured GMPCS/VSAT licensing and completed Indian gateway infrastructure in Gujarat and Tamil Nadu.
- December 2025: Supported Indian Army flood relief operations in Sri Lanka with low-latency connectivity, in partnership with Bharti Airtel.

Global Impact & Partnerships:

- Surpassed one million users in Sub-Saharan Africa.
- Expanded government and defence-grade LEO services.
- Collaborated with Viasat, Liquid Intelligent Technologies, SoftBank, and Airbus for next-generation satellite manufacturing and enterprise connectivity.

Technology & Services:

- Hughes HL1120W terminal approved for LEO connectivity.
- Astra PNT service developed to counter GPS jamming.
- Conducted 5G NTN tests and enhanced GEO–LEO hybrid solutions.

Regional & Social Initiatives:

- Established a OneWeb testing centre in Taiwan.
- Achieved the Partner2Connect milestone of 1 million underserved users in Africa.
- Continued humanitarian connectivity support with Télécoms Sans Frontières.
- Gained IN-SPACe approval for commercial broadband services in India.

Operational Milestone:

- ISRO completed controlled re-entry of the LVM3-M3 cryogenic upper stage after launching 36 OneWeb satellites.

GalaxEye Space

- Advanced multi-sensor Earth observation capabilities in 2025 following successful in-orbit validation of the GLX-SQ payload aboard PSLV-C60, including SAR image transmission and DAC/ADC hardware testing.
- Combined SAR and optical imaging to overcome cloud cover and darkness, refined through high-altitude trials on NAL's pseudo-satellite and tested on ISRO's POEM-4, withstanding South Atlantic Anomaly radiation.

- Mission Drishti (~160 kg, ~1.25–1.5 m resolution) scheduled for launch in 2026, alongside development of a second ~0.5 m resolution satellite, with a target 10-satellite constellation by 2029.
- Signed MoU with IN-SPACe for co-working and testing facilities.
- Signed a launch contract with Impulso Space (February 2025) for the Drishti mission.
- Awarded an iDEX contract for a multi-sensor fusion processing system for the Indian Air Force.
- Raised USD 6.5 million in early funding and USD 10 million in Series A.
- Included in the 25th Cohort of Technology Pioneers by the World Economic Forum (July 2025).
- Provided support during Operation Sindoor.

Garuda Aerospace (Garuda UAV)

- In 2025, expanded its strategic defence role with the inauguration of a Defence Drone Facility in Chennai by the Union Minister of State for Defence.
- Unveiled multiple next-generation indigenous UAV platforms, including a high-altitude Avalanche Rescue Drone.
- Laid the foundation for a 76-acre Defence Park in Cheyyur (Tamil Nadu) to support large-scale indigenous production and AI-enabled systems.
- Launched Garuda Akash Raksha Vans (GAR Vans) for mobile UAV fleet maintenance and repair.
- Established a Defence Drone Innovation Lab with the Indian Army's 13 JAK Rifles to co-develop mission-specific unmanned solutions.

Geo Solutions India

- In 2025, advances under India's National Geospatial Mission and the PM Gati Shakti National Master Plan accelerated GIS-based mapping of national infrastructure.
- Enabled integration of Jal Jeevan Mission rural water assets and pipeline networks into the PM Gati Shakti platform.
- Implementation supported technically by the Bhaskaracharya National Institute for Space Applications and Geo-Informatics (BISAG-N).
- Strengthened real-time spatial monitoring and decision support for national rural infrastructure planning and asset management.

Godrej & Boyce Manufacturing

- Remained a cornerstone supplier of propulsion systems, cryogenic engines, and structural components for India's space programme.
- Continued participation in engine manufacturing and high-precision fabrication during FY 2024–25.
- Supported both public launch missions and private-sector technology maturation.

Hindustan Aeronautics Limited *(HAL)*

- Reached a pivotal milestone in 2025 with the transfer of Small Satellite Launch Vehicle (SSLV) technology.
- Secured a ₹511-crore SSLV commercialisation contract from ISRO to manufacture, own, and commercialise SSLVs, with at least two vehicles to be produced over the next two years.
- Signed an MoU with BEML to strengthen aerospace and defence manufacturing capabilities through joint learning and development.
- Transitioned from a supporting manufacturer to a prime industrial operator, enhancing India's small satellite launch infrastructure.

Hughes Communications India

- Strengthened its position in India's SATCOM market in 2025 by advancing managed LEO satellite services for enterprise and government customers.
- Conducted live demonstrations of LEO-enabled broadband services, supporting upcoming commercial rollouts by global LEO operators.
- India Expansion: Partnered with Thaicom to provide satellite capacity and broadband services supporting mobile backhaul, maritime, and enterprise sectors.
- Product Innovation: Launched a compact Electronically Steerable Antenna (ESA) for connectivity on aircraft, ships, and land vehicles.
- Aviation Connectivity: Signed an agreement with Airbus as a Ka-band managed service provider for the HBCplus inflight connectivity programme.
- International Projects: Selected by Kazakhstan's RCSC to deploy the Hughes JUPITER System; expanded defence and government offerings in Europe with Konnect VHTS services in collaboration with Telespazio.

SkyServe *(Hyspace Technologies)*

- Advanced AI-powered edge computing in orbit through the STORM platform, launched aboard a SpaceX satellite in collaboration with D-Orbit.
- Enabled real-time on-orbit processing for vegetation analysis, disaster monitoring, and cloud/water filtering, reducing dependence on ground stations.
- Partnered with NASA JPL for AI monitoring of wildfires, floods, and urban heat islands.
- Signed an MoU with Leaf Space to deploy SMART ground stations integrated with STORM, reducing latency and enhancing processing.
- Most Innovative Vertical AI Startup – VIBE Summit 2025
- Winner – 14th Aegis Graham Bell Award for Innovation in AI

ICEYE

- Expanded its SAR satellite constellation with multiple launches in 2025, enhancing all-weather, day-night Earth observation.
- Signed a cooperative development agreement with IHI Corporation (Japan) to jointly develop additional SAR satellites.
- Delivered SAR data to defence and security partners, including operational use by NATO's Situation Centre.
- Continued growth in commercial SAR data adoption for disaster response, infrastructure, insurance risk, and utilities monitoring.

IPSTAR India

- In 2025, completed key regulatory authorisations from IN-SPACe under India's new space policy.
- Authorised to provide broadband satellite services in India using Thaicom's GEO satellite fleet, including Thaicom-4 and Thaicom-8.
- Secured authorisation for the next-generation Thaicom-9 high-throughput satellite.
- Positioned to support enhanced satellite broadband connectivity across rural and underserved markets.

KaleidEO Space System

- Successfully aerial-tested a high-resolution optical EO payload, capturing 16 cm imagery over the UK and Austria.

- Introduced a new imaging payload optimised for 65 km swath coverage with ~1 m GSD for large-area imaging and analytics.
- Payload designed and developed entirely in India, independent of ISRO systems.
- Finalised plans to launch four satellites in 2026 (rescheduled from 2025), with edge-computing capability for real-time processing.
- Selected under the Indo-US Defence Innovation Programme to collaborate with the US Defence Innovation Unit and DoD.
- Provided support during Operation Sindoor.

Kawa Space

- Provided satellite imagery support during Operation Sindoor (2025), enabling independent visual analysis of conflict impact.
- Founding member of the Bharat Space Collective, alongside Kepler Aerospace, Azista Industries, and Dfy Graviti.
- Focused on collaborative development of space-based intelligence, RF, imaging, and analytics for commercial and strategic applications.

Kepler Aerospace

- Won a USD 4 million iDEX defence contract to develop an **autonomous swarming satellite constellation** for ISR, with a planned launch around 2027.
- Continued execution of advanced space and defence R&D projects, including GNSS solutions, satellite beacons, Tx/Rx systems, GNSS antennas, CUAS prototyping, and GPS-denied navigation.
- Provided global ground station support for the SpaDeX mission via its GSaaS model.
- Received two ₹10-crore grants from the Defence Space Agency, indicating early institutional support prior to the 2025 iDEX award.

Kerala Spacepark

- Advanced its mission to position Thiruvananthapuram as a leading aerospace and defence innovation hub.
- Signed MoUs with ICT Academy Kerala, Digital University Kerala, and VSSC to promote space-tech startups and co-develop infrastructure.
- Laid the foundation for a Common Facility Centre (CFC) and R&D Centre at Pallippuram (2 lakh sq. ft. on 20 acres).
- Announced plans for a Liquid Propulsion Systems Facility near LPSC–IIST and an Aerospace Control Systems Complex near VSSC, with 13.5 acres earmarked.
- Allocated ₹52.5 crore in the 2025–26 State Budget and ₹244 crore from NABARD for multi-city aerospace corridors.
- Hosted Kerala Aero Expo 2025, showcasing India’s space achievements.

Larsen & Toubro

- Consolidated its role in India's space ecosystem through large-scale system integration and advanced hardware fabrication.
- Served as a key industrial integrator for the NASA–ISRO NISAR mission, supporting assembly and fabrication of complex spacecraft structures.
- Led the industrial consortium manufacturing five PSLV rockets, in collaboration with HAL; the first flight model scheduled for early 2026.
- Expanded capabilities at its Coimbatore facility (March 2025) for launch vehicle and satellite manufacturing.

Larsen & Toubro (L&T) playing a crucial role in India's Gaganyaan human spaceflight program, particularly in critical systems like the Crew Escape System (CES), by providing advanced engineering, manufacturing capabilities for high-precision components, supporting ISRO's goal of ensuring astronaut safety during launch aborts through systems like the Low Altitude Escape Motor (LEM).

LeoLabs

- Recorded USD 60 million+ in contract awards in 2025, including 186% YoY growth in U.S. government contracts.
- Licensed its LEO Object Catalog to the U.S. Department of Commerce and U.S. Space Force, enabling multi-agency use.
- Advanced integration with the Traffic Coordination System for Space (TraCSS).
- Continued expansion of its global phased-array radar network, including Scout-class and Seeker-class UHF radars.
- Tracked approximately 25,000 objects in LEO, providing conjunction and manoeuvre support.
- Signed an MoU with ST Engineering Geo-Insights to expand Asia-Pacific SSA collaboration.

Manastu Space

- Achieved TRL-8 through successful in-orbit validation of the Vyom 2U green propulsion system aboard ISRO's POEM-4 mission.
- Completed 700+ seconds of cumulative firing using proprietary MS-289 green propellant, including a 360-second continuous burn and 20+ restarts; Vyom 2U logged 1,099 orbits and 1,656+ hours in space (March 2025).
- Advanced hydrogen-peroxide-based green propellant technology with proprietary additives as a safer alternative to hydrazine.
- Conducted hot-firing tests of a 300 N green monopropellant engine, validating system stability.
- Delivered the iBooster system to DRDO for 100–500 kg satellites.
- Raised USD 3 million Series A funding led by Capital-A to commercialise MS-289 and scale its in-space refuelling architecture; additionally secured a USD 3 million bridge round (August 2025) with participation from IAN, Capital 2B, E2MC Ventures, Bhagnani Family Office, and Jeet Chandan.
- Awards: MCCIA – Brig. S.B. Ghorpade Award 2025; Top 10 Startups at Maharashtra Startup Week 2025

VANTOR *(formerly Maxar Technologies India)*

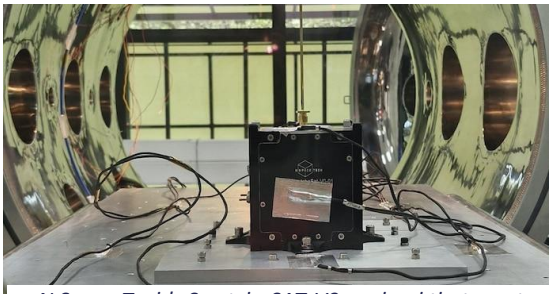
- Provided high-resolution, daily-revisit imagery during Operation Sindoor (May 2025) to supplement ISRO assets.
- Enabled real-time target validation, multi-location monitoring, and definitive Battle Damage Assessment (BDA) using before-and-after imagery.
- Expanded constellation capacity with the launch of the 5th and 6th WorldView Legion satellites via SpaceX (Feb 2025).
- Introduced ClimateDesk and Raptor navigation system for GPS-denied environments.
- Secured USD 205 million in multi-year Direct Access Program contracts and an order under NGA's Luno-A programme.
- Selected to build EchoStar XXVI on the Maxar 1300™ platform and delivered hardware for NASA's Psyche mission.

Micronet Solutions

- Contributed geospatial intelligence during Operation Sindoor (May 2025) using commercial EO data.
- Expanded defence analytics through multi-sensor fusion of optical and SAR datasets.
- Scaled AI-driven volumetric and terrain analysis services for infrastructure, mining, and strategic asset monitoring.
- Executed GIS and remote-sensing projects for multiple Indian government and public-sector organisations.
- Operationalised 30 cm-class commercial optical imagery workflows, including Pléiades-Neo class data, for precision mapping and 3-D modelling.

N Space Tech

- Successfully tested an indigenously developed UHF communication payload (SwetchaSAT-V0) on ISRO's POEM-4 platform.
- Received operational data via the ISTRAC ground network in early 2025.



N Space Tech's SwetchaSAT-V0 payload that went aboard Poem-4

Nelco Limited (A Tata Enterprise)

- Signed a strategic LEO services agreement with Eutelsat OneWeb to deliver low-latency satellite connectivity across India, including borders and territorial waters (Aug 2025).
- Conducted B2B proof-of-concept trials for mission-critical LEO connectivity, validating latency and reliability for enterprise and government use-cases (Dec 2025).
- Awarded a 10-year national VSAT Virtual Network Operator (VNO) licence by the Department of Telecommunications (June 2025).
- Received DoT approval for GMPCS/VNO licence, authorising operation of satellite broadband and mobile satellite services in India (Oct 2025).

- Announced plans with Tata Group to launch satellite broadband internet services targeting remote and underserved regions, pending spectrum and final regulatory clearances (Dec 2025).
- Entered an agreement with Intelsat to provide in-flight connectivity (IFC) over Indian airspace, covering 35,000+ feet altitude operations (Aug 2025).
- Took responsibility for ground infrastructure, regulatory compliance, and service enablement in India under the Intelsat IFC partnership (Aug 2025).

Nibe Space

- In 2025, secured a historic contract with Thales Alenia Space to supply India's first private 0.5 m-resolution Earth Observation satellite.
- Following its parent company NIBE Limited's NSE listing, raised significant capital to develop a 40-satellite multi-sensor constellation, including Optical, Infrared, and SAR payloads.
- IN-SPACe Authorisation (Apr 2025): Registered as a "Data Disseminator" for controlled EO data distribution over India (GSD >30 cm).
- Partnered with BlackSky for analytics.
- Roadmap includes a 23-satellite constellation, expanding to 40 satellites.

NorthStar Earth & Space

- Defence & Space Domain Awareness (SDA):
  - Providing 24/5 operator support to the US Space Forces Joint Commercial Operations (JCO) since 2023.
  - Supporting NOAA's Office of Space Commerce, in partnership with the US DoD, for piloting space traffic data platforms.
  - Acted as Prime performer for DARPA SpaceWatch TA1 and Sub-contractor for TA2, completed by May 2025.
- Launched advanced Space Traffic Management (STM) and Collision Avoidance Services.
- Research & Development:
  - Active collaborations with ESA, the European Union, and the Canadian Space Agency.
  - Received equity investment from the Luxembourg Future Fund (LFF).
  - Expanding dual-use SSA services in Europe.
  - Delivered Data-as-a-Service Product Offering (DaaSPO) to European defence organisations.

Omnipresent Robot Tech

- ADITI Contract: ₹25 crore contract with the Indian Army to develop ultra-high-resolution SAR for 3D DEM generation.
- iDEX Projects: Developing a multi-sensor AI engine for real-time change detection and flight safety analytics for the Indian Air Force.
- Funding: Raised ₹103 crore (₹75 crore private funding and ₹28 crore government support).
- ISRO Collaboration: Previously supported Pragyaan rover navigation; exploring expanded mission collaborations.

OmSpace Rocket & Exploration

- Raised USD 3 million in late 2025 to accelerate development of Infinity One, a reusable launch vehicle designed for 350 kg payloads.
- Successfully completed its third solid-fuel engine test.

- Established OSRE FZC in the UAE to access Middle Eastern space investments.
- Targeting a first commercial launch by January 2028, with a focus on 24-hour relaunch capabilities.

OrbitAID Aerospace

OrbitAid R&D Facility Launch

- Opened a 6,500 sq. ft. state-of-the-art R&D facility, India's largest commercial centre for in-orbit refuelling and satellite servicing, inaugurated by Dr. V. Narayanan, Chairman of ISRO.
- Successfully validated autonomous fluid transfer in microgravity during the Zero-G2 mission.
- Completed two zero-gravity technology demonstration missions for satellite refuelling and docking in Florida, USA.
- Achieved Technology Readiness Level 7 (TRL-7) for its Standard Interface Docking and Refuelling Port (SIDRP).
- Signed a strategic partnership with ispace (Japan) to integrate SIDRP into future lunar landers under the MAITRI mission framework.
- Awarded the Indo-Australian Space MAITRI Grant to deploy India's first in-orbit refuelling interface, supporting collaborative R&D and in-space demonstrations.
- Secured USD 1.5 million in pre-seed funding led by Unicorn India Ventures with participation from Tamil Nadu Startup and Innovation Mission (TANSIM).
- Developed tanker satellite architectures and standardized refuelling interfaces to enable satellite life-extension, space-debris reduction, and sustainable on-orbit servicing.
- Founded by IISc alumni Sakthikumar R and Nikhil Balasubramanian, with a core focus on in-orbit servicing, docking, and satellite refuelling systems.
- Established a Rendezvous, Proximity Operations and Docking (RPOD) testbed and an advanced propellant transfer laboratory for safe, leak-proof fuel transfer validation.
- Facility inauguration attended by senior leadership from ISRO, ISpA, StartupTN, and diplomatic representatives from Germany, Italy, and Switzerland.
- Positioned as India's leading private in-space refuelling company, advancing a circular space economy through satellite life extension and operational resilience.

Paras Defence

Signed an MoU with the Government of Maharashtra to establish India's first Optics Park with a planned ₹12,000-crore investment, positioning the state as a national hub for advanced optics technologies across defence, space, semiconductor, automotive, and industrial sectors. Envisioned as a phased development, the Optics Park aims to build a large-scale manufacturing and innovation ecosystem, create ~2,000 direct jobs, strengthen indigenous optical systems capability, and reduce import dependence in critical technologies.

PierSight Space

- Raised USD 8 million cumulative funding by mid-2025, with support from Sustainable Ocean Alliance and CE-Ventures.

- Selected to provide the sovereign SAR backbone for India's first PPP Earth Observation constellation, with a 12-year contract and guaranteed annual demand of USD 25 million.
- Integrating the MATSYA maritime analytics platform with a planned 12-satellite SAR + AIS network for persistent Indian Ocean monitoring.
- Designed and developed India's first deployable flat-panel reflect-array antenna by a private company.
- Won the first India-US Defence Challenge (INDUS-X) for Maritime ISR (Oil Spill Detection), followed by PoC contracts from the Indian and US Coast Guard.
- Part of Techstars Space Accelerator and Creative Destruction Lab.
- Selected under IN-SPACe Seed Fund Scheme (Disaster Management, Urban Development, and Marine Sector).
- Selected as one of 8 finalists in the NSIN-NGA Global Fishing Forecast Challenge.

Pixxel

- **Constellation Deployment & Launches**
  - Deployed India's first privately led Earth Observation satellite constellation, the **Firefly series**, comprising six hyperspectral satellites.
  - Launched three Firefly satellites in January 2025, followed by first-light imagery in March 2025.
  - Successfully launched and commissioned all six satellites across two missions, establishing one of the world's highest-resolution commercial hyperspectral constellations.
- **Strategic Contracts & PPP Leadership**
  - Led a consortium that secured a ₹1,200-crore IN-SPACe PPP contract to build India's first fully indigenous commercial EO constellation.
  - Leading India's first privately led national EO constellation under a PPP framework with IN-SPACe.
- **International Partnerships & Market Expansion**
  - Signed strategic international data distribution agreements with Geoimage, Heartland GIS, SIIS, and Kita Earth.
  - Selected for strategic programmes and partnerships with U.S. government agencies, including the National Reconnaissance Office and NASA.

Pixxel launched India's first private satellite constellation by deploying six Firefly satellites, marking the start of its commercial operations.

- **Technology Development & Grants**
  - Signed a SPARK Grant agreement (June 2025) to develop advanced MWIR and hyperspectral payloads for the Indian Air Force's miniaturised satellites.
  - Awarded iDEX and DIU grants for satellite manufacturing and advanced payload development.
- **Global Recognition**
  - Recognised among Fast Company's Top Innovative Space Companies, Via Satellite's Top 10, and TIME's Best Inventions.
  - Founders Awais and Kshitij recognised in Forbes 30u30 and Entrepreneur 35u35; Awais additionally recognised in MIT Innovators Under 35, Forbes 40u40, and as a UN Next Generation Fellow.

Planet Labs

- Conducted multiple satellite launches aboard SpaceX Falcon 9 in 2025, ensuring uninterrupted high-cadence imagery delivery.
- Expanded collaboration with Indian users, providing access to near-real-time imagery.
- Strengthened integration of private EO data within India's analytics ecosystem.

Pelican-2 rendering by Planet Labs

Key Achievements:

- August 2025: Launched Pelican-3 and Pelican-4 aboard Falcon 9 from Vandenberg SFB; Gen-1 Pelican satellites provide ~40 cm resolution across six multispectral bands.
- Equipped with NVIDIA Jetson AI platforms for on-orbit computing, via partnership with NVIDIA.
- August 2025: Partnered with Global Fishing Watch, processing 2+ million sq. km of imagery daily for ocean transparency and sustainability.

Saankhya Labs

- As the deep-tech arm of Tejas Networks, became a key architect of India's Direct-to-Mobile (D2M) ecosystem.
- Unveiled third-generation SDR chipsets in late 2025, enabling broadcast video reception on mobile devices without cellular data.
- Successfully completed pilot trials in 19 cities.

Sanyark Space Technologies

- Selected among 68 applicants for Seed Fund Grant Support.
- Secured mentorship and technical support from IN-SPACe for a project on precise orbit determination for LEO satellites.

SatSure

- Joined the ₹1,200-crore IN-SPACe-led EO-PPP consortium with Pixxel, Dhruva Space, and PierSight.
- Formalised a strategic partnership with Dhruva Space to deliver end-to-end EO-as-a-Service (EOaaS)solutions.
- Continued delivery of AI-powered geospatial analytics and decision intelligence across agriculture, infrastructure, risk, and sustainability domains.
- Subsidiary KaleidEO completed payload testing and qualification.
- During Operation Sindoor, KaleidEO supplied high-resolution, multi-sensor fused data for 24/7 visibility in mountainous terrain and cloud cover.

SES India

- Supported enterprise and government connectivity through high-throughput satellite services and gateway operations.
- Utilised Northrop Grumman's MEV-2 to extend the life of Intelsat-10-02 to 2030.

- Renewed a long-term distribution agreement with Sony Pictures Networks India, reaching 700+ million viewers across Asia-Pacific.

Sisir Radar

- Raised USD 7 million Series A funding (Dec 2025) to launch India's first private L-band and P-band SAR satellite by 2026.
- Achieved 0.75 m resolution in L-band, enabling foliage penetration.
- Won two iDEX challenges to build specialised satellites for the Indian Air Force.
- Built India's first drone-borne SAR system.
- Advancing development toward the world's highest-resolution L-band SAR satellite.

Skyroot Aerospace

- Advanced preparations for Vikram-1, India's first private orbital launch vehicle.
- Unveiled the complete Vikram-1 design and Infinity Campus in Hyderabad; campus inaugurated by Prime Minister Narendra Modi.
- Raised USD 95.5 million (~₹850 crore).
- Test-fired India's largest privately developed rocket stage.
- Secured 300 acres in Tirupati for launch infrastructure.

PM inaugurates Skyroot's Infinity Campus in Hyderabad via video conferencing

Vikram-1 Progress:

- Completed propulsion tests: Kalam-250 (186 kN), Kalam-100, 3D-printed cryogenic engine.
- Demonstrated Raman Engine RCS with 65 pulses.

VIKRAM 1

Strategic Collaborations:

- MoU with Axiom Space (June 2025).
- Partnership with Telangana Government for ₹500-crore integrated rocket facility (Jan 2025).
- Dr. S. Somanath joined as Chief Technical Advisor (June 2025).
- Strategic partnership with Exolaunch (Oct 2025) for global launch and deployment services.

SpaceFields

- Opened the Optimus Factory in Sydney (June 2025), the region's largest industrial-scale spacecraft manufacturing facility.
- Finalised a Launch Service Agreement with NSIL to launch its second 450-kg Optimus spacecraft aboard SSLV in 2026 under Space MAITRI.
- Successfully hot-fired India's first aerospike rocket engine, with static tests at IISc Challakere.

- Secured USD 5 million Pre-Series A funding.
- Signed MoUs with BDL, JSR Dynamics, and CSIR-NAL.
- Advanced international collaboration via GIFAS, including discussions with Roxel (Europe).

Space Kidz India

- Announced Mission ShakthiSAT, a global all-girls space mission engaging ~12,000 participants from 108 countries.
- Collaborated with UK-based Meridian Space Command for mission support.
- Continued leadership in space education and youth programmes through hands-on workshops and satellite science initiatives.
- Built upon its mission portfolio from KalamSAT to AzaadiSAT to expand global youth engagement.

Space Machines Company

- Established the Optimus Factory (OF-01) in Sydney, Australia's largest spacecraft manufacturing facility.
- Enabled scalable production of 300-kg-class spacecraft, with 20+ units per year capacity.
- Scaled manufacturing of Optimus Viper on-orbit servicing vehicles.
- Advanced Space MAITRI mission under an AUD 8.5 million Australian Space Agency grant.
- Progressed rendezvous and proximity operations (RPO) technologies for on-orbit servicing and sustainability.

Suhora Technologies

- Strengthened position in satellite data solutions and maritime intelligence.
- Exclusive partnership with SatVu (UK) for high-resolution thermal imagery.
- Partnered with Orbital Sidekick for hyperspectral data.
- Launched SPADE, a subscription-based SaaS platform for satellite data tasking and analytics.
- Awarded IN-SPACe Seed Fund Grant-in-Aid (Marine Sector AO).
- Honoured with the ISpA Space Industry Award for Innovation and Special Award for Operational Imagery Support (2025).
- During Operation Sindoor, aggregated data from 250+ satellites for post-strike damage assessment and onboarded Azista AFR-1 data.
- Signed MoU with IIIT Delhi for industry-academia collaboration.
- Became the first Indian private company selected by a strategic defence customer for Maritime Domain Awareness.
- Renewed SAR imaging and analytics contract with a strategic customer for the third time.
- Secured an Indo-German Science & Technology Centre grant for AI-based flood forecasting.

Tata Advanced Systems Limited

- Continued expansion in the space sector, building on TSAT-1A, India's first privately built sub-metre EO satellite.
- TSAT-1A assembled and tested at TASL's AIT facility and launched aboard Falcon 9.
- Vemagal AIT infrastructure positioned TASL as a key private contributor to high-resolution EO missions.

Thrustworks Dynetics

- Raised ₹7 crore (~USD 850k) seed funding in October 2025, led by Jamwant Ventures.
- Scaling its Integrated Rocket Facility in Pune.

- Developing ANYA, a liquid rocket engine platform.
- Pioneered India's first Mobile Rocket Engine Test Bed, used for rapid hot-fire tests in late 2025.

Viasat

- Expanded India footprint through collaboration with BSNL, supporting multi-band, multi-constellation SATCOM for government and defence users.
- Conducted the "Viasat: Space for Good Challenge 2025", a global STEM innovation competition across India, the US, and the UK.

Walchandnagar Industries

- Sustained contributions to India's space and strategic manufacturing ecosystem through precision engineering and heavy fabrication.
- Continues its legacy as a trusted ISRO partner for over five decades.
- 200th S139 motor segment milestone: Successfully flagged off the 200th S139 rocket motor segment to ISRO-SHAR, marking 52 years of collaboration.

XDLINX Space Labs

- Announced a strategic partnership with Sisir Radar to develop India's first private L-band SAR satellite mission.
- Launched Elevation-1 aboard SpaceX Transporter-12 (Jan 2025).
- Signed an agreement to establish a satellite R&D facility at GMR Aerospace Park, Hyderabad.
- Entered an MoU with Japan's BULL Co., Ltd. for sustainable space systems and joint technology development.

Xovian Aerospace

- Raised USD 2.5 million pre-seed funding.
- Advancing development of AI-native RF satellite infrastructure.
- Positioning for upcoming RF payload space trials and constellation plans.

VIII. Partnerships & Collaborations (India)

A. *United States*

- **NASA-ISRO Synthetic Aperture Radar (NISAR) Mission-** India and the United States jointly launched the NASA-ISRO Synthetic Aperture Radar (NISAR) satellite on 30 July 2025 , the first dual-frequency radar satellite built collaboratively by NASA and ISRO to monitor Earth's surface with high precision for climate, disaster and environmental applications.
- **Axiom Space Expanded Collaboration-** US-based Axiom Space deepened its partnership with India in human spaceflight and space station development, following the participation of Indian astronaut Shubhanshu Shukla in Axiom Mission-4. This collaboration is expected to extend India's role in international human space exploration and commercial station efforts.

B. *Japan*

- **Chandrayaan-5 / LUPEX Collaboration with JAXA-** ISRO and the Japan Aerospace Exploration Agency (JAXA) conducted a third technical interface meeting in May 2025 for the joint / Lunar Polar EXploration (LUPEX) mission, affirming combined scientific and engineering efforts for lunar **exploration.**
- **India-Japan Collaboration Announced by Leadership**

During an official state visit in **August 2025**, India and Japan formalised collaboration on the Chandrayaan-5 mission, reinforcing bilateral cooperation in lunar science and shared technological objectives.

- **Indo-Japan Climate & Regional Growth: Augsenselab** signed agreements with **MistEO (India)** and **LocationMind (Japan)** during the Prime Minister's visit to Japan, focusing on climate intelligence and disaster management.
- Japanese space debris company **Astroscale** entered collaboration with Indian startups **Digantara and Bellatrix Aerospace** on orbital services technology, reflecting growing India-Japan private space linkage.

C. *Europe*

- **CSIR-ISRO Space Meet 2025**

Held on **17 November 2025**, this event featured participation by representatives from major European space agencies including ESA, JAXA and CNES, fostering scientific exchange and cooperation in human spaceflight research and technology.

- **ESA & Gaganyaan:** The **European Space Agency (ESA)** collaborated closely with ISRO to validate the mission-critical network systems required for persistent communication with India's **Gaganyaan Crew Module**, ensuring global tracking coverage.

D. *Australia*

- **Indo-Australian Space MAITRI & OrbitAID Aerospace:**

Supported by the MAITRI grant, Chennai-based OrbitAID Aerospace is developing **India's first in-orbit docking and refuelling interface (SIDRP)**. Formalised at **IAC 2025**, the system will fly on an **international joint mission in 2026** to demonstrate docking and refuelling. The initiative aims to **standardise satellite refuelling, extend spacecraft lifespans, and support orbital sustainability**, with OrbitAID also leading the commercial ground-to-orbit propellant.

E. *Global South & Emerging Partners*

India's space cooperation initiatives span numerous countries globally, including Argentina, Brazil, Mexico, Kazakhstan, Indonesia, Thailand, Vietnam and others, with formal agreements covering remote sensing, satellite communications, launch support, capacity building and space science collaboration. Many of these partnerships facilitate **satellite data sharing**, **training and technical capacity building**, **support for disaster management and climate monitoring**, and **joint research and academic exchanges** through bilateral and multilateral cooperation. frameworks.

IX. International Space Developments

A. *The Heavy Lift Revolution: Systems, Struggles, and Strategic Implications*

The year 2025 was marked by significant advancements in **heavy-lift launch vehicles**, contrasting agile commercial programs with traditional aerospace approaches. **Super-heavy payload capabilities** reshaped satellite bus designs, orbital logistics, and deep-space mission architectures, enabling previously constrained missions. Reliable launch infrastructure emerged as a critical component for **national security, scientific exploration, and commercial satellite deployment**.

- **SpaceX Starship: Industrialisation of Mega launch-** SpaceX executed a high-cadence Starship flight campaign at Starbase, Texas. Flight 10 reached orbit with eight Starlink mass simulators, validating controlled re-entry, thermal protection, and landing technologies, while Flight 11 demonstrated reliability ahead of Block 2 vehicles with next-generation Raptor 3 engines. These developments de-risked NASA's Artemis Human Landing System, though cryogenic in-orbit refuelling remained under development.

- **Russia's Angara Program: Angara A5** completed its fifth flight on June 19, 2025, deploying the classified Kosmos-2589 payload from Plesetsk. This reinforced the reliability of URM-1 core modules and underscored Russia's commitment to fully domestic heavy-lift capabilities, ensuring sovereign access to GEO satellites.

- **Blue Origin's New Glenn: New Glenn** maiden flight faced delays due to BE-4 engine integration and hydrolox upper-stage challenges, pushing launch into 2026. These delays affected NASA missions such as ESCAPADE and Blue Moon Mark 1 cargo lander programs, while ground testing resolved technical uncertainties.

B. *Human Spaceflight:*

2025 highlighted the **bifurcation between commercial and government crewed programs**. NASA's **Artemis II** was delayed to 2026 due to heat shield erosion and life-support anomalies, while **Boeing Starliner** shifted to cargo-only operations, leaving **SpaceX** as the primary US crew transport provider. Private missions, such as **SpaceX Fram2**, expanded human spaceflight to **polar orbits**, marking the rise of private expeditionary crewed operations.

- **Artemis Program-** Artemis II was delayed after technical anomalies, providing NASA with critical data on life-support systems and heat shield durability. This recalibration allowed for refinements in lunar mission protocols and improved safety margins for subsequent crewed lunar missions.

- **Commercial Crew: Starliner Challenges and Crew Dragon Dominance-** The Boeing Starliner Calypso crewed test flight was extended due to thruster failures and helium leaks. **Astronauts Sunita Williams and Barry "Butch" Wilmore returned safely after 286 days aboard the ISS on March 2025 via SpaceX Crew-9 Dragon**. Their mission offered invaluable data on human endurance in microgravity and validated contingency life-support systems. NASA subsequently repurposed Starliner for cargo-only missions, leaving SpaceX as the dominant crewed ISS access provider.

NASA astronauts Butch Wilmore and Sunita Williams return to Earth after 9 months stuck in space

- **China's Tiangong: Operational Permanence-** China maintained operational continuity of Tiangong with Shenzhou-20 and Shenzhou-21, while testing next-generation reusable crewed vehicles and Long March 10 variants. Plans for station expansion to six modules reflected ambitions to host international astronauts and challenge global leadership in reusable launch technologies.

Chinese Tiangong Space Station

C. *Satellite Communications: The Direct-to-Device Paradigm Shift*

- The year 2025 marked a major shift toward consumer-focused satellite connectivity. SpaceX Starlink launched **Direct-to-Cell services** in collaboration with T-Mobile, enabling SMS messaging on standard LTE devices. With a constellation exceeding **9,000 satellites**, median download speeds reached **200 Mbps**. Concurrently, the European Union progressed its **IRIS² program** with a €10.6 billion contract for **272 satellites**, while China deployed the **G60 and Guowang constellations** to ensure sovereign global LEO coverage.

- Amazon advanced the operational rollout of **Project Kuiper**, launching its first satellites to provide **low-latency broadband worldwide**. Valued at $10 billion, the initiative leverages LEO technology to expand connectivity in underserved regions and directly compete with Starlink.

Viasat trials direct-to-device connectivity in India in partnership with BSNL

- A notable development in 2025 was the rise of **Direct-to-Device (D2D) connectivity**, demonstrated by AST SpaceMobile and Lynk Global, allowing satellite-enabled mobile services on standard smartphones. Traditional GEO operators, including **Viasat** (following its Inmarsat integration) and **SES**, adopted **hybrid LEO–MEO–GEO architectures** to strengthen service resilience and continuity.

D. Rideshare and Connectivity Milestones

- **SpaceX Transporter-12:** The January 2025 rideshare mission from Vandenberg deployed 131 payloads, including Indian startups Pixxel (hyperspectral imaging) and Digantara (space situational awareness), demonstrating the integration of small international satellites into global LEO networks.
- **Eutelsat Connectivity Milestone:** Eutelsat connected 1 million underserved users in Sub-Saharan Africa via satellite broadband, achieving its ITU Partner2Connect pledge ahead of schedule and emphasizing the strategic role of commercial satellites in providing critical communications infrastructure.

SpaceX's Falcon 9 rocket before launch. Photo: SpaceX

E. Strategic, Defense, and Orbital Operations

- Space militarization advanced with operational exercises and technology demonstrations. The U.S. proposed the **"Golden Dome"** initiative for space-based defense and infrastructure, while the US Space Force published **Vector 2025,** emphasizing proliferated LEO and dynamic space operations.
- Europe conducted **AsterX 2025**, integrating commercial industry data.
- China's **Shenlong spaceplane** performed co-orbital maneuvers, while **Sierra Space's Dream Chaser** attracted DoD interest for rapid cargo transport.

F. Space Sustainability and Debris Management

2025 saw increased debris events stressing orbital sustainability. **Intelsat 33e broke up in GEO, and Long March 6A upper stage fragmentation added 700 LEO fragments**. UNEP and ESA reports emphasized active debris removal and routine collision avoidance, highlighting the critical need for long-term orbital stewardship.

G. Diplomatic Architectures and Commercial Diplomacy

- The **Artemis Accords** expanded to include Finland, Bangladesh, Senegal, and the Philippines, strengthening norms for responsible space activity.
- The U.S. and China coordinated on collision avoidance, establishing **operational Space Traffic Management mechanisms.**
- Simultaneously, commercial diplomacy advanced through **Africa-EU Space Partnership and ESA-South Korea** agreements, integrating Asian partners into European satellite data ecosystems.

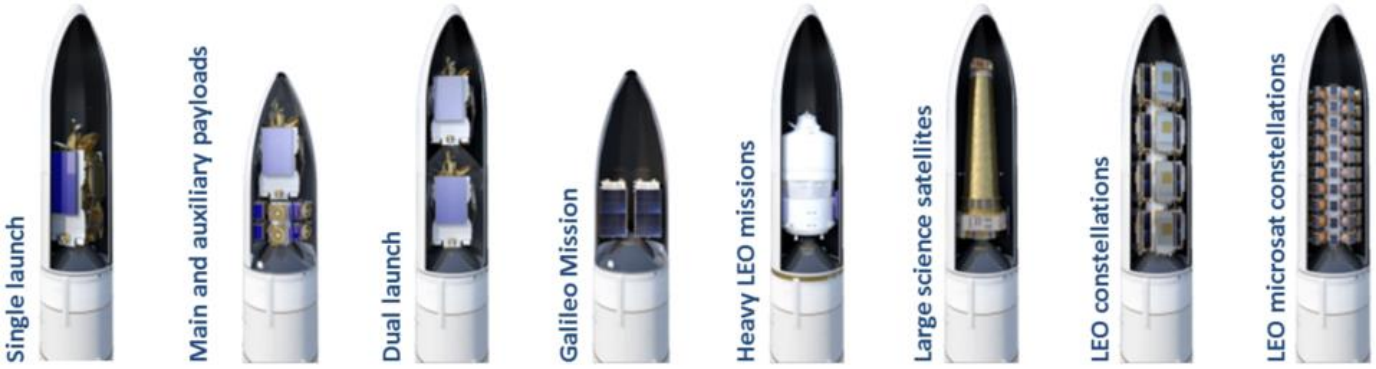
H. Scientific Frontiers and Lunar Exploration

- **NASA Blue Ghost:** Firefly Aerospace's lunar lander successfully touched down in March 2025 under the CLPS program, delivering ten payloads for regolith analysis, radiation monitoring, and resource mapping.
- **China's Lunar Laser Ranging**: Tiandu-1 achieved precise daytime Earth-Moon distance measurements.
- **SPHEREx and JAXA SLIM**: NASA launched SPHEREx for all-sky spectral surveys, while SLIM continued intermittent lunar surface imaging, advancing planetary science and resource studies.

NASA's SPHEREx telescope Illustration
Credit : NASA

I. Launch Vehicles and Access to Space

- Access to space in 2025 continued to improve in terms of cost, cadence, and reliability, driven largely by reusable launch systems and the growing number of commercially operated vehicles. **SpaceX** maintained global leadership with a high-frequency launch manifest using Falcon 9 and Falcon Heavy, reinforcing reusability as an industry standard.
- **China's CASC (China Aerospace Science and Technology Corporation)**, through the Long March family, demonstrated scale and consistency, while private Chinese firms such as **i-Space, Galactic Energy, and LandSpace** advanced methane-fuelled and small-launch capabilities.
- In parallel, **Rocket Lab** expanded its Electron launch services while progressing development of Neutron, targeting medium-lift reusability.
- In Europe, **ArianeGroup** focused on restoring autonomous launch capability through Ariane 6, while new commercial entrants sought to address the small-satellite launch gap.



Ariane 6 possible missions and configurations | Photo: ESA

J. Global collaborations and Acquisitions in space

- **SES completes acquisition of Intelsat** – In July 2025, SES, the Luxembourg-based satellite operator, completed its acquisition of Intelsat, creating a global multi-orbit connectivity provider with a combined fleet of over 120 satellites across GEO and MEO orbits, strengthening global satcom positioning and integrated services.
- **Rocket Lab's strategic acquisition of Mynaric** – In March 2025, Rocket Lab USA announced and progressed its acquisition of German optical communications firm Mynaric, a provider of laser communication terminals for space applications. This acquisition (valued around $75 million) enhances Rocket Lab's capabilities in high-speed intersatellite and space-to-ground links and expands its European footprint.
- **Voyger Technologies acquired Optical Physics Company (OPC)** – May 2025, As part of its vertical integration strategy in 2025, Voyager Technologies acquired Optical Physics Company (OPC), augmenting its optical components portfolio, and agreed to acquire LEO cloud to enhance its space cloud computing platforms.
- **European Space Consolidation** - Airbus, Leonardo and Thales signed a Memorandum of Understanding to align and enhance their space divisions into a unified European space player, strengthening Europe's competitiveness and integrated space systems capabilities.
- **UK Space Agency international collaboration funding** - The UK Space Agency funded 23 space projects fostering international research partnerships, furthering global cooperation on science and space innovation.

K. Total orbital launches

The global orbital launch landscape between 2018 and 2025 demonstrates a pronounced acceleration in space activity, with total annual orbital launch attempts nearly tripling from 114 in 2018 to 329 in 2025. The United States has emerged as the dominant launch actor, exhibiting sustained and exponential growth, particularly after 2021, reflecting the rapid maturation of its commercial launch ecosystem and high-frequency deployment strategies. China has also shown consistent growth, reinforcing its position as the second-largest launch power with a steady increase in both state-led and commercial missions. In contrast, Russia's launch activity has remained relatively stagnant over the period, while Europe has experienced a notable decline post-2021, highlighting structural and programmatic challenges.

India's launch cadence, while modest in absolute numbers, has remained stable and strategically focused, underscoring a measured approach prioritizing mission reliability, capability development, and the gradual integration of private sector participation. The emergence of new launch-capable nations such as New Zealand, alongside incremental activity from others, further illustrates the broadening and diversification of the global space ecosystem. Overall, the data reflects a decisive shift toward higher launch frequencies, commercial dominance, and geopolitical competition in space trends that carry significant implications for policy, regulation, and industry development in the coming decade.

- **Orbital launch attempts per year:**

Country	*2018*	*2019*	*2020*	*2021*	*2022*	*2023*	*2024*	*2025*
USA	31	21	37	45	78	109	145	181
Russia	17	22	12	16	21	19	17	17
China	39	34	39	56	64	67	68	92
Europe	11	9	10	15	6	3	3	8
India	7	6	2	2	5	7	5	5
Japan	6	2	4	3	1	3	7	4
Israel	0	0	1	0	0	1	0	1
Iran	0	2	2	2	1	2	4	1
North Korea	0	0	0	0	0	3	1	0
South Korea	0	0	0	1	1	2	0	2
New Zealand	3	6	7	6	9	7	13	17
Australia	0	0	0	0	0	0	0	1
Other	16	16	16	14	17	25	30	31
Total	**114**	**102**	**114**	**146**	**186**	**223**	**263**	**329**

- **Payloads launched per year**

Country	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Russia	15	24	23	31	22	20	51	67	98	88
USA	94	282	303	281	974	1237	1946	2231	2270	3719
China	40	36	98	73	74	111	182	212	265	371
Europe	22	42	60	50	134	357	190	252	114	147
Other	50	60	84	65	59	99	127	146	116	194
Other	0	0	0	0	0	0	0	0	0	3
Total	**221**	**444**	**568**	**500**	**1263**	**1824**	**2496**	**2908**	**2863**	**4522**

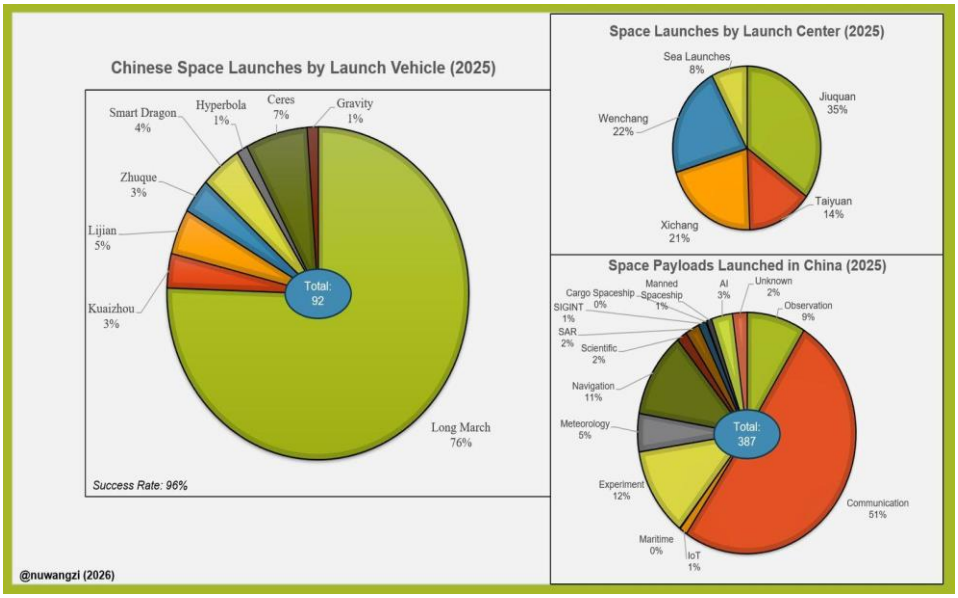
- The data on orbital payloads launched between 2016 and 2025 highlights an even sharper transformation of the global space economy, marked not merely by increased launch frequency but by a dramatic escalation in payload throughput and orbital utilisation. Total payloads deployed annually have expanded more than twentyfold over the decade, rising from 221 in 2016 to 4,522 in 2025, underscoring the shift toward large-scale constellation deployment and high-capacity launch systems.
- The United States overwhelmingly dominates this metric, particularly after 2020, reflecting the operational maturity of reusable launch vehicles and mass satellite deployment architectures. China exhibits steady and structured growth, indicating a parallel expansion in both state-led and commercial payload programmes. Europe shows episodic spikes rather than sustained growth, suggesting programme-driven launches rather than continuous deployment cycles. Russia's payload numbers remain comparatively modest and inconsistent, pointing to limited participation in the emerging high-volume launch paradigm.
- The "Other" category, which includes new commercial launch hubs, records a notable rise, reinforcing the decentralisation and commercialisation of access to space. Collectively, these trends indicate a fundamental transition from launch-centric metrics to payload-centric space operations, with profound implications for orbital congestion, space traffic management, regulatory frameworks, and downstream space-enabled services, areas of increasing relevance for India's evolving space industrial ecosystem.

L. The Debris Status (Oct 2025)

- Number of rocket launches since 1957: ~7070 (excluding failures)
- Number of satellites launched: ~23770
- Number of these still in space: ~15860
- Number of these still functioning: ~12900
- Estimated number of break-ups, explosions, collisions, or anomalous events resulting in fragmentation: ~650
- Total mass of all space objects in Earth orbit: >15100 tonnes
- 54000 space objects greater than 10 cm (including approx. 9300 active payloads)
    - 1.2 million space debris objects from greater than 1 cm to 10 cm
    - 140 million space debris objects from greater than 1 mm to 1 cm

M. China in Space

The data for China's space activity in 2025, as illustrated in the accompanying charts, underscores the scale, maturity, and operational focus of its launch ecosystem. Launch vehicle distribution shows an overwhelming reliance on the Long March family, which accounts for over three-quarters of all launches, reflecting standardisation, high reliability, and industrial depth, complemented by a growing presence of small commercial launchers supporting responsive and diversified access to orbit. Launch site activity is well distributed across Jiuquan, Wenchang, Xichang, and Taiyuan, with the increasing share of sea launches indicating enhanced flexibility and strategic reach.



On the payload side, China's emphasis is clearly oriented toward communications, navigation, and experimental satellites, together forming the bulk of deployments, highlighting priorities in constellation expansion, dual-use infrastructure, and technology validation. Overall, the data points to a highly integrated civil–military–commercial space architecture, characterised by high launch success rates, rapid deployment capability, and a strong alignment between launch capacity and national strategic objectives.

X. Funding, Financial & Economic Impact

- **Economic Developments & Market Trends -**The global space sector in 2025 demonstrated sustained economic strength, marked by rising revenues, stable public funding, and selective but significant private investment. The global space economy was valued at approximately USD 600-630 billion, with over 70 percent of economic value generated by satellite-enabled services such as communications, navigation, and Earth observation.
- **Public Spending and Institutional Demand-** Global government expenditure on civil and defence space programmes exceeded **USD 125 billion** in 2025. The **United States** remained the largest contributor through NASA and defence space budgets, supporting programmes such as Artemis, national security space systems, and commercial launch services. **China** continued large-scale state-backed investment across launch vehicles and satellite constellations, while **Europe** prioritised funding for autonomous access to space, secure connectivity, and Earth observation through ESA and EU programmes.
- **Private Investment and Market Activity -**Private capital deployment in the space sector reached approximately **USD 12–15 billion** in 2025. Investment concentrated on companies with operational maturity and scalable business models. **LEO broadband operators** such as Starlink and OneWeb attracted continued infrastructure funding, while Earth observation companies including **Planet Labs, Maxar, and ICEYE** expanded subscription-based analytics services. Strategic investments and mergers supported vertical integration and global market expansion across the sector.
- **Commercial Revenues and Business Models-** Satellite communications remained the largest revenue-generating segment, driven by broadband, mobility, and enterprise services. Earth observation companies increasingly monetised **analytics and decision-support services**, moving beyond imagery sales. Launch service providers benefited from higher flight rates and reusable systems, improving cost efficiency and margins.
- **Commercialization of SSLV and Private Sector Participation -**The **SSLV commercialization** and robust private-sector infrastructure support reflect the rapidly expanding opportunities within the national space economy. In **FY 2025**, India's private space sector reached a historic milestone, attracting approximately **$157 million** in investment a **94% surge** compared to the previous year. Manufacturing opportunities saw a significant horizontal expansion across satellites, launch vehicles, avionics, propulsion, electronics, and ground systems. This growth is further propelled by an **export-oriented alignment** and an unprecedented demand for skilled talent, firmly establishing space as a critical economic driver for the country.

Table 1: Key Economic Indicators (2025)

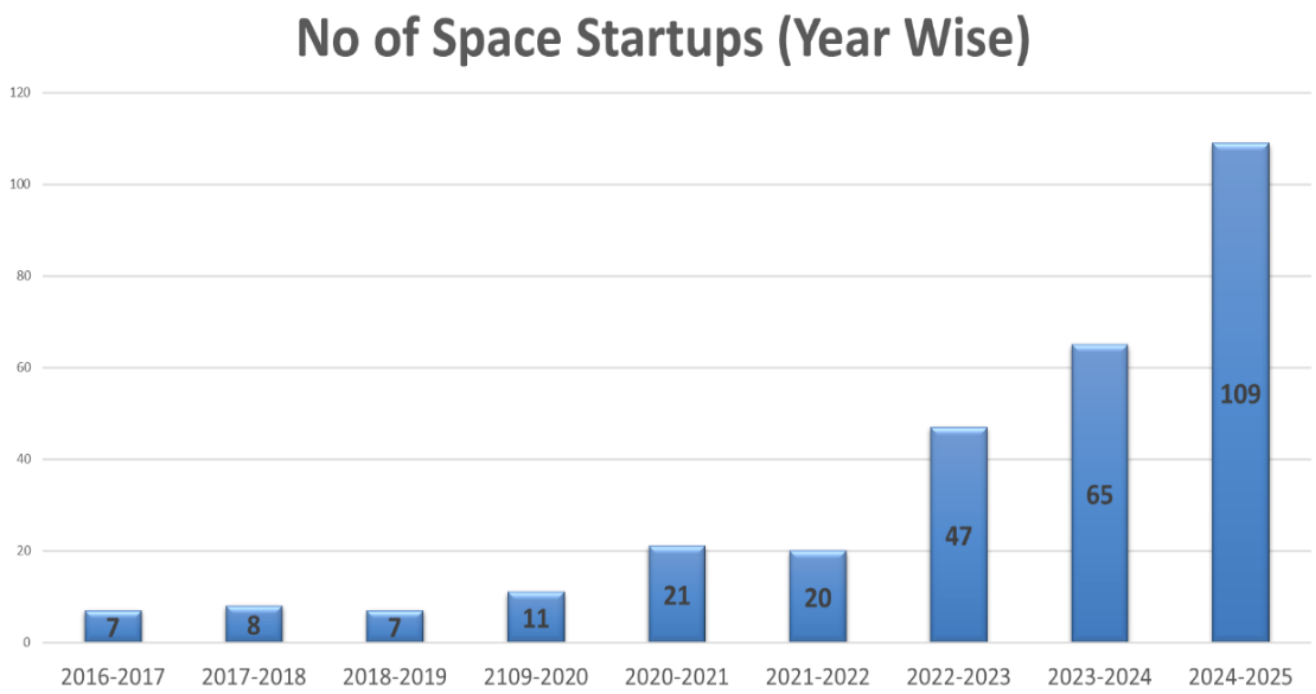
Indicator	Status
Active Space Startups	**300+**
Private Investment (FY25)	**~$157 million**
SATCOM Users Supported	**600,000+**
Global Market Share (Current)	**~2%**
Space Economy Valuation	**~$9 billion**

Table 2: Historical Funding Trends (2017-2025)

Year	Amount (In Million USD)
Upto 2017	$38.00 M
2018	$3.08 M
2019	$6.05 M
2020	$22.50 M
2021	$67.20 M
2022	$125.72 M
2023	$123.90 M
2024	$81.00 M
2025	$149.36 M
Total Cumulative Funding	~$617.44 M

Table 3: 2025 Major Funding Rounds in the Space Sector

Company Name	Funding (In Million USD)
Digantara	$50.0 M
Sanyalayan Tech	$21.5 M
Agnikul Cosmos	$17.0 M
Astrome Tech	$10.0 M
Sisir Radar	$8.50 M
Inspecity	$5.60 M
Spacefields	$5.00 M



XI. Important Events

A. National Meet on Aditya-L1 Data Release and Payload Performance Appraisal (January 6, 2025)

- First-year anniversary of Aditya-L1 at L1 halo orbit.
- Release of the first batch of solar observational data to 40 scientists from 15 Indian universities and research centers.
- Data covered all seven remote-sensing and on-site experiments.
- Second batch of data released on February 14, 2025, providing insights into the Sun's photosphere, chromosphere, corona, and in-situ particle and magnetic field measurements.

B. National Meet 2.0 (NM 2.0) and National Space Day 2025 (August 22-23, 2025)

- Theme: *"Leveraging Space Technology and Applications for Viksit Bharat 2047"* and *"Aryabhatta to Gaganyaan: Ancient Wisdom to Infinite Possibilities."*
- Platform for ministries, state governments, industry, startups, academia, and space enthusiasts to discuss space applications for national development.
- Exhibition showcasing innovations from startups, research institutions, and industry.
- Celebration of India's growing capabilities in space technology and applications.

C. India Hosts GLEX 2025: Forging Global Pathways in Space Exploration

- The Global Space Exploration Conference (GLEX) 2025 was held between May 7-9 in New Delhi and it marked a milestone in international collaboration.
- It was **co-hosted by ISRO and the Astronautical Society of India (ASI)** under the International Astronautical Federation (IAF).
- The high-profile summit, themed Reaching New Worlds: A Space Exploration Renaissance, drew leaders, astronauts, and scientists from over 35 countries, reinforcing India s central role in international space diplomacy and innovation.
- GLEX 2025 featured more than 240 interactive presentations across 10 technical sessions and 15 thematic areas, showcasing global advances in space exploration.

D. India International Space Conclave 2025 (IISC 2025)

- The India International Space Conclave (IISC) 2025, held on 18-19 November at The Lalit, New Delhi, under the co-hostship of ISRO and IN-SPACe, served as a premier platform to showcase India's NewSpace ambitions and global collaborations. With over 1,000 participants from government, industry, startups, and academia across 15+ countries, and featuring 75+ eminent speakers across 17+ sessions, the conclave emphasized innovation, inclusion, and resilience in the emerging space economy.

- At the 4th India International Space Conclave , the **ISpA Industry Awards 2025** celebrated outstanding achievements across India's space ecosystem, recognizing innovation, leadership, and excellence in both industry and academia. **Awards** were presented across diverse categories: **Pixxel** and **GalaxEye** for Earth Observation and Geospatial Excellence; **Esri India** for Platform for Public Impact; **Augsense Lab** for International Collaboration & Market Expansion; **Digantara** for Space Sustainability Champion; **Astrogate Labs** for Emerging Technology of the Year; **Cyran AI** for AI for Defence & Geospatial Intelligence; **Suhora Technologies** and **Vantor** received Special Awards for Operational Imagery Support; **Larsen & Toubro** for Space Manufacturing & Production Excellence; **Azista** for Special Award in Manufacturing Excellence; **Eutelsat OneWeb** and **Ananth Technologies** for Satcom Industry Awards; **Agnikul Cosmos** for Contribution to Space Exploration; **Skyroot Aerospace** for Excellence in Space Technology Innovation; and **Amity University** for Academic Excellence in Space Education & Research.

- **Day 1 Highlights: Enabling India's NewSpace Ecosystem**
  IISC 2025 opened with a strong focus on enabling India's NewSpace ecosystem through regulatory reform, financing innovation, and industry collaboration. **Key sessions** addressed policy, financial, and technological frameworks, alongside **a fireside chat** on space financing, PPP models, and patient and blended capital. **The Exhibitor Spotlight** featured Azista BST Aerospace, Digantara, BosonQ Psi (BQP), Larsen & Toubro (L&T), GalaxEye, Pixxel, Italian Trade Agency, Vantor, and Novaspace. **The inaugural session** included the signing of five MoUs, release of four major reports, including the *Valuation & Fundraising in Aerospace Startups Guide* and the *India DefSpace Symposium 2025 Technical Report*, and presentation of industry awards. Platinum **Sponsors** were L&T, Vantor, Airtel, Eutelsat OneWeb, Nelco, Viasat, and Walchand, with Digantara and Azista BST Aerospace as Silver Sponsors. **Eminent dignitaries** included **Shri Jitendra Singh, Air Chief Marshal VR Chaudhari (Retd), H.E. Antonio Bartoli, Mr. Takashi Ariyoshi, Dr. Pawan Goenka, Dr. Saku Tsuneta, and Gp Capt Shubhanshu Shukla.**

- **Day 2 Highlights: Governance, Sustainability & Global Collaboration**
  Day 2 focused on governance, sustainability, and global collaboration in the New Space era, assessing space's contribution to India's GDP and covering key domains such as Earth Observation, NavIC (GNSS), SatCom and spectrum, launch vehicles, propulsion, human spaceflight, in-orbit servicing, and debris management. Discussions emphasised indigenous capability development, regulatory alignment, and deeper cooperation with **Japan, Italy, the EU, and Asian partners**. **Distinguished speakers** included **Smt Meenakshi Lekhi, H.E. Marjolijn Van Deelen, Shri A.S. Kiran Kumar, Air Chief Marshal RKS Bhadauria (Retd), Air Vice Marshal Manu Midha, Shri Amit Ghosh, Gp Capt PB Nair, Gp Capt Angad Pratap, and Ms Naoko Yamazaki.**

XII. Space Calendar 2026

Dates	Event	Location
17–19 Feb 2026	*Small Satellites & Services International Forum (SSSIF 2026)*	*Málaga, Spain*
23–27 Feb 2026	*National Space Science Symposium (NSSS-2026)*	*Umiam (Shillong), Meghalaya, India*
8–10 Apr 2026	*SMOPS 2026 (IN-SPACe Spacecraft Mission Operations Conference)*	*Bengaluru, India*
23–24 Apr 2026	*Indian DefSpace Symposium (4th Edition)*	*New Delhi, India*
4–7 Jun 2026	*International Space Development Conference (ISDC 2026)*	*McLean, Virginia, USA*
23 Aug 2026	*National Space Day*	*New Delhi, India (celebrated nationwide)*
12–13 Sep 2026 (Provisional)	*ISEC Space Elevator Conference 2026*	*Virtual / Global*
5–9 Oct 2026	*77th International Astronautical Congress (IAC 2026)*	*Antalya, Türkiye*
Oct 2026 (TBC)	*India Mobile Congress 2026*	*New Delhi, India*
Q4 2026 (TBC)	*Bengaluru Space Expo (BSX 2026)*	*Bengaluru, India*
Nov 2026 (TBC)	*India International Space Conclave*	*New Delhi, India*

XIII. Conclusion

The developments of the past year underscore a defining moment for India's space sector. What was once a predominantly government-led domain has evolved into a dynamic, multi-stakeholder ecosystem where policy reform, institutional clarity, technological advancement, and private-sector innovation are converging with purpose. Space today is no longer confined to exploration and science alone; it has become a critical pillar of national security, economic resilience, digital infrastructure, and global influence.

India's progress over the year reflects a maturing ecosystem. Forward-looking policies, growing state-level participation, enhanced regulatory mechanisms, and targeted government initiatives have laid a strong foundation for sustainable growth. Simultaneously, ISRO's continued technical achievements and expanding collaboration with industry have reinforced India's credibility as a reliable and capable space power. The rapid rise of the private sector—across launch services, satellites, downstream applications, and manufacturing signals a structural shift that will define the next decade of Indian space activities.

Internationally, India's expanding partnerships and leadership in global forums highlight its increasing strategic relevance in shaping norms, cooperation frameworks, and responsible space practices. As space becomes more contested and congested, India's emphasis on resilience, security, and self-reliance will be central to safeguarding national interests while enabling global collaboration.

The Indian Space Association remains committed to playing a constructive role in this journey bridging government, industry, academia, and international partners; advocating for enabling policies; and strengthening India's position in the global space economy. The year ahead presents significant opportunities and challenges, but the momentum achieved thus far provides confidence that India is well positioned not only to participate in the global space landscape, but to actively shape its future.

Contributors

The organization acknowledges the contributions of the following individuals to the preparation of this report:

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About ISpA

The **Indian Space Association (ISpA)** is an apex non-profit industry body established to support the successful and collaborative development of India's private space sector.

ISpA serves as the single voice of the private space industry and acts as a bridge between the Government and industry. The association undertakes policy advocacy and engages with stakeholders across the Indian space ecosystem to facilitate business opportunities and enable its members to contribute effectively to national space ambitions.

ISpA facilitates strategic dialogue, professional networking, and knowledge exchange, fostering collaborative partnerships among policymakers, government agencies, industry stakeholders, academia, the user community and resource providers. The association also promotes international engagement and collaboration with global space agencies, industry bodies and partners to strengthen India's participation in the global space economy and advance avenues for cooperation and growth.

Echoing the Hon'ble Prime Minister's vision of **"Atmanirbhar Bharat"**, ISpA works with all stakeholders to create an enabling environment for strengthening the private sector in India's space ecosystem, positioning India at the forefront of the global space industry.

Disclaimer

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Space Activities

(An ISPA Summary)

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