INDIAN SPACE ASSOCIATION
Bhumandal Se Brahmaand Tak

DECEMBER 2025

NEWSLETTER
INDIAN SPACE ASSOCIATION

ISRO LVM3 BLOCK-2
SATELLITE LAUNCH

INDIA IN ORBIT: PROGRESS, PARTNERSHIPS & STRATEGIC GROWTH

INDIAN SPACE ASSOCIATION
Bhumandal Se Brahmaand Tak

Welcome to **ISpA Newsletter**, a trusted conduit for illuminating the latest strategic endeavours, technological innovations and industry insights shaping the future of sustainable space exploration.

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MESSAGE FROM DG-ISpA

The highlight of the month was the successful launch of **AST SpaceMobile's BlueBird Block-2** aboard **ISRO's LVM3-M6** mission, marking one of the heaviest commercial payloads launched from Indian soil. This mission represents a major milestone for India's commercial launch capabilities and reflects the confidence of global space companies in ISRO's heavy-lift launch systems.

Alongside this achievement, ISRO recorded another important milestone with the successful static test of the improved **third stage (SS3)** of the **Small Satellite Launch Vehicle (SSLV)**. The enhanced SS3 design, delivering higher payload performance, strengthens India's responsive launch readiness. The commissioning of new solid motor production infrastructure including expanded facilities at Sriharikota, a second Ammonium Perchlorate production line, and the world's largest indigenous solid propellant mixer further reinforces India's long-term launch resilience and self-reliance.

December also witnessed meaningful progress on the regulatory front with **TRAI** issuing recommendations on the assignment of microwave, E-band, and V-band spectrum, providing a stronger policy foundation for satellite communications, 5G backhaul, and integrated multi-orbit networks. Such regulatory clarity is essential for enabling next-generation connectivity and scaling India's digital and space-enabled infrastructure.

India's private space ecosystem continued to demonstrate strong momentum. **Digantara's** USD 50 million Series B funding to expand space domain awareness and missile-tracking capabilities, and **Sisir Radar's** USD 7 million Series A raise to advance India's first private L-band SAR satellite, highlight growing investor confidence in indigenous technologies addressing both strategic and civilian requirements.

Throughout the month, ISpA remained actively engaged across strategic platforms. I had the privilege of contributing to national dialogues on cyber-physical security, sovereign space infrastructure, and public-private partnership models, including engagements at **AISS 2025** and **GeoSmart India 2025**. ISpA also continued to strengthen international cooperation, including focused engagements with a Japanese delegation, reinforcing industry-led collaboration and future joint missions.

As we now pivot towards the **Indian Defspace Symposium (IDS 2026)**, our focus remains on strengthening India's sovereign space capabilities, accelerating private-sector growth, and deepening international cooperation. I encourage all members to continue engaging closely with Team ISpA, your insights and leadership are vital to shaping the next chapter of India's space journey. Together, we continue to build a more resilient, innovative, and globally influential Indian space ecosystem.

Lt Gen A K Bhatt
PVSM UYSM AVSM SM VSM (Retd)
Director General,
Indian Space Association (ISpA)
(Former DGMO, MS & GOC 15 Corps)

HIGHLIGHTS OF THE MONTH

- THE LVM3-M6 MISSION HAS SUCCESSFULLY PLACED THE BLUEBIRD BLOCK-2 SATELLITE INTO ITS INTENDED ORBIT
- SUCCESSFUL ACCOMPLISHMENT OF DROGUE PARACHUTE DEPLOYMENT TESTS FOR GAGANYAAN
- ISRO CONDUCTED A SUCCESSFUL STATIC TEST OF THE ENHANCED THIRD STAGE (SS3) OF THE SMALL SATELLITE LAUNCH VEHICLE (SSLV) AT SDSC, SRIHARIKOTA.
- DIGANTARA RAISED USD 50 MILLION (SERIES B) TO EXPAND ITS SPACE-BASED SDA AND MISSILE-TRACKING CAPABILITIES.
- SISIR RADAR SECURED USD 7 MILLION (SERIES A) TO ADVANCE INDIA'S FIRST PRIVATE L-BAND SAR SATELLITE (TARGET: 2026).
- AZISTA MARKED KEY OPERATIONAL AND PARTNERSHIP MILESTONES, CONTRIBUTING TO INDIA'S EO SATELLITE ECOSYSTEM.
- TRAI ISSUES KEY RECOMMENDATIONS ON MICROWAVE SPECTRUM ASSIGNMENT

MEMBERS BULLETIN

ANANTH TECHNOLOGIES

Ananth Technologies played a key role in the success of India's heaviest launch mission, LVM3-M6, conducted by the Indian Space Research Organisation on 24 December 2025. The Hyderabad-based company supplied critical flight hardware, avionics systems, and precision subsystems including power modules, data acquisition units, command modules, and control electronics that were essential to the launch vehicle's performance and the deployment of the BlueBird Block-2 communications satellite into orbit.

DIGANTARA

Digantara has raised USD 50 million in Series B funding, marking a significant milestone for India's growing capabilities in Space Domain Awareness, space intelligence, and next-generation defence technologies. The company is expanding beyond Space Situational Awareness into missile detection and tracking, supported by advancements such as the launch of SCOT, the scaling of its ground and space-based sensor networks, and its entry into the United States, where it now participates in the U.S. Missile Defense Agency's SHIELD programme. This investment reflects strong confidence in Digantara's strategic vision and technological maturity. ISpA congratulates Anirudh Sharma, Rahul Rawat, Tanveer Ahmed, and the entire Digantara team, along with their investors- 360 ONE Asset, SBI Investment, Peak XV Partners, and Kalaari Capital and looks forward to their continued contributions to India's space ecosystem and global space security framework.

MEMBERS BULLETIN

PIXXEL

Pixxel and UP42 have announced a strategic partnership to make Pixxel's hyperspectral satellite data globally accessible through the UP42 Earth observation marketplace. Under this collaboration, users of UP42 will be able to directly order 5-metre resolution hyperspectral imagery from Pixxel's six-satellite Firefly constellation, offering coverage across 135+ spectral bands with a 40 km swath width a first-of-its-kind capability for commercial users.

The partnership enables advanced Earth observation applications across agriculture, climate, forestry, and environmental monitoring, allowing users to detect subtle signals such as early crop stress, soil conditions, and ecosystem changes that are not visible through conventional multispectral imagery. By joining UP42's global ecosystem, Pixxel significantly expands the reach of its Firefly constellation, advancing its vision of making hyperspectral imaging a mainstream tool for understanding and improving planetary health worldwide.

SISIR RADAR

Sisir Radar has successfully raised USD 7 million in Series A funding, led by 360 ONE Asset with participation from Shastra VC, marking an important milestone for India's private space and defence technology ecosystem. The funding supports the company's plan to launch India's first private L-band Synthetic Aperture Radar (SAR) satellite by 2026, reflecting its sustained progress in developing advanced, indigenous SAR capabilities.

Sisir Radar continues to build high-resolution, all-weather SAR systems tailored for both strategic and civilian applications, including national security, disaster management, environmental monitoring, and urban planning. The company's technical leadership across L-band and P-band SAR systems strengthens India's position in next-generation Earth observation technologies.

ISpA commends Soumya Misra, Tapan Misra, Urmi Bhambhani Misra, and the entire Sisir Radar team on this achievement, and extends best wishes for their continued growth and contributions to India's space and defence ecosystem.

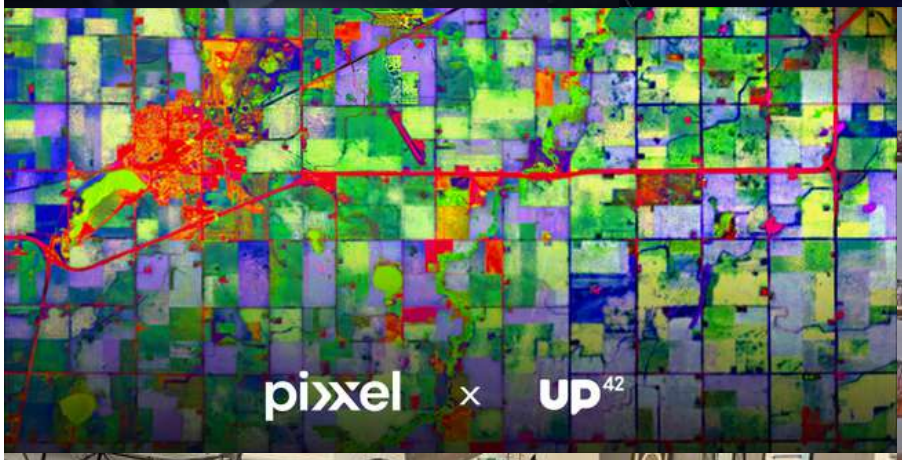
MEMBERS BULLETIN

SUHORA

Suhora Technologies has partnered with Azista Industries to onboard data from Azista's ABA First Runner (AFR1) satellite onto SPADE, Suhora's multi-sensor satellite data and analytics platform. AFR1's multispectral imagery will strengthen indigenised access to high-quality Earth observation data, supporting applications across defence, maritime, agriculture, disaster management, and environmental monitoring.

The announcement coincides with SPADE's first anniversary, with Suhora unveiling enhanced platform features and expanded analytics, reinforcing India's growing private-sector capabilities in satellite data and downstream space applications.

MEMBERS BULLETIN



ISpA ACTIVITIES

DG ISpA LT GEN ANIL KUMAR BHATT (RETD), ATTENDED THE 3RD CONVOCATION OF IIIT RANCHI AS THE CHAIRMAN, BOARD OF GOVERNORS

DG ISpA Lt Gen Anil Kumar Bhatt (Retd), attended the 3rd Convocation of IIIT Ranchi as the Chairman, Board of Governors, held on 29 December 2025 at the Auditorium of Jharkhand University of Technology, Ranchi.

The convocation was graced by Shri Sanjeev Sethi, Rajya Raksha Mantri (Minister of State for Defence), as the Chief Guest, marking an important occasion celebrating academic excellence and innovation.

Graduates from B.Tech, M.Tech, and Ph.D. programmes were conferred their degrees, reflecting IIIT Ranchi's growing contribution to advanced technology education and research.

ISpA remains committed to strengthening academia–industry linkages and nurturing future-ready talent for India's strategic and emerging technology sectors.

ISpA ACTIVITIES

VISIT OF ASTROBASE SPACE TECHNOLOGIES TO ISpA

It was a pleasure to host Mr Neeraj Khandelwal , Co- Founder, Astrobase Space Technologies at the ISpA office for a meeting with the Lt Gen Anil Kumar Bhatt (Retd), Director General, ISpA.

Astrobase is working towards building India's next-generation orbital launch systems, leveraging Full-Flow Staged Combustion (FFSC) engine technology to enable cost-efficient, reliable, and sovereign access to space.

Mr Khandelwal brings successful entrepreneurial experience in blockchain and emerging technologies and has transitioned into the space sector, reflecting the increasing convergence of deep-tech innovation across domains.

ISpA looks forward to continued engagement with Astrobase as India's private space ecosystem continues to evolve.

ISpA ACTIVITIES

ISpA MEMBERS SHOWCASE INNOVATIONS AT ARMY HOUSE RECEPTION

ISpA recorded the participation of three member organisations- Airtel, Astrome, and CYRAN AI Solutions at the Army House Reception held on the eve of Vijay Diwas, where they were invited to showcase their technological innovations. Lt Gen Anil Kumar Bhatt (Retd), Director General, ISpA, was also present at the event.

The reception was graced by the Hon'ble President of India, Smt. Droupadi Murmu, as the Chief Guest, along with the Hon'ble Defence Minister, Shri Rajnath Singh, and senior leadership from the Armed Forces. The occasion served as a significant platform to highlight indigenous technological capability and innovation in support of national security.

ISpA congratulates the participating member companies for this recognition and for representing the growing strength of India's space and defence technology ecosystem.

ISpA ACTIVITIES

BHARAT DEFENCE SUMMIT 2025 | ADVANCING ATMANIRBHAR BHARAT THROUGH SPACE & DEFENCE

Lt Gen Anil Kumar Bhatt (Retd), Director General, ISpA- Indian Space Association, participated in the 2nd Bharat Defence Summit 2025, held on 12 December in New Delhi, highlighting the strategic importance of space capabilities across GEO, MEO and LEO in strengthening national security and self-reliance.

He underscored the role of indigenous satellite communications, Earth observation, surveillance, navigation, disaster response and debris detection as core enablers of Atmanirbhar Bharat, with ISpA serving as a key bridge between government, startups and industry.

The summit was inaugurated in the presence of Shri Sanjay Agrawal, ITS, Director, Directorate of Coordination Police Wireless (DCPW), Ministry Of Home Affairs (mha), GOI, as Chief Guest, and Shri A Robert J Ravi I T S, CMD, Bharat Sanchar Nigam Limited, as Guest of Honour.

Supported by MeitY , ISpA , United Service Institution of India, Digital India Corporation, BSNL, and leading industry partners, the conclave reflected strong public–private collaboration shaping India's defence and space ecosystem.

ISpA ACTIVITIES

ISpA AT DATA SECURITY COUNCIL OF INDIA (DSCI)- ANNUAL INFORMATION SECURITY SUMMIT

ISpA participated in the Annual Information Security Summit (AISS 2025) organised by the Data Security Council of India (DSCI) on 5 December 2025, where Lt Gen Anil Kumar Bhatt (Retd), Director General, ISpA, delivered an address during the Inaugural and Keynote Session on “Future Ready Cyber-Physical Systems for National Security.”

In his remarks, DG ISpA highlighted the growing interdependence between space-based assets and critical ground infrastructure, noting that the protection of this integrated cyber-physical ecosystem is now central to India’s strategic resilience. Emphasising that security must be embedded as a foundational element rather than treated as an add-on, he underscored the importance of safeguarding the full continuum of space, digital, and operational technologies.

The session brought together key stakeholders from industry, government, and academia, with discussions focused on strengthening national preparedness for emerging security challenges. ISpA continues to contribute to these efforts by engaging in policy dialogue and fostering collaboration across the broader cyber–space ecosystem.

ISpA ACTIVITIES

DG ISpA CHAIRS SESSION ON SOVEREIGN SPACE INFRASTRUCTURE AT GEOSMART INDIA 2025

Lt Gen Anil Kumar Bhatt (Retd), Director General, ISpA, chaired the session on "Sovereign Space Infrastructure" at GeoSmart India 2025 on 3rd December. The session focused on key strategic themes, including satellite constellations for real-time C4SIR, long-range surveillance, and Space Domain Awareness, highlighting the growing importance of resilient and sovereign space-based capabilities for national security.

The panel featured senior leaders and domain experts, including AVM Pawan Kumar VM (Retd), Former DG DSA, Brig G Manoj (Defence Space Agency), Col Harinderjit Singh (DIPAC), and Mr. Shravan Bhati, Founder & CEO, SatleoLabs. Discussions explored India's expanding role in advanced space-enabled surveillance, operational readiness, and the technological pathways needed to strengthen the country's defence space architecture.

ISpA continues to support these crucial dialogues aimed at building a secure, capable, and future-ready Indian space ecosystem.

ISpA ACTIVITIES

DG ISpA PARTICIPATES IN A PANEL DISCUSSION ON PUBLIC-PRIVATE PARTNERSHIP MODELS AT GEOSMART INDIA 2025

Lt Gen Anil Kumar Bhatt (Retd), Director General, Indian Space Association (ISpA), participated in Panel 7 on "Scope and Business Models of Public–Private Partnership (PPP)" at GeoSmart India 2025. The session examined the growing role of PPPs in driving innovation, efficiency, and scalability across technology-led sectors, particularly within the geospatial and space domains.

The discussion highlighted how structured PPP frameworks can enable infrastructure development, data services, and capacity building through balanced risk–reward models, thereby supporting national objectives and industry growth. Panelists also deliberated on evolving collaboration structures and the need for sustained, high-impact engagement between the public and private sectors.

The session brought together senior stakeholders including Ms. Vaishali Dixit, Vice President–Americas, Geospatial World (Moderator); Shri S.K. Sinha, Additional Surveyor General, Survey of India; Shri Asit Saha, Director General, Geological Survey of India; Dr. Chandra Prakash Singh, Deputy Director, IN-SPACe; and Mr. Biswaketan Kundu, Vice President & Business Unit Head – GIS, Reliance Jio Platforms.

ISpA ACTIVITIES

ISpA REPRESENTED AT IN-SPACe INDO-JAPAN SPACE & GEOSPATIAL ROUNDTABLE AT GEOSMART INDIA 2025

We were elated that several key ISpA member companies proudly showcased their cutting-edge technologies and services, demonstrating the depth of India's commercial space sector:

- Azista
- Dhruva Space
- XOVIAN Aerospace
- TASL
- Hyspace Technologies
- Astrome Technologies Pvt Ltd
- Agnikul Cosmos Private Limited
- Augsense labs
- Skyroot
- Manastu Space
- Digantara
- Suhora
- OrbitAid Aerospace Pvt Ltd

This focused Industry cooperation event is a significant step toward developing commercial linkages, exploring joint ventures, and leveraging mutual strengths in space and geospatial technologies.
We are committed to fostering deep collaboration that benefits both nations.

ISpA ACTIVITIES

ISpA EXHIBITION AT GEOSMART INDIA 2025

ISpA set up an exhibition stall at GeoSmart India 2025, held from 2–4 December 2025, showcasing the Association's initiatives and the growing capabilities of India's space and geospatial ecosystem. Lt Gen Anil Kumar Bhatt (Retd), Director General, ISpA, graced the exhibition with his presence during the event.

The ISpA team remained present at the stall throughout the three-day exhibition, engaging with industry participants, government stakeholders, and international delegates. The exhibition provided an effective platform to highlight ISpA's role in fostering collaboration across the space and geospatial domains and to strengthen outreach with the wider ecosystem.

ISpA ACTIVITIES

ISpA HOSTS A DELEGATION FROM JAPAN DEEPENING THE INDO-JAPAN SPACE PARTNERSHIP

ISpA hosted a delegation from Japan on 1 December 2025, reinforcing the momentum for deeper Indo-Japan space collaboration following the India International Space Conclave (IISC 2025). The visiting delegation included representatives from the Ministry of Economy, Trade and Industry (METI), the Japan External Trade Organization (JETRO), and Nomura Research Institute (NRISG).

Discussions, led by Mr. Wataru Takahama, Director, Space Industry Division, METI, and Lt Gen Anil Kumar Bhatt (Retd), Director General, ISpA, focused on strengthening industry-level cooperation, identifying concrete opportunities for joint engagement, and clarifying ecosystem roles for private sector participation.

The Japanese side expressed strong interest in collaborating with India's private space ecosystem, with both sides reaffirming the importance of future joint missions, particularly in lunar exploration, as a key area of cooperation between ISRO and JAXA.

The meeting reflected the growing commitment of both countries to advancing strategic partnerships in the global space sector, with ISpA continuing to facilitate these collaborative efforts.

ISpA ACTIVITIES

ISRO INDIAN SPACE RESEARCH ORGANISATION

CHANDRAYAAN-3'S RAMBHA-LP INSTRUMENT DELIVERS CRITICAL 'GROUND TRUTH' ON THE MOON'S PLASMA ENVIRONMENT | DECEMBER 09, 2025

Analysis of Chandrayaan-3 lander data from August 23 to September 03, 2023 has produced significant, first-of-its-kind results on the plasma environment near the Moon's surface at southern high latitudes, showing that the electrical environment at the South Polar Region is far more active than previously understood.

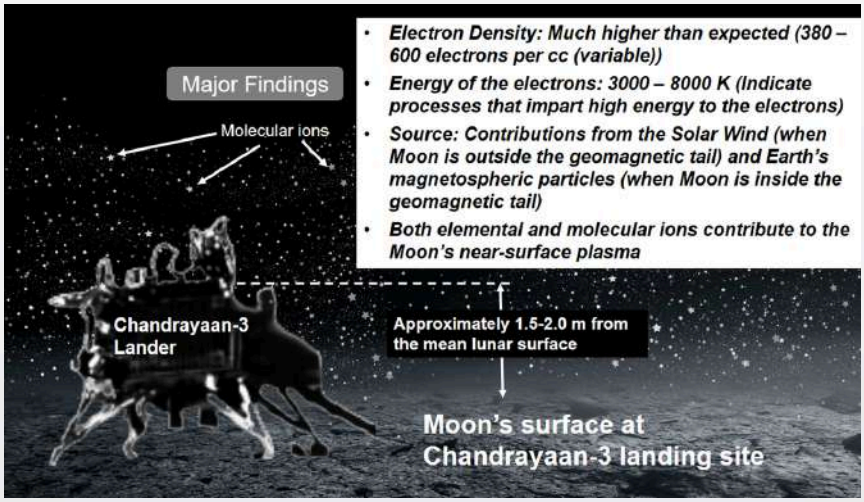
Plasma the fourth state of matter consisting of ions and free electrons is highly conductive and strongly influenced by electromagnetic fields. The Moon's thin plasma environment (lunar ionosphere) is shaped by several processes: the solar wind (charged particles from the Sun), the photo-electric effect (Sunlight ejecting electrons from the surface), and deposition of charged particles from the Earth's magnetotail when the Moon passes through it for 3–5 days each lunar cycle. These processes create a constantly changing electrical environment near the surface.

In this context, the RAMBHA-LP (Langmuir Probe) instrument aboard the Vikram lander delivered the first-ever in situ measurements of near-surface lunar plasma. At the Shiv Shakti Point landing site (69.3°S, 32.3°E), the electron density was found to be 380–600 electrons/cm^3, much higher than earlier estimates from high-altitude radio occultation techniques. The electrons also showed very high energies, with kinetic temperatures between 3,000 and 8,000 K.

The study found that lunar plasma is not static but modulated by the Moon's orbital position. During lunar daytime, outside Earth's magnetic influence, changes are driven by solar wind interactions with the exosphere. When the Moon enters the geomagnetic tail, the plasma is affected by charged particles from Earth's long magnetic tail.

Further, the in-house Lunar Ionospheric Model (LIM) indicates that, besides elemental ions, molecular ions (likely from CO_2 and H_2O) significantly contribute to the near-surface charged layer.

These RAMBHA-LP results provide crucial ground truth for future lunar exploration. The experiment was designed and developed by the Space Physics Laboratory (SPL), Vikram Sarabhai Space Centre (VSSC), Thiruvananthapuram.



ISRO INDIAN SPACE RESEARCH ORGANISATION

RECENT VISIT OF PROF RAO R TUMMALA, ADVISOR TO INDIA SEMICONDUCTOR MISSION (ISM) AT SPACE APPLICATIONS CENTRE (SAC) | DECEMBER 09, 2025

Prof. Rao R. Tummala, Advisor to the India Semiconductor Mission (ISM), Government of India, and Founding Director of the 3D Electronic Systems Packaging Research Center at the Georgia Institute of Technology, Atlanta, USA, visited the SAC semiconductor fabrication and packaging facilities in Ahmedabad, Gujarat, on November 12, 2025.

During the visit he was pleased to see the strides taken by SAC in developing in-house LTCC foundry technology and its widespread adoption in ISRO programmes, for electronics system miniaturization. He also visited Semiconductor fabrication facilities and was briefed about on-going research and development in the field of III-V semiconductor device technologies, viz. RF high power GaN and Quantum devices.

He interacted with the SAC semiconductor fabrication and packaging teams, during which the technical know-how developed over the years was highlighted. He noted the existence of comprehensive semiconductor device-to-systems fabrication infrastructure and trained personnel available under a single roof, a facility arrangement not commonly found elsewhere in the country.

The visit concluded with a meeting with Director, SAC, during which Prof. Rao expressed appreciation for the ongoing efforts in semiconductor fabrication and packaging at SAC. He also conveyed interest in exploring potential collaboration with SAC/ISRO under the Indian Design, Semiconductor, Packaging and Systems (IDSPS) programme, an initiative he leads within the India Semiconductor Mission (ISM).




INDIA'S ADITYA-L1 JOINS GLOBAL EFFORT IN LANDMARK SOLAR STORM STUDY | DECEMBER 09, 2025

In May 2024, Earth experienced the strongest solar storm in over two decades now called "Gannon's storm" triggered by a series of powerful coronal mass ejections (CMEs). A CME is a massive bubble of hot gas and magnetic energy ejected from the Sun, and when it strikes Earth, it can disrupt satellites, communications, GPS, and power grids.

A team of Indian scientists published a breakthrough study in Astrophysical Journal Letters (DOI:10.3847/2041-8213/adfe60, September 2025) explaining why this storm behaved unusually. During the event, they found that instead of behaving normally, the Sun's magnetic fields twisted "magnetic ropes" inside a CME were breaking and rejoining due to a rare collision of two CMEs, which squeezed each other and triggered magnetic reconnection. This sudden reversal in magnetic fields greatly intensified the storm's impact. Satellites also detected particles rapidly accelerating, confirming the reconnection.

The discovery was made possible by India's Aditya-L1 solar observatory, working with six U.S. satellites (NASA's Wind, ACE, THEMIS-C, STEREO-A, MMS, and the NASA–NOAA DSCOVR mission). For the first time, scientists observed the same extreme storm from multiple points in space. Precise magnetic field data from Aditya-L1 allowed researchers to map the reconnection zone, which was found to be enormous about 1.3 million km across, nearly 100 times the size of Earth. This was the first observation of such a massive magnetic breakup inside a CME.

The discovery enhances understanding of how solar storms evolve as they travel toward Earth and highlights India's growing leadership in global space science. With Aditya-L1's contributions, India is now better equipped to study and predict extreme solar storms.

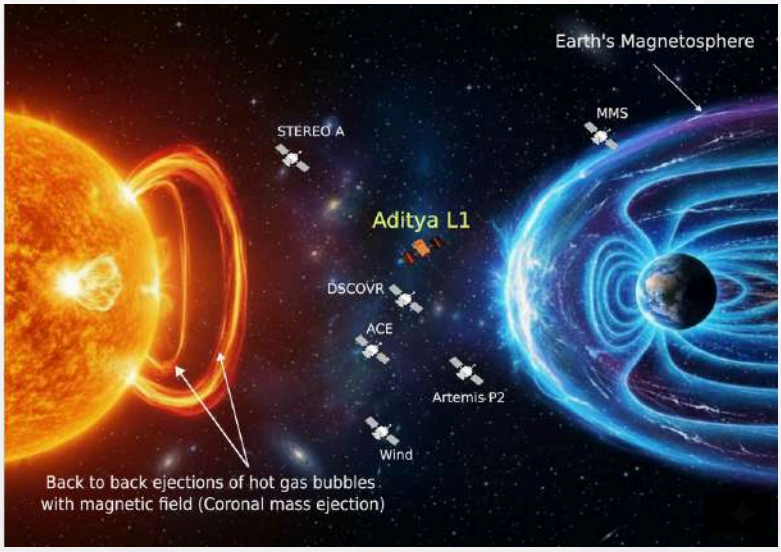


Figure: Artistic illustration of the ejection of hot gas bubbles and magnetic field from the Sun, known as Coronal Mass Ejections. These two back-to-back CMEs collided in interplanetary space, and the embedded magnetic field lines snapped and rejoined, as captured by Aditya-L1 and six other spacecraft from NASA and NOAA, as shown in the above figure. The figure and spacecraft positions are not drawn to scale and are for illustrative purposes only.

ISRO INDIAN SPACE RESEARCH ORGANISATION

ISRO ACADEMIA DAY - 2025 | DECEMBER 17, 2025

ISRO Academia Day is organized on 16th December, 2025 at ISRO HQ, to provide opportunities for academicians to gain insights into the current and emerging research areas of the Indian Space Programme. Secretary, DOS / Chairman, ISRO inaugurated the event and released the Respond Basket - 2025 in the presence of Scientific Secretary, ISRO, ISRO Centre/Unit Directors, Senior officials from across ISRO centres and Academicians.

Secretary, DOS / Chairman, ISRO in his inaugural address emphasized the vital role of academia in contributing innovative ideas, advanced research, and skilled human resources to India's expanding space programme, and highlighted the impact of the RESPOND programme in addressing complex technological challenges through collaborative research. He informed that as ISRO sets its sights on ambitious goals for the coming decades, including establishing the Bharatiya Antariksh Station, the Chandrayaan-4 Moon Sample Return Mission, Gaganyaan continuation missions, a Venus orbiter, and ultimately, a human landing on the Moon, the role of academia will be more vital than ever. With the announcement of the Space Sector Reforms academia can play a pivotal role in preparing and upskilling human resources through programmes like RESPOND, enabling them to become future-ready for the growing space industry.
Respond basket 2025 consists of 125 selected research proposals from across ISRO centres. The research problem statements in Research Basket 2025 reflect ISRO's current and emerging needs in space science, technology, and applications. These topics have been selected from the most relevant and high-impact areas linked to future projects, where innovative thinking can drive the next wave of breakthroughs. About academicians 125 from 50 institutions were represented in the event.

ISRO INDIAN SPACE RESEARCH ORGANISATION

LVM3-M6 / BLUEBIRD BLOCK-2 MISSION | DECEMBER 19, 2025

The LVM3-M6 mission has successfully placed the BlueBird Block-2 satellite into its intended orbit.

The LVM3-M6 / BlueBird Block-2 Mission is a dedicated commercial mission onboard the LVM3 launch vehicle, which will launch the BlueBird Block-2 communication satellite of AST SpaceMobile, USA. This mission marks the 6th operational flight of LVM3.

LVM3, developed by ISRO, is a three-stage launch vehicle comprising two solid strap-on motors (S200), a liquid core stage (L110), and a cryogenic upper stage (C25). It has a lift-off mass of 640 tonnes, a height of 43.5 m, and a payload capability of 4,200 kg to Geosynchronous Transfer Orbit (GTO). In its earlier missions, LVM3 successfully launched Chandrayaan-2, Chandrayaan-3, and two OneWeb missions carrying 72 satellites. The previous launch of LVM3 was the LVM3-M5/CMS-03 mission, that was successfully accomplished on November 02, 2025.

In this mission, LVM3-M6 will place the BlueBird Block-2 satellite, into the Low Earth Orbit and is the largest commercial communications satellite to be deployed in Low Earth Orbit. It will also be the heaviest payload to be launched by LVM3 from Indian soil. The satellite is part of a next generation of BlueBird Block-2 communication satellites, designed to provide space-based cellular broadband connectivity directly to standard mobile smartphones.

SUCCESSFUL ACCOMPLISHMENT OF DROGUE PARACHUTE DEPLOYMENT TESTS FOR GAGANYAAN | DECEMBER 20, 2025

ISRO has successfully completed a series of qualification tests for Drogue Parachutes for the development of deceleration system of Gaganyaan Crew Module at the Rail Track Rocket Sled (RTRS) facility of the Terminal Ballistics Research Laboratory (TBRL), Chandigarh, during December 18-19, 2025.

The deceleration system of Gaganyaan Crew Module comprises of a total of 10 parachutes of 4 types. The descent sequence begins with two apex cover separation parachutes that remove the protective cover of the parachute compartment, followed by two drogue parachutes that stabilize and decelerate the module. Upon release of the drogues, three pilot parachutes are deployed to extract three main parachutes, which further slow down the Crew Module to ensure a safe touchdown.

A crucial component of this system is the deployment of drogue parachutes, which play a pivotal role in stabilizing the Crew Module and also reducing its velocity to a safe level during re-entry.

The objective of this specific test series was to rigorously evaluate the performance and reliability of the drogue parachutes under extreme conditions. Both the RTRS tests on drogue parachutes were successfully conducted on December 18 & 19, 2025 achieving all the test objectives and confirming their robustness even under the situation of significant variation in flight conditions.

The successful completion of these tests marks another significant step toward qualifying the parachute system for human spaceflight, with active support and participation from the Vikram Sarabhai Space Centre (VSSC), ISRO, Aerial Delivery Research and Development Establishment (ADRDE), DRDO and Terminal Ballistic Research Laboratory (TBRL), DRDO.

Description: Drogue Parachute Deployment Tests for Gaganyaan

ISRO INDIAN SPACE RESEARCH ORGANISATION

ISRO CONDUCTS GROUND TEST OF SSLV THIRD STAGE | DECEMBER 30, 2025

ISRO successfully carried out a static test of an improved version of the third stage (SS3) of the Small Satellite Launch Vehicle (SSLV) on December 30, 2025 at the Solid Motor Static Test Facility, SDSC Sriharikota. SSLV is a three-stage, all-solid launch vehicle designed for industrial production and launch-on-demand capability, with the third stage providing up to 4 km/s velocity using a monolithic composite motor case and free-standing nozzle divergent to minimise inert mass.

The static test validated an improved SS3 stage featuring a carbon-epoxy motor case, significantly reducing stage mass and improving SSLV payload performance by 90 kg. The stage also incorporates improved igniter and nozzle designs for higher efficiency and robustness, with nozzle control implemented via a fault-tolerant electromechanical actuation system and low-power control electronics. The high-strength carbon filament-wound motor case was developed at VSSC's Composites Entity, while the solid motor was cast at SDSC's motor production facilities.

The motor included 233 measurements to record pressure, thrust, temperature, vibration, and electronics parameters; all measured values closely matched predictions over the 108-second test. With this successful firing, the improved SS3 motor is now qualified for flight induction.

During 2025, multiple facilities were commissioned nationwide to enhance solid motor production capacity. In July 2025, new solid motor production facilities were established at Sriharikota. In September 2025, a second Ammonium Perchlorate production line was commissioned at Alwaye, doubling national production capacity. SDSC also commissioned an indigenous 10-tonne vertical mixer, the world's largest solid propellant mixing equipment. Additionally, SDSC's Solid Motor Production & Static Testing facilities successfully realized and tested the solid motor for the first orbital launch of a launch vehicle developed by an Indian space start-up.

SS3 Motor at Test Bed

SS3 Motor Static Firing at Test Bed

IN-SPACE PROPOSES 'ANTARIKSH PRAYOGSHALA' SPACE LABS AT ACADEMIC INSTITUTIONS

DECEMBER 23, 2025

India's space sector regulator and promoter, the Indian National Space Promotion and Authorisation Centre (INSPACe), has proposed setting up dedicated space laboratories, named Antariksh Prayogshala, at seven academic institutions across the country to strengthen the space technology ecosystem.

INSPACe has issued a Request for Proposal (RfP) inviting eligible higher education institutions to host these first-of-their-kind space labs. The initiative is designed to offer students practical exposure and hands-on training in space technologies, complementing the increasing number of space-related courses being introduced by Indian universities and colleges.

According to INSPACe officials, the labs will serve as shared platforms for students, researchers, and industry partners, enabling applied research, early-stage innovation, and skill development aligned with industry requirements. The programme is also expected to promote closer collaboration between academia and the emerging private space sector.

Under the scheme, up to seven institutions will be selected in phases, with one institution chosen from each geographical zone of the country. INSPACe will fund up to 75 per cent of the project cost for each lab, subject to a maximum of Rs 5 crore per institution, with funds disbursed based on project milestones.

Eligibility criteria outlined in the RfP include institutions that are at least five years old, have a National Institutional Ranking Framework (NIRF) ranking within the top 200, and offer courses related to space technology.

Officials said that the initiative aligns with India's long-term ambition of becoming a global space economy leader. With the country's space sector currently valued at about $8 billion and projected to grow to USD 44 billion by 2033, the demand for a skilled workforce is expected to rise sharply. INSPACe believes that the Antariksh Prayogshala initiative will play a key role in developing the talent needed to support this growth.

ISpA IN NEWS

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01 December 2025 | ANI

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ISpA IN NEWS

Interview

BUSINESS INDIA • THE MAGAZINE OF THE CORPORATE WORLD

Bright future for space sector

The Indian Space Association (ISpA) plays a comprehensive role across the entire space domain. It has undertaken policy advocacy and engaged with stakeholders, including the government and its agencies, to make India self-reliant, technologically advanced, and a global leader in the space arena. India's private space sector is experiencing an unprecedented boom. **Lt Gen AK Bhatt** (Retd), Director General of ISpA, shares a variety of issues related to this sector with **SM Boothem**

Tell us about ISpA's activities and current role in the space sector

ISpA is the apex industry body representing the interests of India's space companies across satellite communications, launch services, downstream applications, and emerging spacetech segments. It acts as a collaborative platform between the government, ISRO, IN-SPACe, regulators, and private industry, providing structured policy inputs on issues such as remote sensing, satellite communications, technology transfer, spectrum use, and ease of doing business, so that India can emerge as a leading global space economy.

ISpA's activities span policy advocacy, industry representation, and ecosystem development, including detailed recommendations on draft space-based communication and remote-sensing policies, satellite gateway regulations, and spectrum apportionment for satellite versus 5G/IMT services. The Association also convenes members through councils and events, showcases India's capabilities in international forums, and works to align industry growth with the Prime Minister's broader vision of a $5 trillion economy.

How is the space startup ecosystem growing in India?

The space startup ecosystem in India has grown from a few dozen firms in 2020 to well over 300 today, spanning launch vehicles, full-stack satellite manufacturers, and Earth-observation and data-analytics companies. Many of these startups are building technology for small-satellite constellations, responsive launch, hyperspectral imaging, and satellite-enabled connectivity, supported by liberalised policies, better access to testing facilities, and rising interest from domestic and global investors.

Policy moves such as opening end-to-end space activities to non-government entities under the Indian Space Policy 2023, along with IN-SPACe schemes for seed funding, ISRO facility utilisation, and technology transfer, are giving founders a clearer pathway from idea to commercial missions. Collaborative platforms, accelerator programmes, and ecosystem studies are further strengthening confidence that Indian spacetech startups can scale from prototyping to revenue-generating, export-oriented businesses integrated into global supply chains.

What is the market size and economic impact on the sector?

India's space economy is currently estimated at around $8.4 billion, roughly 2-3 per cent of the global space market, and is projected to rise nearly fivefold to about $44 billion by 2033, as per the government's vision. This growth is expected to come from satellite manufacturing, commercial launches, broadband from space, navigation, imaging-based services, and a wide array of data-driven applications for agriculture, logistics, infrastructure, and disaster management. As the value chain deepens, the sector is positioned to generate high-skill employment, spur advanced manufacturing and electronics ecosystems, and help India capture a significantly higher share of the global space economy.

How do public-private partnerships (PPPs) work in the space industry?

Public-private partnerships in the space sector are increasingly structured around a model in which public agencies such as ISRO provide core infrastructure, legacy expertise, and strategic oversight, while private companies bring in capital, innovation, and operational efficiency. The Indian Space Policy 2023 explicitly allows non-government entities to design, own, and operate satellites, ground infrastructure, and even launch vehicles, while IN-SPACe promotes, authorises, and regulates these activities on behalf of the government.

In practice, this is taking shape through models where ISRO shares test facilities, tracking networks, and heritage technologies with private firms; NSIL structures commercial contracts and PPPs for missions; and private players invest in manufacturing and operate services for both government and commercial customers in communications and Earth observation.

What is the future growth potential for this sector?

The future growth potential for India's space sector is widely viewed as transformational, driven by continued reform, liberal foreign investment norms, and targeted funding mechanisms for high-risk R&D and commercialisation. The government has already cleared a dedicated venture capital fund of about ₹1,000 crore for space startups and announced a target for India to capture around 8 per cent of the projected $1.8 trillion global space economy by the mid-2030s.

"We are very deficient in sensors, cameras and electronics. But launch vehicle capability, like our PSLV, has been doing great."

By Sanjana Gupta

India has a workforce talent that spans across states and major technology hubs. While this remains an advantage in the country, it has also come up as a key bottleneck. According to recent reports, of the 1.5 million engineering graduates, only 0.5% pursued further studies in aerospace.

Lt Gen AK Bhatt (retd), director general of the Indian Space Association (ISpA), told AIM in an exclusive conversation that the broader engineering base could still serve the space sector. "In space, you have to have multiple expertise in electronics, mechanical, design and other things. Even computers. So all these scientists, all these engineers, can be used in space," he said.

At a recent panel discussion on self-reliance in space, industry leaders and officials pointed to bottlenecks that keep the country reliant on foreign suppliers, while offering ideas on how to close the gap.

The panel agreed that training a large number of space engineers is vital. One key suggestion was that the country has to train more than 10,000 space engineers across industries.

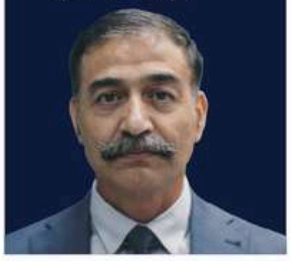
Lt Gen Bhatt expanded on this point. He noted that while the IITs are prestigious, India's talent pool runs far deeper. If some of the top graduates move abroad, equally capable students from other institutions step up to fill those roles.

Hence, he cautioned that funding should not be concentrated only in elite institutions. "The issue is that India does not have a culture of spending money on academia. The government has announced higher funds, but...all the money is going to IITs. It's not going to other institutes," he said, stressing that partnerships between a wide range of universities and industry are vital.

"Our talent is not limited. No doubt, they [IITs] are doing well, but it should also be spread out to others."

Academia can take projects to the design stage, but industry is needed to manufacture and scale them. Expecting fully finished, commercial-ready products straight out of academia is unrealistic; the solution lies in long-term collaboration between industry and academia.

> The issue is that India does not have a culture of spending money on academia. The government has announced higher funds, but...all the money is going to IITs. It's not going to other institutes.
>
> *Lt Gen AK Bhatt (Reta), Director General of the Indian Space Association (ISpA)*



The Subsystem Bottleneck

Experts noted that while India has made progress in launch systems and satellites, gaps remain in the smaller but vital parts. "We are very deficient in sensors, cameras and electronics. But launch vehicle capability, like our PSLV, has been doing great," Lt Gen Bhatt said.

These components are tightly controlled by global companies. They are costly and subject to supply delays, which hurts Indian missions. As MV Reddy, joint managing director of Astra Microwave Products, explained, "In the Indian space ecosystem, critical vulnerabilities remain at the subsystems and

INDIA CHASES STARS WITH BORROWED PARTS

Space-tech startups: Downstream companies see demand uptick

TIMES NEWS NETWORK

Chennai: As Indian space-tech startups advance towards commercial operations and scale up their project execution, downstream space companies are witnessing an uptick in demand.

Amit Kumar, co-founder and COO of Suhora Technologies, a geospatial intelligence company, said the value creation is now shifting closer to applications and analytics. "Satellite data is steadily becoming a mainstream business and governance tool across industries and the growing maturity of demand is encouraging," he said.

Agendra Kumar, managing director of Esri India, a geographic information systems (GIS) firm, said the market is expanding and GIS has emerged as a core platform as its intelligence is embedded across enterprises. "With the convergence of AI, drone and satellite imagery, and IoT (Internet of Things), GIS is becoming a mainstream platform that connects data systems," he added.

The satellite services market demand is expected to grow at a compound annual growth rate (CAGR) of approximately 15.2% to 21.1% between the 2026 and 2033 fiscal years, according to an ISpA-EY report. This is driven by requirements for high-bandwidth and low-latency data, alongside the spread of autonomous systems such as high-resolution streaming, connected cars, and autonomous drones. Within satellite services, the remote sensing segment is estimated to have one of the highest growth rates in 2025, driven by the availability of higher-resolution commercial imagery and the adoption of new-age technologies.

Director General of the Indian Space Association (ISpA), **Lt Gen AK Bhatt** (Retd), said that following tangible execution across launch, satellite manufacturing, and space data and satellite communications, data-driven services have scaled across civilian, commercial, and strategic domains.

The industry is set to gain further momentum this year with key startups fully commercialising. Skyroot Aerospace is expected to launch its first commercial orbital mission this month, while Agnikul Cosmos is also expected to launch its first orbital mission this year with commercial payloads. Both startups are currently scaling up their rocket manufacturing. Pixxel Space launched the country's first private satellite constellation and is now leading a consortium selected by IN-SPACe to build and operate an earth observation constellation.

India's space economy, valued at around $8 billion in 2022, is expected to touch $44 billion by 2033, capturing 8% to 10% of the global share, up from just 2%. India's satellite services and application market stood at $4.6 billion in 2025.

200 milestones behind it in 2025, Isro readies for Gaganyaan tests

SHINE JACOB
Chennai, 14 December

For India's space sector, 2025 will be remembered as a year defined by milestones. According to the Indian Space Research Organisation (Isro), the year saw nearly 200 significant achievements, ranging from the 100th rocket launch from the Satish Dhawan Space Centre to Shubhanshu Shukla joining the elite ranks of Indian human spaceflight travellers, following Rakesh Sharma in 1984, and India becoming only the fourth country to master space-docking technology.

The country is now poised for yet another defining moment: The first of three uncrewed test launches under Gaganyaan, marking the final countdown to India's crewed space mission scheduled for 2027. Isro Chairman V Narayanan told the media in Tirunelveli late last week that the first unmanned rocket test launches as part of Gaganyaan could take place in December. But industry sources said that the dates are yet to be finalised and could well slip into the first half of 2026.

Test vehicle for characterisation of Crew Escape System ready at SDSC
PHOTO: ISRO

In action mode

₹20,193 crore
Government spending on Gaganyaan

8,000 Critical tests completed so far. These include covering propulsion hot tests, structural checks, simulations, & acoustic trials

Milestones so far

- **Human Rated Launch Vehicle Mark-3 (HLVM3):** Development and ground testing completed
- **Orbital Module:** Propulsion systems for Crew Module and Service Module developed and tested. ECLSS engineering model realised
- **Crew Escape System (CES):** Five types of motors developed and static-tested
- **Infrastructure established:** Orbital Module Preparation Facility, Gaganyaan Control Centre, Gaganyaan Control facility, Crew training facility, Second Launch pad modifications
- **Precursor Missions:** A Test Vehicle developed for validating CES and flight tested in TV-D1. Activities are in progress for TV-D2 and IADT-01

Gaganyaan is Isro's ambitious programme to place a three-member crew of Indian astronauts into a 400-kilometre orbit around the Earth for a three-day mission. Reports suggest that around ₹20,000crore has so far been allocated to the programme.

Whether or not Gaganyaan proceeds exactly as planned, 2025 is likely to mark a take-off year for a series of milestones ahead. The broader space economy is gaining momentum, with the number of start-ups approaching 400 in 2025; a landmark ₹1,000-crore venture capital fund under IN-SPACe aimed at fuelling innovation and private-sector participation; and a road map for the National Geospatial Mission that is expected to create a ₹1 trillion geospatial market in India by 2030, according to industry experts.

A report by HR solutions provider Adecco India says that India's space economy is on track to expand more than fivefold to $44 billion by 2033, generating more than 200,000 new jobs in the process. This will open up a new frontier of opportunities for engineers, researchers, data scientists, and business professionals alike.

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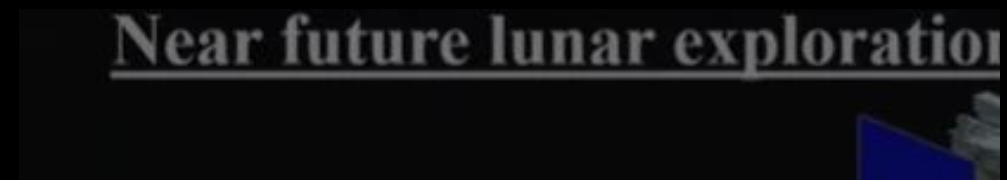
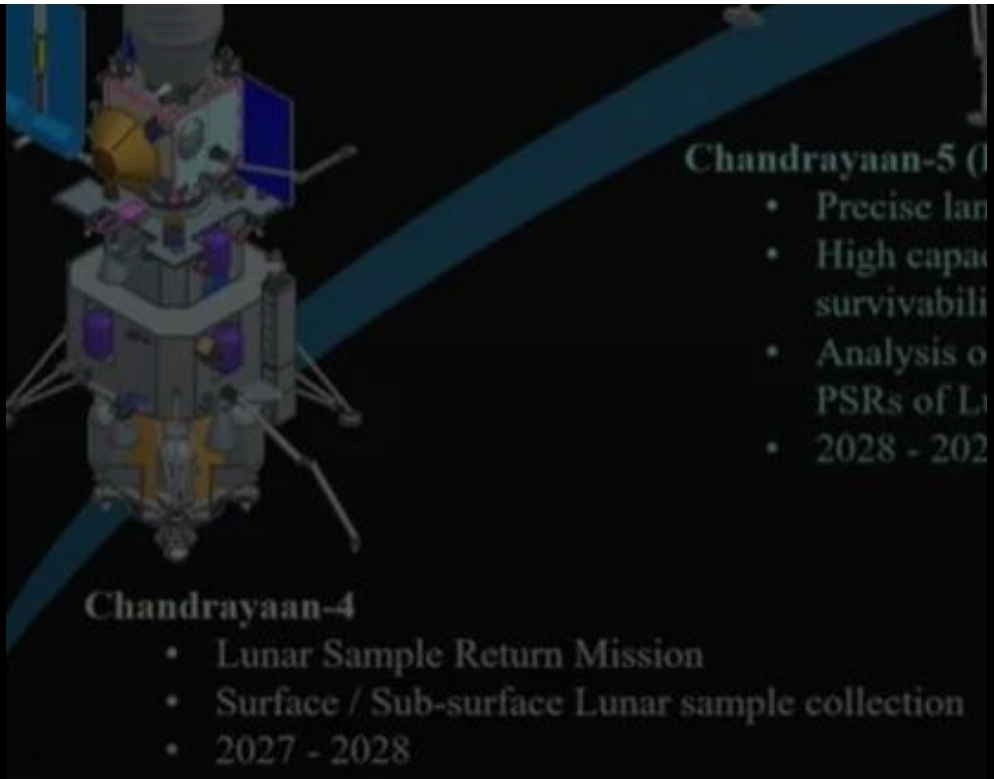


NATIONAL NEWS



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GOVERNMENT POLICIES/ CONSULTATIONS/ RECOMMENDATIONS/ ANNOUNCEMENTS

TRAI Issues Recommendations on Assignment of Microwave Spectrum - December 2025

The Telecom Regulatory Authority of India (TRAI) released its Recommendations on the Assignment of Microwave Spectrum on 10 December 2025, marking a significant regulatory step toward strengthening India's digital and satellite communication infrastructure. The recommendations cover key spectrum bands including 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, 21 GHz, as well as the E-Band and V-Band all critical for backhaul connectivity, 5G expansion, and high-capacity communication networks. Recommendation_10122025

These recommendations introduce a clearer framework for:

- Efficient assignment of microwave spectrum across multiple bands;
- Supporting high-throughput, low-latency networks, essential for 5G and satellite broadband;
- Aligning national practices with global standards, ensuring spectrum readiness for next-generation communication technologies;
- Enhancing flexibility for operators, enabling scalable network deployment across regions.

By strengthening the regulatory foundation for microwave backhaul and emerging high-capacity links, this development is expected to accelerate India's digital transformation, improve service quality across sectors, and bolster upcoming terrestrial-satellite integrated networks.

ISpA UPCOMING EVENTS

BHARAT DEFENCE TECH SHOW 2026

ISpA is proud to be an Association Partner for the **Bharat Defence Tech Show 2026**, scheduled to be held on 16-17 February 2026 at the Manekshaw Centre, New Delhi.

Bharat Defence Tech Show 2026 will bring together defence leadership, industry innovators, startups, and policymakers to deliberate on cutting-edge defence technologies, strategic collaborations, and India's journey towards Atmanirbhar Bharat in the defence sector. The platform will enable meaningful engagement across the defence ecosystem, highlighting innovation, indigenisation, and national security priorities.

ISpA looks forward to active participation and continued engagement with stakeholders at the event.

INDIAN DEFSPACE SYMPOSIUM 2026

The **Indian DefSpace Symposium (IDS 2026)**, the 4th edition of ISpA's premier annual defence–space forum, will convene senior leaders from the Armed Forces, global space agencies, industry, academia, and emerging startups to advance India's defence space capabilities.

The 4th edition of the Indian DefSpace Symposium (IDS 2026) will be announced shortly, bringing together senior leaders from the Armed Forces, industry, academia, global space agencies, and startups to advance India's defence–space agenda.

Join military leaders, policymakers, innovators, and global stakeholders as we shape India's defence space roadmap for the future.

Stay tuned for updates and announcements on www.ispaevents.space.

INDIAN SPACE ASSOCIATION
Bhumandal Se Brahmaand Tak

DECEMBER 2025

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