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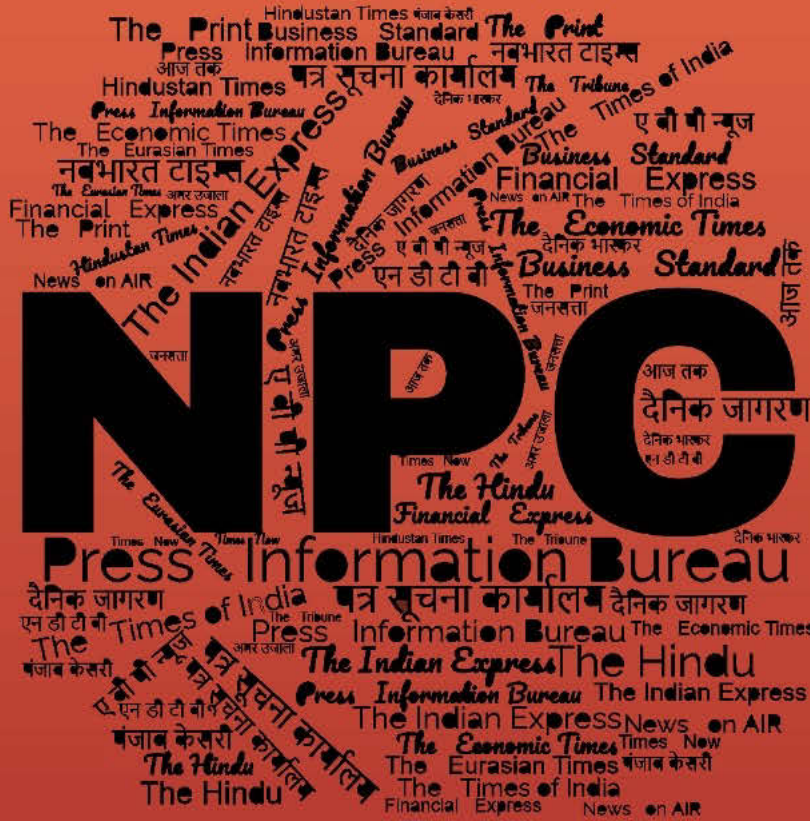
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Defence News

Army Upgrading Pinaka Rocket Systems; L&T and Tata Bag Contract

Source: *The Economic Times*, Dt. 09 Jan 2026

'WORK UNDERWAY TO INCREASE ITS RANGE'

Army Upgrading Pinaka Rocket Systems; L&T and Tata Bag Contract

Manu Pubby

New Delhi: The Army is undertaking an extensive upgrade of its Pinaka multi-barrel rocket launchers, with orders going to private sector defence giants Tata and Larsen & Toubro who have also manufactured the systems in the past.

The contract will involve the two companies working with Army Base Workshops in upgrading critical sub-systems, providing sustained technical support and replacing outdated components. The indigenous Pinaka has emerged as the army's primary rocket system, with work underway to significantly increase its range to excess of 150 km.

The partnership of the two companies with the Corps of EME of the Indian Army seeks to enhance long-term operational availability and modernisation of Pinaka regiments. "This unique partnership between a domestic private OEM (Original Equipment Manufacturer) and the Indian Army, for sustenance of frontline artillery systems, is a significant step for product lifecycle support of Made-in-India, in-service artillery systems," an L&T spokesperson said.

Under the contract, in the initial phase, a pilot overhaul of Pinaka Launcher and Battery Command Post will be carried out in collaboration with 510 ABW. After its

completion, all remaining systems will be overhauled. "This model is expected to serve as a blueprint for similar lifecycle management and upgrade programmes across other defence platforms," the spokesperson added.

Tata Advanced Systems also announced the contract and said it has achieved nearly 80% indigenous content on manufacturing the Pinaka launchers already. "Tata Advanced Systems has delivered a significant number of Pinaka

IN INITIAL PHASE

A pilot overhaul of Pinaka Launcher & Battery Command Post will be carried out in collaboration with 510 ABW

MLRS which are currently operationally deployed by the Indian Army, further strengthening the company's land combat systems portfolio," a Tata spokesperson said.

The Pinaka programme, developed by DRDO and manufactured by the private sector, has emerged as a key Make in India success story in the defence sector. Last year, the government signed India's largest ever domestic contract for ammunition — for Pinaka rockets worth over ₹10,000 crore to be made domestically to meet Army requirements over the next decade. The ammunition will be made by Munitions India Limited and Economic Explosives Limited (EEL), both of which have been transferred technology from DRDO. A longer range variant, that can strike targets at 75 km range, has been tested successfully and is likely to be ordered in future.

Work is on to create even longer range variants that can strike targets at over 150 km.



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53rd New Delhi Book Fair to honour Armed Forces

Source: *The Asian Age*, 09 Jan 2026

53rd New Delhi World Book Fair to honour armed forces

AGE CORRESPONDENT
NEW DELHI, JAN. 8

With free entry for all for the first time in its history, the New Delhi World Book Fair will open here at Bharat Mandapam on January 10 with 'Indian Military History: Valour and Wisdom @75' as its central theme, the National Book Trust (NBT) announced on Thursday.

The 53rd edition of the "world's largest B2C book fair" will be inaugurated by minister of education Dharmendra Pradhan with dignitaries from the guest of honour country Qatar and the focus country Spain.

The nine-day book fair will bring together over 1,000 publishers from more than 35 countries, host about 600 literary activities with nearly 1,000 speakers and is expected to "attract over two million visitors."

The highlight of this year's book fair will be

the theme pavilion titled 'Indian Military History: Valour and Wisdom @75,' honouring the courage, sacrifice, and nation-building role of the Indian Army, Navy, and Air Force since Independence.

Milind Sudhakar Marathe, the chairman of NBT, said that in continuation of NBT's commitment to making "books and knowledge more open and accessible to all," the book fair will have free entry for all visitors for the first time in its history.

The theme pavilion, which will feature more than 500 books, curated exhibits, posters, documentaries, and installations, is inspired by the Indian Military Academy (IMA), Dehradun.

Some key features at the theme pavilion include replicas of the Arjun Tank, INS Vikrant, and LCA Tejas.

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Pune-based firm transmits wireless signal over 20km

Source: The Tribune, Dt. 09 Jan 2026

Pune-based firm transmits wireless signal over 20 km

TRIBUNE NEWS SERVICE

NEW DELHI, JANUARY 8
Pune-based military technology firm Olee.space on Thursday announced the successful demonstration of a wireless laser communication system that enabled signal transmission over 20 km at speeds of up to 10 gigabits per second.

Key to defence applications

The firm said the system was designed and manufactured in India with 85 per cent local content. The system validates Olee.space's capability to deliver high-capacity optical wireless links for defence and strategic applications.

Wireless links provide independence from radio waves. It has low probability of interception and resistance to electronic jamming, making it relevant for defence applications.

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Report : Pak, Saudi in talks on JF-17 jets-for-loans deal

Source: *The Times of India*, Dt. 09 Jan 2026

Report: Pak, Saudi in talks on JF-17 jets-for-loans deal

Islamabad: Pakistan and Saudi Arabia are in talks to convert about \$2 billion of Saudi loans into a JF-17 fighter jet deal, two Pakistani sources said, deepening military cooperation months after they signed a mutual defence pact last year.

The talks underscore how the allies are moving to operationalise defence cooperation at a time when Pakistan is facing acute financial strain and Saudi is reshaping its security partnerships to hedge against uncertainty about US commitments in West Asia.

The mutual defence deal was signed following Israel's strikes on what it said were Hamas targets in Doha, an attack that shook the Gulf region. One of the sources said the talks were limited to the provision of JF-17 Thunder fighter jets, the light combat aircraft jointly developed by Pakistan and China and produced in Pakistan, while the second



The total deal was worth \$4bn, with an additional \$2bn to be spent on equipment over and above the loan conversion

said the jets were the primary option among others under discussion.

One source said the total deal was worth \$4 billion, with an additional \$2 billion to be spent on equipment over and above the loan conversion. Pakistan's Air Chief Zaheer Ahmed Baber Sidhu was in Saudi this week to discuss "defence cooperation, regional security environment and future avenues of collaboration" with his counterpart Lt Gen Turki bin Bander bin Abdulaziz, Pakistan's military said on Thursday. REUTERS

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Science & Technology News

CSIR-NPL Strengthens National Quality Infrastructure with Inauguration of Two Apex Calibration Facilities

Source: PIB, Dt. 08 Jan 2026

India witnessed the launch of two apex-level calibration establishments at CSIR-National Physical Laboratory, dedicated to empowering indigenous measurement and certification within the country. The CSIR-NPL, the apex institution for metrology and custodian of India's national standards, completed eight decades of diligent service to the nation. The Laboratory had been discharging its responsibilities as the National Metrology Institute of India, establishing reference measurements that supported research laboratories, manufacturing units, municipal agencies, and strategic sectors. Its work in developing accurate measurements had a direct bearing on industrial quality, fair trade, reliable environmental data, and consumer and public safety.

The National Primary Standard Facility for Solar Cell Calibration (NPF-SCC) was created to provide India with a world-class system to check the performance of reference solar cells and panels. The facility was built around a laser-based Differential Spectral Responsivity Primary Reference Measurement System developed in collaboration with PTB Germany. It enabled the measurement of the short-circuit current of reference solar cells with ± 0.35 percent uncertainty at k equals 2, one of the lowest uncertainties among the four World Photovoltaic Scale laboratories. This milestone established a complete domestic traceability chain for photovoltaic metrology, reduced dependence on foreign calibration, shortened turnaround time for Indian solar companies, and allowed calibration certificates to be issued on the basis of Indian climatic, humidity, and dust profiles. The facility was expected to support India's rapidly expanding solar manufacturing ecosystem, rooftop solar missions, and wider acceptance of Indian PV products in exports and PLI-linked programmes.

The National Environmental Standard Laboratory (NESL) was established to test and recalibrate instruments used for air pollution monitoring systems and environmental sensors under Indian environmental conditions. Earlier, most such equipment was imported with foreign certifications issued under Europe or US weather profiles. The difference in temperature, humidity, pollution mix, and high dust load often affected the long-term reliability and transparency of data generated in India. NESL allowed manufacturers, industries, and municipal agencies to validate performance within the country, ensured credible data for the National Clean Air Programme, industrial emission audits, and smart-city monitoring networks, and provided reference gases, protocols, and uncertainty evaluation services that improved public trust and evidence-based governance.

Together, NPF-SCC and NESL were expected to help MSMEs, start-ups, and indigenous manufacturers to demonstrate product quality at lower cost, meet tightening regulatory guidelines on quality and transparency, and overcome trade and certification barriers in a cost-effective manner. Both facilities were realised through financial grants from the Ministry of New and Renewable Energy, Government of India, and the Ministry of Environment, Forest and Climate Change, respectively. These facilities show the strength of inter-ministerial collaborations in realizing world class facilities in India. CSIR-NPL also reiterated that the Laboratory had been working on quantum standards development, advanced materials and biomedical metrology, and maintenance of Indian Standard Time. These initiatives reflected the Laboratory's multidimensional

contribution to India's economy and daily life, highlighted the importance of reliable measurements to society, and reaffirmed CSIR-NPL's commitment to provide precision for India's progress and prosperity.

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Non-invasive way to feel density of atoms can provide a new window into the Quantum World

Source: PIB, Dt. 08 Jan 2026

A new technique developed by scientists can enable local density measurements of cold atoms in real time, without significantly disturbing them. This could prove instrumental in the development of near-future applications in quantum computation and quantum sensing, where real-time detection of atoms and their quantum state is of paramount importance.

In conventional cold atom experiments, where kinetic energy of atoms are reduced to near absolute zero temperatures by means of laser cooling and trapping techniques, the quantum properties of the atoms are more evident. These cold atoms can then be used as resources for quantum computers and quantum sensing. In order to detect the quantum state of these atoms, methods such as absorption and fluorescence imaging are widely used. However, these techniques have inherent limitations. Absorption imaging struggles while imaging dense atomic clouds because the probe beam cannot penetrate sufficiently to provide accurate density measurements. Fluorescence imaging, on the other hand, requires longer exposure times to collect scattered photons, and both approaches are often destructive, altering the state of the atoms during measurement.

Researchers at the Raman Research Institute, an autonomous institute of the Department of Science and Technology (DST), Government of India, demonstrated a technique called Raman Driven Spin Noise Spectroscopy (RDSNS), that overcomes these challenges by combining spin noise spectroscopy, which detects natural fluctuations of atomic spins by detecting the polarisation fluctuations of a laser light passing through the atomic sample. This method also uses two additional laser beams to coherently drive atoms between two adjacent spin states.

These Raman beams drive transitions between atomic states and dramatically boost the signal – by nearly a million times. The probing volume is 0.01mm^3 which is achieved by focusing the probe to just 38 micrometers, targeting a tiny region of the atom cloud encompassing about 10,000 atoms. Importantly, the measured signal provides a direct measure of local density rather than merely the total atom number.

The team used RDSNS to study potassium atoms in a magneto-optical trap (MOT), and observed that the central density of the atomic cloud saturated within one second, whereas the total atom count, measured via fluorescence, took nearly twice as long.

This highlights a key difference-- fluorescence reveals global atom counts, while RDSNS shows how tightly atoms are packed locally.

“The technique is non-invasive, as the probe is far-detuned and operates at low power, allowing even microsecond-scale measurements to achieve accuracy within a few percent,” Bernadette Varsha FJ & Bhagyashri Deepak Bidwai, Research Assistants, QuMIX lab at RRI pointed out.

“Real-time nondestructive imaging methods are a great quantum sensing and computing candidate. It uncovers many-body dynamics by capturing the transient microscopic density fluctuations. It can be used to

benchmark theoretical models with spatially resolved data.”, said Sayari, a PhD researcher at RRI and the study's lead author.

To validate RDSNS, the team compared local density profiles with results obtained using the inverse Abel transform applied to fluorescence images. The agreement was remarkable. Unlike the Abel transform, which requires axial symmetry, RDSNS performs robustly even in asymmetric or dynamically evolving atomic clouds.

The broader significance of this work is invaluable for quantum technologies; fast, precise, and non-invasive density measurements are helpful in devices like gravimeters, magnetometers, and other sensors that depend critically on knowing atom density with precision. By enabling micron-scale local probing without disturbing the system, RDSNS opens pathways to study phenomena such as density wave propagation, quantum transport, to name a few.

“We anticipate that this technique will find broad applications in real time diagnostics of cold atom experiments especially in context of quantum computing with neutral atoms and quantum simulations with cold atoms, and in domains such as exploring transport phenomena, non-equilibrium dynamics etc.”, said Prof. Saptarishi Chaudhuri, who leads the Quantum Mixtures (QuMIX) lab at RRI.

Supported under India's National Quantum Mission, this breakthrough positions RRI at the forefront of precision measurement in quantum research, underscoring a broader lesson: progress often comes not from looking harder, but from finding gentler, smarter ways to look.

Publication Link: <https://doi.org/10.1063/5.0277027>

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2212324®=3&lang=1>

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Water vapor heats the atmosphere much more than aerosols do: new study

Source: PIB, Dt. 08 Jan 2026

New research has revealed the combined role of aerosols and water vapour in shaping the implications of climate change, suggesting that for reliable climate implications and future projections, both aerosols and water vapor should be considered, as their interactions can significantly impact regional atmospheric dynamics and the Indian summer monsoon.

The radiative effects of aerosols and water vapour are crucial for understanding as well as predicting the Earth's radiation balance and hence climate dynamics, and play a pivotal role in the Earth's radiation balance, influencing global temperatures, weather patterns and climate stability. These radiative effects provide insights on how aerosols, water vapour clouds, greenhouse gases influence the Earth's radiation balance by scattering and absorbing the incoming solar radiation and outgoing terrestrial radiation.

The Indo-Gangetic Plain (IGP) region is considered a global hotspot of aerosol loading, with high spatio-temporal variability in aerosols and water vapor content, making accurate quantification of their climatic response quite challenging and uncertain. To refine climate projections and assess the implications of atmospheric composition changes on regional climate dynamics in and around IGP, it is important to analyse the relationship between aerosol loading and WVRE.

A study by Aryabhatta Research Institute of Observational Sciences (ARIES), Nainital along with Indian Institute of Astrophysics (IIA), Bengaluru, both autonomous research institute under the Department of Science and Technology (DST), Government of India, and international collaborators, University of Western

Macedonia, Kozani, Greece and Soka University, Tokyo, Japan assessed the dependence of water vapour radiative forcing on aerosol loading over the Indo-Gangetic Plain (IGP) region.

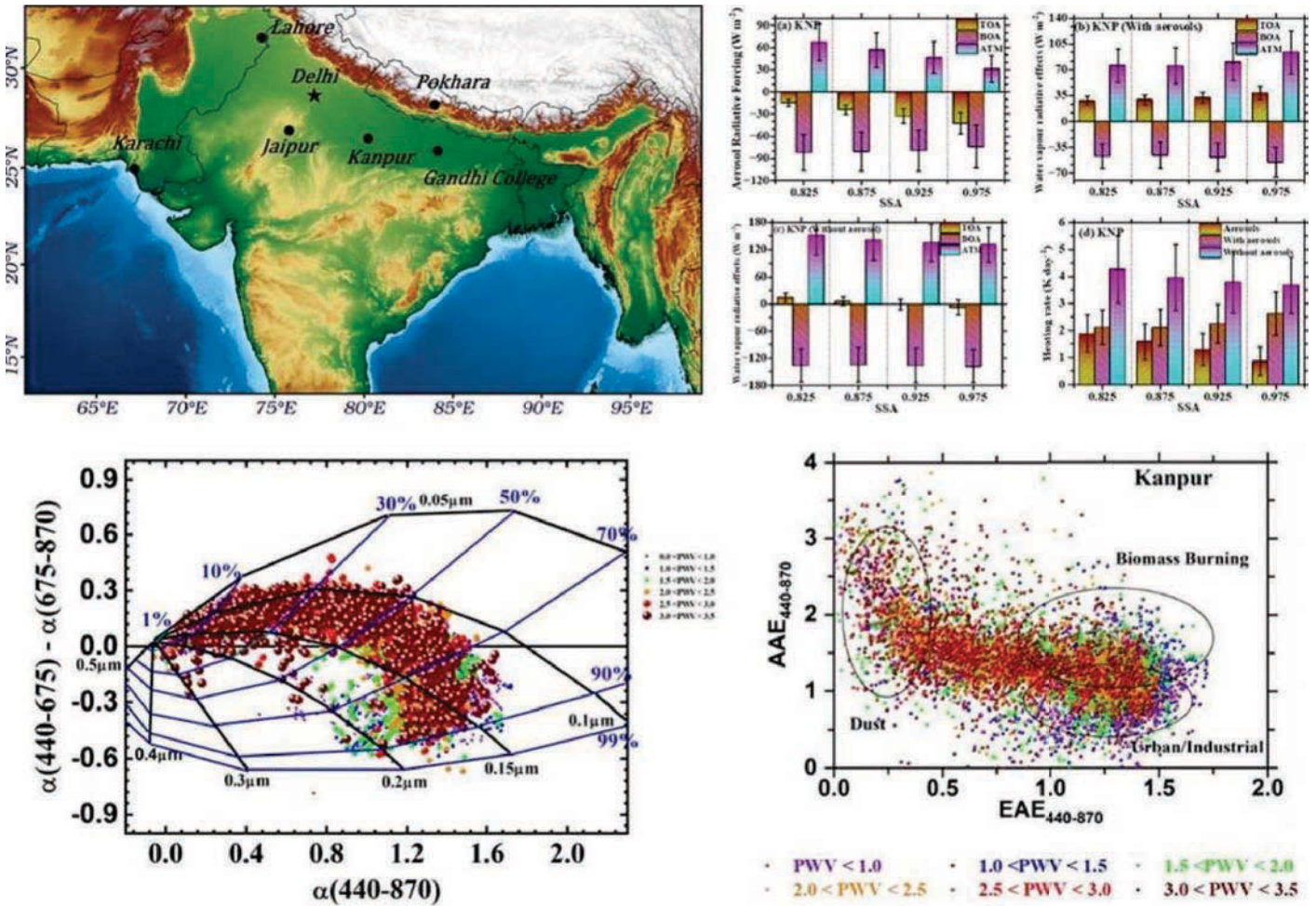


Figure 1: Location of observational sites over the Indo-Gangetic Plain region (top left corner), radiative forcing estimates due to aerosols (a) and water vapour, coupled with (b) and without aerosols (c), as well as heating rate (d) in Kanpur for four intervals of single scattering albedo values (top right corner). Extinction Ångström exponent (EAE) vs EAE difference binned by PWV (in cm) for Kanpur (bottom left corner) and scatter plot for EAE₄₄₀₋₈₇₀ vs. AAE₄₄₀₋₈₇₀, shows the different aerosol types over Kanpur (bottom right corner).

The researchers led by Dr. Umesh Chandra Dumka from ARIES and Dr. Shantikumar S. Ningombam from IIA along with Dimitris G. Kaskaoutis, R.E.P. Sotiropoulou, and E. Tagaris from University of Western Macedonia and Dr. Pradeep Khatri from Soka University leveraged data from six AERONET (Aerosol Robotic Network, an international network of ground-based Sun Photometers which measure the aerosol properties) sites across the IGP and employed radiative transfer simulations using the SBDART (Santa Barbara DISORT Atmospheric Radiative Transfer) model.

Analysing the relationship between aerosol loading and water vapor radiative effects (WVRE) over the densely populated and highly polluted Indo-Gangetic Plain (IGP) region with the help of this data they found that water vapor has a greater impact on atmospheric heating than aerosols.

Their research published in *Atmospheric Research Journal* found that the radiative effects of water vapor are strongly influenced by the presence of aerosols and that aerosol-water vapor interactions highly modulate the radiation budget in the atmosphere, with the WVRE being much more intense in aerosol-free atmospheres compared to aerosol-laden conditions.

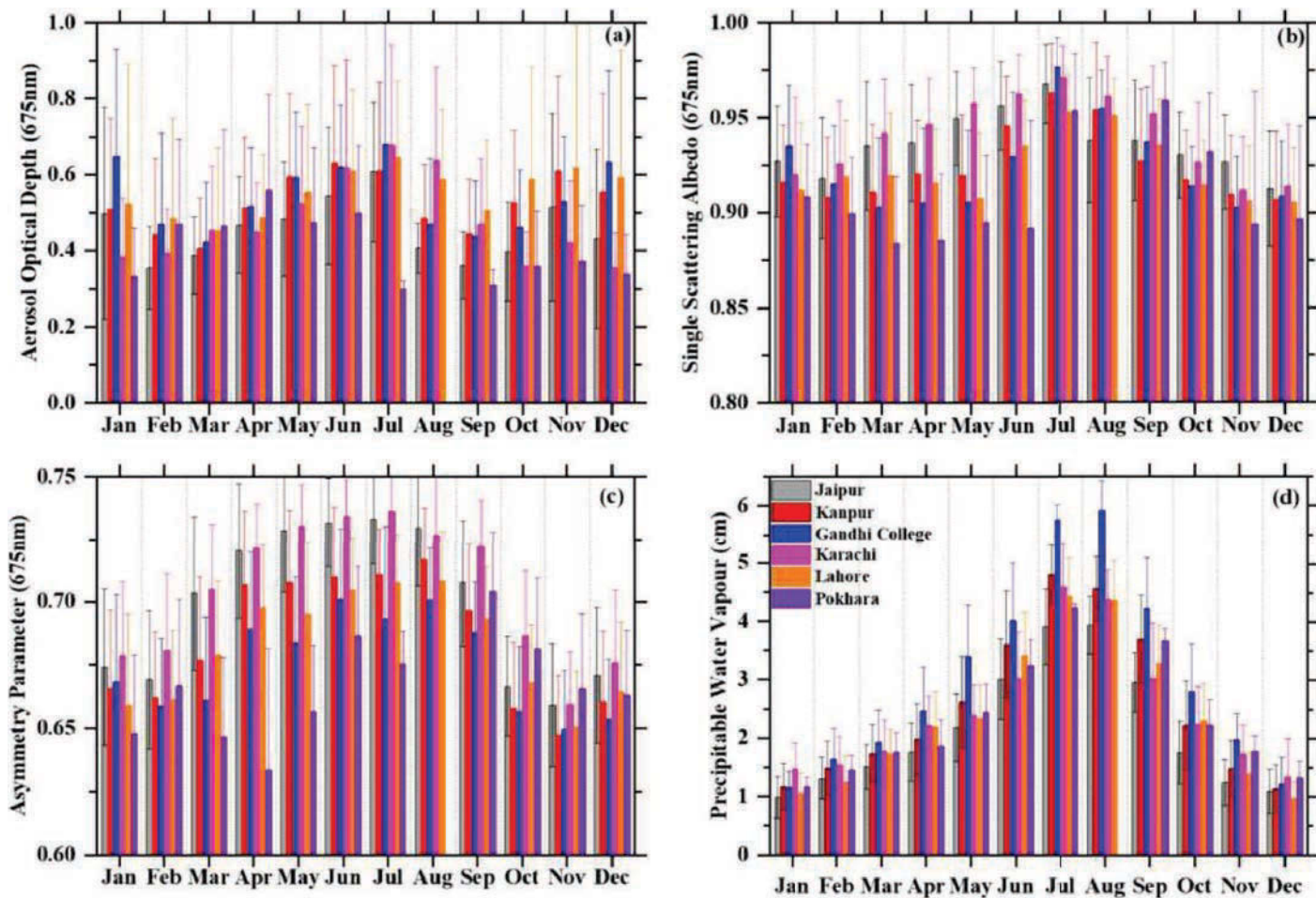


Fig 2: Climatology of aerosol properties and precipitable water vapour.

These effects are stronger over both the Earth's surface and, in the atmosphere, when the air is clean (i.e., with fewer aerosols). When aerosols are present, the water vapor effect becomes more noticeable at the top of the atmosphere highlighting a significant interrelation between aerosols and water vapour.

The study also found that water vapor heats the atmosphere much more than aerosols do. This highlights the major role of water vapor in influencing the climate over the Indo-Gangetic Plains. The results reveal a strong dependence on both solar position and atmospheric variables related to aerosol absorption, thereby unravelling the combined role of aerosols and water vapour in shaping climate implications.

Publication link: <https://doi.org/10.1016/j.atmosres.2025.108343>

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2212322®=3&lang=1>

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ISRO and the next big challenge

Source: The Hindu, Dt. 08 Jan 2026

ISRO and the next big challenge

ISRO's past accomplishments raise the bar for future missions as it prepares in parallel for more complex programmes; the next phase depends less on individual feats and more on sustained institutional performance, clearer legal structures, and the capacity to execute ambitious missions in a routine way

FULL CONTEXT

Yasudevan Mukunth

The record of the Indian Space Research Organisation (ISRO) over the last decade has been remarkably broad for an agency of its size and budget.

Its rockets, especially the Polar Satellite Launch Vehicle (PSLV), have sustained reliable access to orbit, rendering operations with multiple satellite classes almost a matter of routine today. And ISRO is attempting even more technically demanding missions. The soft landing of the Chandrayaan-3 lander on the moon on August 23, 2023, placed India in a coterie of countries with demonstrated lunar-landing capability.

The Aditya-L1 probe reached its intended halo orbit around the first sun-earth Lagrange point on January 6, 2024, adding a dedicated solar observatory mission to ISRO's portfolio. In July 2025, ISRO executed a prominent international collaboration by launching the billion-dollar NASA-ISRO Synthetic Aperture Radar (NISAR) mission, an earth-observation platform for climate and hazard monitoring.

Preparing in parallel

The thing about succeeding in such a consistent way is that it also raises the bar for future accomplishments. It no longer matters that ISRO had humble beginnings or that it transported parts of its first rocket on a bullock cart. Even launching the PSLV or the GSLV flawlessly the first dozen or so times is awesome, but being able to do that also changes what comes next. And it will be good for ISRO to be able to access that new opportunity space, and without taking too long to do so. Otherwise, it will have some difficult questions to answer.

Today, on the cusp of Gaganyaan, Chandrayaan-4, and the Next-Generation Launch Vehicle (NGLV), among others, ISRO's major challenges can be distilled to three: (i) its capacity to execute more complex missions; (ii) questions about how clearly the space programme is and can be governed in a newly liberalised sector; and (iii) constraints on ISRO's competitiveness that are as industrial and financial as they're technological.

First, ISRO currently confronts a deceptively structural prioritisation problem. Specifically, as the organisation prepares in parallel for the human spaceflight mission, complex science missions, satellite replenishment, and the development of NGLV, a more powerful launch vehicle (GSLV may be 'Bahubali' but it's still only in the medium-lift category), its annual launch cadence and project timelines have become an increasingly obvious bottleneck. Experts have linked its low number of launches in 2025 – only five against the then ISRO chairman V. Somanath's projection of an also-low eight – to project delays and to the organisation shifting towards big-ticket programmes. At the same time, private launch providers still depend heavily on ISRO facilities and infrastructure, meaning the system can't yet offload work at scale. The implication is that when a mission suffers an anomaly, it has cascading effects.

To prevent this ISRO needs more integration capacity, better access to test stands, industrial supply chains for structures and avionics, and a workflow that can absorb setbacks without freezing unrelated programmes or crumpling their timelines. Perhaps the first step could be an internal scheme to help scientists and



On track: The LVM-3 launch vehicle at Sriharikota ahead of its M6 mission to launch the BlueBird Block-2 satellite on December 24, 2025. ISRO

engineers determine which mission's timelines are allowed to slip and for what particular reasons, together with separate resource allocations for R&D vehicles and operational vehicles and creating new capacity in the industrial base. The ultimate aim should be for ISRO to not simultaneously be the designer, the integrator, and the bottleneck for all missions.

ISRO pulled in

Second, ISRO's role in India's liberalised space and spaceflight ecosystem – since the national government's 2020 reforms – is conceptually clear only on paper. The principal issue here is that India still lacks a comprehensive national space law. The Indian Space Policy framework, the Indian National Space Promotion and Authorisation Centre (IN-SPACE) and New Space India Ltd. (NSIL), created in 2019-2020, were meant to separate functions. Research and advanced capability development would lie with ISRO, authorisation and promotion with IN-SPACE, and commercialisation with NSIL.

But for all of them to execute those functions efficiently, they need statutory authority and clearer legal allocations of obligations, especially those pertaining to authorisation, liability, insurance, and resolving disputes.

A national space law wouldn't merely help startups: it would also protect ISRO by reducing the *ad hoc* demands placed on it because it's still perceived as a

fallback regulator and technical certifier for everything. If IN-SPACE is to be the authorising body, it needs to have legal authority. If NSIL is to be the commercial arm, it shouldn't be in a situation where, if a commercial mission fails, creates third-party liabilities or whatever, nobody can say in advance who is responsible for what, leaving ISRO to be pulled in by 'default' because it's the most capable state actor. And if ISRO is to focus on frontier capabilities, it needs to be insulated from routine tasks, like booking and operating test stands or coordinating spectrum allocation, that actually should be performed by an industrial and regulatory ecosystem.

Finally, like most laws, a space law – and thus the activities it supports – would also survive political and administrative changes.

Sustained performance

Third, ISRO's competitiveness increasingly resembles an ecosystem problem. The world is moving towards more frequent launches by providers, partially reusable launch vehicles, and rapid satellite manufacturing, and India needs to respond with more than by expanding its engineering ambitions. The Indian government's own framing of the NGLV, linking the space programme's future goals to its "high payload capability" and "reusability", including a reusable first stage and the ability to lift up to 30 tonnes to low-earth orbit, acknowledges that economic launches

and agility are now central, rather than optional, features of enterprises that operate launch vehicles. And building such systems and operating them in turn requires more production depth, advanced manufacturing capabilities, higher qualification capacity, and much more capital.

Investment in India's space sector fell sharply in 2024, reflecting both global headwinds and the specific difficulties of financing hardware that's developed and deployed on long horizons. IN-SPACE has in response launched a technology adoption fund aimed at helping firms bridge prototypes with scalable products and at reducing import dependence, among other funding instruments.

ISRO's past accomplishments have earned it political capital and public trust but the next phase depends less on individual feats and more on sustained institutional performance. The capacity to execute will determine whether the Indian space programme will also be able to deliver ambitious missions in a routine way. And within this context, governance and law will say whether the government's efforts to liberalise the sector will reduce ISRO's burden or, counterintuitively, expand it. Similarly ISRO's ability to compete will depend on whether the programme can transition from executing a series of individually laudable missions to being an industrial system, and for this engineering, regulation, manufacturing, and finance will have to mature together.

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The Tribune
The Statesman
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