



REFLECTIONS



The Quarterly In-House Newsletter of the North Eastern Space Applications Centre



From the Director's Desk



Dr. S. P. Aggarwal
Director, NESAC

It is my immense pleasure to bring forward the major activities of NESAC during the eventful third quarter of 2025, marked by notable accomplishments and distinguished visits. One of the major scientific accomplishments during this period was the successful generation of the Long-Term Multi-Source Merged Rainfall Product over North East India – a valuable dataset that will immensely benefit hydrological and climate-related studies in the region. Another noteworthy milestone was the development of a novel methodology for mapping pineapple plantations in a hilly cropping system, a first-of-its-kind initiative that showcases NESAC's innovation in applying geospatial technology to regional agricultural challenges.

The 3rd Edition of the NESAC User Interaction Meet (NeUIM-2025), held during 25–26 September 2025 in hybrid mode, witnessed enthusiastic participation from 122 user departments from states and central government. The event served as a dynamic platform for user engagement, knowledge exchange, and collaborative planning.

As part of ISRO's nationwide celebration of the 2nd National Space Day, NESAC organized outreach events across all eight North Eastern States and West Bengal during July–August, igniting curiosity and enthusiasm about space science among students and citizens alike.

Under the NE-SPARKS program, the 4th and 5th batches of students visited various ISRO Centres, gaining valuable exposure to cutting-edge space technologies. Additionally, NESAC successfully conducted the Rashtriya Karmayogi Large Scale Jana Seva Training Program in two phases, contributing to the vision of empowering public servants with technology-driven insights.

In line with our focus on skill development, NESAC conducted four specialized training programs on the following themes: Advanced Geospatial Technologies towards Precision Agriculture, Remote Sensing and GIS Applications in Forestry and Ecology, Customized Training Program for ISS Probationers, UAV Remote Sensing: Technologies & Applications

A proud moment for all of us was the release of the Forest Resource and Analysis System by the Hon'ble Governor of Manipur – a testament to NESAC's enduring efforts in supporting natural resource management through geospatial solutions. The visit of Shri A. S. Kiran Kumar, Former Chairman, ISRO, in August 2025 was another highlight that inspired our team and reinforced our commitment to excellence. NESAC also participated in the NESTI 2025 Expo, organized by Spark Educational Society, Shillong at NEHU to showcase various exhibits of ISRO/NESAC during 27–30 October, 2025.

These collective achievements exemplify NESAC's dedication to harnessing space technology for regional development and fostering a culture of innovation, collaboration, and capacity building. Together, we continue to work towards a technologically empowered and sustainable future for the North Eastern Region.

HIGHLIGHTS:

- Third Edition of NESAC User Interaction Meet was organized at NESAC during 24th–25th September 2025.
- 2nd National Space Day Celebrations for NER States & West Bengal were conducted during July–August 2025.
- Shri AS Kiran Kumar, Former Chairman, ISRO visited NESAC during August 2025.

Long-Term Multi-Source Merged Rainfall Product Over North East India

Dr. Aniket Chakravorty

Reliable precipitation estimates are critical for hydrometeorological and climate applications, particularly over regions with high spatial and temporal variability such as India. This study develops and evaluates a non-stationary triple collocation (TC) based merging scheme for generating multi-source, low-uncertainty precipitation products. Unlike traditional TC-based schemes that assume stationary error characteristics, the proposed approach incorporates time-varying error variances to better represent the non-stationary nature of precipitation. The scheme was assessed against its parent products and the stationary TC-based merge using TC based uncertainty estimates (SNR) and validation with AWS station rainfall from 56 locations across five states of Northeast India (Arunachal Pradesh, Assam, Meghalaya, Manipur, and Mizoram). Among contemporary precipitation datasets, IMDAA, IMERG, CHIRPS, IMR, GSMaP, and IPED, the IR-based products (CHIRPS, IMR) showed higher uncertainties, while GSMaP and IMDAA performed best. The non-stationary merging scheme consistently reduced both spatial and temporal uncertainties and improved correlations with station observations. The non-stationary merging scheme is used to blend IMR with other products (IMR+GSMaP+IMDAA and IMR+IPED+IMDAA) for 2015–2022 to generate two merged products which showed superior performance over IMR alone. While promising, the approach is limited by the TC assumption of independent error sources and lack of explicit bias correction, which future work aims to address through refined error decorrelation and bias-adjustment mechanisms.

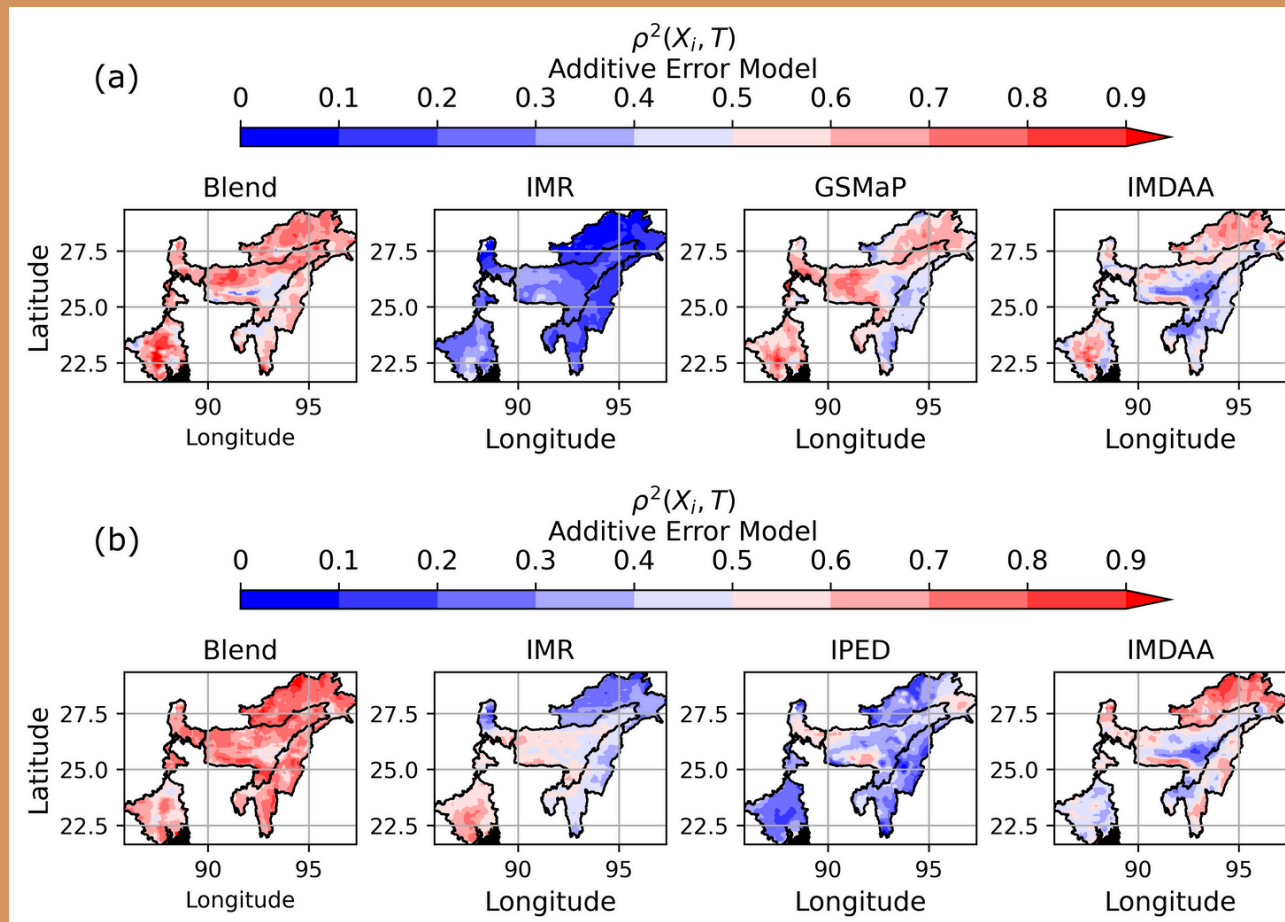


Figure shows the spatial maps of levels of uncertainty, in terms of correlation between the estimate (X_i) and unknown truth (T), for one merged product in (a): Blend, IMR, GSMaP and IMDAA, and another merged product in (b): Blend, IMR, IPED, and IMDAA.

Development of Methodology for Mapping Pineapple Plantations in a Hilly Cropping System

Dr. Francis Dutta & Dr. Pradesh Jena

Pineapple, a major horticultural cash crop in Meghalaya, plays a vital role in the state's agro-economy and holds significant potential for processing, export, and value chain development. This study presents the development of an integrated RS and GIS-based methodology for pineapple acreage mapping in a hilly cropping system of NER. Ri Bhoi district of Meghalaya was selected as the study area.

To address the challenges posed by complex terrain, fragmented landholdings, and diverse cultivation practices (including monoculture and intercropping), the approach used multi-source spatial datasets. These datasets included multi-temporal Sentinel-2 optical imagery, Sentinel-1 Synthetic Aperture Radar (SAR) data, vegetation indices, textural features, and terrain parameters derived from Digital Elevation Model (DEM).

These datasets were integrated into a comprehensive feature stack, out of which 38 significant features were identified for classification. Advanced machine learning algorithms, including Random Forest (RF), Maximum Likelihood Classifier (MLC), and Support Vector Machine (SVM), were employed, with Random Forest providing the best results. Feature importance analysis determined that elevation was the most influential factor for pineapple suitability, scoring significantly higher than all other variables.

Using this integrated methodology, the total pineapple acreage for the 2024–25 season in Ri Bhoi district was estimated at 3,993 ha. The classification achieved an overall accuracy of 84% and a Kappa coefficient of 0.79. Overall, this systematic, multi-source approach provides a replicable framework for generating informed agricultural statistics and planning in complex hilly regions for pineapple crop.

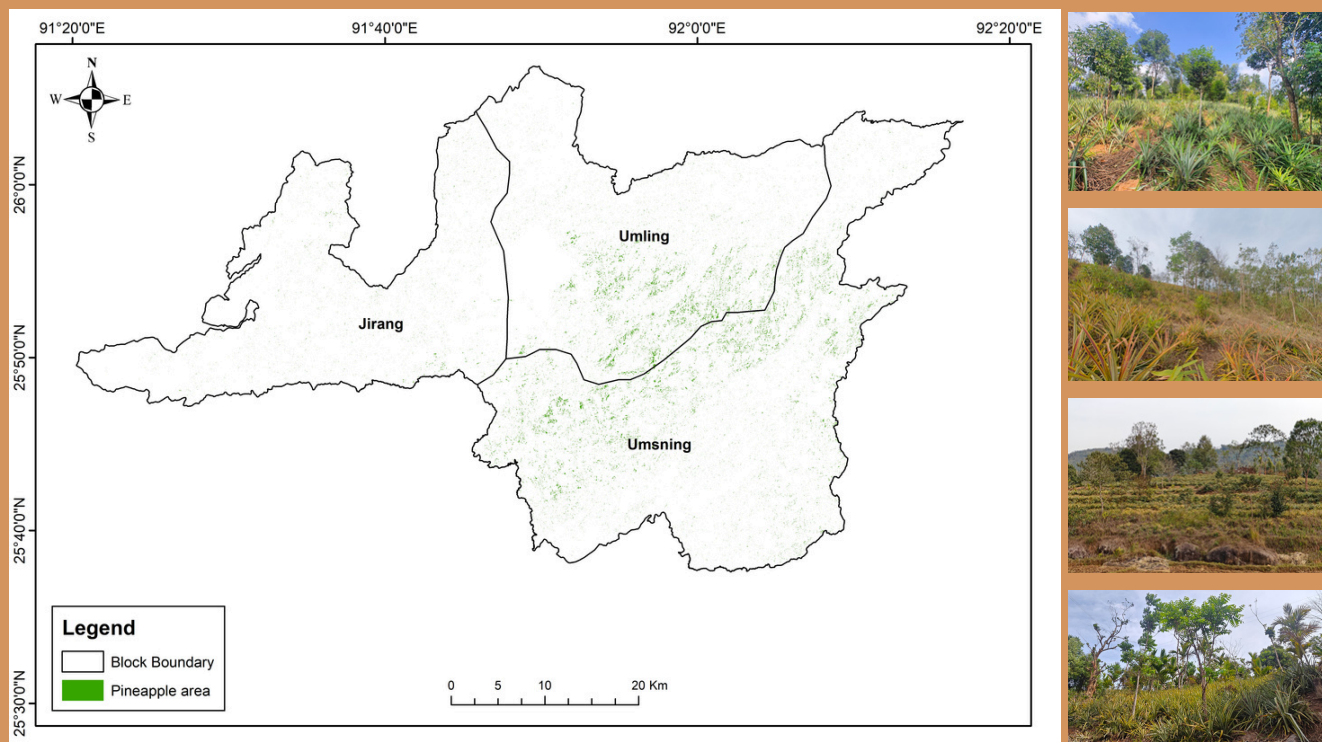


Figure shows the spatial area of Pineapple in Ri Bhoi District of Meghalaya (left) and ground truths of pineapple plantations (right)

Capacity Building and Outreach

NESAC conducts course on Advanced Geospatial Technologies Towards Precision Agriculture

NESAC organized the 6th regular two-week short course on “Applications of Remote Sensing & GIS in Agriculture and Allied Areas” on the theme “Advanced Geospatial Technologies Towards Precision Agriculture” during August 25 - September 5, 2025. The course was attended by 21 participants.

Dr. S.P. Aggarwal, Director, NESAC and the Chief Guest, inaugurated the course addressed the participants, outlining the legacy of the Indian Space Programme and its contributions to precision agriculture since its inception.



NESAC conducts course on Remote Sensing and GIS Applications in Forestry and Ecology

Forestry and Ecology Division (FED), NESAC conducted a two weeks short course on “Remote Sensing and GIS Applications in Forestry and Ecology” during September 08–19, 2025. A total of 21 participants attended the course. Dr. K. Ravichandran, IFS, Director, IIFM, graced the inaugural program as Chief Guest. The course curriculum included regular as well as advanced technologies such as UAV, LiDAR, microwave remote sensing, AI, ML and Google Earth Engine etc.



NESAC conducts Customized Training Program for ISS Probationers

NESAC organized a one-week training programme on “Applications of Geospatial Technology in Surveying, Monitoring and Programme Implementation” during 08–12 September 2025 for 27 probationers of the 46th batch of the Indian Statistical Service (ISS). The programme was sponsored by the National Statistical Systems Training Academy (NSSTA), Ministry of Statistics and Program Implementation (MoSPI), Government of India. During the course, the participants engaged in theory classes and hands-on practical sessions, including project-based activities.



NESAC conducts Course on UAV Remote Sensing : Technologies & Applications

NESAC conducted a two-week training course on “UAV Remote Sensing: Technological Advances & Its Applications” from 06 to 17 October 2025. The program aimed to enhance technical capacity in UAV-based data acquisition, photogrammetric processing, and thematic applications in sectors such as agriculture, forestry, geosciences, urban studies, and water resources. A total of 19 participants attended the course. The course combined lectures, simulator exercises, hands-on practical sessions, field demonstrations, and mini-projects, covering various topics.



Capacity Building and Outreach

Visit of the 4th Batch of Students to various ISRO Centres under NE-SPARKS program

The 4th batch of 100 students selected from all 8 North Eastern States under the NE-SPARKS program visited various ISRO Centres during August 28-29, 2025. During the two day visit, the students were taken to ISTRAC & URSC. The students listened to various lectures, interacted with senior scientists and visited various facilities like Satellite Control Centre (SCC), Mission Operations Complex (MOX) and Indian Deep Space Network (IDSN), located at Byalalu, Bengaluru during their visit to ISTRAC. . These visits provided the students a rare and valuable opportunity to witness the operational backbone that supports India's growing constellation of satellites.

During their visit to URSC they were taken on a detailed tour of the ISRO Satellite Integration and Test Establishment (ISITE) which is equipped with state-of-the-art clean room facilities for spacecraft integration and testing, including a 6.5-metre thermo-vacuum chamber, which simulates the harsh environment of space. The students also viewed footages of the successful Chandrayaan-3, SPADEX Missions, etc. Students also visited the elaborate Space Exhibition and enjoyed special shows at the Jawaharlal Nehru Planetarium (JNP), located in Bengaluru. The students were accompanied by Shri Sumanth B C and Dr Dhruval Bhavsar, Scientist, NESAC and Maj. Raishe PA, Director (E&M) from NEC.



Visit of the 5th Batch of Students to various ISRO Centres under NE-SPARKS program

The 5th batch of 100 students selected for NE-SPARKS program visited ISTRAC & URSC during September 25-26, 2025. During the two day visit, the students visited various facilities like Satellite Control Centre (SCC), Mission Operations Complex (MOX), ISRO Satellite Integration & Testing Establishment (I-SITE) and interacted with scientists.

The students visited the elaborate Space Exhibition and enjoyed special shows at the Jawaharlal Nehru Planetarium (JNP), located in Bengaluru. The students were accompanied by Shri Sumanth B C and Shri Sanjay Pandit, Scientist, NESAC and Ms Shrutimala Rajbongshi, Under Secretary (Planning) from North Eastern Council (NEC), Government of India.



Capacity Building and Outreach

NESAC conducted 2nd National Space Day Celebrations for 8 North Eastern Region states & West Bengal

NESAC celebrated the 2nd National Space Day in the eight North Eastern States and West Bengal as part of ISRO's nationwide celebration of the historic event during July -August. One event was conducted at each of the nine states in collaboration with local organizing agencies. Each of these events saw large number of students participation. The programs were structured with thematic lectures on India's space mission & Societal applications of space technology and Quiz competitions on space science & technology. ISRO Scientists from UR Rao Satellite Centre (URSC) attended each of these programs & delivered lectures and interacted with students. A final program was conducted at Shillong on 14th August as a Zonal Event where around 500 students from schools around Shillong and their faculties participated. Shri Satinder Bhalla, ITS, Secretary, North Eastern Council graced the occasion as Chief Guest and delivered an encouraging speech. Dr. S. P. Aggarwal, Director, NESAC was the Guest of Honour and he also delivered his speech and interacted with the students. The prize winning students from each state event as well as the state event coordinators were felicitated.



Celebration of National Remote Sensing Day at St. Edmund's College, Shillong

Dr. S. P. Aggarwal, Director, NESAC and President, ISRS, graced the National Remote Sensing Day celebration event as the Chief Guest at St. Edmund's College, Shillong on 8th August, 2025. The event was organised by Indian Society of Remote Sensing (ISRS), Shillong Chapter, jointly with Department of Geography, Indian Society of Geomatics (ISG)-Shillong Chapter, Indian Meteorological Society (IMS)-Shillong Chapter and St. Edmund's College, Shillong on the theme "Celebrating innovation for a better future".

The main program had a technical session comprising three invited talks, followed by a quiz competition on space science and technology. About 200 students and accompanying faculties from leading colleges in Shillong actively participated in the event to make the program a grand success.



Shri A S Kiran Kumar, Former Chairman, ISRO visits NESAC



Shri A. S. Kiran Kumar, Former Chairman of ISRO, visited NESAC during August 11–13, 2025, delivered a popular lecture on “Celebrating Innovation for a Better Future: India’s Space Program” on 12 August 2025, organized as part of the National Remote Sensing Day – 2025 celebrations.

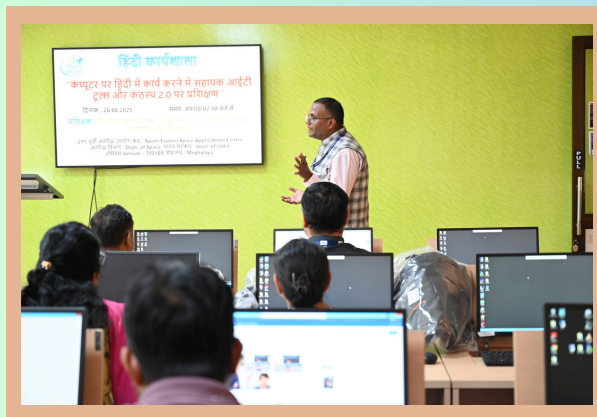
During his stay, he also reviewed NESAC’s preparations for hosting the National Space Science Symposium – 2026 and examined NESAC’s activities, providing his valuable suggestions & guidance.

NESAC celebrates the 79th Independence Day of the Nation



NESAC celebrated the 79th Independence Day of the Nation in an eventful manner on 15th August, 2025. Director, NESAC hoisted the National Flag followed by singing of the National Anthem. CISF unit presented a Guard of Honour to Director, NESAC, followed by the address of Director, NESAC, where he highlighted the notable achievements of the Nation as well as NESAC during the last year. CISF unit presented a Weapons Drill. The program was concluded with distribution of sweets followed by a symbolic march, the ‘Tiranga Yatra’.

NESAC Organizes Quarterly Hindi Workshop



The quarterly Hindi workshop was organized at NESAC on Aug 26, 2025. Shri Ajay Kumar Prasad, Assistant General Manager (Official Language), Reserve Bank of India, Shillong conducted the workshop on “Training on IT Tools helpful in working in Hindi on Computer and Kanthastha 2.0” in two sessions. In the first session, training was given on Kanthastha 2.0. In the second session, training was imparted on IT tools that are helpful in working in Hindi on the computer. A total of 17 personnel participated in the workshop.

NESAC signs Tripartite MOU with IITM, Pune and ASDMA



A Memorandum of Understanding (MoU) was signed on 24th September 2025 among NESAC, Indian Institute of Tropical Meteorology (IITM), Pune, and the Assam State Disaster Management Authority (ASDMA), Guwahati for the development of a lightning nowcasting system and integrated lightning risk reduction measures for Assam. The MoU was signed by Ms. L. Sweety Changsan, IAS, CEO, ASDMA, Dr. S. P. Aggarwal, Director, NESAC, and Dr. A. Suryachand Rao, Director, IITM, in presence of senior officials.

Third Edition of NESAC User Interaction Meet (NeUIM-2025) held via hybrid mode



The 3rd Edition of NESAC User Interaction Meet (NeUIM-2025) was held during 25-26 Sept, 2025 at NESAC via hybrid mode. The primary aim of the event was to drive greater leveraging of space and GeoAI technologies for strengthening governance, infrastructure planning, natural resources management, disaster management and capacity building in the North Eastern Region.

The event was marked by participation of 122 state and central user departments of the region. In total, 542 participants attended through hybrid mode. In addition, the event reached a wider audience with over 400 YouTube views. The program included six technical sessions and a concluding session, with 42 speakers from NESAC/ISRO, government, academia, and industry sharing valuable insights.

During the inaugural session, Dr. S.P. Aggarwal, Director NESAC highlighted NESAC's 25-year journey serving the region. The inaugural session was graced by Shri Satinder Kumar Bhalla, ITS, Secretary, North Eastern Council, as Chief Guest, with Dr. Prakash Chauhan, Director, NRSC, and Dr. R.P. Singh, Director, IIRS, as Guests of Honour.

Shri Satinder Kumar Bhalla, Secretary, NEC, lauded NESAC on its silver jubilee, affirming that users form the cornerstone of all technological ecosystems. He assured NEC's unwavering support for NESAC's mission in driving Viksit Bharat and regional development initiatives.

The NeUIM-2025 was also attended by Dr. Abdul Hakeem, Deputy Director, BG & WSA, NRSC; Dr. John Mathew, Associate Director, EDPO, ISRO HQ; Shri G. Hari Krishnan, Director, CBPO, ISRO HQ; along with other senior officials from the North Eastern Region. Dr. Dibyajyoti Chutia, Chairman, NeUIM-2025 Organizing Committee & Head, GID, coordinated the event on behalf of NESAC.



Rastriya Karmayogi Large Scale Jana Seva program:

In line with the Honorable Prime Ministers vision of fostering Seva Bhav among Central Government employees, the capacity Building Commission launched the Rashtriya Karmayogi-Large-Scale Jana Seva program. This programme is being implemented in a phase manner in all Ministries/Departments of Government of India. As per the guideline from CBC NESAC took part in Phase II level training for training of Master Trainer. Subsequently the one day traing program for the end participants were organised in two phase at NESAC.



Swachhata Pakhwada Celebrated at NESAC

NESAC observed Swachhta Pakhwada-2025 with a series of cleaning and sanitation activities within NESAC and the surrounding areas of Umiam from September 17th to October 02nd, 2025.



Celebration of Hindi Fortnight at NESAC

Hindi Fortnight was organized at NESAC from September 12 to October 6, 2025.

During September 16-17, various competitions were organized for students from the neighborhood. Further, from September 18 to September 23, 2025, various competitive events were organized for all NESAC employees and family members such as Antakshari, poetry recitation, noting/drawing and correct writing. On 24th September 2025, school students were awarded for the events. On 6th August 2025, the closing ceremony of the Hindi Fortnight was held in presence of Chief Controller, VSSC and Joint Director (Official Language), Bengaluru. Prizes were distributed among NESAC Staff and Director, NESAC congratulated everyone on the successful organization of Hindi Pakhwada 2025.



NESAC Participated in NESTI Science Expo 2025

NESAC participated in the North East Science, Technology and Industrial Exposition (NESTI) 2025 Science Expo at NEHU, organized by Spark Educational Society, Shillong.

NESAC showcased various activities of ISRO/NESAC & the "Space on Wheels" bus from 27-30th October, 2025, where the active participation of students, academia and other professionals was witnessed.



NEWS & EVENTS

Release of Forest Resource and Analysis System by Hon'ble Governor of Manipur

The Forest Resource and Analysis System (FRAMS), developed by NESAC for the Forest Department of Manipur, was officially released by the Hon'ble Manipur Governor Shri Ajay Kumar Bhalla on 9th October, 2025 during the grand finale of the 71st Wildlife Week Celebration 2025 held at the City Convention Centre, Imphal. The event was attended by Chief Secretary, Principal Chief Conservator of Forests (PCCF), Principal Secretary (Forest, Environment & Climate Change), and other officials from the Government of Manipur. The event was attended by Dr S.P. Aggarwal, Director, NESAC along with two scientists from NESAC.

FRAMS is an AI-powered geospatial intelligence platform designed to enable real-time, data-driven forest governance. It provides actionable insights through its interactive dashboard. With automated alerts issued, it empowers proactive forest monitoring, rapid response to deforestation and forest fires and transparent tracking of afforestation efforts, making it a transformative digital system for sustainable forest management in Manipur.



Student Visits to NESAC



A group of 21 students and 3 faculty members from Physics Department, Patkai Christian College, Nagaland visited NESAC on 6th October 2025. The students visited SASD Lab, UAV Lab and ISTRAC facility.

Upcoming Events

The Smart AXOM mobile app developed by NESAC for Assam State Disaster Management Authority will be inaugurated by the Govt. of Assam on 6th of November 2025



ISRO in collaboration with the Association of Healthcare Providers of India (AHPI) is conducting a Two-day training on Utilization of Remote Sensing and GIS Tools for the officials of Indian Institute of Public Health, Shillong on November 6-7, 2025 at NESAC Outreach Facility, Umiam, Meghalaya

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