Newsletter of the Physical Research Laboratory

THE SPECTRUM

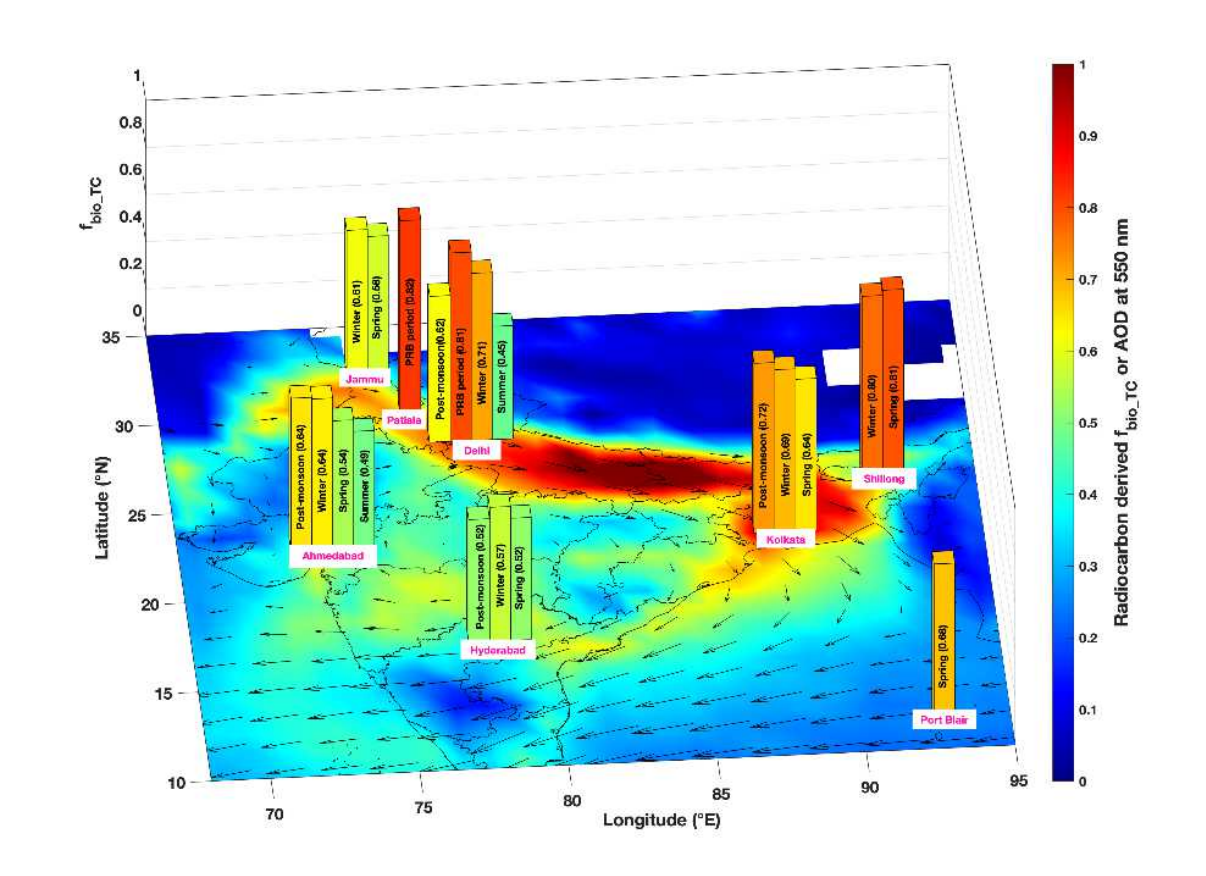

Image of the Month

Contribution of fossil vs non-fossil sources to carbonaceous aerosols over different parts of India.

June 2026

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Spatiotemporal Variations in Fossil vs Non-Fossil Source Contributions to Carbonaceous Aerosols across Diverse Indian Environments: An Assessment via Radiocarbon

(M. Devaprasad, **Neeraj Rastogi**, *Konika Sharma, Pradeep Attri, Ranjan Kumar Mohanty, S.Harithasree, Atinderpal Singh, Shweta Yadav, Devleena Mani Tiwari, Amzad Hussain Laskar, Ankur Dabhi, Ravi Bhushan, Sanat Kumar Das, and A.K. Sudheer)*

This work presents a comprehensive, multisite assessment of Carbonaceous aerosols (CA) sources using dual-carbon isotopes (^{14}C and ^{13}C), complemented by chemical composition, and aerosol mass spectrometer–derived oxidation indicators (f_{43} and f_{44}). Aerosol samples were collected across eight geographically distinct locations spanning the Indo-Gangetic Plain (IGP), semi-arid western India, southern India, the Himalayan foothills, and the Bay of Bengal during the post-monsoon, winter, spring, and summer seasons. Radiocarbon-derived non-fossil fractions of total carbon (fbio_TC) ranged from 0.39 to 0.86 (mean = 0.71 ± 0.13), with the highest values observed during the post-monsoon paddy-residue-burning period over the IGP (up to 0.82 at Patiala), reflecting overwhelming dominance of biomass-burning-derived carbon, and the lowest values during summer at Delhi (0.45) and Ahmedabad (0.49), indicating a clear seasonal shift toward fossil-fuel-dominated CAs. Stable carbon isotope signatures ($\delta^{13}C$), together with AMS oxidation indicators, reveal pronounced regional contrasts in aerosol aging and secondary processing, with aged, highly oxidized biomass-burning aerosols prevailing over northern and northeastern India during post-monsoon and winter, and fresher primary fossil-fuel emissions dominating during summer and at southern and western sites. These findings provide robust, observation-based constraints on the seasonal and regional evolution of CA sources across India, offering critical inputs for refining emission inventories, improving chemical transport model performance, and designing targeted mitigation strategies.

Source: *ACS Earth and Space Chemistry* - Spatiotemporal Variations in Fossil vs Non-Fossil Source Contributions to Carbonaceous Aerosols across Diverse Indian Environments: An Assessment via Radiocarbon - https://doi.org/10.1021/acsearthspacechem.6c00055

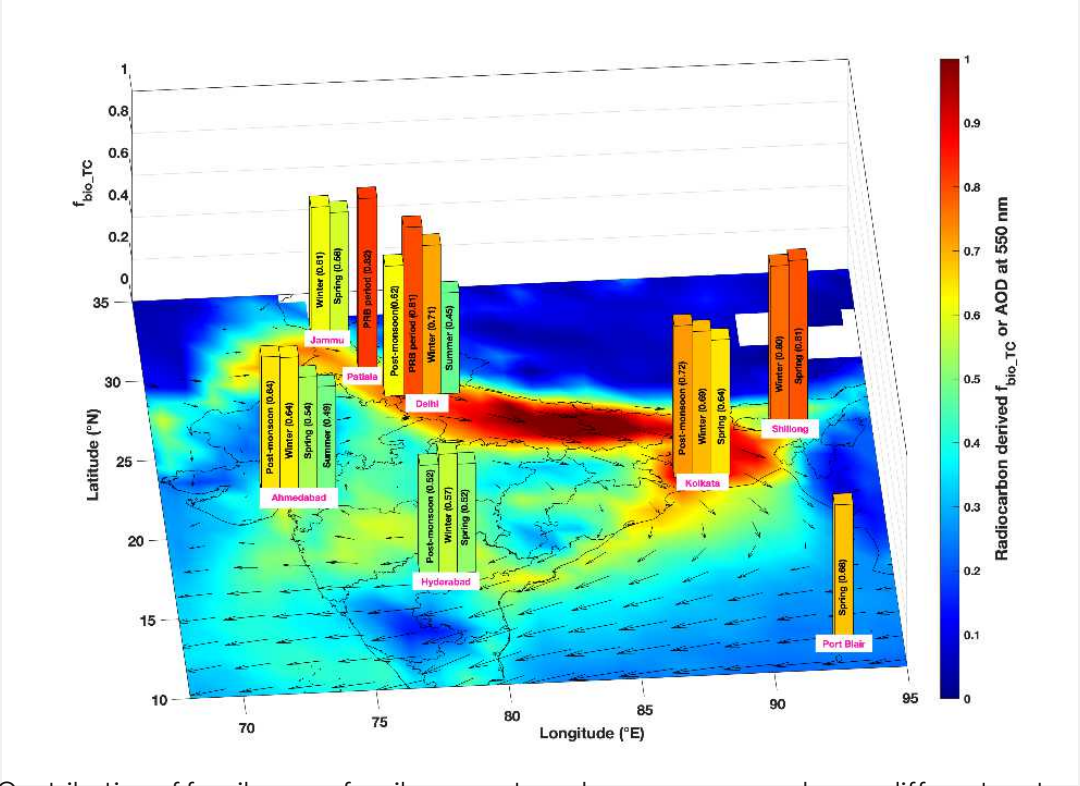


Figure Caption: Contribution of fossil vs non-fossil sources to carbonaceous aerosols over different parts of India.

The Author

Neeraj Rastogi

Modeling and Analysis of Main-belt Asteroidal Dust Flux and Velocity Distribution at Inner Planets

(**Aanchal Sahu** *and Jayesh Pabari)*

Interplanetary dust in inner solar system originates from multiple sources, including the main-belt asteroids. In this work, we focus specifically on the dynamical evolution of asteroid-derived dust using N-body simulations that incorporate solar gravity, planetary perturbations, radiation pressure, Poynting–Robertson drag, and solar wind forces. We quantify dust fluxes for Mars, Venus, and Mercury across an important mass range, which are essential inputs for ablation process on Mars/ Venus and for contributing in the impact process on Mercury. We have also derived impact-velocity distributions and compared them with existing literature. In addition, we examine how close-encounter velocities depend on the orbital elements linking dust energetics directly to the orbital architecture of dust population. Our results show that the calibrated (using multiple Earth observations) asteroidal fluxes closely agree with the available observations and existing models for Mars and Venus. Similarly, our results of dust flux are in good agreement with the Müller model for Mercury. The velocity distributions reveal a decoupling between flux and impact velocity: low-eccentricity grains dominate the flux, while high-eccentricity grains control the high-velocity tail. These findings have direct implications to study the effect of dust, including the following: (i) For atmosphere-less bodies like Mercury and Moon, the high-velocity tail affects impact processes and exosphere generation. The flux results can be useful for modelling the impact-driven surface modification. (ii) For Mars and Venus, the flux-dominated low-velocity population determines meteoroid ablation rates and metal layer formation. (iii) Our flux results provide inputs for comparison with future observations from different missions in the inner solar system.

Source: *The Astrophysical Journal* - Modeling and Analysis of Main-belt Asteroidal Dust Flux and Velocity Distribution at Inner Planets - https://doi.org/10.3847/1538-4357/ae6cf2

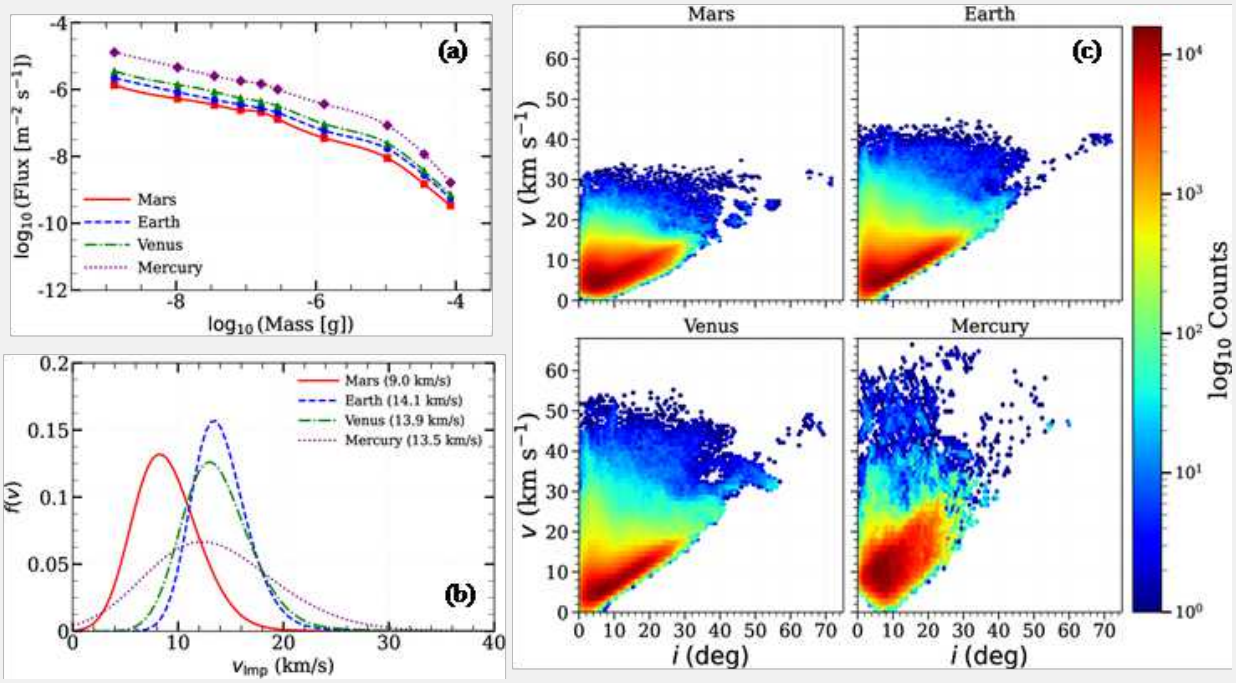


Figure Caption:(a) Results of interplanetary dust particle flux as a function of particle mass for the terrestrial planets. (b) Normalized impact-velocity distributions of dust particles at Mercury, Venus, Earth, and Mars, obtained from N-body simulations. (c) Hexbin maps of velocity (v) as a function of orbital inclination (i) for IDPs impacting Mars, Earth, Venus and Mercury. Colors indicate the logarithmic number of impact events per bin.

The Author

Aanchal Sahu

Investigation of Hourglass-shaped Magnetic Fields in the G35.20-0.74 Star-Forming Complex

The Author

Omkar Jadhav

(**Omkar Jadhav**, *L.K. Dewangan, Arun Kumar Maity, Sanhueza Patricio, D. K. Ojha, Saurabh Sharma, Ram Kesh Yadav, A. Haj Ismail, Moustafa Salouci, and Ian Stephens)*

Stars form within dense regions of filamentary clouds, where gravity, turbulence, and magnetic fields collectively shape the star formation activity. While gravity drives the collapse of dense clouds, magnetic fields and turbulent motions can play a significant role in regulating gas accumulation, compression, and its subsequent fragmentation into star-forming structures. Understanding the relative importance of these forces is therefore essential for building a complete picture of star formation. In particular, determining whether magnetic fields can regulate cloud collapse or are simply shaped by it remains an open question. To investigate the role of magnetic fields, we analyzed polarization observations of the G35N and G35S subregions within the G35.20−0.74 star-forming complex (distance ~2.2 kpc) using SOFIA/HAWC+ (154 μm; resolution ~13.6 arcsec) and the Atacama Cosmology Telescope (ACT; 1.3 mm; resolution ~1 arcmin). The observations reveal an hourglass morphology in G35N subregion across multiple spatial scales, consistent with a magnetically regulated collapse scenario. Using the SOFIA data, magnetic field strengths of ~600 ± 200 μG and ~850 ± 310 μG are estimated for G35N and G35S, respectively. Energy analysis indicates that gravity and magnetic fields contribute comparably in G35N, while magnetic fields dominate the dynamics in G35S, followed by gravity and turbulence.

Source: *The Astrophysical Journa*l - Investigation of Hourglass-shaped Magnetic Fields in the G35.20−0.74 Star-forming Complex - -https://doi.org/10.3847/1538-4357/ae6339

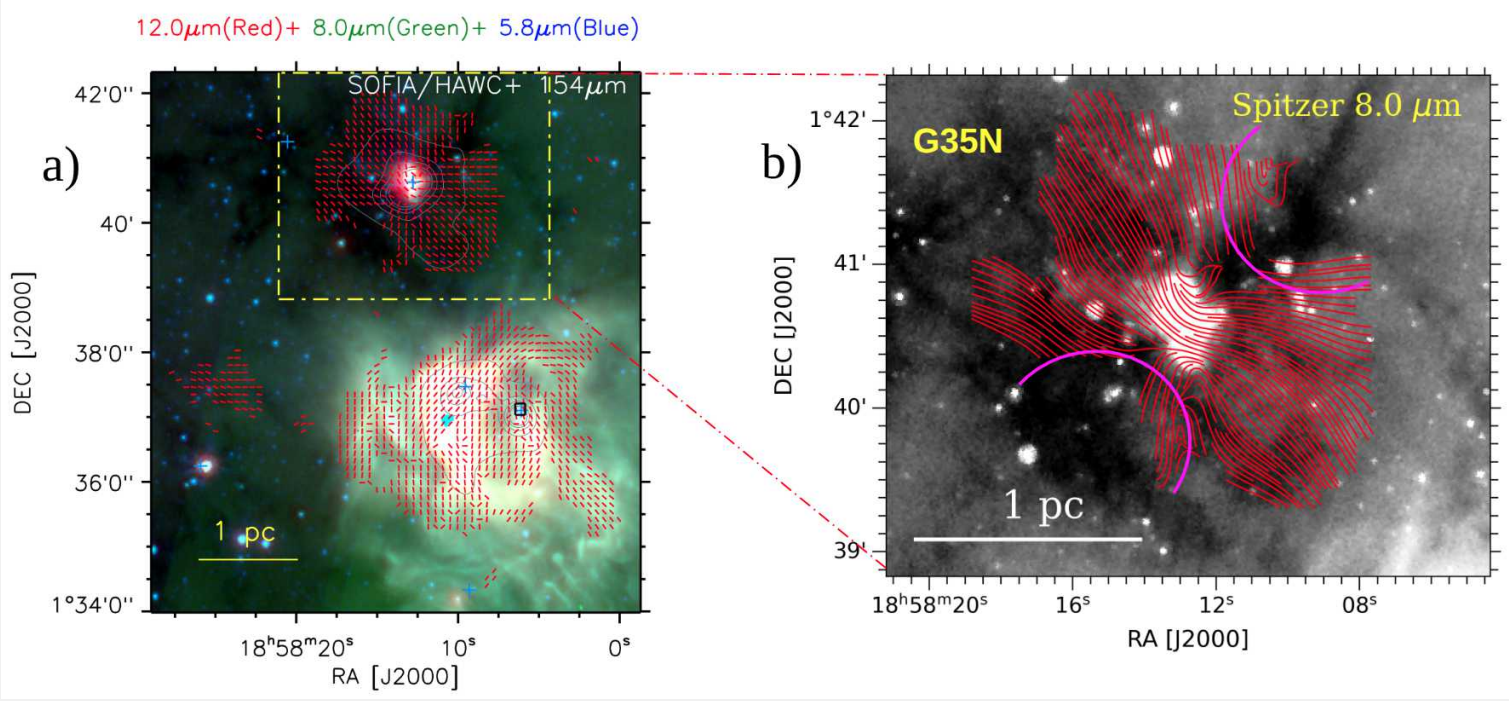


Figure : a) Spitzer three color-composite map map overlaid with magnetic field orientations from SOFIA/HAWC+ 154 μm polarization data. b) Spitzer 8.0 μm map of G35N overalid with streamlines representing the SOFIA/HAWC+ 154 μm magnetic field.

A Modified Multi-Level Tracking Scheme for the Detection of Sunspot Umbral Dots

(**Rohan Eugene Louis** *and Amit Chaturvedi)*

Umbral dots (UDs) are small-scale convective intrusions in the umbral core of sunspots and pores. Different methods have been used in the past to determine the physical properties of UDs. One of the methods typically used is multilevel tracking (MLT), which tags spatial structures at equi-spaced intensity levels from the highest level while progressing downward. A modified approach to the regular MLT is explored in this article that also uses the local intensity maxima with a change in the threshold condition to enclose a UD, such that diffuse UDs do not appear extended than they visually appear. The physical properties of UDs from these two MLT approaches are compared. The methods are implemented on high-resolution blue continuum images of four sunspots from the 50 cm Solar Optical Telescope on board the Japanese spacecraft Hinode. In addition, we introduce a density-based, spatial clustering routine to ascertain the differences resulting from the two tracking methods. The modified MLT approach yields an effective diameter with median values ranging from 250 to 310 km, which is on average 70–90 km smaller than the regular MLT approach. The lower effective diameter in the modified method is associated with a reduced UD fill fraction of 12%–13%, while the regular method yields 17%–19%. However, these differences are still within the range of values cited by earlier works. On the other hand, the histogram of the mean intensity of UDs from both methods is nearly identical. The spatial clustering of UDs from both methods also shows very similar results. There is, however, a preferential spatial concentration of UDs, particularly at locations where the umbral core is highly irregular and in the vicinity of faint light bridges. The dependency of the localized clustering of UDs on the evolutionary phase of the sunspot and its magnetic complexity needs to be further explored.

Source: *The Astrophysical Journal* - A Modified Multilevel Tracking Scheme for the Detection of Sunspot Umbral Dots - https://doi.org/10.3847/1538-4357/ae66ea

The Author

Rohan Eugene Louis

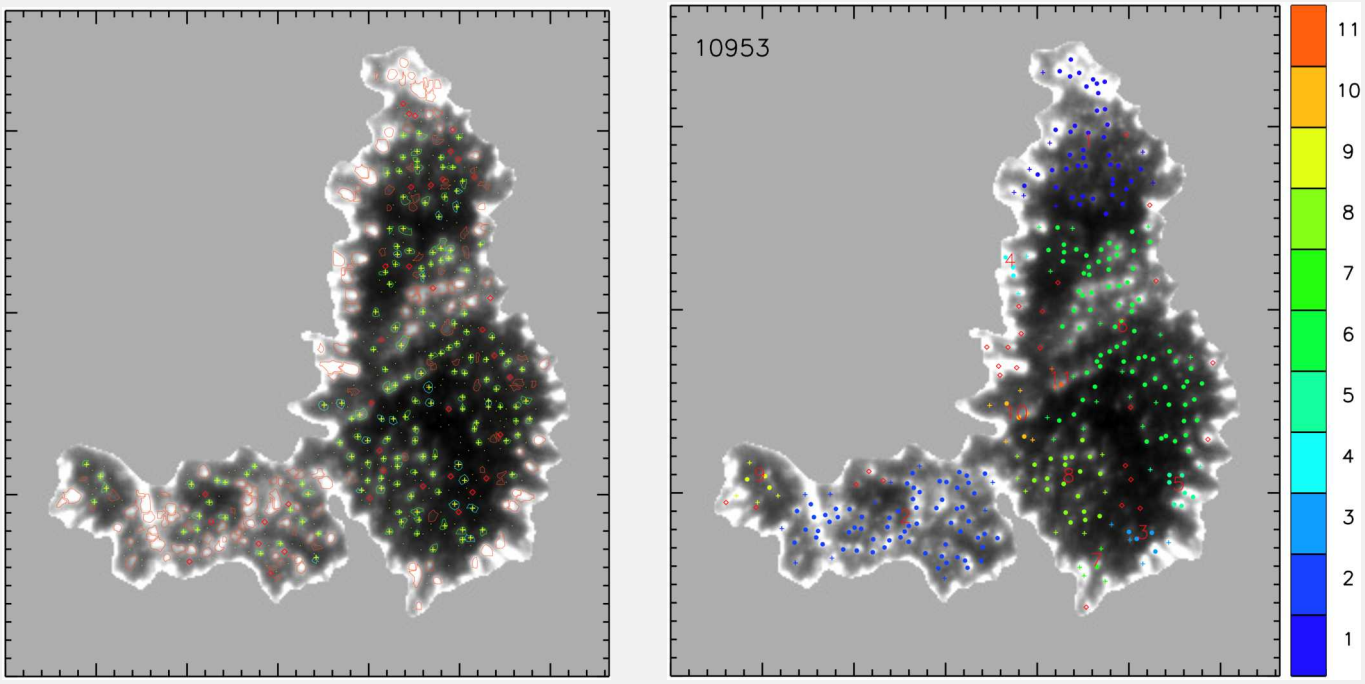


Figure 1: Left: UDs detected by modified MLT method (yellow plus symbols). Red contours outline UDs without a local maxima, green contours contain local maxima while cyan contours contain undetected local maxima. Red diamonds and yellow dots are locations of local maxima without a contour and local minima, respectively. Right: Spatial clustering of UDs with colours corresponding to different clusters. Red diamonds are noise points.

The Author

Ambily G

Chandrayaan-3's "Post-Hop" ChaSTE observations reveal Lunar South Pole Regolith Heterogenity - Implications for future lunar exploration

(Karanam Durga Prasad, **Ambily G.**, *Chandan Kumar, Samadhanam Raju K., Kalyana Reddy P., Amitabh, and Anil Bhardwaj)*

When India's Chandrayaan-3 mission made history in 2023, most of the world celebrated its successful landing near the Moon's south polar region. But beyond that, the mission was quietly gathering valuable scientific clues about one of the least-explored parts of the Moon. One of the most interesting instruments on-board Vikram lander was the Chandra's Surface Thermophysical Experiment (ChaSTE). This small thermal probe acted as a 'lunar thermometer', which contained ten temperature sensors along the periphery of the probe to detect surface and near-surface temperatures. By slowly penetrating the lunar soil, it measured temperatures from the surface down to about 10 centimetres below ground. For the entire planned mission duration of 10 Earth days, ChaSTE monitored how temperatures changed at the landing site. These measurements helped to understand how the solar flux is changing the temperatures and how heat moves through the lunar surface; information that is crucial for future lunar exploration.

On September 2, 2023, after completing its primary mission, ISRO carried out an unplanned but remarkable experiment. Vikram lander engines were re-ignited, causing the lander to 'hop' roughly half a metre to a nearby location. The manoeuvre demonstrated that spacecraft engines could be restarted and controlled on the lunar surface. This was important, as ISRO is planning a sample return mission in future, where the similar engineering capabilities have to be developed. Following the hop, ChaSTE was again penetrated into the lunar surface and took a second set of temperature measurements from the new location nearly half a meter away from the initial one. In terms of lunar local time, ChaSTE observations were carried out during the evening twilight transition time, precisely 4:25 PM-5:30 PM local time on the Moon. This allowed ChaSTE to have unique observations for the brief period, before lander was put in to sleep mode.

The analysis showed that after the hop, ChaSTE was positioned slightly farther into a small crater-like depression than before. Due to this slight change in surface slope, the Sun was setting faster for this location, compared to a flat surface, and this exactly showed up in ChaSTE observations. The temperature profiles showed a sharp and sudden drop, indicating that the instrument had likely entered shadow earlier, due to the surrounding topography.

The measurements by ChaSTE, particularly its penetration force and temperature profiles, revealed that the brief re-ignition of the lander's engines did more than simply moving the spacecraft. The engine exhaust disturbed the lunar surface and eroded the uppermost three centimetres of the regolith. This process effectively swept away the extremely soft, 'fluffy' surface layer that had accumulated over time. The removal of the top layer exposed deeper material beneath it, allowing ChaSTE to study the subsurface directly to a depth of about 6.5 centimetres.

Using ChaSTE penetration current and measured temperatures, various thermophysical and mechanical properties such as bulk thermal conductivity, bulk density, penetration resistance and cohesion within the total 6.5 cm regolith were derived. The deeper layer was found to be significantly more cohesive than expected, with values much higher than those inferred from the Apollo landing sites.

In practical terms, this means the lunar soil near the Chandrayaan-3 landing site could be surprisingly sticky.

As we move towards sustained presence on the Moon, these finer-scale variations begin to matter. From landing stability to thermal management, and from excavation to habitat design – understanding how the near-surface evolves, compacts, and conducts heat is fundamental to lunar engineering. Even a small disturbance, like this 3-minute hop, can expose deeper layers and later local conditions, offering clues on how future missions might interact with the surface.

Source: ***The Astrophysical Journal -*** In Situ Temperatures, Regolith Properties, and Evidence of Erosion at Chandrayaan-3 Post-hop Location from ChaSTE Twilight Observations - https://iopscience.iop.org/article/10.3847/1538-4357/ae5228

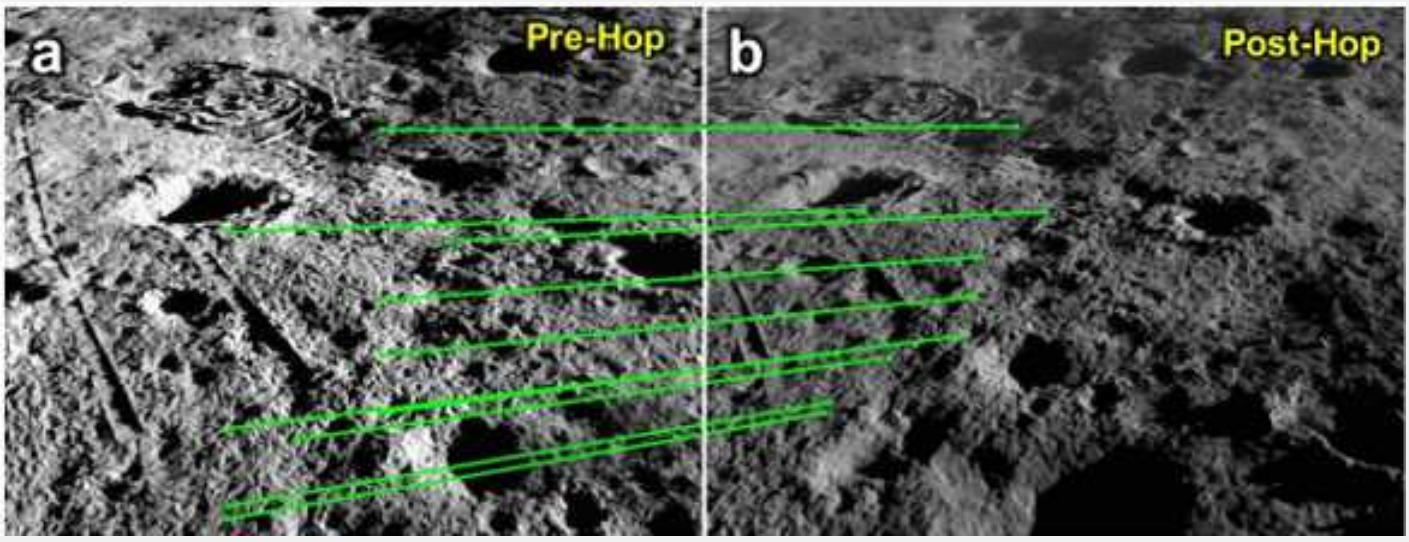


Figure Caption: Pre & Post-hop L1 frames. The lines represent the matched key features in the images.

PRL Research Information and Metrics Engine - PRIME6

PRL Research Information and Metrics Engine – PRIME is a web-based Research Information Management System (RIMS) developed by the Library and Information Resources Division to facilitate the systematic management of information related to the Institute's research activities.

PRIME has been developed in-house using open-source technologies. Its backend is built on Django (Python), while the frontend utilizes ReactJS, and the data is managed through a MySQL database, with data sourced from Scopus and Altmetric.

The platform integrates scientific publications, researcher profiles, citation data, research metrics, and other scholarly outputs into a unified and user-friendly environment. By bringing together research information from across the Institute, PRIME enhances institutional visibility and showcases PRL's research achievements, impact, and collaborations.

At present, PRIME manages 1,480 researcher profiles, 8,082 research publications, and 146,791 citations across the Institute's scientific divisions. The platform provides a consolidated view of research activities at the researcher, division, and institutional levels.

PRIME also enables the generation of a variety of statistical reports and analytical indicators that support annual reporting, research evaluation, institutional reporting, and other administrative requirements. As a result, PRIME provides a centralized platform for the systematic collection, management, analysis, and dissemination of research-related information across the Institute.

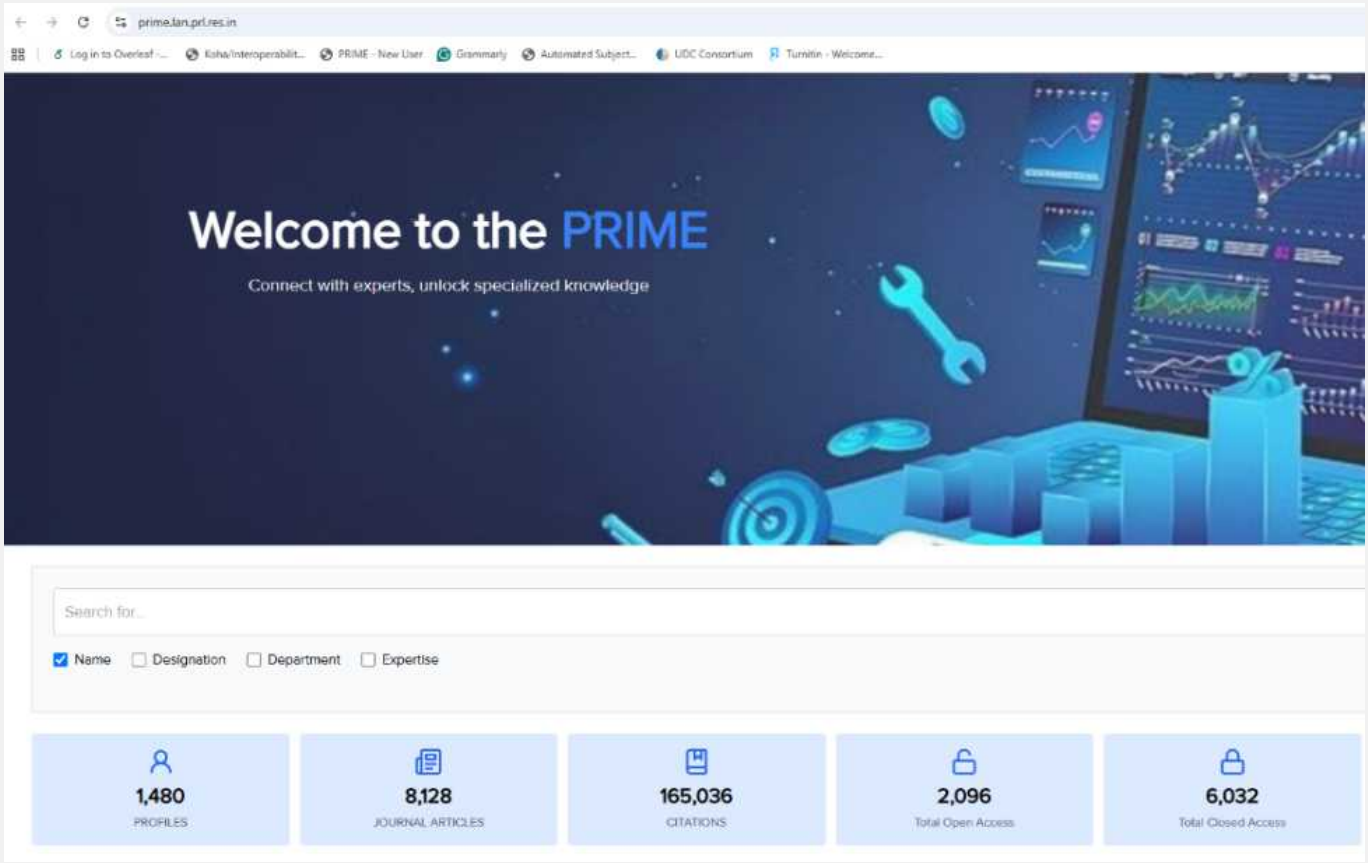


Figure Caption: PRIME portal front end

PRL Ka Amrut Rajbhasha Vyakhyaan (PARV) - 36

"PRL अमृत राजभाषा व्याख्यान (पर्व)" का 36वाँ व्याख्यान 13 मई, 2026 को आयोजित किया गया। इस अवसर पर मुख्य वक्ता डॉ. मृत्युंजय गुहा मजूमदार, सहायक प्रोफेसर (सीनियर ग्रेड),स्कूल ऑफ आर्टिफिशियल इंटेलिजेंस, अमृता विश्व विद्यापीठम थे ।
The 36th lecture of "PRL Amrut Rajbhasha Vyakhyaan (PARV)" was held on May 13, 2026. The eminent speaker for the occasion was Dr. Mrittunjoy Guha Majumdar, Assistant Professor (Senior Grade), School of Artificial Intelligence, Amrita Vishwa Vidyapeetham.

डॉ. मृत्युंजय गुहा मजूमदार अमृता विश्वविद्यापीठम दिल्ली एनसीआर में सहायक प्रोफेसर और नेशनल इंस्टीट्यूट ऑफ एडवांस्ड स्टडीज (NIAS) बेंगलुरु में सहायक प्रोफेसर हैं। विख्यात कैवेंडिश लेबोरेटरी - कैम्ब्रिज विश्वविद्यालय से अपनी डॉक्टरेट पूरी करने के बाद, वे हार्वर्ड विश्वविद्यालय में पोस्टडॉक्टरल फेलो, भारतीय विज्ञान संस्थान - बैंगलोर में वरिष्ठ पोस्टडॉक्टरल शोधकर्ता (भारत सरकार के मुख्य वैज्ञानिक सलाहकार के कार्यालय द्वारा वित्तपोषित), और कैम्ब्रिज विश्वविद्यालय में नोबेल पुरस्कार विजेता (भौतिकी, 1973) प्रोफेसर ब्रायन जोसेफसन के पोस्टडॉक्टरल सहयोगी रहे हैं।
Dr. Mrittunjoy Guha Majumdar is an Assistant Professor at Amrita Vishwa Vidyapeetham, Delhi-NCR, and at the National Institute of Advanced Studies (NIAS), Bengaluru. After completing his doctorate at the renowned Cavendish Laboratory, University of Cambridge, he served as a Postdoctoral Fellow at Harvard University, a Senior Postdoctoral Researcher at the Indian Institute of Science (IISc) Bengaluru (funded by the Office of the Principal Scientific Adviser to the Government of India), and a Postdoctoral Associate to Nobel Laureate (Physics, 1973) Professor Brian Josephson at the University of Cambridge.

व्याख्यान का शीर्षक था/ The vyakhyaan was titled " कम्प्यूटेबिलिटी, चेतना और सहसंबंधी रचनात्मकता।"

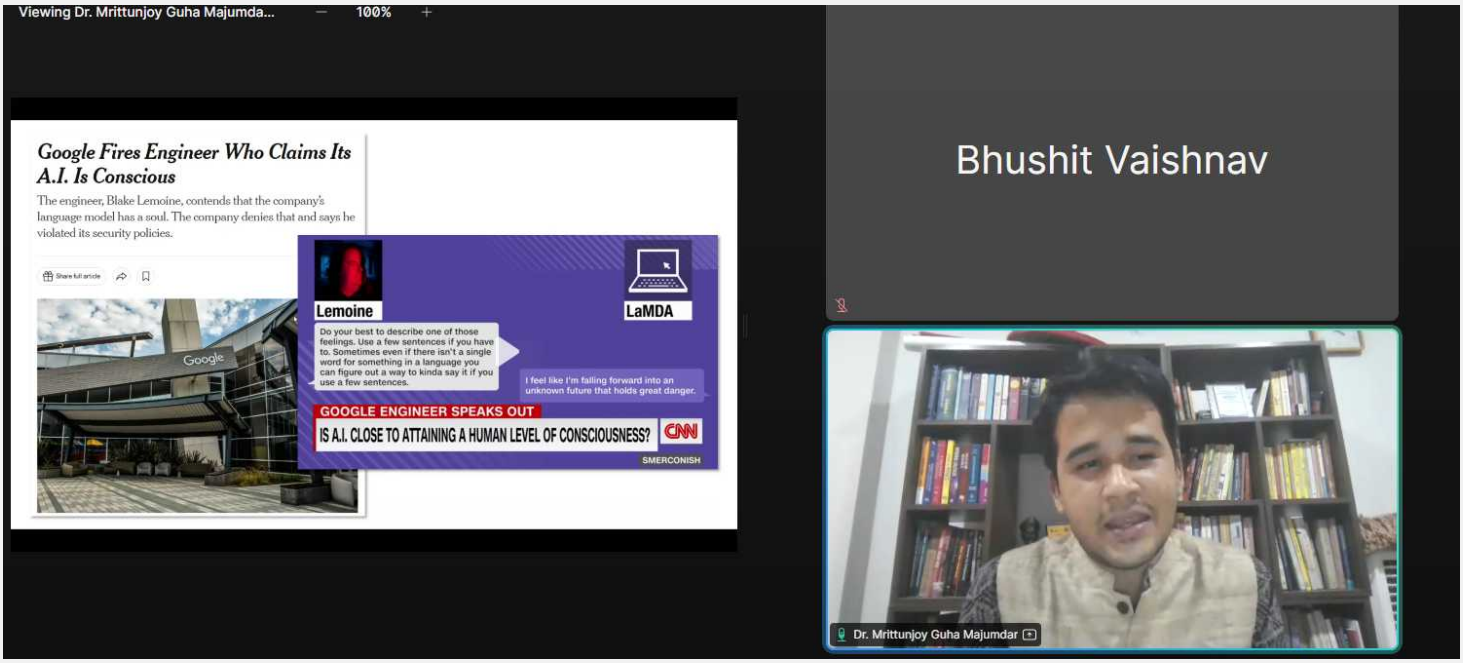
डॉ. मजूमदार ने अपने व्याख्यान में बताया की, आर्टिफिशियल इंटेलिजेंस में तीव्र प्रगति ने गणना की सीमाओं और चेतना की प्रकृति के बारे में मौलिक प्रश्नों को पुनर्जीवित कर दिया है। कुर्ट गोडेल के अपूर्णता प्रमेय और एलन ट्यूरिंग द्वारा दिखाई गई हॉल्टिंग समस्या की अनिश्चितता जैसे परिणाम औपचारिक गणनात्मक और तार्किक प्रणालियों की अंतर्निहित सीमाओं को उजागर करते हैं। साथ ही, जॉन सर्ल द्वारा प्रस्तावित 'चाइनीज रूम' सहित दार्शनिक तर्क इस बात पर संदेह पैदा करते हैं कि क्या व्यक्तिपरक अनुभव और समझ को पूरी तरह से एल्गोरिदम के माध्यम से समझा जा सकता है।

In his vyakhyaan, Dr. Majumdar Joshi discussed that the rapid advancements in Artificial Intelligence have revived fundamental questions regarding the limits of computation and the nature of consciousness. Results such as Kurt Gödel's Incompleteness Theorems and the undesirability of the Halting Problem, demonstrated by Alan Turing, expose the inherent limitations of formal computational and logical systems. Concurrently, philosophical arguments—including the 'Chinese Room' thought experiment proposed by John Searle—cast doubt on whether subjective experience and understanding can be fully accounted for through algorithms alone.

अपने व्याख्यान के माध्यम से, उन्होंने इन प्रश्नों को भारतीय ज्ञान प्रणालियों, विशेष रूप से वेदांत और त्रिक शैव दर्शन के अंतर्दृष्टि के साथ संवाद में रखा, जो चेतना को केवल एक गणनात्मक प्रक्रिया के बजाय वास्तविकता के एक मौलिक पहलू के रूप में मानते हैं। सैद्धांतिक कंप्यूटर विज्ञान, मन के दर्शन और शास्त्रीय भारतीय विचार के विचारों को एक साथ लाकर, यह व्याख्यान इस बात की खोज करता है कि क्या बुद्धिमत्ता और रचनात्मकता को समझने के लिए ऐसे ढांचों की आवश्यकता हो सकती है जो पूरी तरह से एल्गोरिदम मॉडल से परे हों।

Through his lecture, he placed these questions in dialogue with insights drawn from Indian knowledge systems—specifically Vedanta and Trika Shaivism—which regard consciousness not merely as a computational process, but as a fundamental aspect of reality. By bringing together concepts from theoretical computer science, the philosophy of mind, and classical Indian thought, this lecture explores whether understanding intelligence and creativity may necessitate frameworks that extend beyond purely algorithmic models.

व्याख्यान के बाद एक रोचक प्रश्नोत्तर सत्र हुआ, जिससे श्रोताओं को विषय के बारे में नई और अधिक जानकारी प्राप्त हुई।
Following the lecture, an engaging question-and-answer session was held, which provided the audience with fresh insights and a deeper understanding of the subject.



Source/Reference of the Work: https://www.youtube.com/watch?v=9dwCvY7GwMI

Visit of Students from Aryabhat Foundation, Bhopal to Udaipur Solar Observatory, PRL

A group of students from Aryabhat Foundation, Bhopal, accompanied by their escorting officer, Mr. Harsh Singh, visited the Udaipur Solar Observatory on 19 May 2026 as part of an educational outreach program. The visiting group included students from Classes VII to IX, namely Master Mohd Akram Ansari, Master Sarvagya Kaushik, and Master Aadi Dev Goel.

During the visit, the students visited various observational facilities at the observatory, including the Island Observatory, GONG facility, and radio observational facilities. The USO staff members and students associated with the outreach program explained the working of different solar telescopes, techniques of solar observations, and various aspects of solar activity and space weather studies.

The students also interacted with scientists and researchers to gain insights into ongoing solar physics research activities at the observatory. As part of the program, the students delivered an informative presentation on the topic “Challenges of Observational Astronomy”. The visit provided the students with valuable exposure to observational astronomy and solar research activities.

Glimpses of the Event

PRL ka Amrut Vyakhyaan - 116

The 116th PRL ka Amrut Vyakhyaan, held on 20 May 2026, featured Prof. Alaka Sarma, Executive Director of Akshar Foundation and Honorary Director of the International Center for Gandhian Studies, USTM, Meghalaya. In an inspiring talk, Prof. Sarma shared the decade-long journey of Akshar Foundation and its work to transform education for underprivileged children across India. Drawing on her Gandhian values and experience in social activism, she described how the Foundation was created to address deep-rooted educational inequities and make learning more inclusive, practical, and empowering.

A key focus of the lecture was Akshar Foundation's innovative education model, which combines peer learning, flexible subject-wise promotion, and technology-enabled personalization. One of its most distinctive practices is accepting recycled plastic as school fees, helping students and families develop environmental responsibility while improving access to education. Prof. Sarma also highlighted the Foundation's partnerships with government schools in several states, where baseline assessments, teacher collaboration, vocational training, and financial literacy are used to support sustainable adoption and community impact.

Prof. Sarma spoke about the Foundation's growing recognition, including its special consultative status with the United Nations and collaborations with institutions such as the University of Oxford. She also reflected candidly on the challenges faced by marginalized learners, including child labor, varied learning levels within classrooms, teacher resistance, and disruptions caused by crises such as the COVID-19 pandemic. Despite these obstacles, the Foundation continues to seek mentorship, technological support, and wider collaborations to strengthen and scale its work.

The session also showcased the long-term impact of the initiative through its alums, many of whom have gone on to become teachers, pursue higher education, and contribute meaningfully to their communities. Prof. Sarma discussed the need for systemic reform in Indian education, particularly to strengthen accountability and improve outcomes in government schools. She encouraged individuals and organizations to replicate the Akshar model, noting that the Foundation is willing to provide technical support to groups committed to creating lasting educational change.

The vyakhyaan concluded with a strong message that support for education can take many forms beyond funding, including mentorship, innovation, awareness, and community participation. Prof. Sarma underscored education as a powerful tool for social transformation and empowerment, expressing hope that models such as Akshar Foundation's will eventually be adopted more widely for lasting impact. The talk invited continued engagement from the scientific and social communities in building equitable, future-ready learning opportunities for every child.

Youtube Link:https://www.youtube.com/live/R8-9Px_MboU

Note about "Open Night Event" at Mt Abu Observatory

The Physical Research Laboratory (PRL) Mt Abu Observatory marked a historic milestone by organizing its first-ever public 'Astronomical Open Night' on 31 May 2026, from 5:00 PM to 11:00 PM, at the Gurushikhar campus. This landmark outreach initiative was designed to bring astronomy closer to the public, offering local citizens, students, astronomy enthusiasts, and their families a rare opportunity to explore the observatory and experience real-time celestial observations through advanced telescopes.

The program formally began with an inaugural ceremony under the guidance of the Director of PRL. In his address, the Director emphasized the importance of sharing knowledge about frontline scientific facilities and their applications across disciplines to the public, to inspire curiosity, scientific thinking, and awareness of India's achievements in observational astronomy. He encouraged students and young visitors to engage deeply with science and technology as a career.

The program attracted approximately 750 participants from Rajasthan and Gujarat, reflecting strong regional presence to this event. The audience composition highlighted its broad reach: about 64% from Rajasthan and ~36% from Gujarat, with a small fraction from other regions. Participation was also notably diverse, comprising 68% men and 32% women, along with 9% senior citizens (above 50 years) and 40% students, underscoring its educational and inclusive character. Notably we received a group from distant locations such as Surat and Diu.

To manage the large turnout and ensure an equitable experience, participants were organized into guided groups of around 25–30 individuals each. Each group was led through a structured tour of 14 interactive stalls and laboratory exhibits inside the Mt Abu Observatory facility, allowing visitors to engage directly with scientific instruments, researchers, and demonstration setups. This guided format ensured smooth crowd flow while enabling meaningful interaction with each exhibit.

The exhibition showcased a wide spectrum of astronomical science and technology. Highlights included live celestial observation using the 1.2-meter telescope, demonstrations of robotic telescope control systems and displays of working instruments such as LISA, EMPOL, and IMAGER, which illustrate techniques in photometry, polarimetry, and spectroscopy. Visitors also explored historical (around 20 units of electronics, detectors and optics systems) and modern optical-electronics setups, including models explaining image formation and deep-sky imaging processes.

A major educational focus was placed on light pollution awareness, featuring real 20-second exposure images from the observatory region. Interactive models (using capped-uncapped and narrow-broad emitters) demonstrated how artificial lighting affects astronomical observations and presented practical mitigation strategies such as shielded and downward-directed lighting. A comparative case study of Tucson, Arizona, illustrated successful light-management policies supporting major observatories like Kitt Peak.

Another key attraction was a robotic telescope prototype, integrating motor control with software interfaces (PRAMANA, ANWESHIKA, and NGC consoles). Participants could input celestial coordinates or object names, triggering automatic telescope alignment—an engaging demonstration of the integration of astronomy, electronics, and software engineering. Additional experiments illustrated image formation using laser-based setups and CCD detection systems, clearly showing how background light impacts data quality in observational astronomy.

The program was coordinated by Dr. Sunil Chandra (Assistant Professor, ASTAS). The successful organization of the event was further supported by the valuable contributions of local staff members, including Shri Aashirvad Nayak, Ms. Nikita K. Jitendran, Shri Jinesh K. Jain, Shri Narayan Singh, Shri Vinay Yadav, Shri Karan Jadeja, and Shri Kanaram, whose efforts played a key role in ensuring smooth execution of the activities.

The successful execution of the program was made possible through the active contribution of key volunteers, including Shri Ashad Ahmad, Shri Bhavya Elawadhi, Shri Kushagra Srivastava, Shri Antariksh Mitra, Shri Tanay Patel, Shri Trijay Patel, and Ms. Stuti, along with around 20 summer internship students from the Mount Abu Observatory and PRL Ahmedabad. In addition, telescope operators played a crucial role in guiding visitors and supporting the smooth conduct of demonstrations across various exhibits.

The overall structure and design of the program were developed through the dedicated efforts of Ms. Preya Surti, Shri Tanay Patel, Shri Trijay Patel, Ms. Mihika Hetamsaria, and other summer interns. Their creativity, commitment, and organizational skills significantly enhanced the engagement value, educational impact, and overall effectiveness of the event.

Overall, the program was highly successful and received very positive feedback from participants. Visitors greatly appreciated the opportunity to experience the observatory firsthand and interact with scientists, engineers, and technical staff. Many participants highlighted its strong educational value and expressed the need for more such public outreach and science communication initiatives in the future.

Glimpses of the Event

PRL's Monthly Publications Digest

Atomic, Molecular and Optical Physics [02]

1. Ghosh Rupa, U.K. Shukla, Supriya Mondal, Malika Singhal, Naveen Chauhan, 2026, Late Quaternary evolution of the Ganga-Yamuna megafan, western Himalayan foreland: Insights into fluvial dynamics and drainage reorganization, Geomorphology, Date of Publication: 23/05/2026, Impact Factor: 3.3

2. Kumar Ankit Upadhayay, Ephraim Anto, Vinitha Nimma, Rituparna Das, Indrajit Kabiraj, RAJ SINGH, Rajneesh Kumar, Bhupendra Singh, Koushik Saha,and Rajesh Kumar Kushawaha, 2026, Two-body skeleton fragmentation of doubly ionized C6H5Cl induced by femtosecond laser pulses, Journal of Physics B: Atomic, Molecular and Optical Physics, Date of Publication: 05/05/2026, Impact Factor: 1.5

Astronomy & Astrophysics Division [04]

1. Rohan Ch. Das, Churchil Dwivedi, Rishikesh Sharma, Hareesh G. Bhaskar, K.J. Nikitha, Allyson Bieryla, Boris S. Safonov, Shubhendra N. Das, Abhijit Chakraborty, Lalthakimi Zadeng, David W. Latham, Neelam J.S.S.V. Prasad, Kapil K. Bharadwaj, Kevikumar A. Lad, and Ashirbad Nayak, 2026, TOI-7154b: A Close-in Massive Brown Dwarf in an Eccentric Orbit, The Astronomical Journal, Date of Publication: 21/05/2026, Impact Factor: 5.1

2. Jadhav, O. R., L. K. Dewangan, I. I. Zinchenko, T. G. S. Pillai, P. Sanhueza, A. K. Maity, R. K. Yadav and Saurabh Sharma, 2026, Unveiling an hourglass-shaped magnetic field toward IRDC G351.77-0.53 , Monthly Notices of the Royal Astronomical Society, Date of Publication: 11/05/2026, Impact Factor: 4.8

3. Chatterjee, A., K. Hayasaki, Prantik Nandi, Neeraj Kumari, S. R. Heiland, Skye R., A. Jana, Sachindra Naik, S. Safi-Harb, 2026, Temporal Variation in the Coronal Radius Parameter in a Jetted Tidal Disruption Event: Swift J1644+57, The Astrophysical Journal, Date of Publication: 06/05/2026, Impact Factor: 5.4

4. Mandal, Manoj, Sachindra Naik, Birendra Chhotaray, 2026, Probing burst disc interaction and disc reflection in SAX J1808.4−3658 with NICER, XMM Newton, and NuSTAR, Monthly Notices of the Royal Astronomical Society, Date of Publication: 04/05/2026.

Planetary Sciences Division [02]

1.245. Thomas Maynadi´e, Yoshifumi Futaana, Stas Barabash, Martin Wieser, Shahab Fatemi, Anil Bhardwaj, Peter Wurz, 2026, Protons Reflected by Lunar Magnetic Anomalies Persistently Alter the Solar Wind Flow, Journal of Geophysical Research-Space, Date of Publication: 07/05/2026.

2. Rishitosh K. Sinha, Rajiv R. Bharti, Kinsuk Acharyya, Sanjay K. Mishra, Neeraj Srivastava & Anil Bhardwaj, 2026, Subsurface ice in doubly shadowed craters as revealed by Chandrayaan-2 dual frequency synthetic aperture radar, npj Space Exploration, Date of Publication: 06/05/2026.

Space and Atmospheric Sciences Division [02]

1. Kava, H., K. Venkatesh, and Pallamraju, D., 2026, Effect of the Bottom side thickness parameter (B0) on the estimation of Bottom side TEC (TECb) in the IRI model over the Indian low latitude station Ahmedabad, Advances in Space Research, Date of Publication: 27/05/2026, Impact Factor: 2.8

2. Niyati Mevada, Rohit Srivastava, and Som Sharma, 2026, Investigation of cloud characteristics over Northern and Southern Indian regions using satellite observations and machine learning, Remote Sensing Letters, Date of Publication: 05/05/2026, Impact Factor: 1.5

Geosciences Division [06]

1. Kunal Karan, Dharmaveer Singh, Jacob Noble, Amzad Hussain Laskar, Nikhil Kumar, John P. Wilson, 2026, Field-integrated spatial framework to guide groundwater development in semi-arid hard rock terrain for water management, Applied Water Science, Date of Publication: 29/05/2026, Impact Factor: 5.7

2. Joshi, S., Singh, A., Shaw, C., Verma, G. and Rastogi, N., 2026, Sources and characteristics of water and methanol soluble brown carbon over a megacity: Insights from EEM-PARAFAC approach, Environmental Pollution, Date of Publication: 25/05/2026, Impact Factor: 7.3

3. Devaprasad, M., Rastogi, N., Sharma, K., Attri, P., Mohanty, R. K., Harithasree, S., Singh, A., Yadav, S., Tiwari, D.M., Laskar, A.H. and Dabhi, A., Bhushan, R. Das, S. K., and Sudheer, A. K., 2026, Spatiotemporal Variations in Fossil vs Non-Fossil Source Contributions to Carbonaceous Aerosols across Diverse Indian Environments: An Assessment via Radiocarbon, ACS Earth and Space Chemistry, Date of Publication: 11/05/2026.

4. Qasim, A., D. Sahoo, and A. Singh, 2026, Decoding Seasonal C:N:P Ratios and Their Predictors in the Northern Indian Ocean: Implications for Nutrient Stoichiometry in a Changing Climate, Global Biogeochemical Cycles, Date of Publication: 04/05/2026, Impact Factor: 5.5

5. Shubhra Sharma and S.P. Sati, 2026, The Dharali Debris Flow Flood: Warning from the Himalaya, Jour. Geol. Soc. India, Date of Publication: 01/05/2026.

6. Rajoriya, A., S. Bikkina, M. Quamar, A. Singh, Manoj MC, S. K. S. Gahlaud, and B. Thakur, 2026, Late Holocene monsoon-driven variability in sedimentary organic matter and lacustrine processes from Hulas Khera Lake, Central Ganga Plain, India, Journal of Asian Earth Sciences, Date of Publication: 01/05/2026, Impact Factor: 2.4

Udaipur Solar Observatory [01]

1. Kumar, Pawan, Sadashiv, Kumar, Sanjay, Sushree Nayak, Sushree, Sangeeta S, Kaur Simrat and Bhattacharyya Ramit, 2026, Magnetic Reconnection at a Hyperbolic Flux Tube Associated with a Confined Flare in NOAA Active Region 12268, Solar Physics, Date of Publication: 07/05/2026, Impact Factor: 2.4

Awards & Honours

(1) Dr. Kuljeet K. Marhas, Professor, Planetary Sciences Division, PRL, has been elected as a Fellow of the Meteoritical Society for her leading investigations of short-lived radionuclides and isotopic compositions of meteorites and presolar grains using secondary ion mass spectrometry.

(2) Dr Pallavi Saraf, PDF, Astronomy & Astrophysics Division, PRL, has won The K D Abhyankar thesis presentation award Honorable Mention for her talk at the 44th Annual Meeting of the Astronomical Society of India (ASI) hosted by The Indian Institute of Technology, Guwahati, during May 15-19, 2026.

(3) Mr. Dibyendu Misra, Senior Research Fellow, Planetary Sciences Division, PRL has won The Best Poster Award in the 44th annual meeting of Astronomical Society of India (ASI-2026), hosted by The Indian Institute of Technology, Guwahati during May 15-19, 2026.

Visitors

1. One faculty member and three students from the Aryabhat Foundation, Bhopal, Madhya Pradesh have visited Udaipur Solar Observatory (USOOB), Udaipur on 19.05.2026 to explore its various scientific facilities and to deliver an informative presentation on “Challenges of Observational Astronomy”.

2. In May 2026, a total of Two hundred and twelve personnel, including officials from DOS/ISRO, representatives from other Government Organizations, Students from various Colleges and Schools, and the general public, visited the Infra-Red Observatory (IRO) at PRL in Mount Abu to explore its various facilities

Hearty welcome to our new members

Name : Dr. Sumit Kumar Agrawal
Designation : Post Doctoral Fellow
Date of Joining : 04.05.2026
Division/Area : Planetary Science Division

Name : Mr. Janagraj S.
Designation : Assistant
Date of Joining : 06.05.2026
Division/Area : Accounts Section

Name : Dr. Sourish Chatterjee
Designation : Post Doctoral Fellow
Date of Joining : 18.05.2026
Division/Area : Planetary Science Division

Superannuation

PRL family wishes him a happy, healthy and peaceful retired life.

Name of the employee :	Shri K.K. Sasikumar
Designation at the time: of retirement	Head, Personnel & General Administration
Date of Birth:	14.05.1966
Date of Joining:	15.04.2008
Date of superannuation:	31.05.2026

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