

ACHIEVEMENTS

Centre of Excellence in Cloud Physics and Weather Modification Research at IITM

MoES has approved the establishment of a Centre of Excellence in Cloud Physics and Weather Modification Research at the Indian Institute of Tropical Meteorology (IITM). This will feature the first-of-its-kind convection cloud chamber under the Mission Mausam vertical weather modification initiative. The research focus will include observations, numerical modelling, and laboratory studies to enhance cloud physics research.

Monsoon Campaign 2024 at ART-CI

The Monsoon Campaign 2024 has been successfully conducted at the Atmospheric Research Testbed (ART), ART-CI, with continuous operation of advanced meteorological instruments, including C-band radar, ceilometers, disdrometers, rainwater sampling tools, aerosol instruments, lightning sensors, and radiation sensors. Additionally, eco-friendly, battery-operated electric carts have been commissioned at the ART facility in Silkheda.



Monsoon Campaign 2024 at ART-CI

Expansion of the Joss-Waldvogel Disdrometer Network

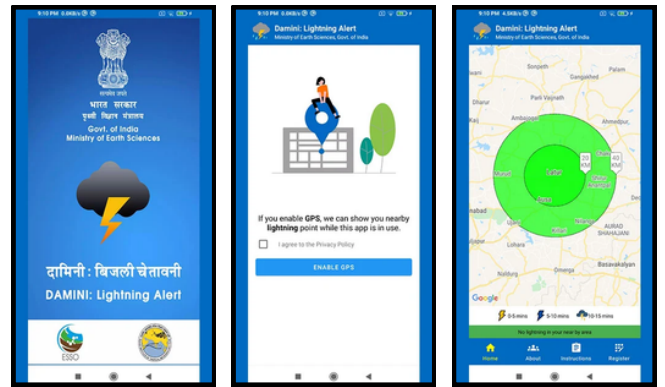
As part of IITM's strategic initiative to build a nationwide disdrometer network for advancing precipitation microphysics research across diverse climatic zones, a Joss-Waldvogel Disdrometer was installed at the Kangra Airport Campus in Dharamshala, Himalayan Region, on November 23, 2024.



Disdrometer

Damini Mobile App for Lightning Location Network

Under the Thunderstorm Dynamics Project, as directed by the Honorable Home Minister and the Ministry of Earth Sciences (MoES), the Damini Mobile App for lightning alerts has been updated. The app is now available in eight additional languages: Sanskrit, Santhali, Mithali, Nepali, Manipuri, Bodo, Sindhi, and Dogo. With this update, the Damini App is now accessible in all languages included in the 8th schedule of the Indian Constitution.



Damini App

Urban Meteorology Project – Delhi

Under this project, several advanced meteorological instruments have been installed across Delhi, including Wind Lidar with scan capability and Ceilometer with depolarization measurement capability at MoES, Delhi; additional ceilometers, CCN counters, and disdrometers at NCMRWF and IITM's Branch Office; and Joss-Waldvogel Disdrometers (JWD) at IMD Aaya Nagar and IMD Main Branch, New Delhi.

GEFS Forecast of Cyclone "DANA"

Cyclone "DANA" was monitored from October 22 to 26, 2024, with its origin traced to a Low Pressure Area on October 19, 2024. Real-time forecast data was continuously shared with the India Meteorological Department (IMD). A new diagnostic tool — the Box and Whisker Plot — was introduced to assess ensemble-based variability in cyclone intensity predictions.

Winter Fog Experiment (WiFEX)

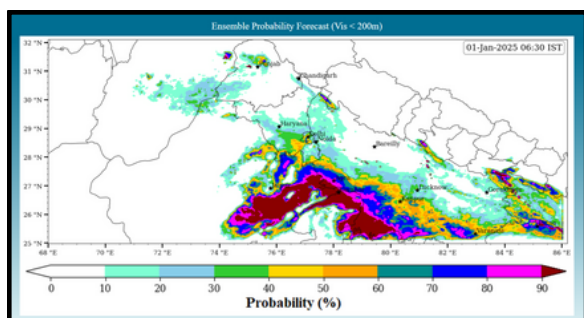
The Winter Fog Experiment (WiFEX) for 2024-2025 is ongoing across three observation sites: IGI Airport, Jewar Airport, and the aerosol lab at IMD, Lodhi Road. Advanced meteorological instruments, including flux towers, visibility meters, and high-end aerosol instruments, are deployed to enhance understanding of fog formation and dissipation. Real-time data is displayed on the WiFEX website.



WiFEX Instruments

Development of a Probabilistic Fog Forecasting System

IITM has developed the 21-member Ensemble Probability Fog Forecast System (EPFS) to improve visibility forecasts for fog-prone regions. This innovative system uses ensemble modeling techniques to capture meteorological uncertainties and provide probabilistic forecasts for major transportation hubs in the Indo-Gangetic Plain.



Development of a Probabilistic Fog Forecasting System

Advancements in Urban Meteorology Research

The Weather Research and Forecasting model coupled with an Urban Asymmetric Convective Model (WRF-UACM) has been implemented at WiFEX for urban fog prediction in the Delhi region. This high-resolution model integrates urban morphology data to better simulate fog dynamics in urban areas.

Enhancements in Data Assimilation Techniques

IITM is developing high-resolution soil data assimilation and microwave radiometer data assimilation techniques in research mode to improve fog prediction accuracy. These advancements will enhance surface flux representation and refine near-surface cooling process simulations crucial for fog formation studies.

Climate-Health Dialogue by WCRP My Climate Risk and WHO-WMO GHIN Hubs

On December 17, 2024, the WCRP My Climate Risk and WHO-WMO Global Heat Health Information Network (GHIN) hubs at IITM convened a Climate-Health Dialogue aimed at addressing climate-related health risks in the Global South. The event brought together experts from IISER Pune, Symbiosis Statistical Institute, ICMR–National Institute of Virology, and Pune Knowledge Cluster, who engaged in interdisciplinary discussions with IITM researchers to explore actionable pathways linking climate science and public health.

Workshop on Soil Moisture Measurements to Modeling and Scaling (SoM2Ms)

A one-day workshop and brainstorming session on Soil Moisture Measurements to Modeling and Scaling (SoM2Ms) was held at IITM Pune on November 26, 2024. Experts from various institutions participated to discuss the creation of a pan-India soil moisture data product.



Group Photo during SoM2Ms Workshop

National Learning Week

IITM employees participated in webinars hosted on the iGOT Karmayogi portal from October 19-25, 2024, as per the guidelines issued by DoPT, CBC, and Karmayogi Bharat.



iGOT Karmayogi portal

Participation in Bhopal Vigyan Mela 2024 (BVM-2024)

IITM researchers participated in the 11th Bhopal Vigyan Mela (BVM-2024) held from December 27-30, 2024, at Jamburi Maidan, Bhopal. Organized by the Madhya Pradesh Council of Science & Technology in collaboration with Vigyan Bharati (VIBHA), the event's theme was "Viksit Bharat 2047: The Foundation of Science, Technology, and Innovation."



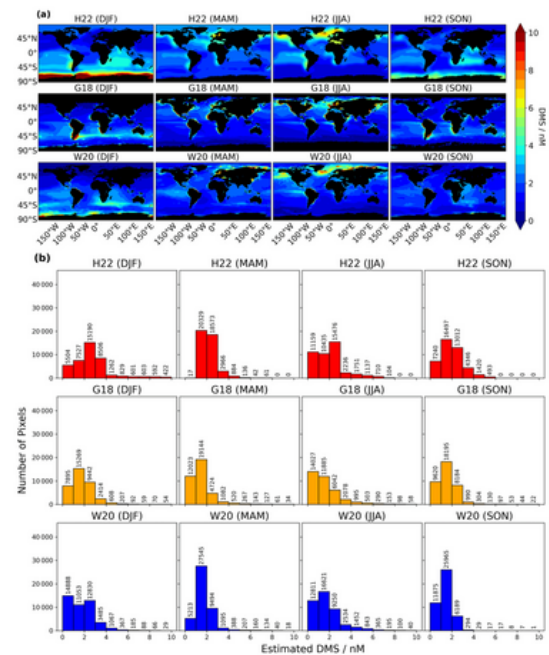
Glimpses from Bhopal Vigyan Mela 2024

Research Highlights

Dimethyl sulfide (DMS) climatologies and flux trends: Differences between seawater DMS estimations

A recent study examines how different methods of estimating seawater dimethyl sulfide (DMS)—a gas that plays an important role in cooling the Earth by affecting cloud formation—can produce strikingly different results. The study compares three techniques: an observation-based method, and two methods based on mathematical models. The observation-based method shows higher DMS values but misses fine-scale variations in the ocean.

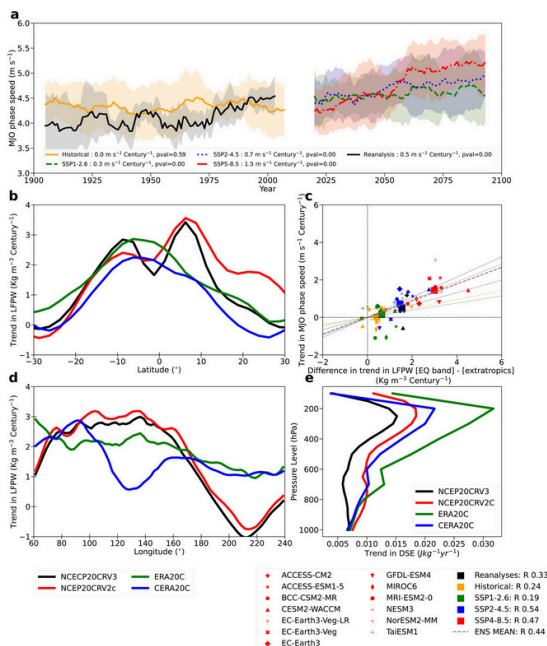
One of the model-based methods gives the lowest values, especially over the Southern Ocean, which normally sees high DMS levels during summer. The model-based methods also show that DMS levels are rising over time, with increases of over 2% to nearly 4% per decade. The findings reveal that the way DMS is estimated can greatly affect how we understand its role in climate, sometimes leading to more than double the difference in results. This underlines the importance of improving DMS estimation methods in climate science. (*Joge S.D., Mahajan A.S., Hulswar S., Marandino C.A., Galí M., Bell T.G., Simó R., Dimethyl sulfide (DMS) climatologies, fluxes, and trends – Part 1: Differences between seawater DMS estimations, Biogeosciences, 21, October 2024, DOI:10.5194/bg-21-4439-2024, pp. 4439–4452*)



(Figure 1: (a) Global seasonal climatologies of H22, G18, and W20 for austral summer (December-January-February (DJF)), spring (March-April-May (MAM)), boreal summer (June-July-August (JJA)), and autumn (September-October-November (SON)) seasons. For all the climatologies, most of the pixels show DMS concentrations of less than 3 nM in oligotrophic regions and higher concentrations along coastal regions. (b) G18 and W20 captured DMS values of more than 8 nM, while H22 did not (except for the DJF season). H22 shows the highest number of pixels in the 3-4 nM range and more than 2000 pixels in total above 6 nM in the DJF season.)

Madden–Julian Oscillation accelerates with intensifying meridional moisture gradient in a warming world

A new study highlights significant acceleration in the phase speed of the Madden–Julian Oscillation (MJO), a key eastward-moving tropical convective system that influences global weather and climate. Analysis based on twentieth-century reanalyses and CMIP6 simulations shows a clear long-term increase in MJO speed, ranging from 0.6 to 1.2 m/s per century in the 20th century, and 0.3 to 1.5 m/s per century projected for the 21st century. The study attributes the acceleration primarily to enhanced meridional moisture gradients across the Indo-Pacific warm pool caused by global warming. Additionally, multidecadal fluctuations in the MJO’s speed are linked to changes in the zonal moisture gradient associated with the Pacific Decadal Oscillation. These findings provide fresh insights into how large-scale convective systems are being reshaped by anthropogenic climate change. (*Dasgupta P., Roxy M.K., Nam S., Prajeesh A.G., Saranya J.S., Zhang C., Ling J., Kim D., Madden Julian Oscillation moves faster as the meridional moisture gradient intensifies in a warming world, Geophysical Research Letters, 51: e2024GL110461, October 2024, DOI:10.1029/2024GL110461, pp. 1–11*)



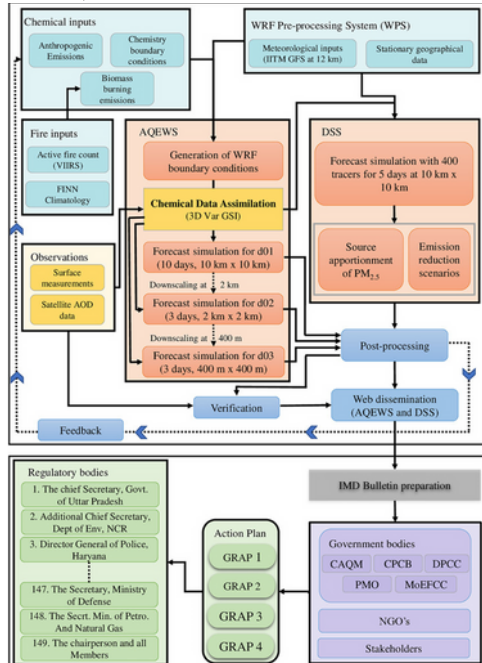
(Figure 2: (a) 11–years running mean timeseries of the MJO phase speed in the reanalyses (black), historical (cyan), SSP1-2.6 (green), SSP2-4.5 (blue)

and SSP5-8.5 (red) simulations (based on selected models). The cross-section in the (b) meridional direction (averaged between 60°E–180°E) and (d) zonal direction (averaged between 15°S and 15°N) of the long-term trend in lower tropospheric (900–500 hPa) precipitable water over the Indo-Pacific warm pool (60°E–180°E, 15°S–15°N). (c) Scatter plot of the long-term trend in the MJO phase speed versus the long-term trend in the meridional moisture gradient. The linear fits represent the relationship between MJO phase speed and meridional moisture gradient for individual scenarios and all scenarios combined. (e) The long-term trend in the boreal winter dry static energy at each vertical level over the Indo-Pacific warm pool.)

AIRWISE: India’s operational high-resolution air quality warning and decision support system

A pioneering study presents AIRWISE (Air Quality Warning and Integrated Decision Support System for Emissions), a state-of-the-art modeling system developed to manage severe air pollution episodes in Delhi and the National Capital Territory (Delhi–NCT). Addressing the limitations of conventional air quality models, AIRWISE integrates a high-resolution Air Quality Early Warning System (AQEWS) with a dynamic decision support system (DSS) that enables near real-time source attribution and emission control scenario analysis. The system assimilates satellite aerosol optical depth data, fire counts, ground-based observations from over 320 stations, and high-resolution emissions at a street-level resolution of 400 m. It demonstrates 83% accuracy in forecasting extreme pollution episodes up to three days in advance, making it the world’s first operational air quality system with such high spatial resolution and chemical data assimilation capabilities. The Commission for Air Quality Management (CAQM) actively uses AIRWISE forecasts to implement the Graded Response Action Plan (GRAP) for pollution control across Delhi–NCT. (*Ghude S.D., Govardhan G., Kumar Rajesh, Yadav P.P., Jat R., Debnath S., Kalita G., Jena C., Ingle S., Gunwani P., Pawar P.V., Ambulkar R., Kumar Sumit, ... et al., Air Quality*

Warning and Integrated Decision Support System for Emissions (AIRWISE): Enhancing Air Quality Management in Megacities, Bulletin of the American Meteorological Society, 105, December 2024, DOI:10.1175/BAMS-D-23-0181.1, pp. E2525–E2550)

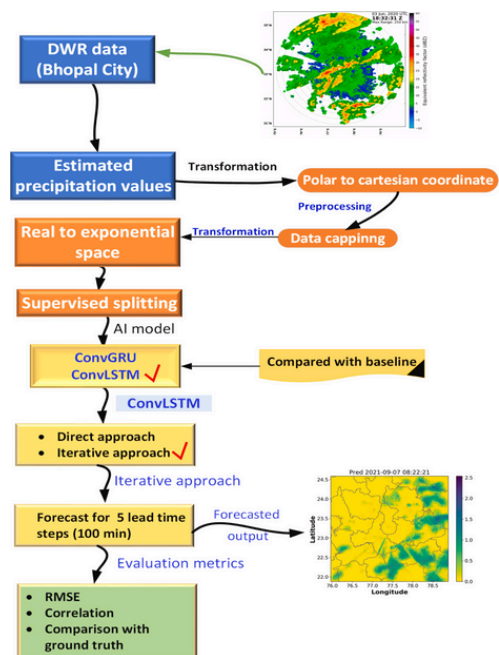


(Figure 3: The forecasting setup block diagram illustrates input data components (meteorology, chemistry, and emissions) in “cyan” boxes. “Yellow” boxes represent chemical data assimilation with satellite AOD retrievals and surface measurements. “Orange” boxes signify the steps involved in AQEWS forecast runs and DSS execution. “Blue” boxes encompass postprocessing, forecast data verification, and public dissemination. “Gray” box involves the preparation of bulletin based on the forecast products, followed by the communication of bulletin to various government bodies and stakeholders for decision-making as denoted by “light-purple” boxes. “Green” boxes pertain to action plans and report the adopted measures to regulatory bodies)

Deep Learning-Based Near Real-Time Rainfall Forecasting Using Radar Data

A recent study highlights the effectiveness of deep learning models for near real-time rainfall forecasting over Bhopal during the Indian monsoon season. Leveraging high-resolution Doppler weather radar data (1 km × 1 km spatial and 20-minute temporal resolution), the study

evaluated several deep learning approaches for precipitation nowcasting. Among the models tested, the Convolutional Long Short-Term Memory (ConvLSTM) network outperformed both ConvGRU and a persistence baseline in terms of spatial-temporal correlation, skill score, and RMSE. The ConvLSTM model achieved a forecast accuracy of 75% at the initial lead time (0–20 minutes), decreasing to approximately 35% by the fifth time step (100 minutes). These findings underscore the potential of ConvLSTM-based architectures for integration into operational nowcasting systems, with applications in flood management and water resource planning. (Kumar B., Haral H., Kalapureddy M.C.R., Singh B.B., Yadav S., Chattopadhyay R., Pattanaik D.R., Rao S.A., Mohapatra M., Utilizing deep learning for near real-time rainfall forecasting based on Radar data, *Physics and Chemistry of the Earth*, 135, October 2024, DOI:10.1016/j.pce.2024.103600, pp. 1–10)

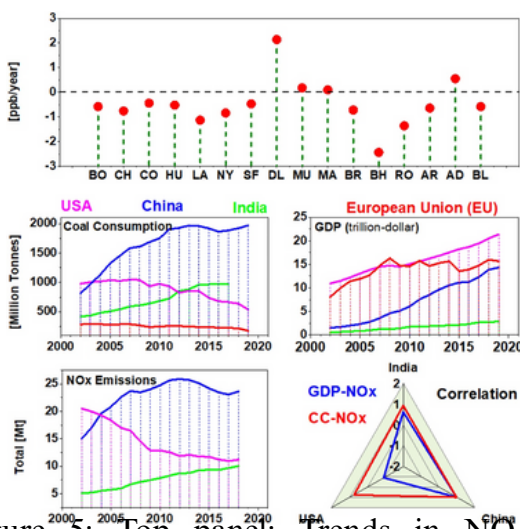


(Figure 4: A flowchart summarizing the work done in this study)

Atmospheric NO₂ trends reflect impact of environmental policies across global cities

A new study investigates long-term changes in atmospheric nitrogen dioxide (NO₂) over major hotspots and 3,000 cities globally between 2002 and 2019. Using harmonized satellite datasets, the analysis reveals a significant decline in NO₂ concentrations across the USA and Western

Europe—approximately -0.1×10^{15} molec./cm²/year—primarily due to the implementation of stringent vehicular emission regulations. Cities such as New York, Boston, Los Angeles, London, Berlin, and Paris show consistent downward trends. In contrast, the study reports a notable rise in NO₂ levels across developing regions, particularly the Indo-Gangetic Plain, Middle East, and parts of South Africa. Cities like Delhi, Johannesburg, Kuwait, and Tehran exhibit increasing trends ranging from 0.04 to 0.1×10^{15} molec./cm²/year, underscoring the urgent need for strong environmental policies in emerging economies. These findings highlight the critical role of regulatory frameworks in shaping urban air quality and sustainability. (*Amritha S., Varikoden H., Patel V.K., Kuttippurath J., Gopikrishnan G.S., Global, regional and city scale changes in atmospheric NO₂ with environmental laws and policies, Sustainable Cities and Society, 112, October 2024, DOI:10.1016/j.scs.2024.105617*)



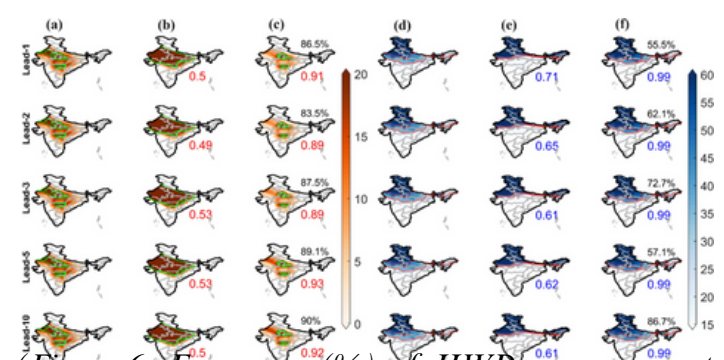
(Figure 5: Top panel: Trends in NO₂ surface concentration in the cities of Boston (BO), Chicago (CH), Columbia (CO), Houston (HU), Los Angeles (LA), New York (NY), San Frasco (SF), Delhi (DL), Mumbai (MU), Madrid (MA), Brussel (BR), Brimingham (BR), Roma (RO), Araraquara (AR), Adelaide (AD) and Berlin (BL) derived from the ground-based measurements for the period 2002–2019. Middle panel: temporal growth in coal consumption (CC) and gross domestic product (GDP) in the USA, China, India and European Union (EU) derived from Statista. Bottom panel: time series of NOx emissions from the total

anthropogenic emissions in India, China and USA. Radial plot shows the correlation between GDP, CC and NOx emissions for the period 2002–2018.)

Near-term prediction of surface temperature extremes over India in the CMIP6-DCPP models

This study explores the near-term prediction of surface temperature extremes over India using the Decadal Climate Prediction Project (DCPP) hindcasts from CMIP6 models. To overcome the limitations of coarse model resolution, the maximum and minimum temperatures (Tmax and Tmin) were downscaled and bias-corrected (DBC) over the Indian region. The DBC-enhanced outputs significantly improved the representation of heat and cold wave intensity, frequency, and spatial extent. Specifically, the DBC Tmax and Tmin products improved extreme threshold prediction accuracy by 82% and 90%, respectively. The bias-corrected models effectively captured the regional characteristics of temperature extremes for lead times up to 10 years. Notably, the recent decade (2017–2026) shows an increase of ~ 0.6 °C in Tmax during April–June and a decrease of ~ 0.3 °C in Tmin during November–February, relative to the previous decade. These findings demonstrate the enhanced capability of CMIP6-DCPP models, after DBC, for predicting temperature extremes and offer valuable insights for policy planning, disaster preparedness, and climate resilience.

(*Konda G., Chowdary J.S., Gnanaseelan C., Parekh A., Near-term prediction of surface temperature extremes over India in the CMIP6-DCPP models, Climate Dynamics, 62, December 2024, DOI:10.1007/s00382-024-07472-z, pp. 10717–10731*)

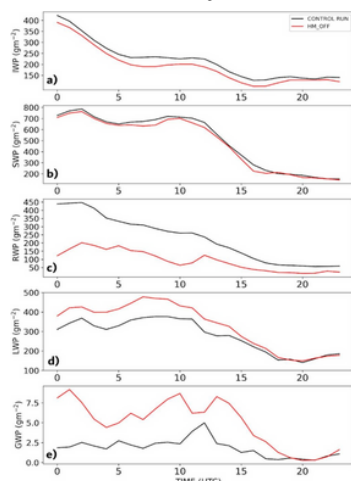


(Figure 6: Frequency (%) of HWD per season at each grid point a IMD, b before DBC, c after DBC

for lead 1, 2, 3, 5 and 10. Green contours represent the regions of 15 and 20 days per season. d, e, f are same as of a, b, c but for CWD. Red contours represent the regions of 30 and 50 days per season. Values in red and blue color represents the pattern correlation, % improvement after DBC is show in black values)

Ice Multiplication Pathways in Nimbostratus Clouds During the Indian Summer Monsoon

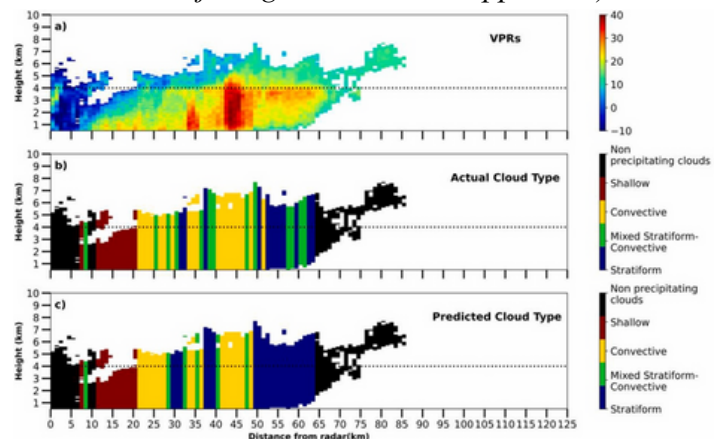
This study explores the microphysical mechanisms responsible for ice multiplication in nimbostratus clouds during the Indian summer monsoon, using in situ aircraft and radar observations from the CAIPEEX campaign, supplemented by WRF model simulations. The results reveal a significant contribution of the Hallett–Mossop (HM) process in producing secondary ice particles within the temperature range of -3°C to -8°C . Sensitivity experiments demonstrate that excluding the HM process leads to reduced ice crystal and snow concentrations, diminished convective strength, and lower precipitation. The inclusion of HM notably enhances latent heat release and updraft intensity, underscoring its critical role in cloud dynamics and monsoonal rainfall development. (Kambrath G.K., Kulkarni G., Patade S., Samanta S., Jaya Rao Y., Murugavel P., Sandeep J., Prabhakaran Thara, Pathways of ice multiplication in nimbostratus clouds during the Indian summer monsoon, Atmospheric Research, 309:107590, October 2024, DOI:10.1016/j.atmosres.2024.107590, pp. 1–13)



(Figure 7: The time evolution of (a) Ice water path (b) Snow water path (c) Rainwater path (d) Liquid water path (e) Graupel water path. Each one is averaged over the study region.)

Cloud Sense: A model for cloud type identification using machine learning from radar data

This study introduces CloudSense, a novel machine learning-based model for classifying precipitating cloud types over the Western Ghats using X-band radar reflectivity profiles. The model categorizes clouds into shallow, stratiform, convective, and mixed stratiform-convective types. Among the ML algorithms evaluated, Light Gradient Boosting Machine (LightGBM) outperformed others with a Balanced Accuracy (BAC) of 0.79 and F1-Score of 0.8. Compared to conventional radar algorithms (BAC: 0.69, F1: 0.68), CloudSense significantly enhances cloud classification accuracy, offering potential improvements in radar-based precipitation estimates for complex terrains. (Nizar M., Jha A.K., Singh M., Vaisakh S.B., Pandithurai G., CloudSense: A model for cloud type identification using machine learning from radar data, Applied Computing and Geosciences, 24:100209, December 2024, DOI:10.1016/j.acags.2024.100209, pp. 1–12)

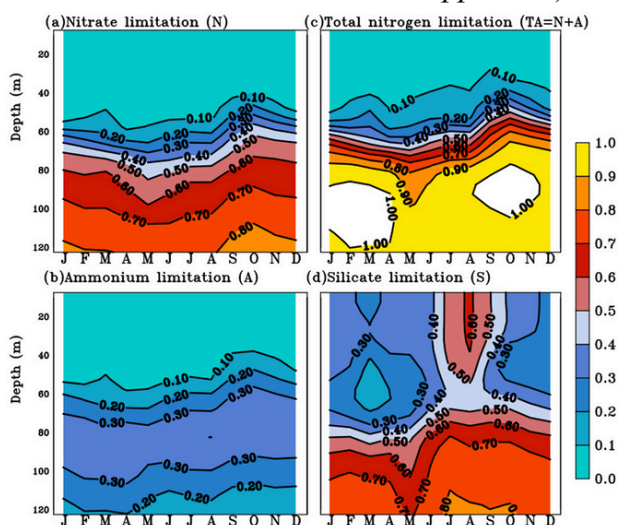


(Figure 8: a) RHI scan taken by the radar at 3:52 UTC on July 15, 2018 b) Corresponding Actual/labelled cloud profiles and c) Predicted cloud profiles by the model. The dotted line at 4 km indicates the melting layer.)

Quantifying the role of silicate and dissolved nitrogen in Co-limiting the primary and secondary productivity of the Bay of Bengal euphotic zone

This study uses a coupled physical-biological model (NEMURO) customized for the Bay of Bengal (BoB) to investigate nutrient limitations on ocean productivity. By analyzing Bio-Argo data (2016–2017) and running nutrient-exclusion experiments,

the authors quantified the relative contributions of nitrate (NO_3), ammonium (NH_4), and silicate ($\text{Si}(\text{OH})_4$) in supporting marine productivity. The findings show that new nitrogen-based production dominates in both eastern and western BoB surface layers (~85%), while silicate significantly limits diatom productivity, especially at depths of 65–105 m. Seasonally, nitrate is the dominant limiting nutrient at the surface, while silicate is critical at subsurface levels due to its deeper vertical distribution. These results highlight the complex interplay of nutrients in regulating biological productivity in the BoB. (Bhavani I.V.G., Hamza F., Smitha B.R., Valsala V., Quantifying the role of silicate and dissolved nitrogen in Co-limiting the primary and secondary productivity of the Bay of Bengal euphotic zone, *Journal of Geophysical Research: Oceans*, 129:e2024JC021009, October 2024, DOI:10.1029/2024JC021009, pp. 1–29)

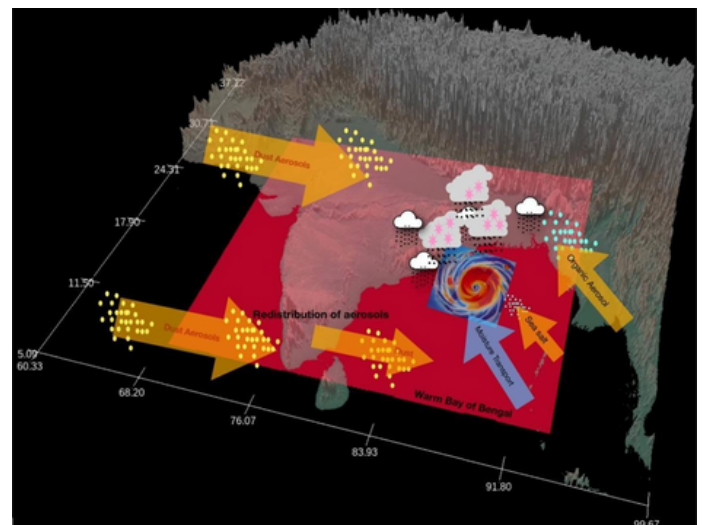


(Figure 9: The vertical distribution of limitation factors for PL is shown in climatology computed from 2016 to 2017 in P-1 Argos (a) nitrate (N), (b) Total nitrogen ($TA = N + A$), (c) ammonium (A), and (d) silicate (S). Zero represents complete limitation and one represent no limitation.)

Intensification mechanisms and moisture dynamics of super cyclonic storm ‘Amphan’ over the Bay of Bengal: Implications for aerosol re-distribution

This study investigates the rapid intensification mechanisms of Super Cyclonic Storm (SuCS) Amphan and its influence on aerosol redistribution during its development over the Bay of Bengal in May 2020. The findings reveal a notable thickening

of the barrier layer from eight to three days before landfall, which helped sustain warm sea surface temperatures. A sea surface temperature anomaly of 0.8–1 °C was recorded near the cyclogenesis point prior to intensification. High-altitude ice clouds were observed during the storm's peak, and the cyclone played a major role in transporting sea-salt and PM2.5 aerosols inland. Notably, aerosol redistribution was observed over cities like Kolkata, Bhubaneswar, Agartala, and Shillong. These results highlight the ocean-atmosphere interactions and the broader environmental impact of Amphan during the lockdown phase. (Singh V., Srivastava A.K., Gupta A., Konduru R.T., Singh A., Singh S., Kumar A., Bisht D.S., Singh A.K. (2024). Intensification mechanisms and moisture dynamics of super cyclonic storm ‘Amphan’ over the Bay of Bengal: Implications for aerosol re-distribution. *Science of The Total Environment*, 951:175501. DOI:10.1016/j.scitotenv.2024.175501, pp. 1–19.)

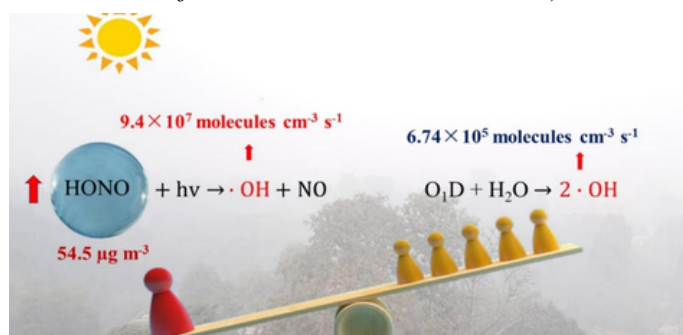


(Figure 10: Graphical abstract illustrating overview of the study)

Unexplored chemical processes enhance oxidation during winter fog events in Delhi

This study explores the atmospheric role of nitrous acid (HONO) during the Winter Fog Experiment (WiFEx) in Delhi, highlighting HONO as a key precursor for hydroxyl radicals ($\cdot\text{OH}$). Elevated HONO levels were detected during fog events, with peak concentrations reaching $54.5 \mu\text{g m}^{-3}$, indicating intense heterogeneous chemical activity. The findings show that gas-phase chemistry alone underestimates observed HONO levels by an order of magnitude. The photolysis of HONO was found 8

to produce significantly more $\cdot\text{OH}$ compared to conventional pathways such as $\text{O}^1\text{D} + \text{H}_2\text{O}$, emphasizing fog's critical influence on radical formation. These results underscore the need to include fog-induced heterogeneous reactions in atmospheric models to better predict air quality and oxidation capacity. (Pawar P.V., Mahajan A.S., Ghude S.D., (2024). *HONO chemistry and its impact on the atmospheric oxidizing capacity over the Indo-Gangetic Plain, Science of The Total Environment*, 947: 174604, October 2024, DOI:10.1016/j.scitotenv.2024.174604, 1-9)



(Figure 11: Graphical abstract illustrating overview of the study)

IMPORTANT EVENTS

Advances and Challenges in the Prediction of Tropical Weather Extremes

IAMAS (International Association of Meteorology and Atmospheric Sciences) has invited proposals for activities during 2025–26. The IAMAS Bureau has approved ICTM's proposal to organize a **Preparatory Commission Planning Meeting and Lectures** on Advances and Challenges in the Prediction of Tropical Weather Extremes, scheduled to be held in Pune, India, on 14 March 2025.

The Eleventh WMO Scientific Conference on Weather Modification

IAMAS has also approved the proposal for "The Eleventh WMO Scientific Conference on Weather Modification," to be hosted by IITM, Pune, in November 2025. The event has received support from the World Meteorological Organization.

Link: <https://wmo-11scwxmod.tropmet.res.in/>

ESSO Review Meeting

IITM participated in the ESSO Review Meeting held at the National Centre for Earth Science Studies (NCESS), Thiruvananthapuram, on October 17-18, 2024. The institute presented an overview of its scientific, academic, administrative, and financial activities, as well as its future plans for 2025-26 and its vision for Viksit Bharat@2047



Snippets of ESSO Review Meeting

Vigilance Awareness Week 2024

IITM observed Vigilance Awareness Week from 28 October to 03 November 2024 with the theme "Culture of Integrity for Nation's Prosperity." Various competitions, including essay writing, e-posters, online quizzes, and debates, were organised.



Vigilance Awareness Week 2024

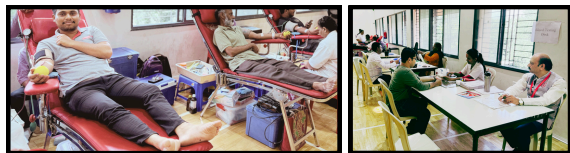
As a prelude to the week, IITM hosted expert talks:

- "The Pillar of Progress: Cultivating a Culture of Integrity for National Prosperity" – Prof. Shalivahan, Director, Indian Institute of Petroleum and Energy, Visakhapatnam (10 October 2024).
- "Cyber Hygiene and Security" – Dr. Phani Murali Krishna, Scientist E (22 October 2024).
- "Ethics and Governance" – Shri Hans Pratap Singh, Hindi Officer (25 October 2024).

On 28 October 2024, IITM staff took the Integrity Pledge. An interactive e-conference was held on 29 October 2024. The event concluded on 04 November 2024 with a talk by Dr. Suchit Kamble, Senior Scientist, ICMR - NITVAR, followed by the felicitation of competition winners.

Blood Donation Day

IITM organized a Blood Donation Camp in collaboration with Jankalyan Raktpedhi, Pune, on 01 October 2024. The event adhered to guidelines issued by the Ministry of Health and Family Welfare. The Director of IITM administered the blood donation pledge.



Talks & Workshops

IITM hosted a series of talks and workshops by **Dr. Rajeev Mehajan**, TEDx Speaker, on 21-22 October 2024:

- "How to Write Grant Proposals" – 21 October 2024
- "The Power Hour: Refresh and Reset" – 22 October 2024
- "Beyond Scales: Redefining Success" – 22 October 2024



Talks and Workshop by Dr. Rajeev Mehajan

Constitution Day (Samvidhan Diwas)

IITM celebrated Constitution Day on 26 November 2024. The Preamble of the Indian Constitution was read by all IITM staff in commemoration of this significant occasion.



Constitution Day (Samvidhan Diwas)

India International Science Festival 2024 (IISF2024)

IITM participated in the 10th India International Science Festival (IISF2024) at IIT Guwahati, Assam, from 30 November - 04 December 2024. The theme of IISF2024 was "Transforming India into an S&T-Driven Global Manufacturing Hub."

During the "Sagarika: The Tale of Earth Sciences" event, IITM scientists presented research initiatives focusing on Northeast India's unique geological, meteorological, and environmental challenges.



Glimps of India International Science Festival 2024 (IISF2024)

MET Training for IAF Officers

IITM conducted specialized meteorology training for Indian Air Force officers from 02-06 December 2024 at IITM, Pune.

IITM 63rd Foundation Day Celebration

IITM celebrated Foundation Day on 17 November 2024, marking 63 years of contributions to weather and climate science. Prof. Berrien Moore, Dean of the College of Atmospheric and Geographic Sciences and Director of the National Weather Center, University of Oklahoma, USA, attended the event as the Chief Guest, while Prof. S. Ananthkrishnan, INSA Senior Scientist, Adjunct Professor at SPPU, and Former Director of GMRT, Pune, served as the Guest of Honor.



Celebration of IITM 63rd Foundation Day.

The event included:

- Welcome Address by **Dr. R. Krishnan**, Director, IITM.
- Opening Address by **Dr. M. Ravichandran**, Secretary, MoES.
- Tribute to Dr. A.K. Kamra by **Prof. Pradeep Kumar**, Savitribai Phule Pune University (SPPU).
- Overview of IITM's activities by **Dr. J. Sanjay**, Senior Scientist, IITM.
- Lecture on "The GeoCarb Mission: Understanding the Carbon-Climate System" – **Prof. Berrien Moore**.
- Lecture on "Exploration of the Earth-Moon Space and Beyond Through a New Low-Frequency Window" – **Prof. S. Ananthkrishnan**.
- Awards Ceremony followed by a vote of thanks by Dr. Thara Prabhakaran, Senior Scientist, IITM.

The event concluded with the cultural program "*Virasat Ki Shaam – Evening of Heritage*," featuring a mesmerizing performance by **Pandit Jai Kishan Maharaj**, President, Birju Maharaj Parampara.

[Watch here: IITM Foundation Day - YouTube.](#)



Celebration of IITM Foundation Day Cultural Program

Rajbhasha Activities

"Rajbhasha Utsav-2024" was celebrated in the Institute from 01 August 2024 to 30 September 2024. A total number of 07 competitions were organised. The winners of the Competitions were awarded in the closing ceremony held on 04 October 2024.



Celebration of "Rajbhasha Utsav-2024"

Rajbhasha Workshop on Unicode Hindi Typing Training was arranged on 09 December 2024.

Rajbhasha Seminar Series: A lecture on the topic "Information Related to E-Office" by Smt. Nikita Yewle, E-Office Administrator was arranged on 19 December 2024.

IITM Participation in Important Meetings/ Events

9th Meeting of the Anusandhan National Research Foundation (ANRF) Programme Advisory Committee (PAC) Earth & Atmospheric Sciences, Babasaheb Bhimrao Ambedkar University, Lucknow (07-09 October).

IMS Pune Chapter's Annual Monsoon Workshop 2024 – Savitribai Phule Pune University (SPPU), Pune (18 October).

1st Pyranometer and Pyrheliometer Working Group Meeting – Hosted by the Bureau of Indian Standards (BIS) (18 October).

NVIDIA AI Summit – Mumbai (23-25 October).

Annual Board of Studies Meeting – Hosted by the Department of Meteorology & Oceanography, Andhra University (25 October).

Online Workshop on Preventive Vigilance & Disciplinary Proceedings – As part of Vigilance Awareness Week-2024, MoES (29 October).

39th Working Group on Numerical Experimentation Annual Meeting – Meteo France, Toulouse (04-08 November).

SOLAS Open Science Conference-2024 – National Institute of Oceanography, Goa (10-14 November).

Meeting on Weather and Climate Science for Service Partnership India (WCSSP India) – Observations & Parameterisation (13 November).

IMSTEC-NWP-WCSSP Meeting - NCMRWF (18-21 November).

Celebration of 30 Years of Operational NWP and 150 Years of IMD, NCMRWF, Noida (19 November).

HAFS Colloquium – NCMRWF, Noida (20-22 November).

Brainstorming Meeting on Establishing a Peninsular Indian Coastal Ocean Monitoring System (PICOMS) – NCESS, Thiruvananthapuram (21-22 November)

Brainstorming Workshop on “Mission Mausam: Forecast to Field (Techniques and Targets for Amrit Kaal)” – IARI, New Delhi (27-28 November).

National Symposium on Recent Advances and Challenges in Understanding and Predicting High-Impact Weather and Climate Extremes Over the Indian Subcontinent in the Climate Change Context (TROPMET-2024) – NIT, Rourkela, Odisha (10-12 December)

WMO/WWRP Steering Group Meeting on Urban Meteorology – National Center for Atmospheric Research (NCAR), USA (16-18 December).

IASTA National Aerosol Conference-2024 – Doon University, Dehradun (17-20 December).

Joint Techno-Scientific Brainstorming Sessions with Stakeholders – College of Agriculture, Pune (21 December).

Prof. R. Ananthkrishnan Colloquium

Prof. Örjan Gustafsson, Professor, Stockholm University, Director of Maldives Climate Observatory Hanimaadhoo (MCOH), and Deputy

Director of Bangladesh Climate Observatory Bhola (BCOB), delivered a lecture on "*Black Carbon Complexities, Aerosol Demasking, Soaring Methane, Climate Overshoot: Key Role of Strategic Observatories and Opportunities Ahead.*" 08 October 2024, (65th series) [Watch Here.](#)



Prof. Örjan Gustafsson

Dr. William Boos, Associate Professor, University of California, Berkeley, delivered a lecture on "*A New Understanding of Tropical Orographic Precipitation.*" 12 November 2024, (66th series) [Watch Here.](#)



Dr. Rajesh Kumar, Deputy Director, National Center for Atmospheric Research (NCAR), delivered a lecture on "*Multiscale Infrastructure for Chemistry and Aerosols (MUSICA) – A Next-Generation Atmospheric Chemistry Modeling System.*" 06 December 2024, (67th series)



[Watch Here.](#)

Prof. Rainer Sauerborn, Senior Professor, Heidelberg University, delivered a lecture on "*Climate Change and Health: Filling the Gaping Research Gap with Population Cohorts.*" 17 December 2024, (68th series) [Watch Here.](#)



Dr. Sandra Barteit,

Research Group Leader, Heidelberg Institute of Global Health, delivered a lecture on "*Leveraging Sensor-Based Technologies to Address Climate Change Impacts on Health in Vulnerable Populations.*" 17 Dec 2024, (69th) [Watch Here.](#)



Ms. Ishwari Mulkalwar, Doctoral Student, Scripps Institution of Oceanography, USA, delivered a lecture on "Inertial Variability in High-Frequency Radar Data: Implications and Challenges for a New Satellite Mission Concept ODYSEA." 20 December 2024, (70th series) Watch Here.



Visitors

Distinguished Academic and Scientific Visitors

- **Group Captain Ashutosh V. Athavale** – Visited IITM, Pune (07-08 October) to discuss Arctic weather research supporting the study on Arctic Sea Route at the Naval War College, Goa.
- **Dr. Rajeev K Mehajan** – President of India's Visitor Nominee (IIT Kharagpur) and Technical Commission Expert (WMO, UN), conducted a workshop at IITM, Pune (20-22 October).



- **Prof. Cristina Flesia** (Chair, ISTIP, International Science and Technology Partnership) – Delivered the IMSP Public Lecture at IITM (05-09 November) and engaged with scientists.



- **Dr. Camille Vautier** and **Dr. Françoise Amélineau** (École Normale Supérieure, Rennes, France) – Visited CCCR, IITM (06 December) to discuss collaborative research on climate change, river interactions, and seabird migration.

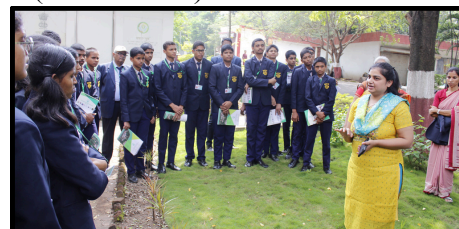
- **Prof. Tarun Souradeep** (Director, Raman Research Institute, Bengaluru) – Held discussions with the Director, Project Directors, and senior scientists of IITM (12 December) on potential research collaboration between RRI and IITM.

Technical and Industry Collaborations

- **Kristine Feese** (Vice President, LI-COR), **Taylor Thomas**, and **Deepak Gupta** (DTPL) – Visited IITM (07 November) for discussions on eddy covariance observations.
- **Shri B Arul Malar Kannan** (Sci. F, RMC Chennai) – Collaborated with the IITM team (20-21 November) to identify suitable locations for X-band radar installations at IIT Delhi Sonipat Campus and Gautam Buddha University, Greater Noida.
- **Delegation from Indian Defence Accounts Service (IDAS)** – 23 officers (Probationers, 2023-24 batch, National Academy of Defence Financial Management) visited IITM (27 December) for discussions with project directors and senior scientists, gaining insights into IITM's cutting-edge research and High-Performance Computing (HPC) capabilities.

Student and Institutional Visits

- **D.Y. Patil College of Engineering**, Civil Engineering Department, Pune – 45 students (01 October).
- **Greenfingers School**, Akluj, Solapur – 80 students (03 October).



- **Government Polytechnic, Awasari (Khurd)**, Pune – 69 students and 2 faculty members (15 October).



- **Bharati Vidyapeeth Deemed University College of Architecture**, Pune – 35 students (17th Oct).

- **Trainee sailors and petty officers from School of Naval Oceanology and Meteorology (SNOM), Naval Base Kochi – 16 trainees (21 November).**



- **Kendriya Vidyalaya, Pune – 106 students (13 December).**
- **Forest Range Officer (FRO) Trainees, Angul, Odisha – (16 December).**

Important Talks/ Lectures delivered by IITM Scientist

Dr. R. Krishnan

- Earth's Climate System and Climate Change, C.V. Raman Global University, Bhubaneswar, 07 December 2024.
- Water Cycle Changes in a Globally Warming Climate, Odisha Climate Change Conclave, Ever Green Forum and Siksha 'O' Anusandhan Deemed University, Bhubaneswar, 08 December 2024.
- Indian Monsoon Precipitation Extremes in a Globally Warming Climate, TROPMET 2024, NIT Rourkela, Odisha, 10-12 December 2024.
- Water Cycle Changes in a Globally Warming Climate, IMD's 150 years celebrations, India Meteorological Department (IMD), New Delhi, 13 December 2024.

Dr. Thara Prabhakaran

- The CAIPEEX Program, ICCP Journal Club Lectures, 27 November 2024.

Academic Cell Activities

- IITM advertised **37 regular Ph.D. positions** through AcSIR, receiving 81 applications, of which 37 candidates were shortlisted for interviews held on 03 & 04 December 2024.
- Following the interviews, **29 candidates have been selected for admission.**
- IITM has invited online applications for **30 MSc/MTech project positions** (6-9 months, starting January 2025), with 57 applications received. The shortlisting process is underway.

PhD synopsis and PhD proposal seminars

Ms. Shravani Banerjee from AcSIR presented her Ph.D. proposal on "Aerosol-induced atmospheric heating contributions to extreme temperatures over India" on 07 October 2024. She is conducting this study under the guidance of Dr. B. Padma Kumari.



Mr. Amit Kumar Sharma from AcSIR discussed his Ph.D. proposal on "Indian Ocean Heat Content Variability, its mechanism, and representation in the decadal prediction system" on 07 October 2024. His research is being guided by Dr. Anant Parekh and co-guided by Dr. Jasti Chowdary.



Mr. Prashant Chavan from SPPU presented his Ph.D. synopsis on "Variability of aerosols in the upper troposphere and stratosphere over the Asian region and its implications on the troposphere" on 10 December 2024. This work is being supervised by Dr. Suvarna Fadnavis.



Ph.D. Thesis Awarded

Mr. Sunil M. Sonbawne (SPPU) for his thesis "Study of Aerosol Characteristics and Their Radiative Forcing Over the Arctic Region at Ny-Ålesund", under the guidance of Dr. G. Pandithurai, Dr. S. Fadnavis, and Dr. A.S. Panicker.



Mr. Prithviraj Mali (SPPU) for his thesis "Retrieval of Aerosol and Trace Gas Vertical Profiles Using Multi-Axis Differential Optical Absorption Spectroscopy (MAX-DOAS) Observations", under the guidance of Dr. Anoop Mahajan.



Mr. Biswas Mriganka (SPPU) for his research on "Study of Oxygenated Volatile Organic Compounds (OVOCs) Over India: Geographical



Distribution and Atmospheric Impact”, under the guidance of Dr. Anoop Mahajan.

Ph.D. Thesis Submitted

Ms. Sebastian Anila (SPPU) on “Subtropical Indian Ocean Sea Surface Temperature Variability and Its Association With the Tropical Indian Ocean and Indian Summer Monsoon”, under the guidance of Dr. G Gnanaseelan.



Mr. Rahul Pai (SPPU) on “Understanding the Variability of Shallow Meridional Overturning Circulation and Its Impact on Indian Ocean Temperature”, under the guidance of Dr. Parekh Anant and Dr. Gnanaseelan G (Co-Guide).



Mr. Sreeraj P. (SPPU) on “Mean and Extreme Sea Level Response of the Indian Ocean to Climate Change”, under the guidance of Dr. Panickal Swapna and Dr. Krishnan R. (Co-Guide).



Ms. Pratibha Gautam (SPPU) on “Understanding the Role of Land Surface Processes in the Prediction of Monsoon Low-Frequency Variability”, under the guidance of Dr. Chattopadhyay Rajib, Dr. Joseph Susmitha, and Dr. Sahai A.K. (Co-Guide).



Mr. Avinash N. Parde (SPPU) on “Impact of Data Assimilation on Fog Forecasting Over Delhi and the National Capital Region (NCR)”, under the guidance of Dr. Sachin D. Ghude.



Deputations

Dr. Thara Prabhakaran was on deputation to the USA (16–20 December 2024) to participate in the Steering Group of the World Weather Research Programme (WWRP) Urban Prediction Project at NCAR, Boulder (16–18 Dec) and to present a

seminar at the Mesoscale and Microscale Meteorology (MMM) Laboratory, Boulder (19–20 Dec).

Dr. Shivsai Ajit Dixit and **Shri Harish Choudhary** were on deputation to the USA (19–26 November 2024). They visited the Pi Cloud Chamber Lab at Michigan Technological University (MTU) (19–20 Nov), the Cloud Chamber Simulations Group at the University of Utah (21–23 Nov), and presented an oral talk at the 77th Annual Meeting of the APS Division of Fluid Dynamics (24–26 Nov) in Salt Lake City, UT, USA.

Dr. Kaustav Chakravarty, Mr. Ambuj Kumar Jha, and Mr. Hari Krishna Devisetty participated in a comprehensive training program on the application software of X-band radar at M/s. Vaisala Factory, Finland (12–19 January 2025)

Dr. Phani Murali Krishna attended the SC24 Conference in Atlanta, USA (17–22 November 2024), contributing to discussions on cutting-edge advancements in computational sciences.

Dr. Ankur Srivastava participated in the 39th Working Group on Numerical Experimentation (WGNE) Annual Meeting at Météo-France, Toulouse (4–8 November 2024), where he presented a research talk.

Honours and Awards

Fellowships & Advisory Appointments

Dr. R. Krishnan elected as a Fellow of the National Academy of Sciences, India (NASI) during its 94th Annual Session at IISER Bhopal (2–3 December 2024).



Dr. Suvarna Fadnavis appointed as a member of the APARC Core Project Scientific Steering Group (2025–2028) and the Governing Board of UGC-DAE Consortium for Scientific Research (CSR), Indore.



Dr. Sachin Ghude appointed as a member of the Steering Committee for the development of an emission inventory framework and source apportionment for Delhi-NCR.



Dr. Mahen Konwar elected as a Member of the Advisory Committee for ST Radar Centre, Gauhati University (2024–2026).



Dr. Maheswar Pradhan elected as a member of the CLIVAR/GEWEX Monsoons Panel's Working Group on Asian-Australian Monsoons (WG-AAM) for 2025–2027.

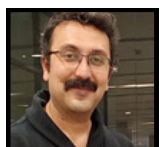


Chairing Scientific Sessions

Dr. G. Pandithurai chaired a session on Radar Sensing of the Atmosphere at the 6th URSI Regional Conference on Radio Science (URSI-RCRS) organized by ARIES, Nainital (23 October 2024). He also chaired a session on "Aerosol-Cloud Interactions" at IASTA-2024, organized by ARIES Nainital & Doon University, Dehradun (19 December 2024).



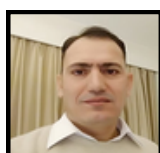
Dr. Kaustav Chakravarty chaired two scientific sessions on Radar Sensing of the Atmosphere at the same conference.



Dr. Atul Kumar Srivastava chaired a session on "Extreme Events" at the IASTA National Aerosol Conference-2024 (17 December 2024) and served as an examiner for oral and poster sessions (17–20 December 2024)



Dr. Deewan Singh Bisht also served as an examiner for oral and poster sessions at IASTA-2024.



Recognitions of Excellence

Dr. Roxy M. Koll felicitated for receiving the **Vigyan Yuva Shanti Swarup Bhatnagar Award** (Earth Sciences, 2024) during IITM's 63rd Foundation Day (17 November 2024).



He was also honoured as a Rockstar Scientist by the Science Journalists Association of India (Sjai) at the Sjai 2024 Conference, IISER Pune (5 December 2024).

Dr. Vineet won the Best Ph.D. Thesis Award in Oceans and Atmospheric Sciences from the Ocean Society of India (OSI) at OSICON-25.



IMS Awards at TROPMET 2024



Dr. Thara Prabhakaran conferred with the IMS Fellowship 2024.

Dr. Susmitha Joseph & Dr. Bhupendra Singh were honoured as IMS Associate Fellows.

Ms. Mercy Varghese received the IMS Best Paper in Monsoon Research Award (formerly B.N. Desai Award).

Mr. Avinash N. Parde received the IMS Best Paper on Weather and Climate Services Award (formerly Bhavanarayana Award).

IITM Best Employee Awards 2024 Presented during IITM's 63rd Foundation Day (17 November 2024):

Outstanding Research Contributions in Weather & Climate Science:

Dr. S.D. Pawar, Dr. J. Sanjay, Dr. Suvarna Fadnavis, Dr. Ramesh Vellore, Dr. Madhu Chandra Reddy, Dr. Hamza Varikoden, Dr. Sachin Deshpande, Dr. (Smt.) Preethi Bhaskar, Dr. Subrata Kumar Das, Dr. Abhilash S. Panicker, Dr. Phani Murali Krishna, Dr. Mahen Konwar, Dr. Y. Jaya Rao, Dr. Rahul Reddy, Dr. (Smt.) Leena P.P., Shri Libin T.R., Dr. (Smt.) Ayantika Dey Choudhury, Smt. Archana Rai, Dr. Avijit Dey, Dr. Sahadat Sarkar, Dr. Gaurav Govardhan, Shri Nilesh Narayan Wagh.

Outstanding Contributions – Administrative Staff:

Smt. C.P. Vijya Kumari, Shri Dilip E. Shinde, Smt. Bhavana Naik, Smt. Kavita Bharati, Smt. Jyoti Waghole, Shri B.T. Pawar.

Outstanding Contributions – Project Staff:

Shri Amey Datey, Shri Yang Lian, Shri Rohit Parashram Patil, Shri Sunil Khadgarai, Dr. Rosimitha Panda, Dr. Revanth Reddy, Shri Mahesh Nikam, Dr. Abhishek Gupta, Ms. Rashmi Sahu, Shri Abhijeet Gangane, Dr. Rajesh Kumar Singh Maurya, Shri Mahesh Kalsetti, Shri Praful Prakash Yadav, Smt. Pradnya Suryawanshi.

Excellence in Hindi Official Language

Implementation: Shri Mriganka Sekhar Biswas, Shri I.A. Pathan, Shri Umesh Dhondiram Ghatal, Smt. Ashwini Dhindle.

Outstanding Performance (ACE) Awards:

Shri Amar Shinde, Ms. Shobha Daware, Ms. Ashwini Pendharkar, Shri Sanjay Mechkar, Shri Sunnuy Kurhadkar, Shri Nikalje Santosh, Shri Sandeep Abba Sonawane, Smt. Vaishali Pathak.

Outstanding Performance Merit Certificate –

Section Awards: General Administration Section: Recognised for contributions to Swachhata Hi Seva Abhiyan and SCDPM 4.0 campaign under Swachh Bharat Mission-2024.

Security Team: Awarded for dedicated service ensuring a safe and conducive work environment



Editorial Team

Chief Editor

Dr. R. Krishnan, Director, IITM

Co-Editors

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Dr. Rahul Reddy, Scientist 'E', IITM

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