

# Schedule

International workshop on “Stratosphere–Troposphere Interactions and Prediction of Monsoon weather EXTremes” (STIPMEX) at IITM, Pune during 3–7 June 2024

## Day 0

### Training Programme Agenda

2 June 2024

Participants: 100

0930–0945 AM | Brief remark by Dr. E. N. Rajagopal, IMPO Introduction: Dr. Vinu Valsala

0945 AM | Group Photo

#### Training Session on Stratosphere–Troposphere Exchange processes

Venue	Aryabhata Hall, IITM, Pune
09:45 – 10:00	Brief introduction to Stratosphere–Troposphere Exchange processes.
10:00 – 11:00	Introduction to balloonsonde launching techniques (1) The cryogenic frost point hygrometer (CFH) for measurements of water vapour and (2) the Compact Optical Backscatter Aerosol Detector (COBALD)
11:00 – 11:15   Tea Break.	
11:15 – 13:00	Hands-on launching of balloonsonde with suitable sensors followed by data acquisition techniques.
13:00 – 14:00   Lunch Break.	
14:00 – 15:00	Satellite and in-situ data analysis, with a special focus on the UTLS region.
15:00 – 16:00	Analysis and visualization of big-data from global chemistry-climate models.
16:00 – 16:30   Tea break.	
16:30 – 17:30	Inter-comparison of observational and model data.
17:30 – 18:00	Discussions

#### Training Session on Prediction of Monsoon Weather Extremes

To be coordinated by Dr. Vinu Valsala, Dr. R. Phani Murali Krishna, Dr. Malay Ganai, Dr. Revanth Reddy

Venue	Varahamihir Hall, IITM, Pune	
0945–1030AM	Dr. Estibaliz Gascon, ECMWF	Introduction of ECMWF's Forecasting Systems and related Extreme Weather Products
1030–1115AM	Dr. Estibaliz Gascon, ECMWF	Practical session on predicting extreme events using ECMWF products
1115–1130   Tea/Coffee Break		
1130–1215PM	Dr. Saulo Freitas, INPE, Brazil	Operational wildfire smoke forecast in Brazil.
1215–0100PM	Dr. Fanglin Yang, NCEP, USA	NCEP Forecasting system, Model output and diagnostic
0100–0130PM   Lunch Break		
0130–0215PM	Dr. Paul Davies	On UKMO Forecast diagnostic
0215–0300PM	Dr. Dev Niyogi	Making weather and climate information useful to usable using atmospheric urban digital twins
0300–0345PM	Dr. Xubin Zeng	On GPEX and organized convection
0345–0400PM   Q&A		
0400–0415PM   Tea/Coffee break		
0415–0500PM	Dr. Toru Terao	Asian Precipitation Experiment (AsiaPEX): Approaches and strategy
0500–0545PM	Dr. W. –K Tao GSFC, NASA	Relating vertical velocity and cloud/precipitation properties: A numerical modeling study of Tropical convection Goddard Space Flight Centre, NASA, USA
0545–0600PM   Student/ECR Feedback End of Training session		

# Day 1

Registration Desk Opens at 08:30 AM

Monday 3 June 2024

9:15 to 10:15 Inaugural Session

10:15 to 10:45 Keynote  
Dr. Michael Höpfner, Karlsruhe Institute of Technology (KIT), Germany  
Composition, origin, and fate of the Asian Tropopause Aerosol Layer – a view from aircraft and satellite by infrared remote sounding

10:45 to 11:15 Group Photo & Tea/Coffee break

11:15–13:00 – Session I: *Atmospheric composition, chemistry, and dynamics of the UTLS*

Chair: Dr. Marc von Hobe, Jülich, Germany, Co-chair: Dr. Sidharth S. Das, SPL, VSSC, India,

Rapporteur: Dr. Satheesh Chandran

11:15 to 11:40 Invited  
Prof. Greg Carmichael, IOWA, USA  
Advancing Atmospheric Composition Predictions and Related Services to Meet the Growing Societal Needs

11:40 to 12:05 Invited  
Dr. Mijeong Park, NCAR, USA  
Relationship between Water Vapor and Cold Point Tropopause during Boreal Summer

12:05 to 13:05 12 Minutes Each Oral  
Dr. Ajll Kottayil, CUSAT, Kerala, India (online)  
The influence of monsoon sub-seasonal variability on the occurrence of sub-visible cirrus clouds over the Asian monsoon region.

Dr. Dmitry A. Belikov, Chiba University, Japan  
Study the influence of the Asian Summer Monsoon on the Upper Troposphere and Lower Stratosphere Using Methane Distributions

Dr. Pawan Vats, IIT Delhi, India  
Implication of precursors of secondary organic aerosols on UTLS and its impact on the Indian Summer monsoon

Dr. Sanjay Kumar Mehta, SRM, Chennai, India  
Relative Roles of Convection and Advection in the Sustenance of the Asian Summer Monsoon Anticyclone

G. S. Gopikrishnan, IIT, Kharagpur, India  
Impact of large-scale atmospheric circulation on the ozone variability in the Upper Troposphere-Lower Stratosphere (UTLS) of the Asian Summer Monsoon Anticyclone (ASMA)

13:05 to 14:00 Lunch break

14:00–16:00 – Session II: *Response of the Asian summer monsoon to volcanic eruptions, large wildfires, anthropogenic emissions, and potential Stratospheric Aerosol Injection (SAI) scenarios*

Chair: Dr. Jean-Paul Vernier, NASA, USA, Co-chair: Prof. Tarun Gupta, IIT Kanpur, India

Rapporteur: Dr. Chaitri Roy

14:00 to 14:25 Invited  
Dr. R. Krishnan, IITM Pune, India  
Role of large volcanic eruptions on the ENSO and Indian Monsoon coupling

14:25 to 14:50 Invited  
Dr. Simone Tilmes, NCAR, USA  
Stratospheric Aerosol Climate Intervention: Efficiency, Impacts and Uncertainties

14:50 to 15:15 Invited  
Dr. Bala Govindasamy, IISc, Bengaluru, India  
How would stratospheric aerosol geoengineering affect tropical monsoon rainfall

15:15 to 16:05 12 Minutes Each, Oral  
Dr. Bernd Heinold, TROPOS Leipzig, Germany  
Stratospheric Smoke Injections from the 2019–20 Australian Bushfires: Impacts on Radiation, Global Circulation, and Adjustments

Dr. S. Sridharan, NARL, India  
Influence of Merapi volcanic eruption on the stratospheric water vapour

Dr. Bomidi Lakshmi Madhavan, NARL India  
Stratospheric Aerosol Characteristics during the Volcanic Eruptions using the SAGE III/ISS Observations

Dr. Ghouse Basha, NARL, India  
Disturbing the Middle Stratospheric Balance: The Enduring Impact of Hunga Tonga-Hunga Ha'apai volcanic eruption

16:05 to 16:15 Break

16:15 to 17:15 Public Talk by Prof. Timothy Palmer, Oxford University on “Ensemble Weather and Climate Prediction: From Origins to AI” (online)

Chair Dr. R. Krishnan

17:15 to 19:00 Tea/Coffee and Poster session on Stratosphere-Troposphere Interactions

19:00 onwards Workshop Dinner

# Day 2

**Tuesday 4 June 2024**

**9:30 to 13:00 -Session III: *Observations in monsoon region with a special focus on recent field campaigns***

Chair: Dr. Bernd Heinold, TROPOS, Germany, Co-chair: Dr. Padma Kumari, IITM, Pune, India

Rapporteur: Dr. Bhupendra Bahadur Singh

9:30 to 9:55 Invited	Dr. M. Venkat Ratnam, NARL, India	Unravelling the Dynamics of the Indian Summer Monsoon Circulation: Insights into ASMA Variability, Aerosol Distribution, and Pollution Transport
9:55 to 10:20 Invited	Dr. Ren Smith, NCAR, USA	Transport by Asian Monsoon Convection to the Upper Troposphere and Lower Stratosphere during the 2022 ACCLIP Campaign
10:20 to 11:00 12 Minutes Each, Oral	Dr. Amit Kumar Pandit, NIA, USA	In situ and satellite observations of tropopause cirrus clouds during the Asian Summer Monsoon: Results from the BATAL Campaign
	Dr. Siddarth Shankar Das, SPL, VSSC, India (online)	Network of ST/MST radars and balloon borne measurement Campaigns of the Asian Summer Monsoon Anticyclone (NetRAD-ASMA) - Initial Results
	Dr. Sunil Kumar S V., SPL, VSSC, India	Insights from Tropical Tropopause Dynamics Experiments under GARNETS program over the Indian monsoon region

**11:00 to 11:25 Tea/Coffee break**

Rapporteur: Dr. Satheesh Chandran

11:25 to 11:45 Lead oral	Dr. Jean-Paul, Vernier, NASA, LaRC, USA	ATAL's inter-annual variability derived from satellite observations and airborne measurements
11:45 to 12:05 Lead oral	Dr. Marc von Hobe, IEK-7 stratosphere, Jülich, Germany	Strategy for more ground-based observations to constrain the lower boundary condition in atmospheric models
12:05 to 12:25 Lead oral	Dr. Manish Naja, ARIES, Nainital, India	Variability in the tropospheric ozone in Asian Summer Monsoon region: Ozone-sonde observations (2011-2023) from ARIES, Nainital
12:25 to 13:00 12 Minutes Each, Oral	V. N. Santhosh, NARL, India	Quantifying the Radiative Impact of Asian Tropopause Aerosol Layer using the Balloon-borne Field Campaign Measurements
	Nabarun Poddar, SPL, VSSC, India	Understanding the stratosphere-troposphere exchange processes through the direct measurements of vertical air motion over central Himalayan region using 206.5 MHz Stratosphere-Troposphere Radar
	Veenus Venugopal, Space Physics Laboratory, Vikram Sarabhai Space Centre, Thiruvananthapuram, India	A composite study on the effect of SSW and QBO on stratospheric meridional circulation: Implications on ozone and water vapor distribution

**13:00 to 14:00 Lunch break**

**14:00 to 15:15 -Session IV: *Inter-connections of Asian summer monsoon with large scale atmospheric patterns such as Brewer-Dobson Circulation, QBO and ENSO, SSW***

Chair: Dr. Manish Naja, ARIES, Nainital, India, Co-chair: Dr. B. Praphulla Chandra, SSSIHL, AP, India

Rapporteur: Sunil Sonbawne

14:00 to 14:20 Lead oral	Suvarna Fadnavis, IITM, India	Association of aerosols in the Asian summer monsoon anticyclone with Indian summer monsoon rainfall
14:20 to 15:10 12 Minutes Each, Oral	Dr. Kishore Kumar, SPL, VSSC, India	Does the Quasi-Biennial Oscillation Modulates Monsoon Hadley Circulation?
	Dr. Uma Das, IIT, West Bengal, India	Tidal variability and aliasing effects from contemporaneous satellite, model, and reanalysis data in the Stratosphere
	Prashant Chavan, IITM, Pune, India	Impact of volcanic aerosols on the tropical stratosphere and disruption of the QBO
	Dr Chirag Dhara, Krea University, AP, India (online)	Impact of rapid reductions in regional aerosols on the near-future strengthening of the South Asian Monsoon

**15:10 to 15:30 Break**

**15:30 to 16:30 Public Talk by Dr. V Ramaswamy, GFDL NOAA, USA Chair Dr. Rolf. Müller**

**16:30 to 18:30 Tea/coffee and Poster session on Stratosphere-Troposphere Interactions**

# Day 3

Wednesday 5 June 2024

## 9:30 to 13:00 –Session V: Modelling studies on the transport of pollutants and feedback processes associated with the Asian summer monsoon

Chair: Dr. Simone Tilmes, NCAR USA, Co-chair: Dr. Kishore Kumar, SPL VSSC, India Rapporteur: Ms. Aathira Maria Jose

09.30 to 09:55 Invited	Dr. Peter Hitchcock, Cornell University, USA	Assessing stratospheric contributions to sub-seasonal prediction: the SNAPSI project
09:55to 10:20 Invited	Dr. David Plummer, Environment and Climate Change Canada	The challenges and need for multi-model intercomparisons of chemistry climate models in the troposphere
10:20 to 11:00 12 Minutes Each, Oral	V. K. Patel, IIT, Kharagpur, India	Changes in water vapour in the Upper Troposphere and Lower Stratosphere (UTLS) of the global tropics: role of surface warming in recent decades and future scenarios
	P. P. Musaid, SRM, Chennai, India	Physical and dynamical factors affecting the boundary layer tracer pathway to the Asian Summer Monsoon Anticyclone
	Dr. C. Sivan, IITM, Pune, India	Estimation of target density and age of air transported from the Asian monsoon anticyclone to the Arctic

### 11:00 to 11:30 Tea/Coffee break

Rapporteur: Dr. Bhupendra Bahadur Singh

11:30 to 11:55 Invited	Dr. Rolf Müller, IEK-7 stratosphere, Jülich, Germany Juelich, Germany	Reconstructing high-resolution in-situ vertical profiles measured in the sparsely monitored Asian monsoon region
11:55 to 12:20 Invited	Dr. Bärbel Vogel, IEK-7 stratosphere, Jülich, Germany Juelich, Germany	Horizontal transport of Asian summer monsoon air into the northern lower stratosphere: the PHILEAS campaign 2023
12:20 to 13:00 12 Minutes Each, Oral	Dr. Shubha Singh, NCMRWF, Noida, India	Assessing Upper Tropospheric Humidity during Monsoon Depression using NCMRWF unified Model forecasts
	Dr. Kseniia Didenko, IZMIRAN, Russian Academy of Sciences, Russia(online)	Numerical modeling of QBO and ENSO phase impact on the evolvement of sudden stratospheric warming and waves processes
	Dr. Atul Kumar Srivastava, IITM, Delhi, India	Assessment of surface air pollutants over the Indian Summer Monsoon region: Linkage to their characteristics in the upper atmosphere

### 13:00 to 14:00 Lunch break

## 14:00 to 15:50 –Session VI: Stratosphere troposphere exchange processes and their association with monsoon extremes

Chair: Dr. Sanjay Kumar Mehata, AOML, SRM, Chennai, India, Co-chair: Dr. Somkumar Sharma, PRL, Ahmedabad, India

Rapporteur: Dr. Chaitri Roy

14:00 to 14:25 Invited	Prof. Seok-Woo Son, Seoul National University, South Korea	QBO-MJO connection and its implication to South Asian precipitation
14:25 to 14:50 Invited	Prof. T. G. Shepherd, University of Reading, UK (online)	Causal prediction and attribution of extreme weather events
14:50 to 15:50 12 Minutes Each, Oral	Dr. Maria Emmanue, MoES,Delhi, India	MJO effect on the tropopause, UTLS water vapour and cirrus over the Indian Peninsula
	Dr. Jonathon Wright Tsinghua University (online)	Covariability of dynamics and composition in the Asian monsoon tropopause layer
	Dr. Saginela Ravindra Babu, National Central University, Taiwan	Extreme UTLS ozone enhancement over the southern flank of Asian summer monsoon anticyclone in August 2022
	Tesna Maria CUSAT, Kerala, Inia	The Impact of the Mesoscale Convective System on the Upper Troposphere Lower Stratosphere (UTLS) Composition over the Asian Monsoon Region
	Dr. Prashant Singh, Goethe University Frankfurt, Germany	Water Vapor Transport to the Upper Troposphere/Lower Stratosphere via Lightning-Intense Deep Convective Systems in the Third Pole Region

## 15:50 to 16:46–Session VII: Asian summer monsoon and its association with tropospheric processes

Chair: Dr. R. Subramanian; CSTEP, Bangalore, India, Co-chair: Dr Yogesh Tiwari, IITM Pune, India

Rapporteur: Dr. Annada Padhi

15:50 to 16:10 Lead Oral	Dr. M. Mujumdar, IITM, Pune, India	The evolution of monsoonal Hydro-Meteorological extremes over India in the backdrop of changing climate
16: 10 to 16:46 12 Minutes Each, Oral	Dr. R. Kriplani, Ex IITM, Pune, India	Response of the Asian Summer Monsoon to Aerosol Reductions due to COVID-19 lockdown regulations
	Dr. Abhishek Anand, IMD, Kolkata, India (online)	Role of the Himalaya-Tibetan Plateau in Moistening the Tropopause as Inferred from the Model Simulations
	Dr. Yuanpu Li, NCAR, USA (online)	QBO impacts Asian summer monsoon precipitation by modulating the Walker circulation

### 16:46 to 18:30 Tea/coffee and Poster session on Monsoon Weather Extreme

# Day 4

Thursday 6<sup>th</sup> June 2024

**9:30 to 11:15 –Session VIII: *Extreme weather events and prediction***

Chair: Dr. Dev Niyogi, Co-chair: Dr. Satyaban B. Ratna,  
Rapporteur: Dr. Medha Deshpande

9:30 to 10:00 Invited	Vijay Tallapragada, NOAA Federal	Design and Development of NOAA's State-of-the-Art Seasonal Forecast System (SFS) for Research and Operations
10:00 to 10:30 Invited	Prof. Kerry Emanuel, MIT, USA (online)	The Physics of the Build-up of Large Values of Convective Available Potential Energy (CAPE)
10:30 to 11:00 Invited	Dr. Estibaliz Gascon ECMWF, Bonn, Germany	ECMWF's Journey in Advancing Extreme Weather Prediction
11:00 to 11:20 Lead Oral	Dr. Pankaj Kumar, IISER Bhopal	Deep-learning based downscaling approaches for precipitation extremes: an assessment over India.

**11:20 to 11:30 Tea/Coffee break**

**11:30 to 13:00 –Session IX: *Extreme weather prediction***

Chair: Dr. A. K. Sahai, Co-chair: Dr. S. D. Pawar,  
Rapporteur: Dr. Radhika Kanase

11:30 to 12:00 Invited	Dr. Fanglin Yang NCEP, USA	On the Development of NOAA Unified Forecast System -- Reducing Extreme Weather Forecast Biases with Improved Model Physics
12:00 to 12:30 Invited	Dr. Takuya Kawabata, MRI, JMA, Japan	Forecasting Severe Local Storms with advanced DA and Ensemble - Beyond Weather Forecast
12:30 to 13:00 Invited	Dr. Paul Davies, UKMO, UK	Exploring the mechanisms and interactions of extreme weather and large scale atmospheric processes using model/observations with a particular focus on the interactions between tropical and mid-latitude meteorological systems

**13:00 to 14:00 Lunch break**

14:00 to 14:15 Oral	Dr. Indrani Roy, University College London (UCL), UK,	East African October to December rainy season- major drivers, mechanism and improved predictability
14:15 to 14:30 Oral	Mr. Vaibhav Tyagi, Indian Institute of Technology Indore	Interplay of Background Dynamics and Large-Scale Circulations in the Kerala Extreme Rainfall Event of August 2019
14:30 to 14:45 Oral	Ms. Sreevidya Ravi, CUSAT, Kochi (Online)	Dynamical Aspects of Heavy Rainfall Events Over Southern Peninsular India during Northeast Monsoon Season and its Association with Indian Ocean Warming and Madden Julian Oscillation

**14:45 to 15:00 Break**

**15:00–16:40 – Session X: *New approaches for extreme weather events prediction***

Chair: Dr. A. Suryachandra Rao; Co-chair: Dr. J. Sanjay Rapporteur: Ms. Rituparna Sarkar

15:00 to 15:30 Keynote	Dr. D. R. Pattanaik, IMD	
15:30 to 16:00 Invited	Dr. Saulo Freitas, INPE, Brazil	A Parameterization for Cloud Organization and Propagation by Evaporation-Driven Cold Pool Edges
16:00 to 16:20 Lead oral	Dr. R. Ashrit NCMRWF (Online)	Extreme Daily Rain: Forecasting & Verification Challenges
16:20 to 16:40 Lead oral	Dr. P. Mukhopadhyay, IITM, Pune	A convection permitting model: IITM HGFM to improve High Impact weather prediction

**16:40 to 19:00 Tea/Coffee break and Poster session on Monsoon Weather Extreme**

**19:00 to 20:30 Cultural Program**

**20:30 to 22:00 Dinner at IITM front lawn**

# Day 5

Friday 7 June 2024

**9:00 to 10:45 – Session XI: *Observation campaign for understanding processes associated with extreme precipitation events* Session**

Chair: Dr. Thara Prabhakaran, Co-chair: Dr. G. Pandithurai,  
Rapporteur: Ms. Monokranthi

09:00 to 09:30 Invited	Dr. W K. Tao, GSFC, NASA (Online)	Developing, Improving, and Applying Cloud-Resolving Models to Study Precipitation Processes
9:30 to 10:00 Keynote	Prof. Xubin Zeng, University of Arizona	On GPEX and organized convection
10:00 to 10:30 Invited	Prof. Toru Terao, Kagawa University, Japan	Asian summer monsoon circulation and precipitation in view of high moist static energy airmass
10:30 to 10:45 Oral	Mr. Harshad S. Hanmante, IITM, Pune	Rain-type classification and convective clustering in heavy rain events: Radar observations and numerical simulation

**10:45 to 11:15 Tea/Coffee break**

**11:15 to 13:00 –Sessions XII: *AI/ML in Weather prediction***

Chair: Dr. E. N. Rajagopal, Co-chair: Dr. C. Gnanaseelan,  
Rapporteur: Dr. Siddharth Kumar

11:15 to 11:45 Keynote	Prof. Dev Niyogi, University of Texas, Austin, USA	
11:45 to 12:15 Invited	Dr. Pierre Gentine, Univ: of Columbia, USA (Online)	
12:15 to 12:30 Oral	Ms. Aayushi Tandon, University of Petroleum & Energy Studies, Dehradun,	A Machine Learning Based Approach to Predict Extreme Rainfall Events in India's Uttarakhand Region
12:30 to 12:45 Oral	Dr. Yesubabu Viswanadhapalli, NARL, ISRO	Impact of Western Ghats orography on the simulation of extreme precipitation over Kerala, India during 14–17 August 2018
12:45 to 13:00 Oral	Dr. Ayantika D. C.	Understanding the extreme precipitating monsoon rainstorms over Pakistan

**13:00 to 14:00 Lunch break**

**14:00 to 15:30 –Session XIII: *Application of Monsoon Weather Forecast for various sectors***

Chair: Shri K. S. Hosalikar, Co-chair: Dr. Susmitha Joseph  
Rapporteur: Dr. Soumyajoti Jana

14:00 to 14:30 Keynote	Prof. Vimal Mishra, IIT, Gandhinagar, India	
14:30 to 15:00 Invited	Dr. Sisir K. Dash, NCCR, MoES, Chennai, India	
15:00 to 15:30 Invited	Mr. V.K. Kodali, WRLDC, Mumbai	

**15:30 to 16:30 –Session XIV: *Stakeholders' Discussion on Renewable Energy & Weather Forecasts***

Chair: Prof. Vimal Mishra, Co-chair: Dr. P. Mukhopadhyay,  
Rapporteur: Ms. Snehlata Tirkey  
*Panelists:* SDMA, Assam on Flood; Adani Green, Ahmedabad; WRLDC (Grid India); Renew Power, Delhi; Suzlon, Pune; NERLDC, Guwahati

**16:30 to 17:00 Tea/Coffee break**

**17:00 to 18:00 –Session XV: *Panel discussion, recommendation and concluding remarks***

*Panelists:*  
Coordinator: Dr. Vinu Valsala