# 53rd Foundation Day Celebration of IITM

IITM celebrated its 53rd Foundation Day on 17th November 2014. On this occasion **Prof. Pramod Kale**, former Director, Space Application Centre (SAC), Ahmedabad and Vikram Sarabhai Space Centre (VSSC), Thiruvananthapuram, ISRO was the Chief Guest. **Prof Mladjen Curic,** Institute of Meteorology, University of Belgrade was the Guest of Honour. **Prof. V.K**. **Gaur,** Chairman, Governing Council, IITM also attended the function. **Dr. R. Krishnan**, Director IITM welcomed all and briefed about the Institute's progress and its current activities.

On this occasion various awards are presented to the scientists, students, scientific, technical, Administrative support and other staff of the Institute. ***Dr. R. Krishnan*** received the Biannual Golden Jubilee Award for his excellent scientific contribution at the hands of Prof. Pramod Kale. The Annual Silver Jubilee Award for the best research paper published in peer reviewed journal for the year 2013 was presented to **Dr. (Smt.) B. Padmakumari** and et.al., for their research paper entitled "In situ measurements of aerosol vertical and spatial distributions over continental India during the major drought year 2009" published in *Atmospheric Environment*, Vol. 80, August 2013, DOI:10.1016/j.atmosenv.2013.07.064,107-121, at the hands of Prof. V.K. Gaur. The Best Student Research Paper Award for 2013 was presented to ***Kum. Saumi Chakravorty*** et. al. for her paper entitled "Spring asymmetric mode in the tropical Indian Ocean: role of El Nin˜o and IOD" published in *Climate Dynamics*, Vol. 40, March 2013, DOI:10.1007/s00382-012-1340-1, 1467-1481 and to ***Kum. Sharmila Sur***, et. al. for her paper entitled "Role of ocean-atmosphere interaction on northward propagation of Indian summer monsoon intra-seasonal oscillations (MISO)" published in *Climate Dynamics*, Vol. 41, September 2013, DOI:10.1007/s00382-013-1854-1, 1651–1669 at the hands of Prof. M. Curic.

***Shri Oomen Abraham, Shri P.W. Dixit, Smt. A.A. Desai*** *and* ***Shri Birendra Singh Bhandari*** received the Excellent Performance Award for the year 2013 for the Scientific, Administrative, Technical Support and multi-Tasking Staff, respectively at the hands of Dr. R. Krishnan, Director of IITM. ***Shri Gopalkrishnan, Dr. M.I.R. Tinmaker, Shri N.K. Agarwal, Shri V.H. Sasane, Smt. Shanthi Iyer*** were presented Recognition of service for their completion of 25 years of service at IITM.

The above programme was followed by the **Foundation Day Lecture** on "The problems and possibilities of weather modification" by Prof Mladjen Curic, Golden Jubilee Award Lecture by Dr. R. Krishnan, Silver Jubilee Award Lecture by Dr. (Smt.) B. Pdma kumari and Best Student Paper Award Lectures by Kum. Saumi Chakravorty and Kum. Sharmila Sur. Institute's present and past employees and some invitees attended the function. The celebration was concluded in the evening by a cultural programme.

## PROGRAM

0930 - 0945- Arrival of guests

0945 –0955- Welcome & Presentation of bouquets

0955 –1000- Invocation & Lighting of Lamp

1000 –1010- Welcome address by Director, Dr. R. Krishnan

1010–1020- Brief Introduction of Chief Guest, **Prof. Pramod Kale,** Former Director, SAC, Ahmedabad, & VSSC, Thiruvananthapuram, ISRO, **Prof. V.K. Gaur**, Chairman, Governing Council, IITM, and Guest of Honour, **Prof. Mladjen Curic**, Institute of Meteorology, University of Belgrade

1020 –1040- Inaugural address by Prof. Pramod Kale

1040 –1050- Speech by Prof. V.K. Gaur, Chairman, Governing Council

1050–1110- **Presentation of Awards**

(a) Golden Jubilee Award to be presented by Prof. Pramod Kale

(b)Silver Jubilee Award to be presented by Prof. V.K. Gaur

(c)Best Student Paper Awardto be presented by Prof. Mladjen Curic

(d) Excellence Awards for Admin,Tech, MTS to be presented by Dr. R. Krishnan

1110–1120- Presentation of Mementos to Dignitaries

1120–1125- Poem recitation by Mr. Lohgaonkar

1125 –1130- Vote of thanks

1130–1200- Tea Break

1200–1300- **Foundation Day Lecture** by Prof. Mladjen Curic

1300 –1400- Lunch Break

1400 –1430- **Golden Jubilee Award Lecture** by Dr. R. Krishnan

1430 –1500 - **Silver Jubilee Award Lecture** by Dr. Padma Kumari

1500 -1510 - Recognition of service rendered by employees who have completed 25 years of service at IITM

1510 –1520- Tea Break

1520 –1540- **Best Student Paper Award Lecture** by Soumi Chakravorty

1540 –1600- **Best Student Paper Award Lecture** by Sharmila Sur

1600 –1800- Cultural Program and High Tea

## AWARDS

**Golden Jubliee Award** : Dr R Krishnan, Acting Director

**Silver Jubliee Paper Award**: Dr(Smt) Padma Kumari, Sc-D
Dr (Smt) Thara Prabhakaran, Sc-E
Dr. R.S.Maheshkumar, Sc-D
Dr J.R.Kulkarani
Dr (Smt) S.B.Morwal, Sc-D
Shri Harikrishan Gandham, Research Fellow

**Best Student Paper Award**: Kum. Soumi Charboratory
: Kum. Sharmila Sur

**Best Performance Awards 2013**

1. Scientific Support Staff : Shri Oomen Abraham, Sc-Officer Gr-II
2. Technical Support Staff : Shri P.W.Dixit, Technician Gr-F
3. Administrative Staff : Smt A.A.Desai, Sr. Executive
4. Multi Tasking Staff : Shri Birendra Singh Bhandari, MTS

**Dr R. Krishnan** joined the Indian Institute of Tropical Meteorology in 1995 and is acting Director of the institute. He has made original contributions in advancing scientific understanding of climate extremes, such as monsoon-droughts over India. In particular, his research identified important pathways for prolonged 'breaks' during the monsoon rainy season and elucidated the role of internal feedbacks in forcing monsoon-droughts, which are known to occur even in the absence of climate drivers like El-Nino/Southern-Oscillation. While future response of monsoon to climate change has enormous implications across different sectors of society, there are major uncertainties in monsoon projections from the IPCC models. To put India amongst the world leaders, he provided guidance and leadership for capacity building in state-of-the-art climate modeling at IITM, leading to development of the first Earth-System-Model in India required for reliable projections of global and regional monsoon climate.

**Dr.(Smt)B.Padma Kumari** joined the Indian Institute of Tropical Meteorology in 1999 and is a Scientist of the institute. Her specialization includes Aerosol- Cloud – Radiation and their interactions. She has made important contributions in the area of Remote Sensing of Atmospheric Aerosols, Radiation and Cloud macro and microphysics using ground-based, in-situ and satellite observations.

**Dr. Mahesh Kumar** joined IITM as a Scientist in 2005, His specialization includes Aerosol cloud Precipitation interaction, aircraft observations of clouds, and cloud physics. He has made important contributions in the area of aerosol-cloud interactions using CAIPEEX observations.

**Shri Harikishan Gandham** joined the Indian Institute of Tropical Meteorology in 2010 as institute research fellow and is working on Aerosol-cloud interactions using observational data. His areas of expertise include radiative Transfer model, satellite data retrievals, Aerosol science, and cloud physics.

**Dr. Savita B. Morwal** joined the Indian Institute of Tropical Meteorology in 1981 and is a Scientist of the institute. Her specialization includes Cloud Aerosol Interaction and

microphysics of Tropical clouds. She has made important contributions in the area Physics and Dynamics of Tropical Clouds using radiosonde and aircraft microphysical observations.

**Dr. Thara Prabhakaran** joined the Indian Institute of Tropical Meteorology in December 2008. Her specialization includes studies on the Physics and Dynamics of clouds. She has made important contributions in the area aerosol-cloud-dynamical interactions using CAIPEEX observations and numerical simulations and is currently the Chief Project Scientist of the program.

**Dr. J. R. Kulkarni** joined the Indian Institute of Tropical Meteorology in 1973. He was program Manager of CAIPEEX program and was an adviser to the CAIPEEX and NFAR programs of the Institute. He is "WMO Expert Committee Member of Weather Modification". His specialization includes aircraft observations of clouds, and cloud physics. He has made important contributions in the area of aerosol-cloud interactions and cloud seeding using CAIPEEX observations.

**Kum Sharmila Sur** joined Indian Institute of Tropical Meteorology as CSIR-Research Fellow in June 2009. She got registered for Ph.D. (Atmospheric and Space Science) at University of Pune in March 2011 on the research topic entitled "Studies on the Characteristics of Intraseasonal Oscillations during Extreme Monsoon years: Observations and Model Simulations" under the guidance of Dr. A. K. Sahai and Prof. B. N. Goswami.

**Kum. Soumi Charboratory** joined Indian Institute of Tropical Meteorology as Junior Research Fellow in July 2009. She got registered for Ph.D. (Atmospheric and Space Science ) at University of Pune in Jan 2011 on the research topic entitled "Understanding the basin scale interannual warming of the Indian Ocean and its regional impacts" under the guidance of Dr. C. Gnanaseelan.

## Abstract of Foundation Day Lecture by Prof. Mladjen Curic

### The problems and possibilities of weather modification

Weather modification is a set of activities to change naturally occurring weather for the benefit of mankind. Cloud seeding is the best- known kind of weather modification with the goal of producing rain or snow in a certain area. In other scenarios cloud seeding is also performed to suppress hail and fog. Cloud seeding is applied by dispersing chemicals into the air, which serve as artificial condensation or ice nuclei. This substantially changes the microphysical processes within the cloud. At present time silver iodide, liquid propane, lead iodide and the other agents are used. Some agents are toxic or corrosive. But, there are the clean methodologies based on sound effect which are not applied in weather modification even they are well documented.

Cloud seeding is performed all throughout the world through numerous operational projects aimed at precipitation change, hail suppression or fog dispersion. These projects have been operated continually for more than half a century and cover large areas as in China, Russia, the United States, Israel, France, Serbia and many other countries. Seeding agents may be dispersed to the appropriate region of the target cloud by different delivery tools such as ground-based generators, rockets or aircrafts.

Positive implications of weather modification activities are now evident, especially due to wide stretches of arid regions all throughout the world. Moreover, cloud seeding also has the potentiality of controlling the weather by prevention of flooding or even creating favorable conditions for various modes of transportation. On the other hand, there are some

negative environmental implications of cloud seeding with two opposed statements. The solution superior to these statements is the objective method for finding concentrations of the seeding agents that are accumulated in large amounts in precipitation over a certain area. This is the key problem not only in cloud seeding but also in air, water and soil pollution.

## Abstract of Silver Jubilee Paper Award Lecture by Dr B. Padmakumari

### In situ measurements of aerosol vertical and spatial distributions over continental India during the major drought year 2009

B. Padmakumari, R.S. Maheskumar, G. Harikishan, S.B. Morwal, T.V. Prabha, J.R. Kulkarni

The variability in aerosol vertical and spatial distribution over the continental Indian region is studied using the airborne observations during the Cloud Aerosol Interactions and Precipitation Enhancement EXperiment (CAIPEEX) from May to September, 2009. The fine mode (0.1–3.0 μm) aerosol vertical profiles up to 6 km at different regions showed different vertical structures mostly influenced by the atmospheric boundary layer (ABL) depth as well as the origin of air mass trajectories and the presence of clouds. Elevated aerosol layers are observed during pre-monsoon and during monsoon at some locations but comparatively lower than the one observed in the boundary layer. During monsoon, aerosol number concentration showed strong vertical gradient and a transition is observed between the boundary layer and the free troposphere. The coarse mode (>3 μm) aerosol vertical profiles also showed elevated layers at higher altitudes due to the incursion of dry air laddened with dust. The spatial distribution shows significant variation at the elevated layers as compared to that in the boundary layer during pre-monsoon, while high variability is observed in the boundary layer during monsoon. The frequency distribution of different aerosol types from Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation (CALIPSO) showed dominating contributions from dust, polluted dust and smoke during pre-monsoon. During monsoon also traces of these pollutants were found to be high as the year 2009 is a drought year with rainfall deficiency of 22%. The surface level number concentration and the height of ABL are found to influence the aerosol optical depths significantly.

***Padmakumari B., Maheskumar R.S., Harikishan G., Morwal S.B., Prabha T.V., Kulkarni J.R., In situ measurements of aerosol vertical and spatial distributions over continental India during the major drought year 2009, Atmospheric Environment, 80, August 2013, DOI:10.1016/j.atmosenv.2013.07.064,107-121***

## Abstract of Best Student Paper Award Lecture by Kum. Soumi Chakravorty

### Spring Asymmetric Mode in the Tropical Indian Ocean: Role of El Niño and IOD

Soumi Chakravorty, J. S. Chowdary and C. Gnanaseelan

The spring asymmetric mode over the Tropical Indian Ocean (TIO) is characterized by contrasting patterns of rainfall and surface wind anomalies north and south of Equator. The asymmetric pattern in rainfall has evolved as a leading mode of variability in the TIO and is strongly correlated with El Niño-Southern Oscillation (ENSO) and Indian Ocean Dipole (IOD). The evolution of the asymmetric pattern in rainfall and surface wind are examined in the twentieth century reanalysis and/or atmospheric general circulation model (AGCM) simulations for the period of 1871–2008. The study revealed that spring asymmetric mode is well developed when El Niño co-occurred with IOD and is driven by the associated meridional gradients in sea surface temperature (SST) and sea level pressure (SLP). The pure El Niño composites are characterized by spatially homogeneous positive SST

anomalies, weaker SLP gradients and convection, leading to weak asymmetric mode. The asymmetric mode is absent in the pure IOD composites due to the persistence of east west SST gradient for a longer duration than the co-occurrence years. The meridional gradient in SST anomalies over the TIO associated with the ENSO-IOD forcing is therefore crucial in developing/strengthening the spring asymmetric mode. The northwest Pacific anti-cyclonic circulation further strengthens the asymmetric mode in surface winds by inducing north-easterlies in the north Indian Ocean during pure El Niño and co-occurrence years. The simulations based on AGCM, forced by observed SSTs during the period of 1871–2000 supported the findings. The analysis of available long term ship track and station data further strengthens the hypothesis. The spring asymmetric mode is significant after the 1976's climate shift mainly due to frequent co-occurrence of El Niño and IOD events. The coupled ocean-atmosphere model sensitivity experiments revealed that air-sea coupled processes in the tropical Indian and Pacific Oceans are responsible for the asymmetric mode formation and its maintenance.

***Chakravorty Soumi, Chowdary J.S., Gnanaseelan C., Spring asymmetric mode in the tropical Indian Ocean: role of El Nin˜o and IOD, Climate Dynamics, 40, March 2013, DOI:10.1007/s00382-012-1340-1, 1467-1481***

## Abstract of Best Student Paper Award Lecture by Kum. Sharmila Sur

**Role of ocean-atmosphere interaction on northward propagation of Indian summer monsoon intra-seasonal oscillations (MISO)**

S. Sharmila, P. A. Pillai, S. Joseph, M. Roxy, R. P. M. Krishna, R. Chattopadhyay, S. Abhilash, A. K. Sahai & B. N. Goswami

This study investigates the relative role of atmospheric dynamics and ocean-atmosphere coupling in the initiation, maintenance, and northward propagation of Indian summer monsoon intraseasonal oscillations (MISO) using the recent version of state-of-the-art coupled NCEP-Climate Forecast System (CFSv2) model and its atmospheric component, the Global Forecast System (GFS). Three numerical simulations are performed; (1) CFSv2 with high frequency air-sea interaction (at every half an hour), (2) GFS forced with observed monthly sea surface temperature (SST) (interpolated to daily) and (3) GFS forced with daily SST obtained from the CFSv2 simulations. Results show that the MISO simulated by CFSv2 has realistic northward propagation of convection from the equator, while both GFS experiments show only standing mode of MISO over the Indian subcontinent. The analyses further indicate that even with the conducive vertical wind shear, the absence of meridional humidity gradient and moistening of the atmosphere column north of convection hinders the northward movement of convection in GFS. This moistening mechanism works only in the presence of an 'active' ocean. In CFSv2, the lead-lag relationship between the atmospheric fluxes, SST and convection are maintained, while such lead-lag is unrealistic in the uncoupled simulations. These results lead to the conclusion that high frequency air-sea coupling is a necessary and crucial condition for reproducing the realistic northward propagation of MISO in the model. This study demonstrates the seminal role of air-sea coupling in simulating realistic MISO using CFSv2-GFS dynamical modeling framework for the first time.

***Sharmila Sur, Pillai P.A., Joseph S., Roxy M., Krishna R.P.M., Chattopadhyay R., Abhilash S., Sahai A.K., Goswami B.N., Role of ocean-atmosphere interaction on northward propagation of Indian summer monsoon intra-seasonal oscillations (MISO), Climate Dynamics, 41, September 2013, DOI:10.1007/s00382-013-1854-1, 1651–1669***

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