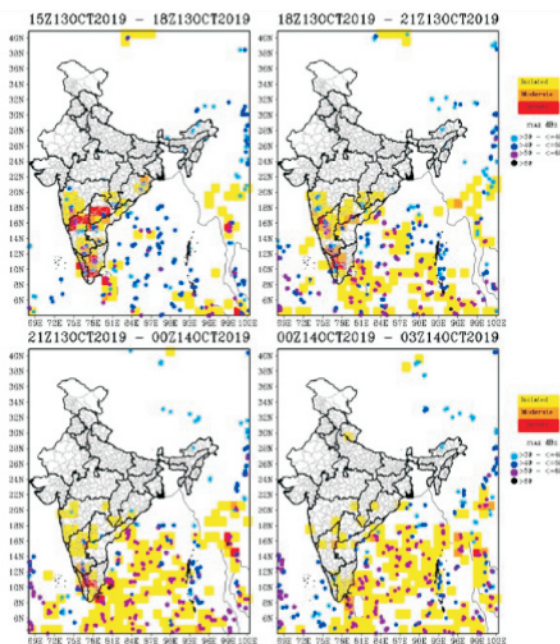


Achievements

•Thunderstorm/ Lightning Forecast System:

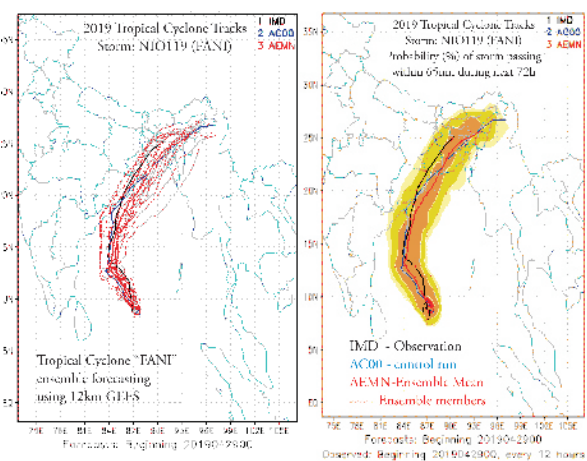
Development of the “Modeling framework for thunderstorm/ lightning prediction” has been set up for operation based on a new approaches using 'dynamical lightning parameterization' in WRF. The system is presently generating Real Time Forecast every day and the forecast is made available at the link: http://srf.tropmet.res.in/srf/lightening_flash/index.php. Since 3 April 2019, a real time operational forecast for lightning/thunderstorm is being generated by using this system at IITM “Aaditya” HPCS using GFS T1534 IC every day in two cycles (00 UTC and 12 UTC). This newly developed system is now handed over to IMD for operationalization. The compiled model codes, scripts (run and analysis) are shared with IMD.



Advertisement for Research Fellowship under MoES Research Fellow Program (MRFP) at Ministry of Earth Sciences Organisations: MoES Research Fellow Program (MRFP) guidelines have been finalized. DESK at IITM has floated advertisement for the filling up of 30 JRF positions for 10 MoES institutes. Advertisement containing online application form & instructions are made available at IITM website: https://www.tropmet.res.in/219-news_details

Forecast of cyclone “FANI”: Using the ensemble forecast based on GEFS and the deterministic GFS, accurate forecast has been achieved with longer lead (5 to

6 days) for cyclogenesis, track, intensification and landfall of extremely severe cyclone “FANI”. The tropical cyclone tracker based on ensemble forecast of GEFS (12.5 km) has been developed, tested and readied for handing over to IMD for operationalization. Methodology and script for percentile-based GFS forecast of extreme precipitation events have been developed and handed over to IMD for operationalization.



Pacific modulation of accelerated south Indian Ocean sea level rise during the early 21st Century:

The south Indian Ocean has shown an unprecedented sea-level rise during the early 21st Century. Sea-level rise in the south Indian Ocean is found to be 37% quicker than the global mean sea-level during 2000-15. Observational datasets and long-term proxy records identify Pacific origin of the south Indian Ocean sea-level rise. Results indicate that south Indian Ocean sea-level rise has accelerated more than the global, with 40% contribution from the halosteric sea level primarily through the Indonesian Through Flow (ITF) transport and a secondary from the local processes during 2000-15. The co-evolution of PDO and the south Indian Ocean sea level is also evident from the long-term proxy records indicating that the association is part of an internal mode of variability modulated on decadal time-scales. The finding from the study cautions that accelerated heat and freshwater intrusion from the western Pacific with the co-evolution of PDO and La Niña-like condition may lead to the accelerated sea-level rise and marine heat waves in the south Indian Ocean imposing threats to the life of coral reefs and marine ecosystems. (Jyoti J., Swapna P., Krishnan R., Naidu C.V., Climate Dynamics, Online, May 2019, DOI:10.1007/s00382-019-04795-0, 1-20)

Forecast of cyclone “VAYU”: Using the ensemble forecast based on GEFS and the deterministic GFS, accurate forecast has been achieved with longer lead (5 to 6 days) for cyclogenesis, recurving track, intensification and landfall of very severe cyclone “VAYU” during 10-19 June 2019. GEFS forecast provided the indication of recurvature of the cyclone with reduced intensity and possible crossing over north of Gujarat. The tropical cyclone tracker based on ensemble forecast of GEFS (12.5 km) has been tested for tropical cyclone “VAYU”. Methodology and script for percentile based forecast of extreme precipitation events on GFS have been developed and handed over to IMD for operationalization.

Monsoon Mission: Fourth Scientific Steering Committee (SSC) meeting was held on 21 May 2019.

Seasonal Prediction: The latest seasonal forecasts are made available at the link: http://www.imdpune.gov.in/Clim_Pred_LRF_New/Models.html. IITM researchers provided necessary assistance to IMD scientists.

Extended Range Prediction: The latest extended range prediction (ERP) products for research/scientific use based have been made available at <http://www.tropmet.res.in/erpas/>. These forecast products are based on the real time weekly operational forecast generated by IMD using the Multi Model Extended Range Prediction System developed at IITM. Rainfall, Maximum & Minimum temperatures, Heat wave, MJO forecast, soil moisture (0-10cm), Relative humidity, and Cyclogenesis predictions are also made available at the same link. The MME forecasts are prepared using CFS (T126 & T382) and GFS (T126 & T382). Each resolution of CFS and GFS is having 4 ensemble members. The IMD operational products are made available at http://nwp.imd.gov.in/erf_outlook.php.

- The ERP forecast products are based on the real time weekly operational forecast generated by IMD using the Multi Model Extended Range Prediction System developed at IITM. Rainfall, Maximum & Minimum temperatures, Heat wave, MJO forecast, soil moisture (0-10 cm), Relative humidity, and Cyclogenesis predictions are also made available at the same link. The MME forecasts are prepared using CFS (T126 & T382) and GFS (T126 & T382). Each resolution of CFS and

GFS is having 4 ensemble members. The IMD operational products are made available at http://nwp.imd.gov.in/erf_outlook.php.

- The IMD operational ERP products are made available at http://nwp.imd.gov.in/erf_outlook.php.

Global Forecast System for Short Range

Deterministic Forecast: IITM team assisted IMD forecasters for developing various new model diagnostics and products. Experimental forecast of rainfall probability for all the blocks were generated and the same were shared with IMD forecasters. Initiatives were taken to share the forecast with the Agrimet division of IMD for generating block level Agro Advisories. The rainfall probability plots were modified based on the feedback of IMD forecasters.

- New forecast probabilistic products for pre-monsoon thunderstorm namely the SCP, Gust wind, Hail index and index LAYERH based on GEFS have been developed and tested. These products will be handed over to IMD for operationalization for Thunderstorm Probability Forecast.

- The system of “Modeling framework for thunderstorm/ lightning prediction” (model codes, scripts etc.) is handed over to IMD for operation. The compiled model codes, scripts (run and analysis) are also shared at [/imd/wrf-iitm/WRF](#). The system is also installed and compiled successfully in another IMD account, “MIHIR” HPCS.

Program for Development of Skilled manpower in Earth System Sciences (DESK)

- Completed the IITM JRF Semester-II classes in the month of April 2019.

- After formulation of MoES Research Fellow Program (MRFP) guidelines the procedure for detailed advertisement has been completed and application are invited through Employment News and other leading newspapers. A webportal is developed for receiving applications from 1st May 2019.

- DESK announced summer intern application and has received total 127 applications for same.

- One Day Training Program and Study Tour for IAF Officer's from Air Force Administrative College's (Coimbatore) was conducted on 2 May 2019 at IITM. 6

Air Force Officers participated in the program. Five scientists from IITM delivered lectures for the training program.

- Applications were invited for Intern Project Positions for M.Sc and M.Tech Project during 10-23 May 2019. About 45 applications were shortlisted.

- A 5-day training program for Indian Air Force (IAF) Officers was held at IITM during 17-21 June 2019. Total 10 IAF Met officers from the Directorate of Meteorology, New Delhi attended the program. The training program ended with the felicitation ceremony wherein all the participants were awarded with the Program certificate and a memento as a token of appreciation.

- Under the MoES Research Fellow Program (MRFP), applications were invited and total 2240 applications have been received.

IUKWC, IITM Pune

IUKWC Workshop: Science and Innovation for Catchment Management: An India-UK Water Centre workshop on Science and Innovation for Catchment Management was held at the University of Warwick in Coventry, UK during 8-10 May 2019. This workshop was led by Mr. Ant Parsons, ICE Blue and Dr. Kapil Gupta, Department of Civil Engineering, IIT Bombay. The workshop was organised with the support of partners from the INTCATCH Horizon 2020 project that is demonstrating innovative monitoring solutions for catchments. The workshop aimed to explore and build on existing knowledge and research on integrated catchment management to enhance collaboration and to identify pathways further improvement. Thirty six participants, including five water-related NGOs/institutes (4 from India and 1 from the UK) and six early-career researchers presented their work, shared their knowledge and co-created new proposals for research that drives towards SMART Rivers as part of integrated catchment.

Pump Priming Projects: Under the IUKWC Pump Priming Project Initiative, two projects have been funded w.e.f. 1st May 2019 till September 2019. The first project 'Improving our understanding of the aquifer system in the Sunderbans' is being led by Dr. Lalu Das, Bidhan Chandra Krishi Vishwavidyalaya, Kolkata and Dr. Alexandre Gagnon from Liverpool Jon Moores University, UK. The second project 'Managing and

monitoring agricultural water demand' is being led by Dr. Gopal Krishan, NIH, Roorkee, Dr. Purnaba Dasgupta, Rajarhat Prasari and Dr. Andrew Mckenzie from BGS, UK.

Indo-UK Water Centre (IUKWC) at IITM, Pune organized four-day workshop on '**Safe and Sustainable Technologies and Strategies for Integrated Freshwater Resource Management**' (as a part of IUKWC's 'Lead a workshop' initiative) at JSS Academy of Higher Education and Research (JSSAHER), Mysuru during 25-28 June 2019. It was led by Dr. Shivaraju H. Puttaiah, JSSAHER, and Dr. David Jenkins, University of Plymouth. The workshop aimed to further the development of sustainable strategies urgently needed in India, which also have global long term impact on quality of drinking water and food production. The workshop attracted both early career and experienced researchers, NGOs and Indian government officers who are active in various aspects of freshwater resource research, innovation, management, and planning. Over 45 delegates from India and the UK presented their research and experiences, and explored innovative approaches and technologies for assessing, treating and managing water within the Water Food Energy Nexus. (a picture)

Ongoing Developmental Activity

High-Altitude Cloud Physics Laboratory: A new chemistry lab is established which housed PTR-TOF-MS (Proton Transfer Reaction Mass Spectrometer), HTDMA (Hygroscopic Tandem Differential Mobility Analyzer) and Particles into Liquid Sampler (PILS)-Ion Chromatograph. (Picture from the concerned scientist)

- The network of automatic rain gauges (ARG) in Mumbai metropolitan region has been augmented with the addition of about 30 ARGs in Navi Mumbai and Thane region. Another 10 ARGs are being installed in Kalyan-Dombivali region. Work is underway to update the Mobile App "Mumbai Weather Live" & web portal.

- **National Facility for airborne Research (NFAR):** Establishment of a laboratory at IITM for the upcoming UAV activities is under progress.

- Twilight Photometer is being operated at IITM during evening twilight period under clear sky days. Work on retrieval algorithm for obtaining aerosol vertical profiles is in progress.

- Field experiment was conducted with Unmanned Aerial Vehicle for atmospheric measurements in collaboration with NAL, Bengaluru during 24-28 June 2019. During the flights, coordinated surface measurements were also made. (Picture)

CAIPEEX Phase IV-Solapur and Tuljapur Site: Intensive Observational Periods (IOPs) as part of CAIPEEX-Phase IV 2019 started on 1 April 2019 and all ground based observations of aerosols, clouds, winds and thermodynamic parameters (in-situ and remote profiling) are in progress at Solapur and Tuljapur stations. (Picture)

- High-Resolution Time-of-Flight (HRTof) Aerosol Mass Spectrometer (AMS) and Humidified Tandem Differential Mobility Analyzer (HTDMA) instruments have been installed at CAIPEEX- lab at NBNSCoE, Solapur and are working satisfactorily.

Fluid Dynamics Laboratory (FDL): First-level single hotwire measurements on self-similar wall jet are over. Purchase of Hardware and Software Upgrades for Particle Image Velocimetry (PIV) systems in FDL is in progress. Preliminary PIV experiments on wall jet are started.

- First-level single hotwire measurements on self-similar wall jet are over. Purchase of hardware and software upgrades for Particle Image Velocimetry (PIV) systems is in progress. Preliminary PIV experiments on wall jet are started.

Lightning Location Network: For installation of lightning location network sensor, site survey was performed at various cities such as Nellore, Vijayawada, Hyderabad, Ananthapuramu and Bengaluru in March 2019.

- Lightning Location Network sensors were installed at Ranchi, Nellore, Vellore and Bengaluru and integrated with the central processor at IITM Pune. Now, a total of 50 sensors are installed over the country.

Field Campaigns

- Rain Gauge network was installed at Mumbai during 30 April 2019 to 17 May 2019.

- Lightning location sensors were installed at Shrivardhan, Ratnagiri, Vengurla and NCPOR, Goa during 1-5 May 2019.

- CAIPEEX-2019 ground campaign observations were carried out during 26-31 May 2019 at NBNSCoE, Solapur Lab and Tuljapur site.

- An instrument to measure the vertical profiles of pollutants was setup at IITM Delhi during 3-12 June 2019. The instrument will gather data over a year to get the annual variation in trace gases. (Picture)

IITM Participation in Important Meetings

- Meeting of the Technical Advisory Committee (TAC) of National Communications, MoEF & CC, New Delhi, 2-3 April 2019.

- Annual meeting of the steering committee of SSiRC (Stratospheric Sulfur and its Role in climate, an activity under the SPARC – Stratospheric and upper tropospheric Processes and their Role in Climate - programme), 2 to 5 April 2019 at Forschungszentrum, Jülich, Germany.

- European Geosciences Union (EGU) General Assembly 2019, Vienna, Austria during 7-12 April 2019.

- MoES Review Meeting (ESSO Council) at National Centre for Antarctic & Ocean Research (NCAOR), Goa, 8-9 April 2019.

- First and Second Stakeholders meetings for review of MoES Knowledge Resource Center Portal (MoES KRCNet) on 13th March 2019 and 9-10 April 2019 at NCPOR, Goa

- South Asian Climate Outlook Forum (SASCOF) and Climate Services User Forum (CSUF), Kathmandu, Nepal, 22-23 April 2019.

- Meeting on "India Consultation on Hindu Kush Himalayas (HKH) call to Action", organized by ICIMOD, Kathmandu and MoEF, Ministry of Environment, Forests (MoEF) & Climate Change, New Delhi, 25 April 2019.

- SOLAS Scientific Steering Committee Meeting, Hokkaido University, Sapporo, Japan, 26-28 April 2019.

- WCRP (World Climate Research Programme) Strategy Plan Implementation Meeting, WMO, Geneva, Switzerland, 4-5 May 2019.

- 40th session of the WMO/IOC/ISC Joint Scientific Committee (JSC) of WCRP at the WMO, Geneva, Switzerland, 6-10 May 2019.

- IUKWC Workshop on Science and Innovation for Catchment Management, Warwick University, 8-10 May 2019.

- Steering Committee Meeting of the India-UK Water Centre (IUKWC), Centre for Ecology & Hydrology (CEH), UK on 17 May 2019.

- IPCC Meeting - WGI Training on data and Software Development, Germany, 6-7 June 2019.

- 50th Sessions of the UNFCCC Subsidiary Bodies Conference, Bonn, Germany, 19-27 June 2019.

- **IITM Monsoon Discussion Forum (IMDF) 2019:** The First IITM Monsoon discussion seminar with a focus on "LRF and Onset phase of monsoon 2019" was organised on 11 June 2019 with the following talks by IITM Scientists:

- Oceanic Conditions by Dr. Anant Parekh
- Seasonal Prediction by Mr. Ankur Srivastava
- Extended Range Prediction by Dr. Susmitha Joseph
- Short Range Prediction by Mr. Tanmoy Goswami

Academic Cell Activities: PhD synopsis and PhD proposal seminar were conducted for IITM research scholars and scientists pursuing PhD degrees from Universities

Important Events : Under Prof. R. Ananthakrishnan Colloquium Series, following talks were delivered by IITM scientists:

- Operational Tracking Method for the MJO Using Extended Empirical Orthogonal Functions by **Mr. Avijit Dey** on 06 June 2019

- The Impact of Modified Fractional Cloud Condensate to Precipitation Conversion Parameter in Revised Simplified Arakawa Schubert Convection Parameterization Scheme on the Simulation of ISM and its Forecast Application for an Extreme Rainfall Event by **Mr. Malay Ganai** on 12 June 2019

- Tropical Indian Ocean decadal sea level response to the Pacific Decadal Oscillation forcing by **Ms. Deepa J.S.** on 19 June 2019

- On Phenomenological Paradigm for Midtropospheric Cyclogenesis in the Indian Summer Monsoon by **Dr. (Ms.) Ayantika Dey Choudhury** on 26 June 2019

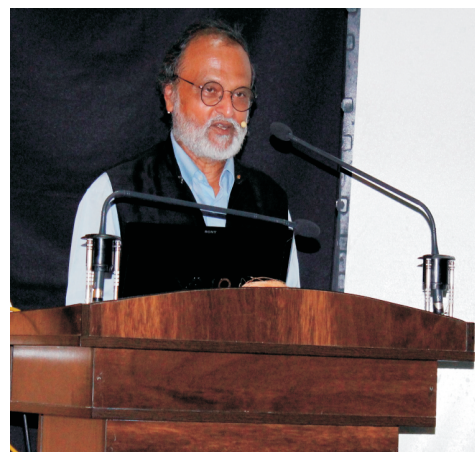
Hindi Activities:

- Akhil Bhartiya Vishesh Rajbhasha Hindi Karyashala evam Sangoshti was organized by Parivartan Jan Kalyan Samiti, Delhi on 30 May - 1 June 2019 at Tiruvananthapuram, Kerala. The follow up actions on the topics raised during the previous meeting held on 6 September 2018 of the Central Hindi Committee (Chaired by Hon'ble Prime Minister) were discussed. On this occasion, IITM Hindi Officer delivered lecture and IITM scientists presented scientific posters in nagari and local languages. IITM, Pune was felicitated by "Rajbhasha hindi karyanvyan ratna samman" for its contribution towards promotion of official language Hindi in official work and Science.

- **Eighth half yearly meeting of Town Official Language Implementation Committee** was conducted at the Institute on 26 June 2019. Heads/ Representatives of 40 offices of Central Govt. stationed at Pune, participated in the meeting.

- **A one day Hindi workshop** was organized on 25 June 2019 in the institute on the subject "Patrachar kr vividh roop" IITM employees participated in the workshop. Hindi Officer delivered the lecture on the said subject.

- **World Environment Day-2019:** IITM-ENVIS celebrated World Environment Day on 7 June 2019. **Dr. Rajendra M. Shende**, Chairman, TERRE Policy Center & Former Chair, UNEP delivered a talk on "Leaving no one behind: United Nations strategy on climate change". On this occasion, tree plantation was arranged, and a cultural program based on the theme 'Environment and Weather' giving message or describing various aspects of the Nature viz. air, weather, climate, monsoon, rain was organized.



International Yoga Day: IITM celebrated International Yoga Day on 21 June 2019. On this occasion, Mr. Chandrakant Gaikwad, Yoga Sansthan, Nasik addressed the gathering on Yoga Mudra, Ayurveda and its benefits in daily life followed by yoga session.



Honors and Awards :

• Aaya Aaya ol Fma, pauNae kae sarkarI kayaQ Fv/a ivazana paXcaar-paXsaar mae rajaBaaVaa ihndI ke ivaSaeVa paXYaaega ke ilaF rajaBaaVaa ihndI kayaaQnvayana rtana sammaana sae sammaainata

• IITM, Pune was felicitated by "Rajbhasha hindi karyanvyan ratna samman" during "Akhil Bhartiya Vishesh Rajbhasha Hindi Karyashala evam Sangoshthi", 30 May - 1 June 2019 at Thiruvananthapuram, Kerala for its contribution towards promotion of official language Hindi in official work and Science.

• Dr. Swapna Panickal is selected as a Member of Expert Committee, IPCC Scholarship Program.

• Shri Sudeepkumar B.L. and Shri Babu C.A Dr. Hamza Varikoden were awarded for the Best Conference Paper at Climate Change Impacts, Vulnerabilities, and Adaption: Emphasis on India and Neighbourhood (CCIVA 2019), IIT Kharagpur, 26 February - 2 March 2019.

• Ms. Seetha C.J. and Dr. Hamza Varikoden were awarded for the Best Poster at the "Annual Monsoon Workshop-2019" (AMW-2018) organised by IMSP at IITM Pune during 28-30 March 2019.

• Mr. Satya Prakash received Second Prize for the poster presentation entitled "Simulation of forest dynamics pattern using forest fragmentation models in Konkan region of Maharashtra" (by Satya Prakash, Somnath Mahapatra and Bikash Ranjan Parida) in the Annual Monsoon Workshop (AMW-2018) and Prof. D.R. Sikka Memorial National Symposium, organized by IMSP at IITM Pune during 28-30 March 2019.

• Dr. R. Krishnan is selected as a member of Scientific Advisory Committee of National Atmospheric Research Laboratory (SAC-NARL).

• Dr. G. Pandithurai was invited as an external member for PhD admission interview at Defence Institute of Advanced Technology (DIAT), Pune on 24 May 2019.

• Dr. Anant Parekh acted as a resource person and training in charge and delivered lectures for International Earth Science Olympiad Training Camp funded by the Ministry of Earth Sciences at Anna University, Chennai during 22-24 May 2019.

• Mrs. Shikha Singh was awarded Fulbright Kalam Climate fellowship and was invited to attend the Fulbright Pre-departure orientation at Kolkata during 10-12 June 2019.

Visitors

• 3 Architects, (1 from Amruta Daulatabadkar Architects, Aurangabad and 2 from space studio architects, Nasik) visited IITM on 5 April 2019.

• 9 M.Tech students and 4 faculty members from Dept. of Electronics and Communications Engineering Tech., Institute of Science and Technology, Kerala visited HACPL and radar faculty on 6 April 2019.

• 36 B.E. Civil Engineering students and 2 faculty members from AISSMS College of Engineering, Kennedy Road, Near RTO, Pune & ii) 72 Final year B. E. Civil Engineering students and 3 faculty members from D.Y. Patil Institute of Engineering & Technology, Ambi, Talegaon, Pune visited IITM on 8 April 2019.

• Mr. Ken Okaijima and Mr. Kenrao Takeuchi, Japan Radio Corporation visited radar & satellite meteorology Project team for discussion on technical specifications of solid state X-band radars on 9 April 2019.

• 42 M.B.A. (Business Analytics) students and 3 faculty members from School of Business, University of Petroleum and Energy studies, Dehradun, visited IITM and Institute's Laboratories on 9 April 2019.

• 48 Third year B. Tech (Computer Science) students and 1 faculty member from Mahindra Ecole Centrale College of Engineering, Bahadurpally, Jeedimetla, Hyderabad, Telangana visited IITM and Institute's Laboratories & HPC on 16 April 2019.

- Dr. S. Ghosh, Senior Professor, VIT Tamil Nadu visited IITM during 29 April - 3 May 2019 to have discussion with CAIPEEX team.
- 18 Indian Naval Sailors and 1 Indian Coast Guard navik undergoing PO 'Q' Met Course along with 1 instructor from School of Naval Oceanography and Meteorology (SNOM), Kochi visited IITM and Institute's Laboratories on 9 May 2019.
- 40 Trainee Forest Range Officers (undergoing induction training) along with 2 faculty members from Telangana State Forest Academy, Dulapally, Hyderabad visited IITM and Institute's Laboratories on 18 June 2019.
- Ms. Riddhi Samtani, Northeastern University, USA visited IITM and delivered a talk to SAFAR group on the topic - "The impact of colonialism on the system of resilience in small island developing nations" on 24 June 2019.
- Training Program for employees at IITM: IDL (Interactive Data Language) & MATLAB software training program was held at IITM, Pune on 10-11 April 2019.
- Anti-Terrorism Day: IITM observed "Anti-Terrorism Day" on 21 May 2019. The Director administered a pledge to IITM employees in this regard. (Picture)
- Intel Parallel Studio and Pratyush User Training were organized by HPC at IITM during 29-31 May 2019. About 30 people participated in the training.



Editorial Team

Chief Editor: Prof. Ravi S. Nanjundiah, *Director, IITM*
 Co-Editors : Dr. Parthasarathi Mukhopadhyay, *Sc. E, IITM*
 Dr. Shivsai A. Dixit, *Sc. E, IITM*
 Mrs. Shompa Das, *Sc. E, IITM*
 Concept & Design: Mr. Vijay H. Sasane, *Sci. Off.-II, IITM*



- 4 T.Y.B. Arch. Students from Dr. Bhanuben Nanavati College of Architecture for Women, Pune visited CCCR, IITM on 28 June 2019.

Other Activities

- Election Duty: As per Election Commission's guidelines, IITM employees took pledge for right to vote during Lok Sabha General Election 2019 on 9 April 2019.
- IITM Employees (including Scientists) performed the duty of the "Presiding Officer", "Polling Officer" and "Micro Observer" for Lok Sabha General Election 2019 during 22-23 April 2019 And also performed the election duty for Counting of votes for Lok Sabha General Election 2019 on the Result Declaration day at Balewadi, Pune on 23 May 2019.



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