

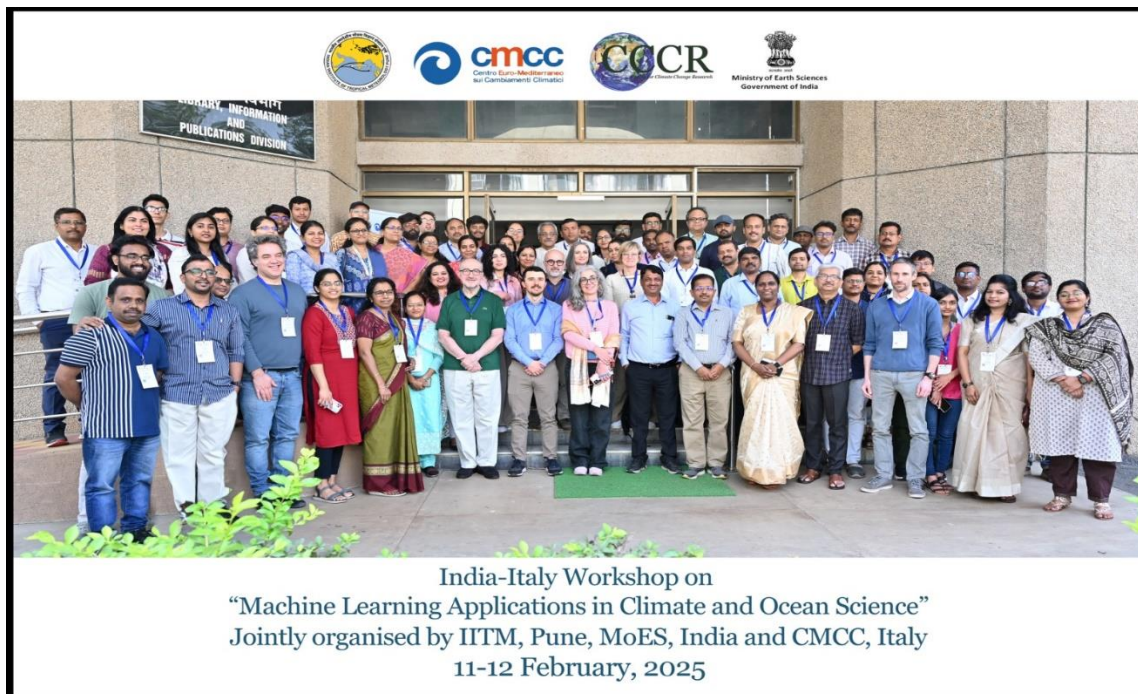
## Indian Institute of Tropical Meteorology (IITM) Pune

(An autonomous Research Institute under the Ministry of Earth Sciences, New Delhi)

### PRESS RELEASE (12.2.2025)

#### India- Italy cooperation on Machine Learning in climate, weather, and ocean

*Leading scientists from India and Italy are meeting in Pune to advance climate modeling and research using AI, improve predictive capabilities, and develop innovative solutions for climate resilience. This workshop jointly organized by the Indian Institute of Tropical Meteorology, Ministry of Earth Sciences, Govt. of India and the Euro-Mediterranean Center on Climate Change (CMCC) aims to strengthen collaborations among research institutions and global leaders in climate research and machine learning applications.*





**Pune, India**—The international workshop on *Machine Learning in Climate, Weather, and Ocean* has brought together leading scientists from both nations to strengthen collaborations in applying machine learning (ML) to climate science, meteorology, and oceanography. Organized by the Euro-Mediterranean Center on Climate Change (CMCC) and the Indian Institute of Tropical Meteorology (IITM), the event also involves scientists from Fondazione Bruno Kessler (FBK) and the Italian National Center for Research (CNR). It serves as a milestone in fostering interdisciplinary research between Italy and India to enhance predictive capabilities and develop innovative approaches to weather and climate.

The Indian team, including Director R. Krishnan along with scientists from the Indian Institute of Tropical Meteorology, Pune Drs. Swapna, Sabin, Ayantika Dey, Rajib, Thara, Pawar, Deepesh Kumar Jain, Bipin Kumar, Sandeep, Umakanth, Vinu Valsala and MoES institutions [**INCOIS** (Drs. Balakrishnan Nair, Arya Paul), **NCCR** (Drs. S.K. Dash, U.S. Panda); **NCMRWF** (Dr. Amar Jyoti), IMD, NCPOR, CMLRE,...], **IISc, Bengaluru** (Dr. Deepak Subramani), **IIT Delhi** (Drs. Sandeep, Hariprasad Kodamana) and **IIT Bombay** (Dr. Sridhar Balasubramanian), **IISER Pune** (Dr. Bedartha Goswami), **NVIDIA** (Dr. Manish Modani), **Pune University SPPU** (Dr. Aditi Deshpande) and several other scientists, early career researchers and PhD students from India, actively participated in the workshop.

CMCC scientists, including Director Antonio Navarra, along with Paola Mercogliano, head of the Italian delegation, Italo Epicoco, Paola Nassisi, Ronan McAdam, Giovanni Coppini, Ilenia Manco are actively contributing to the discussions, focusing on key areas where ML can revolutionize climate and ocean modeling, extreme weather forecasting and impact assessment.

## **Advancing climate science through AI**

Both Italy and India have established themselves as global leaders in climate research and ML applications. CMCC's expertise in earth system modeling, ocean forecasting, and climate projections, coupled with Indian researchers' advancements in monsoon prediction, ocean circulation studies, and AI-driven environmental analysis, creates a unique synergy for scientific innovation.

The workshop aims to facilitate knowledge sharing and networking among experts in ML, climate science, and oceanography. It will also identify key areas where ML can significantly improve climate models, weather prediction systems, and ocean monitoring tools; initiate collaborative research projects and foster institutional partnerships between Italy and India; and address challenges related to data sharing, model interpretability, and ethical considerations in AI-driven climate research.

## **Key areas for innovating climate modeling and research**

The workshop is structured around several pivotal themes, focusing on the integration of machine learning in climate science, weather forecasting, and ocean monitoring. One key discussion area is **climate modeling and prediction**, where ML is being used to enhance long-term climate projections and impact assessments. Another critical theme addresses **weather and monsoon forecasting and extreme events**, exploring AI-driven approaches for early warning systems and the prediction of severe weather conditions. The workshop also delves into **ocean forecasting and monitoring**, leveraging ML techniques to improve ocean state estimation, support marine ecosystem monitoring, and advance conservation efforts.

## **Strengthening international cooperation**

The workshop will pave the way for future Italy-India collaborations, such as the establishment of joint working groups, the development of a framework for data and knowledge sharing, and the drafting of a white paper outlining the role of ML in climate science. Additionally, exchange programs for students and researchers, as well as joint funding proposals, are also part of the discussion.

I am happy to note that the deliberations during the workshop, which included keynote speeches, technical sessions, and interactive discussions, were very productive and ensured a dynamic exchange of ideas to drive future climate science innovations. Plans for follow-up activities especially on AI-ML applications in weather, climate and ocean sciences, include virtual collaborations, joint research projects, and future annual workshops alternating between India and Italy. I am looking forward to a productive research partnership with our Italian colleagues in the coming years. **[ Quote by Dr. R. Krishnan, Director, IITM ]**

" Prediction and projection of monsoon precipitation at different temporal and spatial, particularly extremes have increased in the recent years and the Indian population has become highly vulnerable to intense events. Along with traditional dynamical model, in the recent years AI/ML



approach has emerged as crucial tools to address weather and climate challenges using the data that is already available and at a much less computational cost. This workshop was a step towards exploring AI/ML techniques that can improve and enhance prediction of weather and climate over the Indian subcontinent" **[Quote by Dr. Swapna Panickal, Deputy Project Director - Climate Modeling, Centre for Climate Change Research(CCCR)-IITM]**

["I look forward to build a robust partnership with our Indian colleagues. By pooling our expertise in weather, climate, and ocean science, we can collectively address the pressing global challenges we face today. While this phase of rapid scientific evolution presents both challenges and opportunities, it also presents the chance to expand our knowledge base and develop novel applications. ] **[Quote by Prof. Antonio Navarra, Director of CMCC]**

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