Quarterly Newsletter

IMD NEWS

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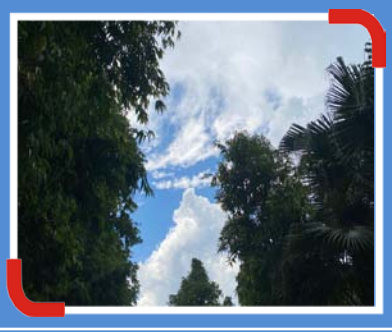

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IMPORTANT EVENTS

14th Asia-Oceania Meteorological Satellite Users' Conference during 04-06 December

The 14th Asia-Oceania Meteorological Satellite Users' Conference (AOMSUC-14) was held during 4-6 December, 2024 at New Delhi, India and was inaugurated by **Hon'ble Minister of Earth Science in the presence Secretary, MoES and DGM, IMD Director, Space application Centre, ISRO was the Guest of Honour in the inaugural function**. The conference aimed to: (*i*) Promote the importance of satellite observations (*ii*) Advance satellite remote sensing science (*iii*) Provide a platform for dialogue and collaboration between satellite operators and users (*iv*) Inform the community about the current status and future plans of international space programs (*v*) Encourage the development of new technologies for weather satellite sensing (*vi*) Engage young scientists in the field.

Asia-Oceania Meteorological Satellite Users' Conference

IMD and WMO jointly organized the 1st Regional Training workshop on Multi-Hazard Early Warning System Interoperability Implementation at New Delhi during 9-13 Dec 2024. **Dr. M. Ravichandran**, Secretary, MoES inaugurated the training programme. The forecasters from nine countries participated in this training workshop along with national participants. The objective of training is to train the National Meteorological and Hydrological Services in South Asia on the interoperability and integration of early warning initiatives, programmes, and activities as feasible into a coordinated and sustainable, multi-hazard interoperable environment, to enhance the capacities of NMHSs. The programme aimed at developing a coordinated and sustainable, multi-hazard interoperable environment through (*i*) sharing good practices (*ii*) improve regional collaboration (*iii*) maximizing available resources (*iv*) developing synergized standard operating procedures (*v*) strengthen national institutional coordination and arrangements for MHEWS (vi) sharing of data and products compatible to various systems to contribute to MHEWS interoperability (*vii*) integrate various services into one package (*viii*) minimization of number of warning bulletins and development of consolidated bulletin as per user's requirements. **Dr. M. Mohapatra**, in his address highlighted the role of interoperability, co-operation and collaboration among various agencies.

Regional Training workshop on Multi-Hazard Early Warning System Interoperability

Significant Events

As a part of pre-cyclone exercise, IMD organised Meeting with stakeholders including disaster managers at National Level & State Level under Chairmanship of **Dr. M. Mohapatra**, DGM IMD on 8th October.

IMD organised Meeting with stakeholders

First Meeting of the Department-related Parliamentary Standing Committee meeting on Science & Technology, Environment, Forests & Climate Change regarding functioning and activities of Ministry of Earth Sciences was held in Bhubaneswar on 23 October 2024. **Mr. Vivek Sinha**, Scientist 'G' represented office of Director General of Meteorology, New Delhi.

India Meteorological Department (IMD), Ministry of Earth Sciences (MoES), in collaboration with Ministry of Panchayati Raj (MoPR) has launched **Gram Panchayat-Level Weather Forecast services** on 24th October, 2024 at Vigyan Bhawan, New Delhi. With this initiative, daily gram panchayat-level forecasts will be available for nearly all 2.6 lakh panchayats across India, covering crucial weather parameters such as temperature, rainfall, relative humidity, wind and cloud cover. The forecasts will be disseminated through the Ministry's digital platforms : like Mausamgram of IMD and e-GramSwaraj and Meri Panchayat app of Ministry of Panchayati Raj. This endeavour is a significant stride toward boosting local-level governance and cultivating climate-resilient villages. In view of recent weather pattern, the introduction of weather forecast at the Gram Panchayat level will serve as a crucial tool in safeguarding agricultural livelihoods and enhancing rural preparedness against natural disasters. The event was attended by **Hon'ble Minister of Earth Sciences, Hon'ble Minister of Panchayati Raj, Hon'ble Minister of state, Panchayati Raj, Secretary MoES, Secretary, Ministry of Panchayati Raj and DG, IMD** among others.

Heavy rainfall warning was issued by India Meteorological Department due to Cyclonic storm "DANA" over Bay of Bengal during October 2024. During this period, 4827793 SMSs were sent to farmers in the states of Odisha and West Bengal. Special Agromet Bulletins have also been prepared and uploaded in the website of Agricultural Meteorology Division. Impact based forecast (IBF) for Agriculture (Heavy Rainfall/Thunderstorm with Gusty winds/Cold wave/Ground Frost/Hailstorm) and Agromet Advisories based on the IBF have been issued for different districts of various States and UTs across the country in co-ordination with NWFC, New Delhi, RMCs/MCs, AMFUs and DAMUs during the quarter.

Dr. M. Mohapatra, DG IMD attended the state level meeting as a Guest of Honour along with Hon'ble Chief Minister of Odisha and other dignitaries on the occasion of Odisha Disaster preparedness and National day for Disaster Reduction held on 29thOct 2024 at Ravindra Mandap Bhubaneswar. **Hon'ble Chief Minister Shri Mohan Charan Majhi** appreciated IMD for the very accurate forecast of cyclonic storm DANA well in advance.

Odisha Disaster preparedness and National day for Disaster Reduction

Vigilance Awareness Week 2024 was observed 28.10.2024 to 02.11.2024. Integrity pledge is administered on 28.10.2024 at RMC Office Kolkata, AMO Kolkata, MC Patna, MC Gangtok and other sub offices.

India Meteorological Department as Secretariat of WMO/ESCAPE Panel on Tropical Cyclones organized the 51st Session of the Panel on Tropical Cyclones (online) under the Chairmanship of the PR of Qatar. **Dr. M. Mohapatra**, DG IMD alongwith other senior officers of cyclone warning division participated in the WMO/ESCAP Panel on Tropical Cyclones (PTC) Meeting through VC during 16-20 December, 2024. During the meeting, IMD as RSMC New Delhi and PTC Secretariat presented country report of India, Tropical Cyclone Operation plan (TCP-21 Edition 2024), PTC News Letter, PTC Vision, country report of India, Annual Operation Plan and Coordinated Technical Plan. The WMO and PTC appreciated the contribution of IMD towards various activities of PTC.

Shri R. S. More, Met A proceeded to Maitri station as Team leader and **Shri P. R. Mhetre**, Met-'A' proceeded to Bharati station as Team member for participation in the 44th ISEA.

Human Resource Development Activities

WORKSHOP

Dr. O. P. Sreejith, Scientist-F attended Cold Wave Preparedness Workshop, organized by Sphere India Academy in collaboration with Integrated Centre for Adaptation, Disaster Risk Reduction & Sustainability (ICARS), on 7th October, 2024 and give presentation on "**Role of IMD on Cold wave Preparedness**".

Dr. Ashutosh Kumar Misra, Scientist 'D' delivered an invited talk on '**Agricultural Aspects of SW Monsoon 2024**' at the Annual Monsoon Workshop 2024, organized by the Indian Meteorological Society Pune (IMSP) at Savitribai Phule Pune University on 18th October, 2024.

Dr. Satyaban B. Ratna, Scientist 'E', as a member of the CLIVAR/GEWEX Monsoon Panel, attended the Asian-Australian-African (3A) Monsoons Programme International workshop (Online) held in Chiba on 19th November, 2024.

Dr. H. R. Biswas, Scientist 'F', RWFC Kolkata, attended an online workshop in regional training workshop on Multi Hazard Early Warning interoperability implementation system in New Delhi, India during 09.12.2024 - 13.12.2024 and delivered a lecture on "**Integrated Impact-based forecast and warning services (IBFWS) for heavy rainfall at district level**" on 10.12.2024.

MEETINGS / VIDEO CONFERENCES

Dr. G. N. Raha, Scientist 'E', MC Gangtok, participated in the meeting organized by Sikkim State Disaster Management Authority for observing State Disaster Risk Reduction Day at Chintan Bhawan, Gangtok on 04.10.2024. Hon'ble Chief Minister, Sikkim, Dignitaries from NDMA and Experts on GLOF from Nepal also participated in the meeting.

Dr. M. Mohapatra, DG IMD held a meeting with **Dr. Upendra Baitha**, Additional Professor, Department of Medicine, AIIMS, New Delhi to discuss about the initiatives by IMD for the Health Sector.

Dr. M. Mohapatra, DG IMD participated in the 19th Session of Regional Association VI (Europe) of the World Meteorological Organization (WMO) through zoom during 15th & 16th October.

Dr. M. Mohapatra, DG IMD participated in the 1st Meeting of the Department-related Parliamentary Standing Committee meeting on Science & Technology, Environment, Forests & Climate Change regarding functioning and activities of Ministry of Earth Sciences on 21st October.

Shri Anand Shankar, Scientist 'D', MC Patna participated in the AeroMetSci-2024 Conference held in Geneva, Switzerland, from 21-25 October 2024. He presented a poster titled "**Improving Aeronautical Visibility and Marginal Visibility (Runway Visual Range) Reporting : A Hybrid Deep Learning Approach**" and delivered an oral presentation on "**Optimizing Flight Safety and Economy with Deep Learning-Based Take-off Data Predictions**" and participated in a panel discussion.

Dr. Kripan Ghosh, Scientist 'F', Agrimet Division and **Dr. Asha Latwal**, Scientist 'C' attended online meeting regarding "**Utilization of RISAT-1A in Ministry of Agriculture**" under the chairmanship of Additional Secretary (DA) with officials from SAC, Ahmedabad, NRSC, Bangalore, MNCFC, New Delhi and IMD on 25th November, 2024.

Dr. Kripan Ghosh, Scientist 'F', Agrimet Division, attended "**XXXIII Board of Studies meeting in Agricultural Meteorology discipline**" at Department of Agricultural Meteorology, College of Agriculture, Pune on 27th November, 2024.

Shri Sudarsan Patro, Scientist 'D', was invited as an esteemed speaker for the online Climate Conference : Monsoon Session, organized by Delhi Public School branches in Patna, Pune, Ludhiana and Coimbatore on 25th December, 2024.

Dr. M. Mohanty, Scientist 'F', MC Bhubaneswar, attended review meetings on the preparedness for cyclone '**DANA**' under the chairmanship of the Chief Minister, Odisha on 21.10.2024, 22.10.2024, 23.10.2024 and 24.10.2024.

Dr. M. Mohapatra, DG IMD participated in the Inaugural Session of the 40th Session of the Data Buoy Cooperation Panel (DBCP) Annual Meeting at INCOIS, Hyderabad on 22nd October.

Shri Umasankar Das, Scientist 'D' and **Shri L. K. Giri**, SO-I, M.C Bhubaneswar attended a preparatory meeting due to cyclone 'DANA' at 2nd floor conference room of APD office, on 22.10.2024 and 23.10.2024.

Dr. M. Mohanty, Scientist 'F', attended the state level programme for observance of "**Odisha Disaster Preparedness Day & National Day for Disaster Reduction**", at Rabindra Mandap, Bhubaneswar on 29.10.2024.

Dr. G. K. Das, Scientist 'E', MWO Kolkata, **Shri Sunny Chug**, Sc-D and **Shri D. Bhattacharya**, Met-B attended the meeting on 29.10.2024 at AAI Conference Hall regarding findings & Obs. of DGCA inspection for Kolkata Airport, with High Officials of AAI.

Dr. M. Mohapatra, DGM IMD participated in the discussion with CWC on Integration of IMD Rainfall Data for RSMS Portal Enhancement on 28th November.

Stakeholders' Meet at Kolkata

Dr. Somenath Dutta, Scientist 'G', with other officers and staff of RMC Kolkata attended the one-day Stakeholders' Workshop

commemorating 150 years of IMD on "**Weather Services Rendered by IMD for High-Impact Weather Phenomena in the West Bengal State**", at the B. R. Ambedkar Auditorium, Geological survey of India, Kolkata on 29.11.2024.

Shri Anirban Biswas, Met 'A' attended General Body Meeting of the Central Government Employees Welfare Coordination Committee (CGEWCC), Sikkim on 29.11.2024 for finalization of the list of holidays, AMA etc. for all Central Government Offices in the state of Sikkim for the year 2025.

The Stakeholders Workshop on "**Severe Weather and Meteorological Services in Bihar**" was organized by MC Patna to commemorate its 150th anniversary, held on 18.12.2024 at Hotel Patliputra Continental, Patna. **Chief Guest Shri Samrat Choudhary, Hon'ble Deputy Chief Minister, Government of Bihar, Guest of Honour Smt. Sahila, IAS, Joint Secretary (Disaster Management), Government of Bihar, Dr. M. Mohapatra**, DGM, IMD along with 200 participants were also present in the event.

Stakeholders' Meet at Patna

Shri Sunny Chug, Scientist 'D' and **Abhishek Mandal**, S.A., MWO Kolkata, attended the Safety Assessment Meeting for "Parallel ATC operations of all units of ADC from New ATS Tower was conducted Conference Hall, ATS Complex, NSCBI Airport, Kolkata between IMD and AAI Officials, on 18.12.2024.

Dr. M. Mohapatra, DG IMD attended Stakeholders Meeting at M. C. Bhubaneswar on 23rd December, 2024.

Stakeholders meeting at Bhubaneswar

Dr. Rizwan Ahmed, Scientist 'D' also participated in the 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). He presented a paper titled "**A Tele connection between TCs and Fog : A Case Study over the IGB, India**".

TRAININGS

During the quarter 6 Farmers awareness programmes (FAPs) were organized across the country.

FAP conducted by AMFU, Roorkee at Gadhaurona Village, Narsan Block, Haridwar District, Uttarakhand on 30th November 2024

FAP conducted by DAMU, Jalore at Keshwana Village, Jalore Block, Jalore District, Rajasthan on 20th December, 2024

FAP conducted by AMFU, Targhadi at Jasdan Taluka, Rajkot District, Gujarat on 9th July, 2024

A Customized Basic Observation and Weather Forecasting training course was conducted from 2nd to 30th December, 2024 with 13 participants from NHMS Bhutan.

Weather Forecasting training

Training on **Airport Meteorological Instruments, Surface Ozone Instrument and High Wind Speed recorder** was imparted to Met officials from Bhutan.

Training on Airport Meteorological Instruments

Dr. Kuldeep Srivastava, Scientist 'F', **Dr. Sankar Nath**, Scientist 'F' and **Ms. Suman Gurjar**, Scientist 'D' have participated as resource person for 1st **Training on Multi-hazard Early Warning System Interoperability Implementation for forecasters in South Asia** during 09-13 December, 2024 at New Delhi.

LECTURES/ TALK/ WEBINAR

Shri Sudarsan Patro, Scientist 'D', was invited on 8th November, 2024 as an expert lecturer for third-year E&TC Engineering students at Cusrow Wadia Institute of Technology, one of the pioneer diploma institutes in Maharashtra State.

Shri Sunny Chug, Scientist 'D', MWO Kolkata delivered a invited talk to the 43rd Indian Expedition to Antarctica team members about the "**Safety Measures – Do's and Don't**" and "**Scientific activities in Antarctica**" on 12.11.2024.

Shri Abhishek Anand, Scientist 'C', MC Ranchi, delivered Speech at One day International Conclave on Atmospheric Sciences at BIT Mesra, on 20.11.2024.

Dr. O. P. Sreejith, Scientist 'F' attended the one day brainstorming session on Soil Moisture Measurements to Modeling and Scaling (SoM2Ms) on 26th November, 2024.

Dr. O. P. Sreejith, Scientist 'F', **Dr. V. K. Soni**, Scientist 'F', **Dr. C. T. Sabeerali**, Scientist 'C' and **Dr. Anikendra Kumar**, Scientist 'C' attended the second session of the Third Pole Climate Forum (TPCF-2), which was held online on November 28th and 29th 2024.

Dr. H. R. Biswas, Scientist 'F', RWFC Kolkata, delivered a Keynote Lecture at the 2nd International Seminar on Innovative Approaches in Geographical Research (IAGR) on 30.11.2024 at Rampurhat College, Birbhum, West Bengal and presented on "**Extreme weather events and sustained development**".

A meeting between CRS, Pune, MSLDC (Maharashtra State Load Dispatch Centre) and **Dr. Radhika** from Somaiya University was held on 20.12.2024 to discuss an action plan and data requirements for Demand and Renewable energy forecasting at the NDC conference hall, Pune. The meeting concluded with a commitment to work together towards developing a reliable and efficient demand and renewable energy forecasting model. **Dr. Satyaban Bishoyi Ratna**, Scientist 'E', **Dr. Soumi Chakravorty**, Scientist 'D', **Dr. Ananya Karmakar**, Scientist 'C', **Ms. Neha Rani**, S.A., **Ms. Tanu Sharma**, S.R.F. and **Dr. Ravi Ranjan Kumar**, Project Scientist II participated in the meeting.

Dr. Kripan Ghosh, Agrimet Division, acted as a convener to organise "**The Anna Mani Memorial Lecture**" to commemorate 150 years of IMD's dedicated service to the nation at Meghdoot Hall, IITM, Pune on 31st December, 2024.

Scientists of the division delivered lectures on following topics during the Customized Intermediate to Advance training on "**Basic Observation and Weather forecasting**" for the officials of National Centre for Hydrology and Meteorology (NCHM), Bhutan, organized by MTI, CR&S, Pune:

Dr. Rizwan Ahmed, Scientist 'D', delivered a lecture to Air Force officers on December 19, 2024, at the IAF Sonegaon Conference Hall, Nagpur. The session was titled "**Interpretation of Winter Weather Systems Using Satellite Data Over the Indian Region**".

MEMORANDUM OF UNDERSTANDING

A Memorandum of Understanding (MoU) has been signed between India Meteorological Department (IMD) and ITC, Limited, Agribusiness Div., Guntur on 16th October, 2024. **Dr. M. Mohapatra**, DG, IMD and **Shri Rahul Gouraha** (Vice President-ITCMAARS, Agribusiness Division), signed the MoU on behalf of the two organizations in the presence of senior officials from both the organizations. The MoU aims to collaborate on disseminating weather and climate information, as well as agromet advisories, to 2 million farmers registered with ITCMAARS' digital platform.

IMD signed a Memorandum of Understanding with ITC Ltd. For dissemination of agro Meteorological advisory services bulletin to farmers.

A memorandum of understanding was signed between IMD and Ministry of Rural Development on 28th October for dissemination of **weather forecast to Krishi Sakhi and Pashu Sakhi** under National Rural Livelihood Mission. The event was attended by **Secretary MoES, Secretary, MoRD and DG IMD** among others.

Memorandum of Understanding between IMD and Synoptic Data Public Benefit Corporation (PBC) was signed on 6 November, 2024 virtually agreement aims to improve the accuracy, visualization and dissemination of weather information, **Dr. M. Mohapatra**, DG IMD and **Mr. Ashish Raval**, President and **CEO of Synoptic data PCB** Signed the MoU.

Dr. M. Mohapatra, DG IMD participated in the signing in ceremony of Memorandum of Understanding (MoU) between Department of Physics, Tripura University and IMD at Meghdoot Hall, MoES on 24thDecember, 2024 in presence of Secretary MoES.

MoU between Department of Physics, Tripura University and IMD

ACHIEVEMENTS /APPRECIATIONS /AWARDS RECEIVED

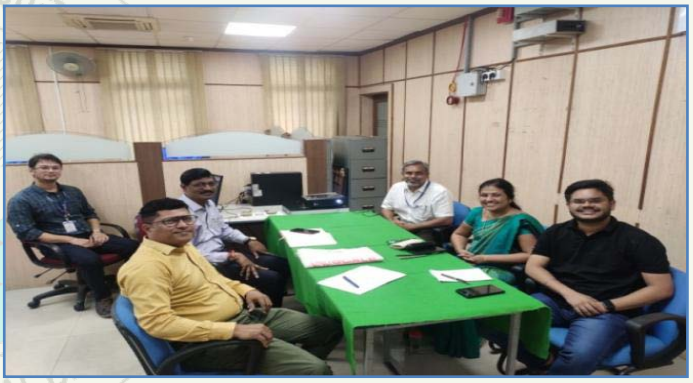
Patent Granted to **Dr. Shirish Yograj Khedikar**. "**An improved portable electronic device**", Patent No. 507054, application No. 201621026922 dated 2nd September, 2016, Patent Granting date : 5th February, 2024.

Dr. S. Mahato, PS-III, attended and presented cyclone track work using Satarkabarta at the 14th Asia-Oceania Meteorological Satellite Users Conference (AOMSUC-I4) to be held at New Delhi from 4th to 6th December, 2024 and received 3rd poster presentation award.

Infrastructure Development & Installations

NEW PROJECTS/SCHEMES INITIATED

Development of Climate Information Management System (CLIMS) for Data collection, Data monitoring, Data quality Control, Metadata Management, Database Management, Data Archival / Retrieval, Data generation (Basic data, derived products generation), Data Visualization, Bulletin & report generation through one platform. The process of surface data scrutiny, verification and submission of data by all RMCs and MCs is now done on a single platform - CLIMS. This facilitates online updating of historical database.



Development of Climate Information Management System

R&D activity on drone-based sensor payloads

Surface Instrument Division, O/o CRS Pune has taken up R&D activity on drone-based sensor payloads as a part of the Thunder Storm Test Bed (TTB). A feasibility study of drone-based observations was proposed and directions were taken from the Drone committee. In this connection, SID is developing sensor payloads for drones. To test the developed sensors on a balloon (normally used with Radio Sonde) for a limited height in a controlled manner, a test trial was conducted on 25/11/2024 at CAgMO observatory, Pune before the drone experiment. The outcome of this experiment will help further refine the system to attach to a drone.

VISITORS

On October 14, 2024, the INSAT AWS & Central Radiation Laboratory, Pashan, conducted a science outreach program, including practical demonstrations of the Automatic Weather Station and sensors, calibration techniques, and radiation instruments. The program was attended by 50 third-year Computer Science Engineering students and 5 professors from Pimpri Chinchwad College of Engineering, Pune.

INSAT AWS & CRL, Pashanconducted a science outreach program

The Director of National Centre for Hydrology and Meteorology, Royal Govt. of Bhutan visited RMC Kolkata office and Alipore Observatory on 16.11.2024.

The INSAT AWS & Central Radiation Laboratory, Pashan on 18th November, 2024, conducted science outreach program and practical demonstration of Automatic Weather station and Sensors, Calibration, Radiation Instruments, for 12 Bhutan Meteorological Trainees.

Royal Govt. of Bhutan visited RMC Kolkata office and Alipore Observatory

Prof. Berrien Morre, Prof. Pierre Kirsrteller and **Prof. T. Venkatesan** of University of Oklahoma, US visited IMD and had an interaction with DGM & senior officials of IMD on 19th November.

The INSAT AWS & Central Radiation Laboratory, Pashan on 22nd November, 2024, conducted science outreach program and practical demonstration of instruments, for 15 Naval Officers, School of Naval Oceanology and Meteorology, Kochi.

INSAT AWS & CRL, Pashanonducted science outreach program

On 16 November, 2024, science outreach activities were conducted at the INSAT AWS & Central Radiation Laboratory, Pashan, with 50 students and faculty members from the Civil Engineering Department of Dr. D. Y. Patil Institute of Engineering, Management and Research, Akurdi.

Science outreach activities were conducted at the INSAT AWS & Central Radiation Laboratory, Pashan

Around Nine Hundred (900) students of VI to X, accompanied with 18 Teachers of Kendriya Vidyalya, Ajni, Nagpur visited RMC Nagpur during 11 -13 December and 16 – 18 December, 2024.

RESEARCH & PUBLICATIONS

Anjita, N.A.; Indu, J.; Thiruvengadam, P.; Dixit, Vishal; Rastogi, Arpita and Kannan, B.S.A.M, 2024, "**Doppler weather radars as a game changer in desert locust swarm tracking**", *SCIENTIFIC REPORTS,* **14**, 1. DOI : 10.1038/s41598-024-81553-1.

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Phadke, D. P.; Chaurasia, A. N.; Goroshi, S.; Ram, M.; Singh, C. P.; Bhattacharya, B. K. and Krishnayya, N. S. R., 2024, "**Comparing two sensor data to perceive landscape phenology dynamics at Gir Wildlife Sanctuary, Gujarat, India**", *Current Science*, **127**, 11, 1357-1362. DOI :10.18520/cs/v127/i11/1357-1362.

Rakshit, G.; Mitra, A. K. and Krishnan, K. C. S., 2024, "**Multitechnique investigation of the prevailing atmospheric parameters for the Odisha lightning catastrophe on 2 September 2023: A case study**", *Journal of Earth System Science*, **134**, 1. DOI :10.1007/s12040-024-02465-2.

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Weather Summary

(A) Operational Long-Range Forecasts issued during October to December 2024

During October to December 2024, following operational Long-Range Forecasts were issued as shown in Table 1.

TABLE 1

Operational Long-Range Forecasts issued during Oct-Dec, 2024

S. No.	Forecast for	Region for which forecast issued	*Date of Issue*	Method/ Model
1	Long Range Forecast for Rainfall and Temperature for November 2024	Country as a Whole	1st November, 2024	MME
2	Outlook for the Temperatures during Winter Season (Dec.2024- Feb.2025) and Forecast for the Rainfall and Temperatures during December 2024	South Peninsular India & Country as a Whole	2nd December, 2024	MME

- **The highlights of various LRF's are as given below:**
- **Long Range Forecast for Rainfall and Temperature for November 2024: -**

- **Rainfall :** Monthly rainfall for November 2024 over South Peninsular India consisting of five meteorological

subdivisions [Tamil Nadu, Puducherry & Karaikkal, Coastal Andhra Pradesh & Yanam, Rayalaseema, Kerala & Mahe and South Interior Karnataka) is most likely to be above normal (>123% of Long Period Average (LPA)]. The LPA of rainfall over South Peninsular India during November based on data from 1971-2020 is about 118.7 mm.

Monthly rainfall over the country as a whole during November 2024 is also most likely to be normal (77-123 % of LPA). The LPA of rainfall over the country during the month of November, based on data from 1971 to 2020, is about 29.7 mm. The spatial distribution of probabilistic forecasts for the rainfall in tercile categories (above normal, normal, and below normal) over the country during November 2024 is shown in Fig. 1. The above-normal to normal rainfall is likely over most parts of the country except northwest India and some areas of central India where below normal rainfall is likely during November 2024.

- **Temperature:** Above normal maximum temperatures are likely over northeast & east central India and some parts of northwest and Peninsular India. Normal to below normal maximum temperatures are likely over west central India and adjoining areas of northwest India and north peninsular India. Above-normal minimum temperatures are likely over most parts of the country except some areas of northwest India, where normal to below-normal minimum temperatures are likely.

Fig. 2a and Fig. 2b show forecast probabilities of the maximum and minimum temperatures respectively for November 2024.

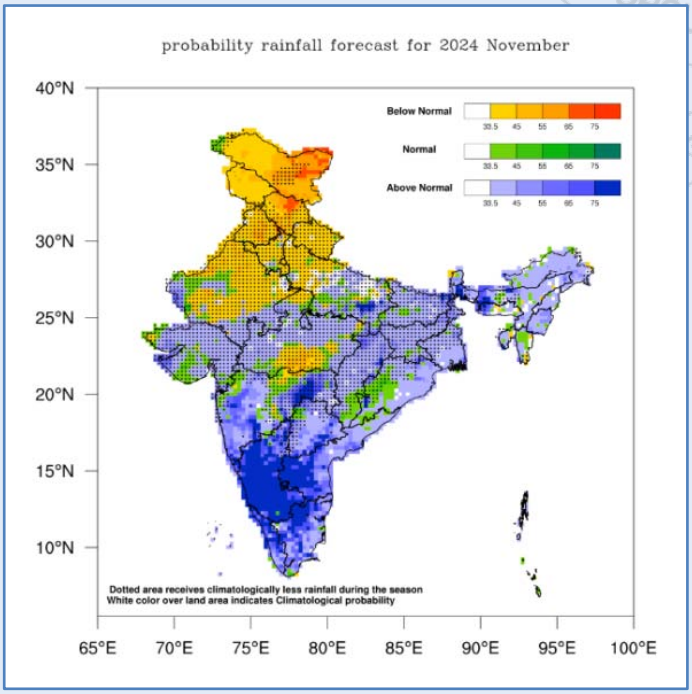


Fig. 1. Probability forecast of tercile categories* (below normal, normal and above normal) for the rainfall over India during November 2024

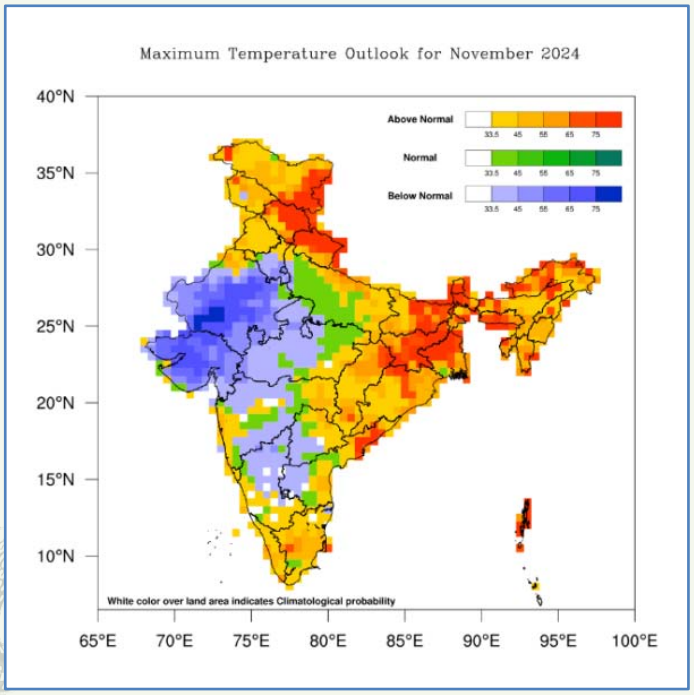


Fig. 2a. Probability forecast of tercile categories* (below normal, normal and above normal) for the Minimum Temperature over India during November 2024

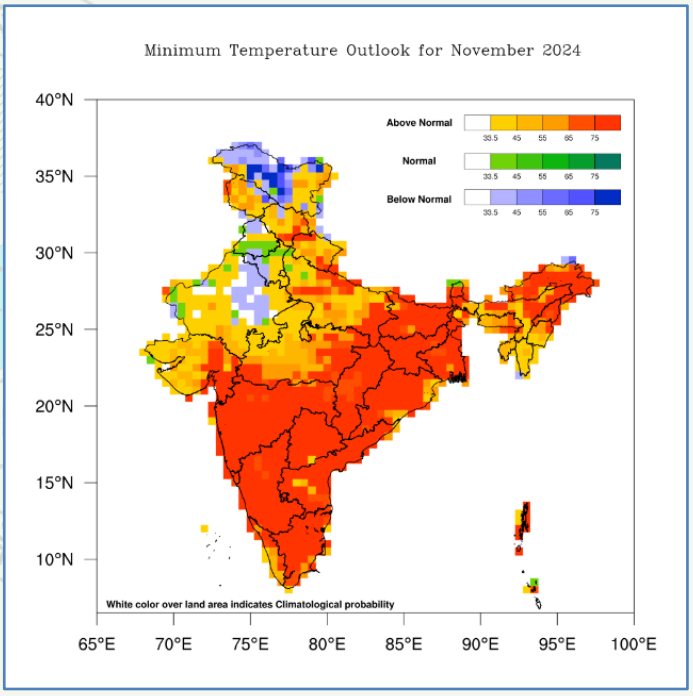


Fig. 2b. Probability forecast of tercile categories* (below normal, normal and above normal) for the Maximum Temperature over India during November 2024

- **Outlook for the Temperatures during Winter Season (Dec 2024 - Feb 2025) and Forecast for the Rainfall and Temperatures during December 2024: -**

- **Rainfall**

Monthly rainfall for December 2024 over the South Peninsular India consisting of five meteorological subdivisions [Tamil Nadu, Puducherry & Karaikkal, Coastal Andhra Pradesh & Yanam, Rayalaseema, Kerala & Mahe and South Interior

Karnataka) is most likely to be above-normal (>131% of Long Period Average (LPA)]. Monthly rainfall over the country as a whole during December 2024 is most likely to be above normal (>121 % of LPA). The LPA of rainfall over South Peninsular India during December, based on data from 1971 to 2020, is about 43.0 mm.

Monthly rainfall over the country as a whole during December 2024 is most likely to be above normal [>121 % of the long-period average (LPA)]. The LPA of rainfall over the country as a whole during the month of December, based on data from 1971 to 2020, is about 15.9 mm. The probabilistic forecast of tercile rainfall categories (above normal, normal, and below normal) over the country for the month of December 2024 is shown in Fig. 3. The forecast suggests that above-normal rainfall is most likely over most parts of peninsular India, west-central India, and some parts of east-central India and northeast India. The normal to below normal rainfall is likely over most parts of north and northwest India, as well as many areas of east and northeast India.

- **Temperature:**

During December 2024, monthly minimum temperatures are most likely to be above normal over most parts of the country. Monthly maximum temperatures for December 2024 are likely to be above normal over most parts of the country except some areas of central India where normal maximum temperatures are likely. Fig. 4a and Fig. 4b show the probability forecast during December 2024 for the minimum and maximum temperatures, respectively.

During the upcoming winter season (December 2024 to February 2025), above-normal maximum temperatures are likely over most parts of the country except most areas over south Peninsular India, where normal to below-normal maximum temperatures are likely. Above-normal minimum temperatures are likely over most parts of the country during the DJF season. Fig. 5a and Fig. 5b show the probability forecast during December 2024 to February 2025 (DJF) season for the maximum and minimum temperatures, respectively.

Coldwave:

The forecast for the number of coldwave days compared to the normal number of coldwave days in the country for December 2024 is presented in Fig. 6. The occurrence of cold waves over the northwest, central, east, and northeast parts of the country during December 2024 is likely to be below normal.

The forecast for the number of coldwave days compared to the normal number of coldwave days in the country for the December 2024 to February 2025 season is presented in Figure 7. The occurrence of cold waves over the northwest, central, east, and northeast parts of the country during the upcoming winter season (December 2024 to February 2025) is likely to be below normal.

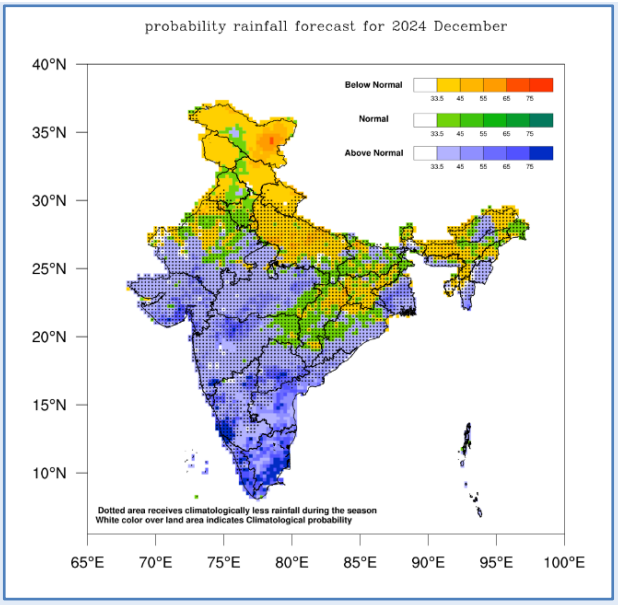


Fig. 3. Probability forecast of tercile categories* (below normal, normal and above normal) for the rainfall over India during December 2024

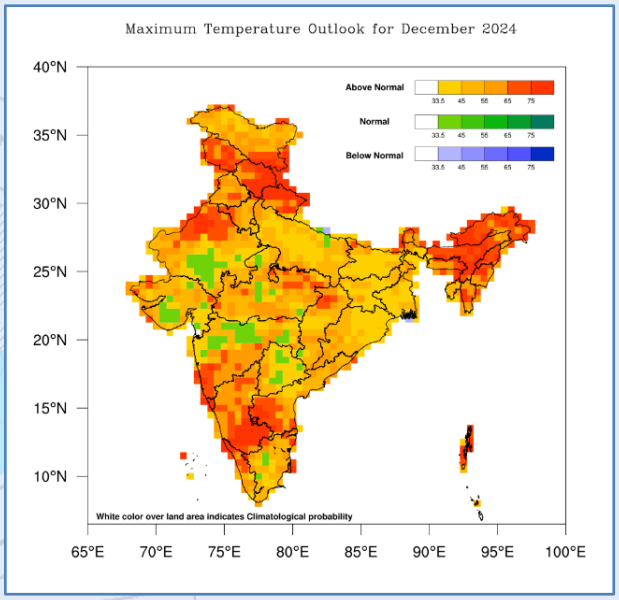


Fig. 4a. Probability forecast of Maximum Temperature for December 2024

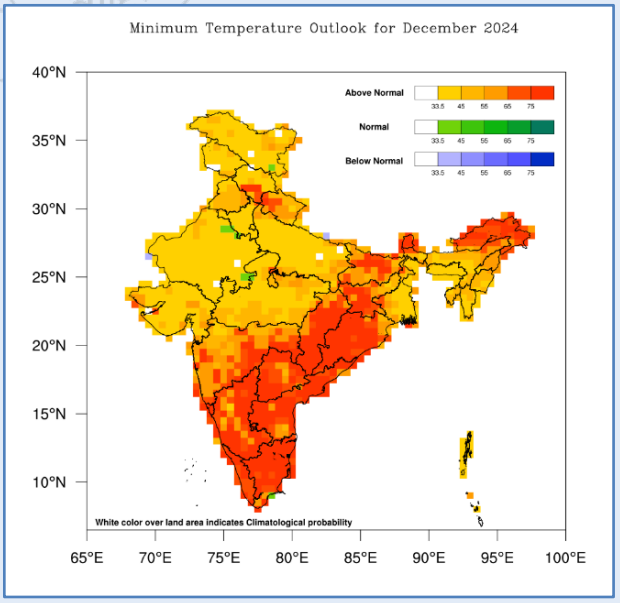


Fig. 4b. Probability forecast of Maximum Temperature for December 2024

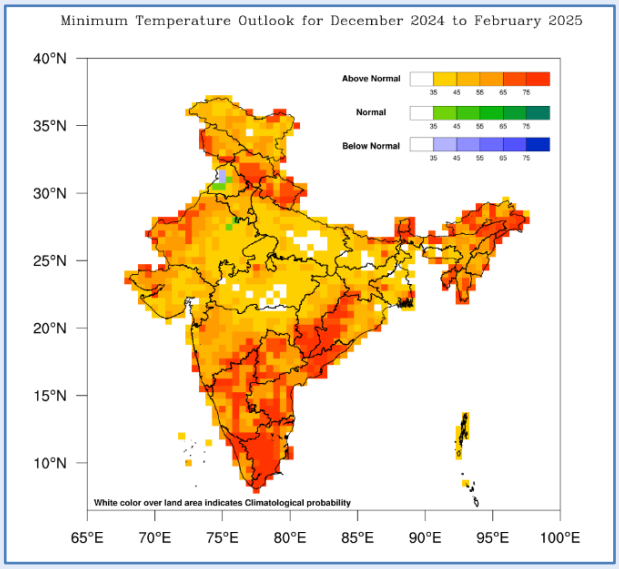


Fig. 5a. Probability forecast of Maximum Temperature for December 2024 to February 2025

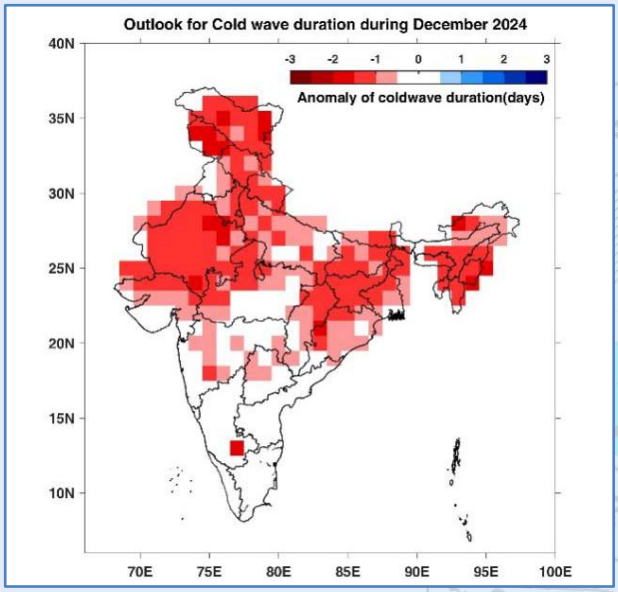


Fig. 5b. Probability forecast of Maximum Temperature for December 2024 to February 2025

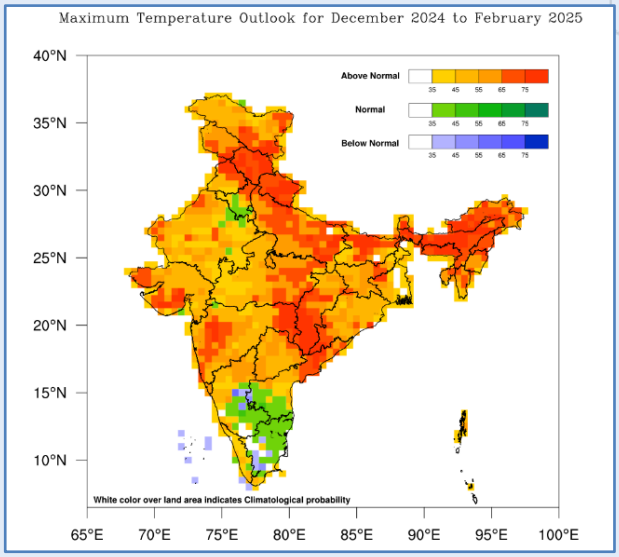


Fig. 6. The forecast for the number of coldwave days compared to the normal number of coldwave days in the country for December 2024

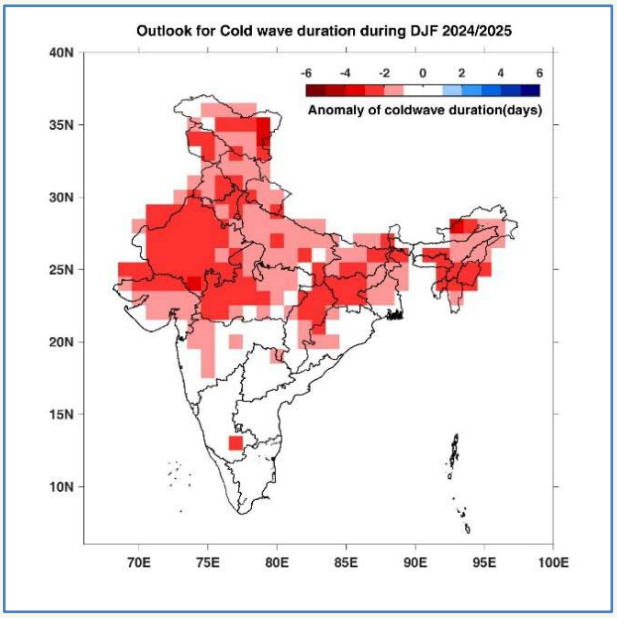


Fig. 7. The forecast for the number of coldwave days compared to the normal number of coldwave days in the country for December 2024 to February 2025

(B) Regional Climate Centre (RCC) Activities during October to December 2024

The CRS office of IMD, Pune is recognized as the World Meteorological Organization (WMO) Regional Climate Centre (RCC) for South Asia. Preparing monthly and seasonal ENSO & IOD bulletins with monthly update are carried out under RCC, Pune. Fig. 8 shows ENSO & IOD forecast for next 7 seasons.

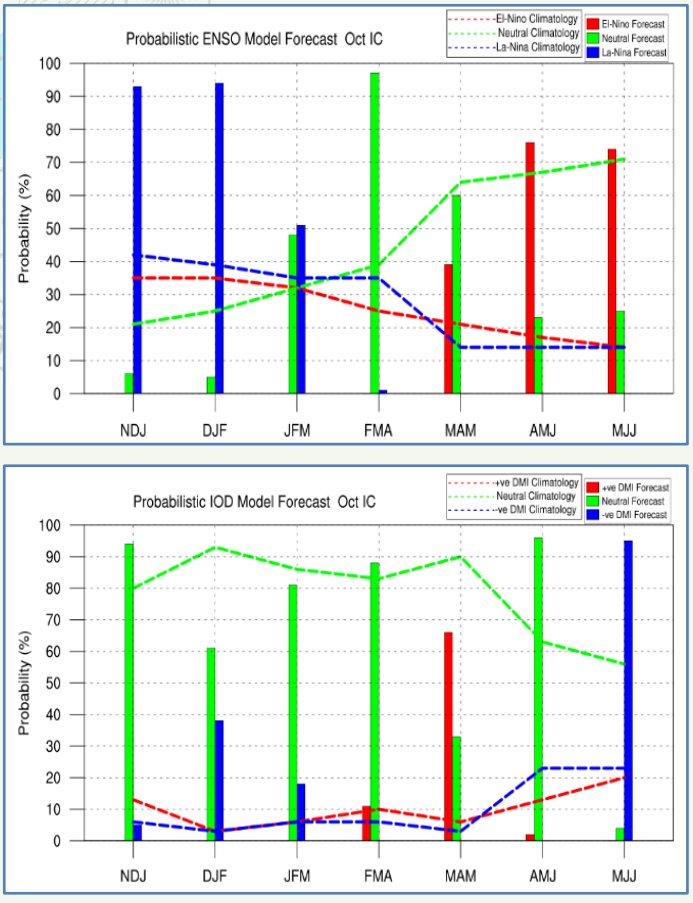


Fig. 8. Probabilistic forecast for ESNO (right) and IOD (left) prepared using MMCFS Oct IC

(C) Regional Climate Centre (RCC) Activities during October to December 2024

The CRS office of IMD, Pune is also recognized as the WMO Regional Climate Centre (RCC) for south Asia. Presently the MMCFS is used for the RCC long range forecasting activities.

(a) Generate global monthly and seasonal (anomaly and probability) forecasts for the temperature and rainfall. This is updated every month.

(b) Prepare Seasonal Climate Outlook for rainfall and temperatures over south Asia for the next 2 moving 3-month seasons (total 4 months) with monthly update.

For this quarter two Seasonal Climate Outlook for rainfall and temperatures over South Asia were prepared. The details are as follows:

(i) Summary of Seasonal climate outlook for South Asia using October IC (November - January 2025)

- The probability forecast for precipitation for November - January (NDJ) season indicates that enhanced probability of above normal precipitation is likely in extreme south peninsular India, northeast and southeast of South Asia and moderate to extreme probability of below normal precipitation is likely over northwest, north along the plains of Himalayas, west and central parts of South Asia. The same for December - February (DJF) season indicates that moderate probability of above normal precipitation is likely in most parts of central, south peninsular, northeast and south east of South Asia and moderate probability of below normal precipitation in northwest, west and north along the plains of Himalayas (Fig. 9).
- Temperature probability forecast for NDJ and DJF seasons indicate that enhanced probability of above normal temperatures is likely over most parts of South Asia (Fig. 10).

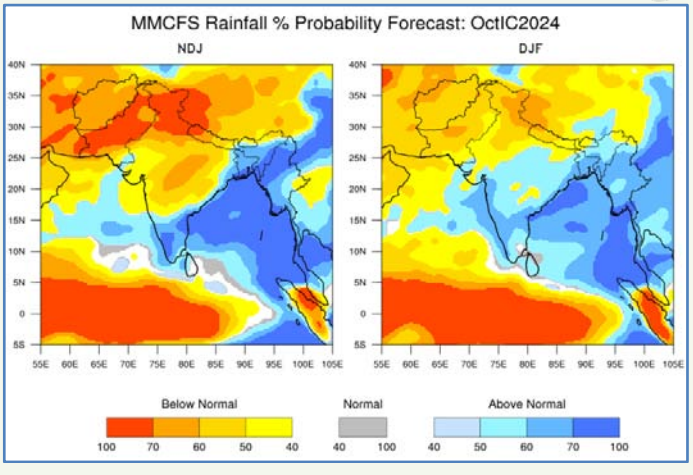


Fig. 9. Seasonal probability (%) forecasts of precipitation for (a) NDJ 2024 -25 (left) and (b) DJF 2024 -25 (right) based on initial conditions of October 2024

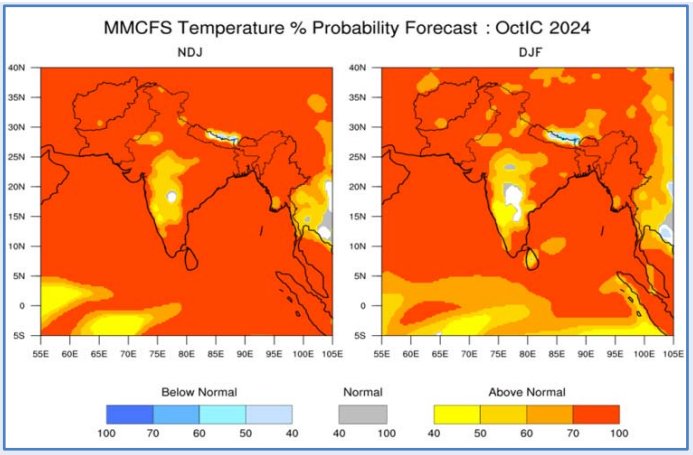


Fig. 10. Seasonal probability (%) forecasts of temperature for (a) NDJ 2024 - 25 (left) and (b) DJF 2024 – 25 (right) based on initial conditions of October 2024

(ii) **Summary of Seasonal climate outlook for South Asia using November IC (December - February 2025)**

- The probability forecast for precipitation for December – February (DJF) season indicate that enhanced probability of above normal precipitation is likely in most parts of south peninsular India, central, northeast and southeast of South Asia, some parts of northwest of South Asia and enhanced probability of below normal precipitation is likely over extreme northwest, north along the plains of Himalayas and west parts of South Asia. The same for January to March season(JFM) indicates that enhanced probability of above normal precipitation is likely in some parts of northwest, extreme north, central and northeast of South Asia and enhanced probability of below normal precipitation in west, east, southern peninsular region, north along the Himalayan plains and south east of South Asia (Fig. 11).
- The forecast is prepared based on the November initial conditions. Temperature probability forecast for DJF and JFM seasons indicate that enhanced probability of above normal temperatures is likely over most parts of South Asia (Fig. 12).

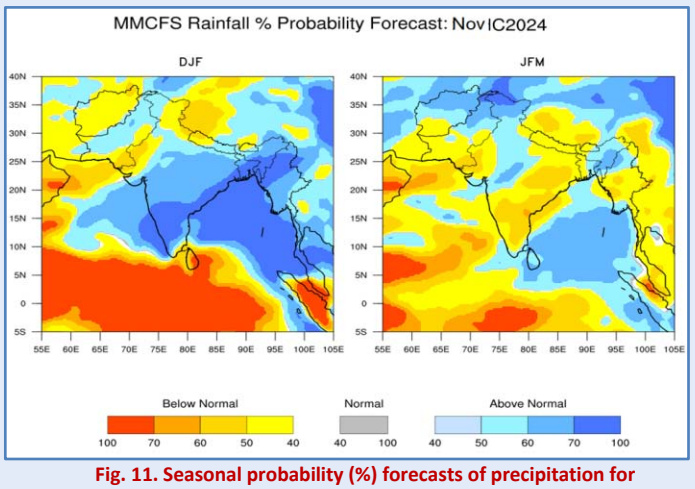


Fig. 11. Seasonal probability (%) forecasts of precipitation for (a) DJF 2024 - 25 (left) and (b) JFM 2024 - 25 (right) based on initial conditions of November 2024

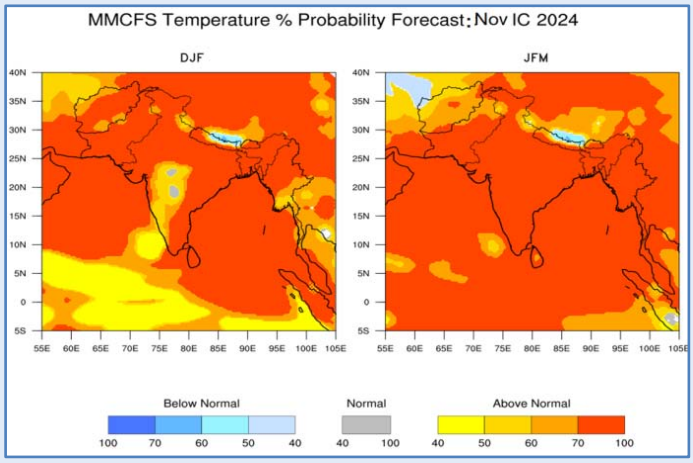


Fig. 12. Seasonal probability (%) forecasts of temperature for (a) DJF 2024 - 25 (left) and (b) JFM 2025 (right) based on initial conditions of November 2024

Prepare ENSO & IOD bulletin every month providing statement on the global SST anomalies and probabilities forecast with emphasis on the ENSO and IOD conditions for the next 9 months based with monthly update. Fig. 13 gives the Global sea surface temperature % probability forecast for the month of September 2024 using the August initial conditions.

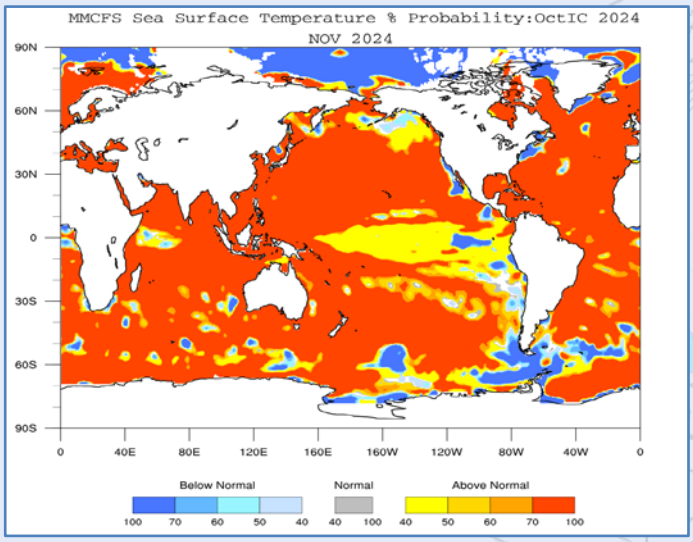


Fig. 13. gives the Global sea surface temperature anomaly and probability forecast for the month of November 2024 using the October initial conditions

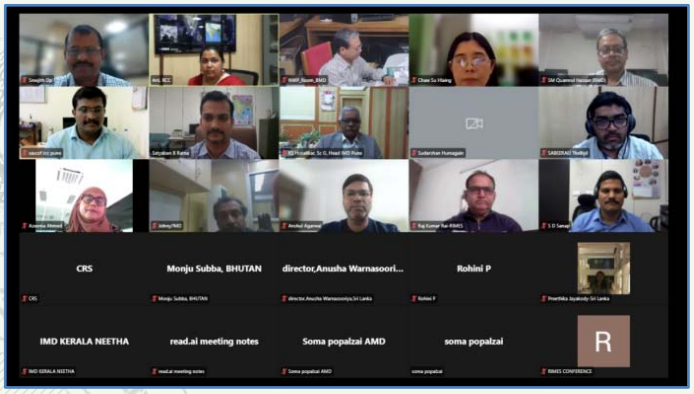
Take lead role in preparing consensus forecast outlook for the monsoon season rainfall, northeast monsoon rainfall and winter rainfall over south Asia.

(e) Acting as Lead Centre in conducting South Asia Climate Forum Activities for RA II Region and Conducting SASCOF for generating consensus outlook for South Asian region for Summer Monsoon, Northeast Monsoon and December to February (DJF) Season.

(D) South Asia Climate Outlook Forum (SASCOF Activity)

<u>30th Session of South Asian Climate Outlook Forum (SASCOF-30) 5th December 2024 (Online)</u>

Thirtieth Session of South Asian Climate Outlook Forum (SASCOF-30) for ensuing Winter Season (December to February 2024/25) took place online through video conferencing on 5th December 2024. The SASCOF-30 session was organized by Regional Climate Centre (RCC), India Meteorological Department (IMD), Pune in collaboration with World Meteorological Organization (WMO), UK Met. Office (UKMO) and Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES), Bangkok. Experts from National Meteorological and Hydrological Service (NMHS) from nine south Asian countries participated in the Forum and discussed the outlook for rainfall and temperature during upcoming Winter season DJF 2024/25. All the participants discussed their views on the current climate factors as well as regional climate outlook over South Asia for the upcoming winter season 2024 (December to February 2024/25).



SASCOF-30 Meeting Photo

Summary of state of climate during the period July to September 2024:

In the month of October, over the country the mean temperature was 26.92°C with an anomaly of 1.23°C and the highest since 1901. The maximum temperature was the 7th highest (32.05°C with an anomaly of 0.68°C) and minimum temperature was the highest (21.79°C with an anomaly of 1.78°C) since 1901.

Among the four homogeneous regions, over Northwest India maximum temperature was the 4th highest (32.276°C with an anomaly of 1.55°C) after the years 2017(32.75°C), 1951(32.50°C) and 1941(32.278°C) and minimum temperature was the highest (18.98°C with an anomaly of 2.25°C) since 1901. Over Central India minimum temperature was the highest (22.98°C with an anomaly of 2.07°C) and South Peninsular India, it was also the highest (23.46°C with an anomaly of 0.94°C) since 1901. The minimum temperature over East & Northeast India, it was the 3rd highest (22.34°C with an anomaly of 1.54°C) since 1901.

During October 2024, rainfall realized over the country as a whole was 100% of its LPA. The realized rainfall for October this year was 24% of its LPA over northwest India, 95% of its LPA over central India, 114% of its LPA over east & northeast India, and 112% of its LPA over south peninsula.

In the month of November, over the country the mean temperature was 23.14°C with an anomaly of 0.84°C and the 3rd highest after the years 1979(23.26°C), 2023(23.16°C) since

1901. The maximum temperature was the 2nd highest (29.37°C with an anomaly of 0.62°C) after the year 2016(29.54°C) and minimum temperature was the 7th highest (16.90°C with an anomaly of 1.05°C) since 1901.

Among the four homogeneous regions, over Northwest India maximum temperature was the 2nd highest (27.19°C with an anomaly of 1.11°C) after the year 1987(27.34°C), and minimum temperature was also the 2nd highest (13.09°C with an anomaly of 1.63°C) after the year 1979(13.11°C) since 1901. The maximum temperature was the 3rd highest (28.45°C with an anomaly of 0.96°C) after the years 2023(28.93°C) and 2022(28.46°C) and minimum temperature was the 2nd highest (17.13°C with an anomaly of 1.54°C) after the year 1979(17.51°C) since 1901, over East & Northeast India.

During November 2024, rainfall realized over the country as a whole was 45% of its LPA. The realized rainfall for the month of November this year was 20% of its LPA over northwest India, 13% of its LPA over central India, 33% of its LPA over east & northeast India and 62% of its LPA over south peninsula.

In the month of December, over the country the mean temperature was 19.72°C with an anomaly of 0.68°C and the 5th highest after the years 2008(20.03°C), 2022(19.95°C), 2023(19.94°C) and 2016(19.85°C) since 1901. The maximum temperature was the 6th highest (26.34°C with an anomaly of 0.53°C) and minimum temperature was the 7th highest (13.10°C with an anomaly of 0.82°C) since 1901.

Among the four homogeneous regions, over Northwest India maximum temperature was the 4th highest (22.31°C with an anomaly of 1.10°C) after the years 1953(23.21°C), 2016(22.99°C) and 1993(22.38°C) since 1901. Over South Peninsular India minimum temperature was the highest (20.91°C with an anomaly of 2.20°C) and mean temperature was the 2nd highest (25.24°C with an anomaly of 1.10°C) after the year 2015(25.26°C) since 1901.

During December 2024 till 18th, rainfall realized over the country as a whole was 165% of its Long Period Average (LPA) value. The rainfall realized during the month was 42% of its LPA over central India, 5% of its LPA over northwest India, 31 % of its LPA over east & northeast India and 325% of its LPA over south peninsular India.

Inputs for "Crop Specific Weather Based Agromet Advisories" for the country have been prepared every Tuesday and Friday and sent for telecasting through DD Kisan Channel, New Delhi.

639 bi-weekly District AAS bulletins have been prepared and uploaded in the website of Agrimet Division, Pune.

Dissemination of Agromet Advisories to the users' community through SMS and IVR technology is being continued in the country through PPP mode and presently reaching to 5.8 million farmers through PPP mode.

India Meteorological Department organised a Virtual Press Conference with media on Salient Features of Southwest Monsoon 2024 and forecast for Oct-Dec 2024 on 1st October. The salient features of the press release issued in this regard are given below:

Rainfall over the country as a whole during the 2024 southwest monsoonseason (June- September) was 108% of its long period average (LPA). Thus the seasonal rainfall was above normal (>104% of LPA) as per the IMD forecast.

Seasonal rainfalls over Northwest India, Central India, South Peninsula and Northeast (NE) India were 107%, 119%, 114% and 86% of respective LPA.

The southwest monsoon seasonal (June to September) rainfall over the monsoon core zone, which consists of most of the rain fed agriculture regions in the country received 122% of LPA.

Out of the total 36 meteorological subdivisions, 2 subdivisions received large excess rainfall (9% of the total area of the country), 10 subdivisions constituting 26% of the total area received excess, 21 subdivisions received normal rainfall (54% of the total area) and 3 subdivisions (Arunachal Pradesh, Punjab, J & K and Ladak) constituting 11% of the total area) received deficient season rainfall.

Monthly rainfall over the country as a whole was 89% of LPA in June, 109% of LPA in July, 115% of LPA in August, and 112% of LPA in September.

Southwest monsoon current advanced over the south Andaman Sea and Nicobar Islands in time (19 May 2024, nearly two days before the normal date).

It set in over Kerala on 30th May, 2024 against the normal date of 1stJune and covered the entire country on 2nd July, 2024 against its normal date of 8thJuly.

Monsoon withdrawal commenced from west Rajasthan on 23rd September (delay of 6 days).

The forecast for monsoon onset over Kerala for this year was correct, which is the nineteenth consecutive correct forecast for this event except year 2015 since the commencement of this forecast in 2005. The Forecast date of monsoon onset over Kerala was 31st May with a model error of ±4 days and monsoon set in over Kerala on 30thMay.

The forecast for the rainfall over the country as whole during the season as a whole was correct as the realized rainfall is 108% of LPA against the forecast of 106% ± 4%.

India Meteorological Department organized the monthly media briefing on 2nd December. Dr. M. Mohapatra, DGM IMD addressed the Press Conference on Seasonal outlook for cold weather season Dec 2024 to Feb, 2025 and monthly outlook for rainfall and temperature for December 2024 on 2nd December, 2024. Highlights of the conference are:

a) During the upcoming winter season (December 2024 to February 2025), above-normal minimum temperatures are likely over most parts of the country. During the season above-normal maximum temperatures are likely over most parts of the country except most areas over south Peninsular India, where normal to below-normal maximum temperatures are likely.

b) Below-normal cold wave days are expected over most parts of northwest, central, east and northeast parts of country during the upcoming winter season (December 2024 to February 2025).

c) During December 2024, monthly minimum temperatures are most likely to be above normal over most parts of the country. Monthly maximum temperatures for December 2024 are likely to be above normal over most parts of the country except some areas of central India where normal maximum temperatures are likely.

d) The occurrence of cold waves over northwest, central, east and northeastern parts of the country during December 2024 is likely to be below normal.

e) Monthly rainfall for December 2024 over the South Peninsular India consisting of five meteorological subdivisions [Tamil Nadu, Puducherry & Karaikkal, Coastal Andhra Pradesh &Yanam, Rayalaseema, Kerala & Mahe and South Interior Karnataka) is most likely to be above-normal (>131% of Long Period Average (LPA)]. Monthly rainfall over the country as a whole during December 2024 is most likely to be above normal (>121 % of LPA). Above-normal rainfall is most likely over most parts of peninsular India, west-central India, and some parts of east-central India and northeast India. The normal to below normal rainfall is likely over most parts of north and northwest India, as well as many areas of east and northeast India.

The cyclonic storm "DANA" developed over eastcentral Bay of Bengal (BoB) and adjoining North Andaman Sea as a **Low-Pressure Area**. It moved nearly north-northwestwards, intensified into a **depression** over eastcentral BoB on 22nd October, **cyclonic storm "DANA"** on 23rd October and into a **severe cyclonic storm** over central & adjoining northwest BoB in the mid-night (2330 hours IST/1800 UTC) of 23rd October, 2024. It reached its peak intensity on 24th October and **crossed north Odisha coast close to Habalikhati Nature Camp (Bhitarkanika) and Dhamara during 0130 hrs IST to 0330 hrs IST of 25th October (2000 to 2200 UTC of 24th October) as a severe cyclonic storm with a wind speed of 100-110 kmph gusting to 120 kmph**. It moved slowly during and after landfall. The landfall process continued for 9 hours during midnight of 24th till morning of 25th October. After landfall, it weakened rapidly into a cyclonic storm over north coastal Odisha in the forenoon of 25th and into a well marked low pressure over interior Odisha in the early morning of 26th October.

India Meteorological Department (IMD) provided 1st information about the likely development of depression around 23rd October and its intensification into a cyclonic storm over eastcentral BoB in the extended range outlook issued on 17th October (about 7.5 days ahead of landfall).

There was almost zero error in cyclone landfall point, landfall time and landfall intensity prediction for all lead periods of forecast upto 3.5 days (Figs. 1 and 2). The operational track and intensity forecast errors were markedly less than the long period average (LPA) errors based on last five years (2019-2023) for all lead periods of forecast. The track forecast errors were 20-30 km and the intensity forecast errors were 2-5 kt (3-10 kmph) upto 72 hours lead periods.

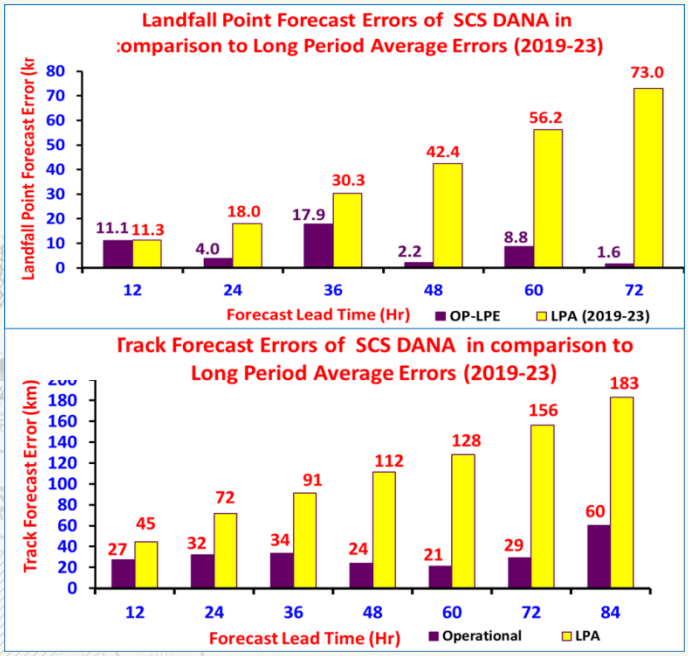
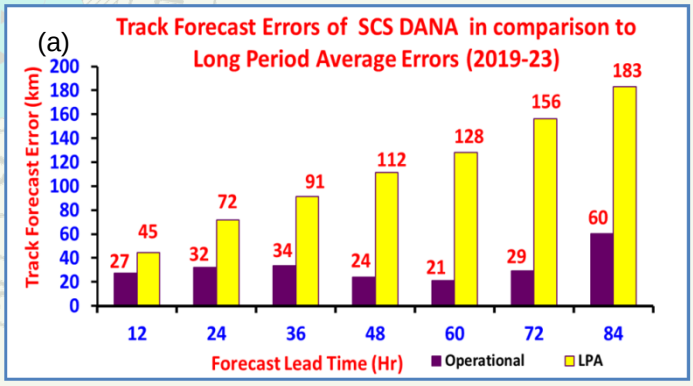


Fig.1. (a) Landfall point and (b) time errors against the long period average (LPA) errors based on 2019-2023



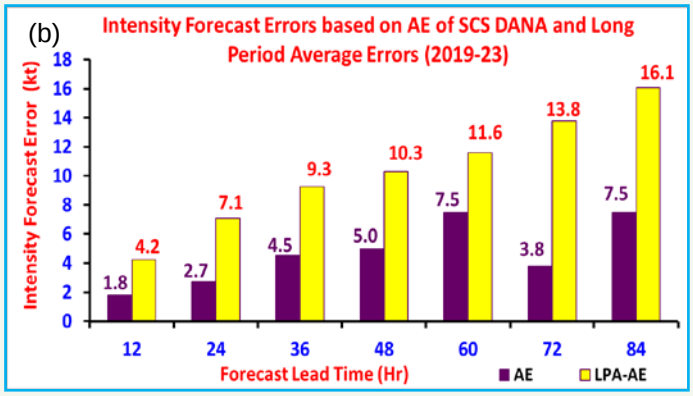


Fig. 2. (a) Track and (b) Intensity forecast errors compared to long period average (LPA) errors based on 2019-2023