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INDIA METEOROLOGICAL DEPARTMENT

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

Highlights

- 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.

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

1. Background

India Meteorological Department (IMD) has recently adopted a new strategy using Multi-Model Ensemble (MME) based forecasting system for issuing monthly and seasonal outlooks of rainfall and temperature over the country. The MME approach uses the coupled global climate models (CGCMs) from different global climate prediction and research centers including IMD/MoES Monsoon Mission Coupled Forecast System (MMCFS) model.

Now, IMD has prepared a seasonal outlook for temperatures over the country for the upcoming winter season (December 2024 to February 2025) and rainfall and temperature forecasts for December 2024.

2. Seasonal Temperature Forecast for December 2024 to February 2025

Fig.1 and Fig.2 show the probability forecast during December 2024 to February 2025 (DJF) season for the minimum and maximum temperatures, respectively,. It indicates that during the upcoming winter season (December 2024 to February 2025), above-normal minimum temperatures are likely over most parts of the country. During the DJF 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 (Fig.2).

3. Cold wave outlook for the December 2024 to February 2025 season.

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 3. 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.

4. Probabilistic Forecast for the Temperature during December 2024

Fig.4 and Fig.5 show the probability forecast during December 2024 for the minimum and maximum temperatures, respectively, The monthly mean minimum temperatures are likely above normal over most parts of the country (Fig.4).

The maximum temperatures (Fig.5) during 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.

5. Cold wave outlook for the December 2024

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 Figure 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.

6. Probabilistic Forecast for the Rainfall during December 2024

Monthly rainfall for December 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 (>131% of Long Period Average (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.7. 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. In the map, dotted areas represent areas that receive climatologically very less rainfall during December. There is no signal by the model over the white-shaded areas within the land region of the country.

7. SST conditions in the Pacific and the Indian Oceans

The sea surface temperatures are below average in the eastern equatorial Pacific Ocean. Currently, neutral El Nino-Southern Oscillation (ENSO) conditions are observed over the equatorial Pacific. The probability forecast indicates a higher chance of La Niña conditions developing around the DJF 2024 season and an enhanced probability of La Niña conditions until early next year.

In addition to ENSO conditions over the Pacific, other factors, such as the Indian Ocean Sea Surface Temperatures (SSTs), also influence the Indian climate. Above-average sea surface temperatures (SSTs) are currently seen across most of the Indian Ocean. Currently, neutral Indian Ocean Dipole (IOD) conditions are observed over the Indian Ocean. The latest MMCFS forecast indicates that the neutral IOD conditions are likely to continue for the next several months.

8. Extended Range Forecast and short to medium-range forecasting services

IMD also provides extended range forecasts (7–day averaged forecasts for the next four weeks) of rainfall and maximum and minimum temperatures over the country updated every week on Thursday. This is based on the Multi-model ensemble dynamical Extended Range Forecasting System currently operational at IMD. The extended range forecasts are available through the IMD website https://mausam.imd.gov.in/ind_latest/contents/extendedrangeforecast.php).

The extended range forecast is followed by a short to medium range forecast issued daily by IMD. The forecasts are available through the IMD website https://nwp.imd.gov.in/gfsproducts_cycle00_mausam.php

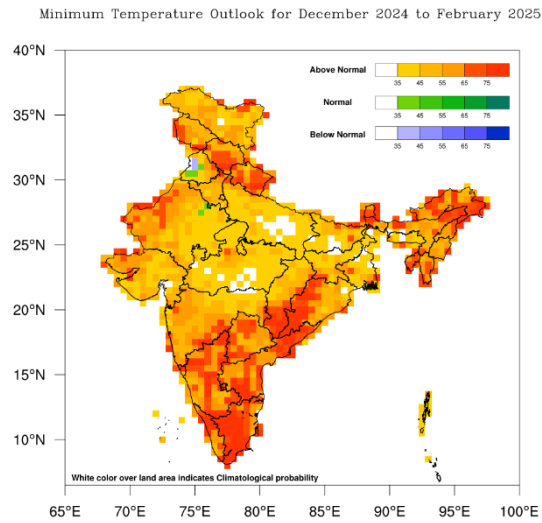


Fig 1. Probability forecast of Minimum Temperature for Dec. 2024 to Feb. 2025

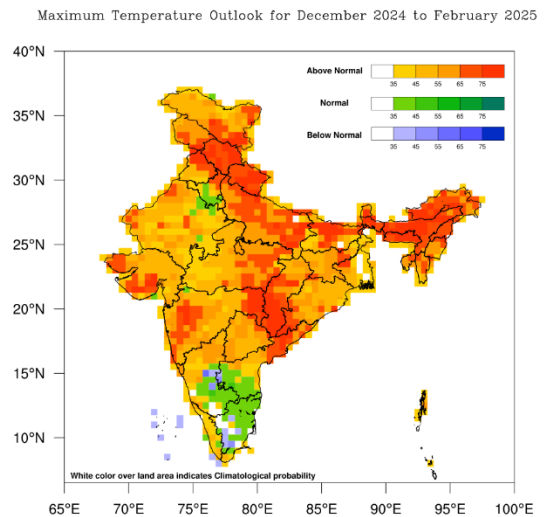


Fig 2. Probability forecast of Maximum Temperature for Dec. 2024 to Feb. 2025

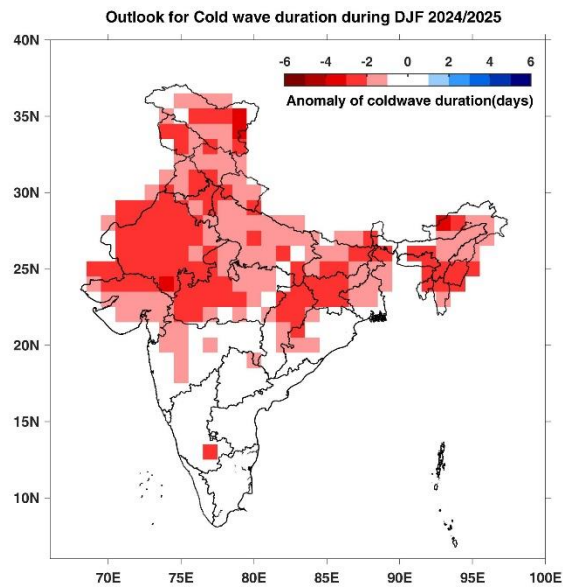


Fig 3. Anomaly (Deviation from the normal) of Cold Wave Duration (days) for Dec. 2024 to Feb. 2025.

Minimum Temperature Outlook for December 2024

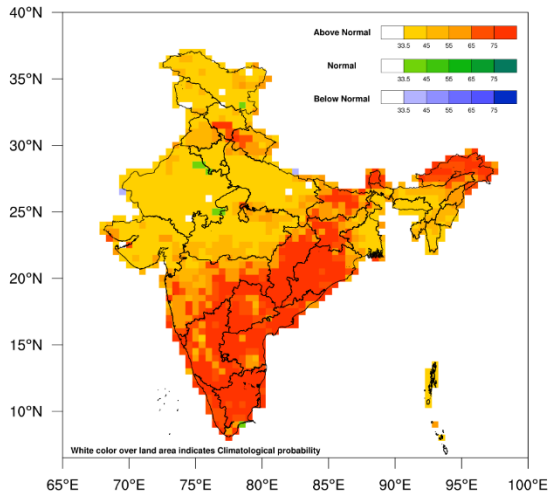


Fig 4. Probability forecast of Minimum Temperature for December 2024

Maximum Temperature Outlook for December 2024

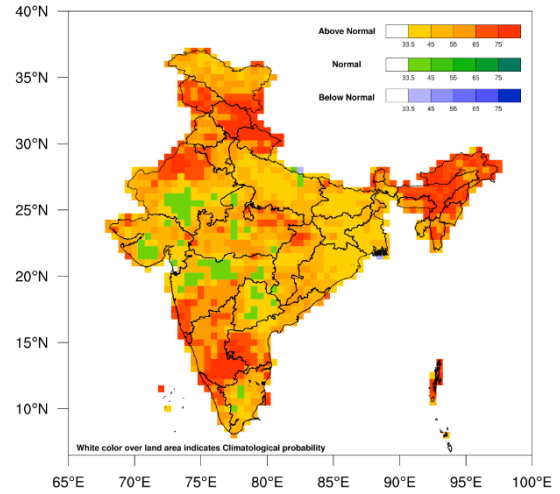


Fig 5. Probability forecast of Maximum Temperature for December 2024

Outlook for Cold wave duration during December 2024

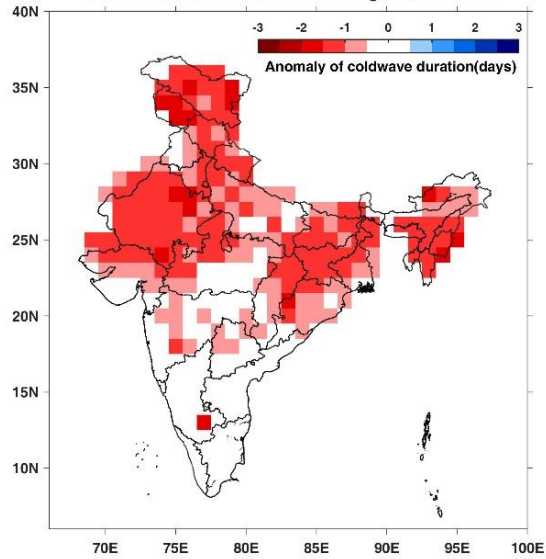


Fig 6. Anomaly (Deviation from the normal) of Cold Wave Duration (days) for Dec.2024

probability rainfall forecast for 2024 December

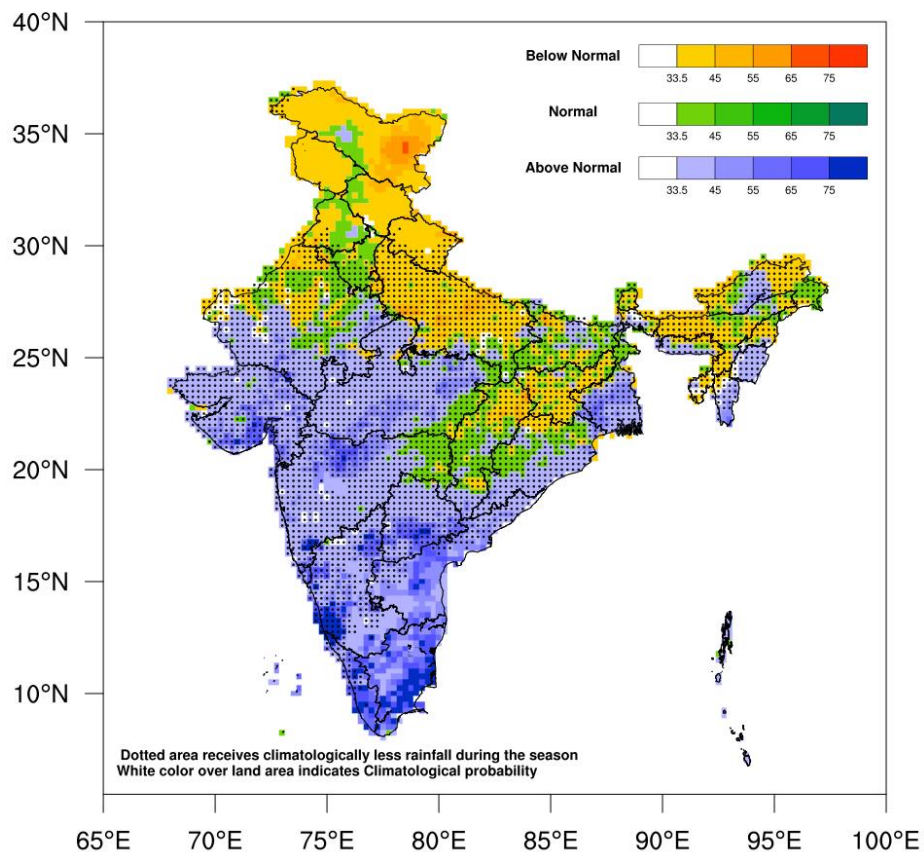


Fig.7. Probability forecast of tercile categories* (below normal, normal, and above normal) of rainfall over India during December 2024. The figure illustrates the most likely categories as well as their probabilities. The dotted area shown in the map climatologically receives very less rainfall during December month. There is no signal by the model over the white-shaded areas within the land region of the country.

(*Tercile categories have equal climatological probabilities of 33.33% each).