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INDIA METEOROLOGICAL DEPARTMENT

**Rainfall Forecast for January to March (JFM) period
and monthly outlook for rainfall and temperature during January 2022**

Highlights

- a) **Rainfall** – The rainfall during January to March 2022 averaged over North India consisting of seven meteorological subdivisions (East Uttar Pradesh, West Uttar Pradesh, Uttarakhand, Haryana, Chandigarh & Delhi, Punjab, Himachal Pradesh, Jammu Kashmir & Ladakh) is most likely to be normal (86 to 114% of Long Period Average (LPA)).

Monthly rainfall for the 2022 January averaged over the North India is most likely to be above normal (>124 % of Long Period Average (LPA)).

- b) **Temperature** - During the month of January 2022, normal to above normal minimum temperatures are most likely over many parts of northwest India, northeast India and adjoining areas of east India. Below normal minimum temperatures are most likely over some parts of north peninsula and some parts of central India.

Below normal maximum temperatures are likely over most parts of central and peninsular India. The normal to above normal maximum temperatures are most likely over some parts of north India and most parts of northeast India.

- c) **SST Conditions** - Currently, moderate La Niña conditions are prevailing over equatorial Pacific region. The latest Monsoon Mission Climate Forecast System (MMCFS) forecast is indicating that these La Niña conditions are likely to persist during the JFM and thereafter likely to start weakening to reach to cold ENSO neutral conditions during the second quarter of 2022. At present, neutral IOD conditions are present over Indian Ocean and the latest MMCFS forecast indicates that the neutral IOD conditions are likely to continue during the forecast period.

Rainfall Forecast for January to March (JFM) period and monthly outlook for rainfall and temperature during January 2022

1. Background

North India consisting of seven meteorological subdivisions (East Uttar Pradesh, West Uttar Pradesh, Uttarakhand, Haryana, Chandigarh & Delhi, Punjab, Himachal Pradesh, Jammu Kashmir & Ladakh) receives about 18% of its annual rainfall during January to March. The Jammu Kashmir and Ladakh in particular receive about 31% of their annual rainfall during this period. The winter rainfall is very crucial for Rabi crops over the region. It is also crucial for the water management of the region. Because of these reasons, India Meteorological Department (IMD) has been issuing long-range forecast outlooks for the winter rainfall over North India. IMD also continuously works to improve the skill of the forecasting models. This year, IMD has adopted a new strategy for issuing monthly and seasonal outlooks of rainfall and temperature over the country. The new strategy is based on the newly developed Multi-Model Ensemble (MME) based forecasting system. The MME approach uses the coupled global climate models (CGCMs) from different global climate prediction and research centers including IMD/MoES Monsoon Mission Climate Forecast System (MMCFS) model. IMD has now prepared the forecast outlook for the rainfall during the January to March (JFM) period and for the January of 2022 and the same is presented in section 2.

- a. Probabilistic forecasts for rainfall during January to March 2022 averaged over North India consisting of Seven meteorological subdivisions.
- b. Probabilistic forecast for the January rainfall averaged over North India.
- c. Spatial distribution of probabilistic rainfall forecasts over the country for the January to March 2022 and for January 2022.

Since 2016, the India Meteorological Department (IMD), Ministry of Earth Sciences (MoES) has been issuing seasonal forecast outlooks for temperatures over the country for both hot and cold weather seasons. On 1st December, 2021 IMD had issued seasonal forecast for the temperatures for the December to February (DJF) season. As an additional information, IMD has now prepared a monthly temperature outlook for the January 2022 over the country and the same is presented in section 3.

2.(a) Probabilistic Forecast for the Rainfall during JFM 2022

The rainfall during Jan-Mar (JFM) 2022 averaged over North India is most likely to be normal (86 to 114% % of LPA). The LPA of rainfall over North India during JFM based on data of 1961-2010 is about 183.5 mm.

The probabilistic forecast for the spatial distribution of tercile rainfall categories (above normal, normal, and below normal) over the country for the JFM period is shown in Fig.1. The forecast suggests that normal to above normal seasonal rainfall is likely over some isolated parts of North India. However, the rainfall over the remaining areas of North India have climatological probabilities as indicated by white shaded areas. The dotted areas in the map climatologically receive very less rainfall during the JFM season.

2(b). Probabilistic Forecast for the rainfall during January 2022.

The 2022 January rainfall averaged over North India is most likely to be above normal (>124 % of LPA). The LPA of rainfall over North India during January based on the data of 1961-2010 is about 48.5 mm.

The probabilistic forecast for the spatial distribution of tercile rainfall categories (above normal, normal, and below normal) over the country for the month of January is shown in Fig.2. The forecast suggests that normal to above normal rainfall is most likely over most parts of North India except some parts of Uttar Pradesh and Punjab where below normal rainfall is most likely. The dotted areas in the map climatologically receive very less rainfall during the month and the white shaded areas within the land areas represent climatological probabilities.

3. Probabilistic Temperature Forecast for January 2022

Fig.3 and Fig.4 show forecast probabilities of the minimum and maximum temperatures respectively for January 2022. The probability forecast for the minimum temperatures indicates that during the month of January 2022, above normal minimum temperatures are most likely over most parts of north, northwest and northeast India and adjoining areas of east India. Below normal to normal minimum temperatures are most likely over many areas of the north peninsula and some parts of central India. Climatological probabilities (indicated by white shaded areas) are predicted over the remaining areas of the country.

The probability forecast for the maximum temperatures (Fig.4) indicates that below normal maximum temperatures are likely over most parts of the central and peninsular India. Above normal temperatures are likely over some parts of northwest & north India and most parts of northeast India. Climatological probabilities (indicated by white shaded areas) are predicted over the remaining areas of the country.

4. SST conditions in the Pacific and the Indian Oceans

Currently, moderate La Niña conditions are prevailing over the equatorial Pacific region. The latest MMCFS forecast is indicating that these La Niña conditions are likely to persist during the JFM season. Thereafter the La Niña conditions are likely to start weakening to reach to cold ENSO neutral conditions during the second quarter of the 2022.

At present, neutral IOD conditions are present over the Indian Ocean and the latest MMCFS forecast indicates that the neutral IOD conditions are likely to continue during the entire forecast period.

5. 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 & 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 forecasts are available through the IMD website (https://mausam.imd.gov.in/imd_latest/contents/extendedrangeforecast.php). The extended range forecast is followed by short to medium range forecast issued daily by IMD.

probability rainfall forecast for 2022 JFM

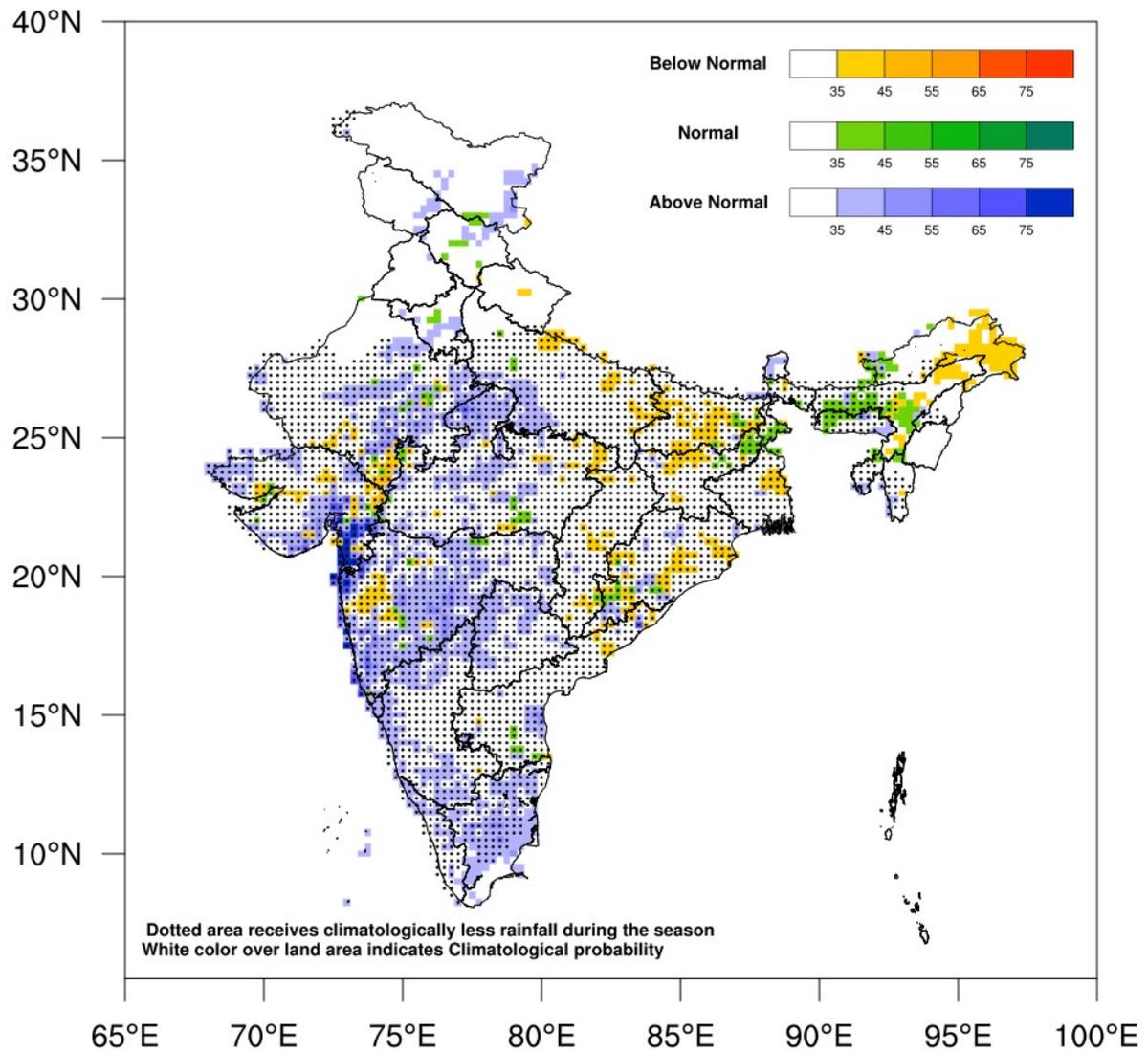


Fig.1. Probability forecast of tercile categories* (below normal, normal, and above normal) for the rainfall over India during JFM 2022. The figure illustrates the most likely categories as well as their probabilities. The dotted area shown in the map climatologically receives very less rainfall during this period and the white shaded areas within the land areas represent climatological probabilities. The probabilities were derived using the MME forecast prepared from a group of coupled climate models. (*Tercile categories have equal climatological probabilities, of 33.33% each).

probability rainfall forecast for 2022 JAN

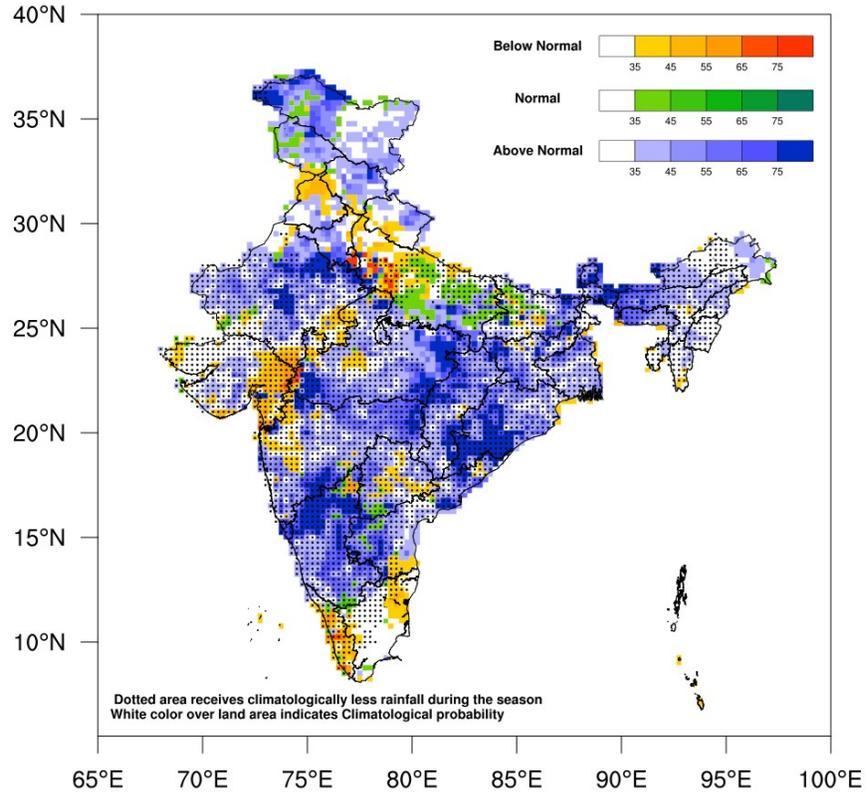


Fig.2. Probability forecast of tercile categories* (below normal, normal, and above normal) for the rainfall over India during January 2022. The figure illustrates the most likely categories as well as their probabilities. The dotted area shown in the map climatologically receives very less rainfall during January and the white shaded areas within the land areas represent climatological probabilities. The probabilities were derived using the MME forecast prepared from a group of coupled climate models. (*Tercile categories have equal climatological probabilities, of 33.33% each).

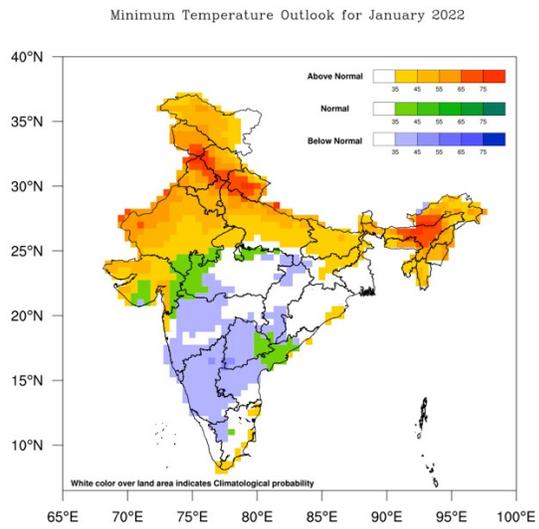


Fig 3. Probability forecast of Minimum Temperature for the month of January 2022.

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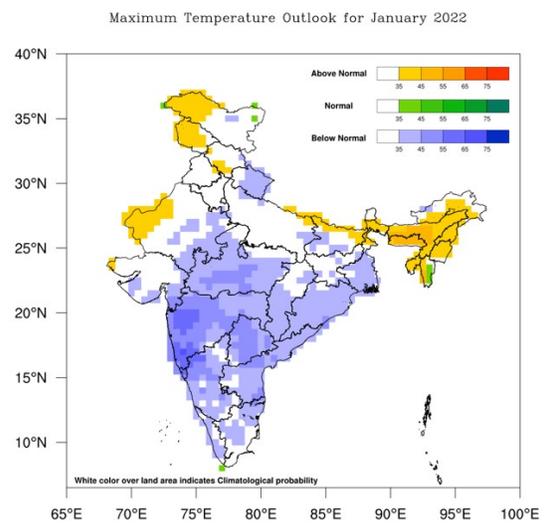


Fig 4. Probability forecast of Maximum Temperature for the month of January 2022.