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Ministry of Earth Sciences (MoES)
भारत मौसम विज्ञानविभाग
INDIA METEOROLOGICAL DEPARTMENT
Long Range Forecast
for the 2023Southwest Monsoon Season Rainfall

Summary of the Forecast for the 2023 Southwest Monsoon Rainfall

a) Quantitatively, the southwest monsoon seasonal (June to September) rainfall over the country as a whole is likely to be **96%of the Long Period Average (LPA) with a model error of ± 5% (Normal).** The LPA of the season rainfall over the country as a whole for the period **1971-2020 is 87 cm**.

b) Currently, La Nina conditions changed to Neutral conditions over the equatorial Pacific region. The latest MMCFS as well as other climate model forecast indicates that El Niño conditions are likely to develop during the monsoon season.

c) At present, neutral Indian Ocean Dipole (IOD) conditions are present over the Indian Ocean and the latest Climate models forecast indicates that the positive IOD conditions are likely to develop during the southwest monsoon season.

d) The northern hemisphere snow cover areas during February and March 2023 were observed to be below normal.Winter and spring snow cover extent over Northern Hemisphere as well as Eurasia has a tendency of general inverse relationship with the subsequent summer monsoon rainfall.

IMD will issue the **updated forecasts for monsoon season rainfall in the last week of May 2023.**

1.   Background

Since 2003, India Meteorological Department (IMD) has been issuing the operational long-range forecast (LRF) for the southwest monsoon seasonal (June-September) rainfall averaged over the country as a whole in two stages. The first stage forecast is issued in April and the second stage or update forecast is issued by the end of May. Since 2021 IMD has implemented a new strategy for issuing monthly and seasonal operational forecasts for the southwest monsoon rainfall over the country by modifying the existing two stage forecasting strategy. The new strategy uses both dynamical and statistical forecasting system. Multi-Model Ensemble (MME) forecasting system based on coupled global climate models (CGCMs) from different global climate prediction centres, including IMD's Monsoon Mission Climate Forecast System (MMCFS) is used in dynamical forecast system.

2.   Forecast for the 2023 Southwest monsoon Season (June–September) rainfall over the country as a whole.

The forecast based on both dynamical and statistical models suggests that quantitatively, the monsoon seasonal rainfall is likely to be **96% of the Long Period Average (LPA) with a model error of ± 5%.** The LPA of the seasonal rainfall over the country as a whole based on data of **1971-2020 is 87 cm**.

The five category probability forecasts for the Seasonal (June to September) rainfall over the country as a whole are given below, which suggests the higher probability for monsoon seasonal rainfall to be normal.

Category	Rainfall Range (% of LPA)	Forecast Probability (%)	Climatological Probability (%)
Deficient	< 90	22	16
Below Normal	90 - 95	29	17
Normal	96 -104	35	33
Above Normal	105 -110	11	16
Excess	> 110	3	17

April initial conditions have been used for generating the MME forecast for 2023 southwest Monsoon season rainfall. Best climate models with the highest skill over the Indian monsoon region have been used to generate MME forecasts.

The spatial distribution of probabilistic forecasts for tercile categories (above normal, normal and below normal) for the seasonal rainfall (June to September) is shown in Fig.1. The spatial distribution suggests normal to above normal rainfall likely over many areas of Peninsular India and adjoining East Central India,Northeast India and over some parts of Northwest India. Normal to below normal rainfall is likely over some areas of Northwest India and parts of Westcentral India and some pockets of Northeast India. White shaded areas within the land represent climatological probabilities.

3. Sea Surface Temperature (SST) Conditions in the equatorial Pacific & Indian Oceans

Currently, La Niña conditions changed to Neutral conditions over the equatorial Pacific region. The latest MMCFS as well as other climate model forecast indicates that El Niño conditions are likely to develop during the monsoon season.

At present, neutral IOD conditions are present over the Indian Ocean and the latest climate model forecast indicates that the positive IOD conditions are likely to develop during the southwest monsoon season.

As sea surface temperature (SST) conditions over the Pacific and the Indian Oceans are known to have a strong influence on the Indian monsoon, IMD is carefully monitoring the evolution of sea surface conditions over these Ocean basins.

4. Snow Cover over the Northern Hemisphere

The northern hemisphere snow cover areas during February and March 2023 were observed to be below normal.Winter and spring snow cover extent over Northern Hemisphere as well as Eurasia has a tendency of general inverse relationship with the subsequent summer monsoon rainfall.

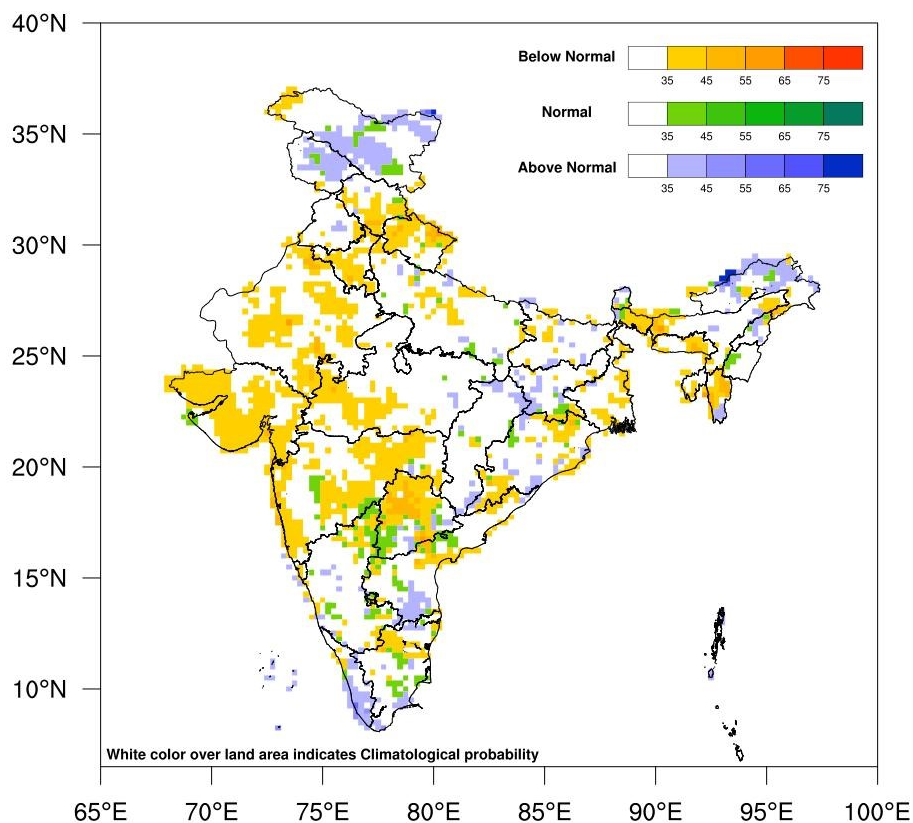Terclie probability rainfall forecast for 2023 southwest monsoon season

Fig.1. Probability forecast of tercile categories[*] (below normal, normal, and above normal) for the seasonal rainfall over India during the 2023 southwest monsoon season (June -September). The figure illustrates the most likely categories as well as their probabilities. The white shaded areas represent climatological probabilities for all the tercile categories. The probabilities were derived using the MME forecast prepared from a group of best coupled climate models.([*]Tercile categories have equal climatological probabilities, of 33.33% each).