PRESS RELEASE
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भारत सरकार
Government of India
पृथ्वी विज्ञान मंत्रालय (एम. ओ. ई. एस.)
Ministry of Earth Sciences (MoES)
भारत मौसम विज्ञान विभाग
INDIA METEOROLOGICAL DEPARTMENT
Updated Long Range Forecast
For the 2021 Southwest Monsoon Season Rainfall

Highlights

a) Southwest monsoon seasonal (June to September) rainfall over the country as a whole is most likely to be **normal (96 to 104 % of Long Period Average (LPA)).**

b) Quantitatively, the monsoon seasonal (June to September) rainfall over the country as a whole is likely to be **101% of the Long Period Average (LPA) with a model error of ± 4%.** The LPA of the season rainfall over the country as a whole for the period **1961-2010 is 88 cm**.

c) The southwest monsoon seasonal (June to September) rainfall over the four homogeneous rainfall is most likely to be **Normal over Northwest India (92-108%) and South Peninsula (93-107%). Seasonal rainfall is most likely to be below normal over North east India (<95%) and above normal over Central India (>106%).**

d) The southwest monsoon seasonal (June to September) rainfall over the monsoon core zone, which consists of most of the **rainfed agriculture regions in the country is most likely to be Above Normal (>106% of LPA).**

e) Monsoon seasonal rainfall is likely to be well distributed spatially (Fig.1). Most parts of the country is expected to receive normal to above normal rainfall during the season.

f) The latest global model forecasts indicate the prevailing neutral ENSO conditions are likely to continue over the equatorial Pacific Ocean and possibility of development of negative IOD conditions over the Indian Ocean during the monsoon season**.**

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

IMD will issue the **forecast for the July rainfall in the last week of June 2021.**

1. Background

This year, 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 state forecasting strategy. The new strategy uses the existing statistical forecasting system to generate these forecasts along with a newly developed Multi-Model Ensemble (MME) forecasting system based on coupled global climate models (CGCMs) from different global climate prediction and research centers including IMD's Monsoon Mission CFS (MMCFS) model. The monthly probabilistic forecast for each of the monsoon months will also be issued at the end of the previous month based on MME approach.

Accordingly, on 16th April 2021, IMD had issued the first stage forecast for the 2021 southwest monsoon seasonal (June to September) rainfall over the country as a whole using the existing statistical forecasting system and the newly developed MME based forecasting system. The spatial distribution of probabilistic forecasts for tercile categories (above normal, normal and below normal) for the seasonal rainfall (June to September) over the country was also issued for the first time in the history of the operational seasonal forecasting in the country.

Now, IMD has prepared the following forecasts as a part of the second stage forecasts;

1. Updated quantitative and probabilistic forecasts for the monsoon seasonal rainfall over the country as a whole and spatial distribution of the probabilistic forecasts for the seasonal rainfall over the country.
2. Probabilistic forecasts for the seasonal rainfall over the four homogenous regions of India (northwest India, central India, south Peninsula and northeast India) and the monsoon core zone (MCZ).
3. Probabilistic forecast for the June rainfall over the country as a whole and spatial distribution of the probabilistic forecasts for the June rainfall over the country.

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

La Niña conditions which peaked in November last year, started weakening in the early part of 2021 and turned into neutral ENSO conditions by end of April 2021. Presently, neutral ENSO conditions are seen over the equatorial Pacific along with substantially

warmer subsurface temperatures over the region. Atmospheric patterns also reflect neutral ENSO conditions. The latest MMCFS and other global model forecast indicate that neutral ENSO conditions will continue during the upcoming monsoon season.

At present, neutral Indian Ocean Dipole (IOD) conditions are prevailing over the Indian Ocean. The latest forecast from the MMCFS and other global models together indicate possibility of development of negative IOD conditions during the monsoon season.

3. Second Stage Forecasts for the 2021 Southwest monsoon Rainfall

3a. Updated Forecast for the 2021 Southwest Monsoon Rainfall over the Country as a Whole Based on the Operational Statistical Ensemble Forecasting System (SEFS)

The forecast suggests that quantitatively, the monsoon seasonal rainfall is likely to be **101% of the Long Period Average (LPA) with a model error of ± 4%.** The LPA of the season rainfall over the country as a whole for the period **1961-2010 is 88 cm**.

The 5 category probability forecasts for the Seasonal (June to September) rainfall over the country as a whole based on the SEFS forecast are given below, which suggests maximum probability for monsoon seasonal rainfall to be normal (96-104% of LPA).

Category	Rainfall Range (% of LPA)	Forecast Probability (%)	Climatological Probability (%)
Deficient	< 90	**8**	16
Below Normal	90 - 96	**18**	17
Normal	96 -104	**40**	33
Above Normal	104 -110	**22**	16
Excess	> 110	**12**	17

3.b. Updated Forecast for the 2021 Southwest Monsoon Rainfall over the Country based on the Multi Model Ensemble (MME) Forecasting System

The updated MME forecast for 2021 southwest Monsoon season rainfall has been computed using various coupled global model forecasts with May initial conditions. Climate models with the highest forecast skills over the Indian monsoon region including MMCFS have been used to prepare the MME forecast.

The updated MME forecast also suggests that the monsoon rainfall during the 2021 monsoon season (June to September) averaged over the country as a **whole is likely to be normal (96-104% of LPA).**

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 or above normal seasonal rainfall is most likely over many areas of north west India, central India and eastern parts of the southern Peninsula. Below normal seasonal rainfall is most likely over some areas of north, east and neighboring northeast parts of the country and western parts of the south peninsula. The white shaded areas within the land area represent climatological probabilities.

3c. Forecast for the 2021 Southwest Monsoon Rainfall over the four Homogenous regions of the country and MCZ based on the Multi Model Ensemble Forecasting System.

The tercile category forecasts for the four homogenous regions and MCZ for the 2021 southwest monsoon seasonal (June-September) rainfall based on the MME forecast generated using May initial conditions are given in the tables below.

Rainfall Category	**NW India**		**Central India**		**South Peninsula**	
	Range (% of LPA)	Forecast Probability (%)	Range (% of LPA)	Forecast Probability (%)	Range (% of LPA)	Forecast Probability (%)
Below Normal	<92	**27**	<94	**27**	<93	**33**
Normal	92-108	**41**	94-106	**34**	93-107	**34**

Above Normal	>108	**32**	>106	**39**	>107	**33**

Rainfall Category	**Northeast India**		**Monsoon Core Zone (MCZ)**	
	Range (% of LPA)	Forecast Probability (%)	Range (% of LPA)	Forecast Probability (%)
Below Normal	<95	**40**	<94	**27**
Normal	95-105	**33**	94-106	**33**
Above Normal	>105	**27**	>106	**40**

3d. Probabilistic Forecast for the 2021 June Rainfall over the Country Based on the Multi Model Ensemble Forecasting System.

The MME probability forecast suggest that the 2021 June rainfall averaged over the country as a **whole is most likely to be normal (92 to 108 % of LPA).**

The spatial distribution of probabilistic forecasts for tercile categories (above normal, normal and below normal) for the June rainfall is shown in Fig.2. The spatial distribution suggests above normal rainfall probability is likely over most areas of eastern parts of central India, along the planes of Himalayas and east India. Below normal probability is likely over many areas of northwest India and southern parts of south peninsula and some areas of northeast India. The white shaded areas within the land area represent climatological probabilities

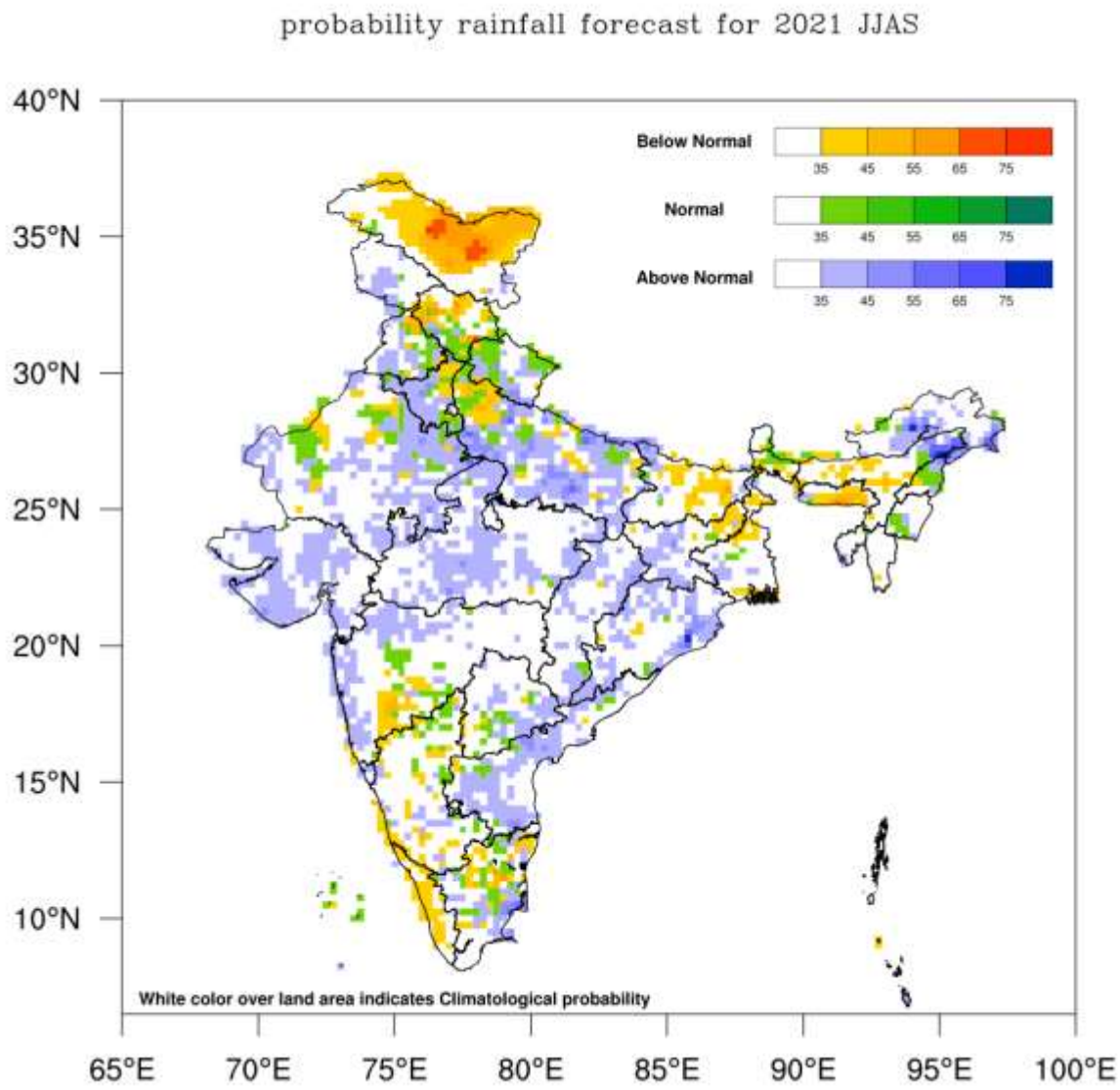

Fig.1. Updated Probability forecast of tercile categories* (below normal, normal and above normal) for the seasonal rainfall over India during the 2021 southwest monsoon season (June - September). The figure illustrates the most likely categories as well as their probabilities. The white shaded areas within the land area 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).

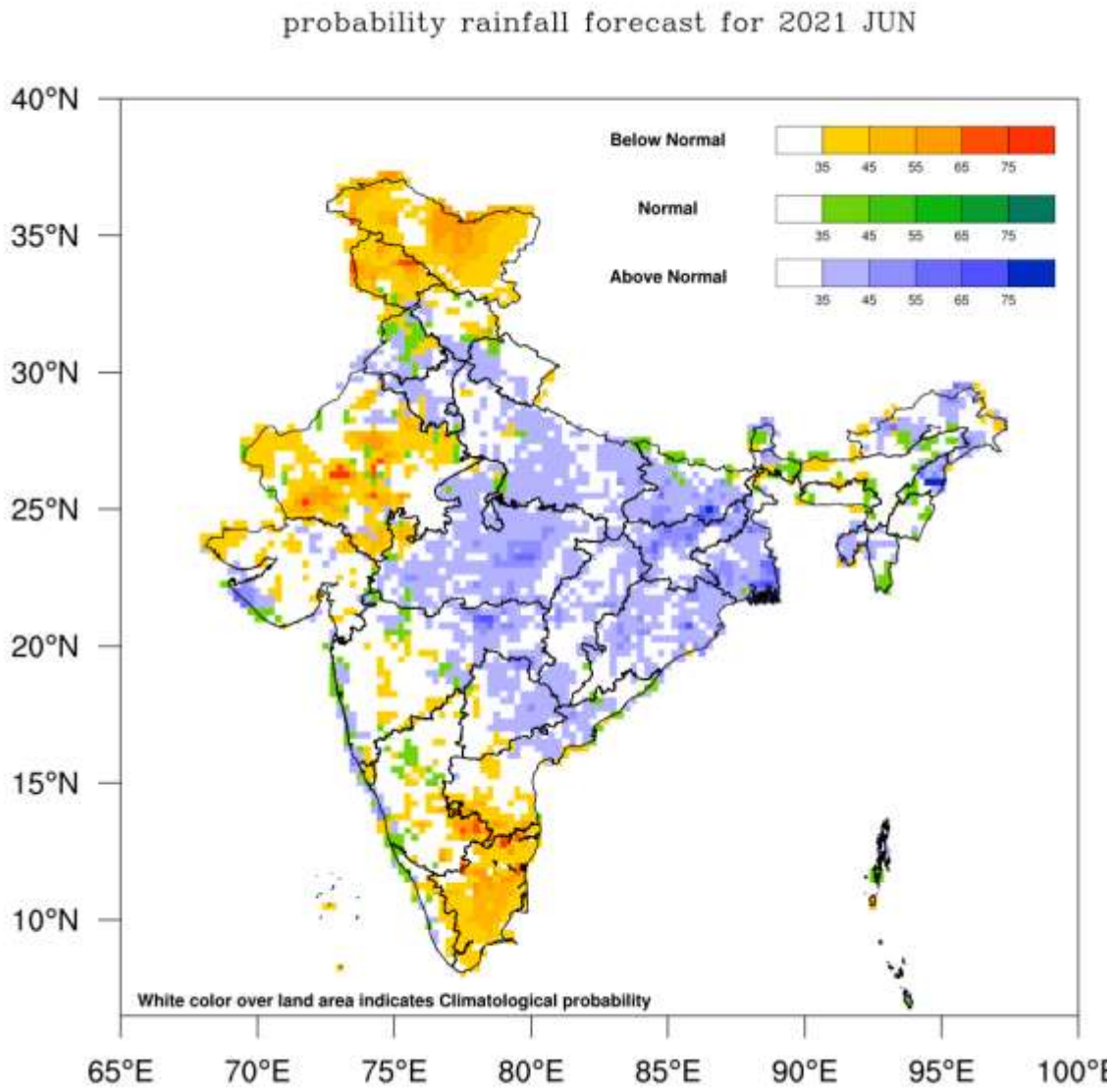

Fig.2. Probability forecast of tercile categories* (below normal, normal and above normal) for the 2021 June rainfall over India. The figure illustrates the most likely categories as well as their probabilities. The white shaded areas within the land area represent climatological probabilities. The probabilities were derived using the MME forecast prepared from a group of coupled climate models. (*Tercile categories have equal climatological probabilities, of 33.33% each).