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**Ministry of Earth Sciences (MoES)**  
भारत मौसम विज्ञान विभाग  
**INDIA METEOROLOGICAL DEPARTMENT**

**Long Range Forecast for the Rainfall during Post-monsoon Season 2021**

**Highlights**

- a) 2021 Northeast Monsoon (October to December (OND)) season rainfall over the south Peninsular India consisting of five meteorological subdivisions (Tamil Nadu, Coastal Andhra Pradesh, Rayalaseema, Kerala and South Interior Karnataka) is most likely to be normal (89-111% of Long Period Average (LPA)).
- b) Monthly rainfall for the 2021 October over the south Peninsula is most likely to be normal (87-113 % of Long Period Average (LPA)).
- c) Currently cool ENSO neutral conditions prevailing over equatorial Pacific Ocean and negative IOD conditions over the Indian Ocean. The sea surface temperatures (SSTs) over central and east equatorial Pacific Ocean are showing cooling tendency and the latest global model forecasts indicate that there is an increased possibility of re-emergence of the La Niña conditions during northeast monsoon season. The negative IOD conditions are likely to weaken during the coming months.

**1. Background**

The south Peninsular India consisting of five meteorological subdivisions (Tamil Nadu, Coastal Andhra Pradesh, Rayalaseema, Kerala and South Interior Karnataka) receives about 30% of its annual rainfall during the Northeast monsoon season (October to December). Tamil Nadu in particular receives about 48% of its annual rainfall during this season. Due to this important fact, IMD has been preparing experimental forecasts for Northeast monsoon season rainfall over south Peninsula since 1998 using statistical models. 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 operational forecasts for the seasonal rainfall over the country. The new strategy is based on the existing statistical forecasting system and 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's Monsoon Mission CFS (MMCFS) model. Accordingly, IMD had issued various seasonal forecast for the 2021 southwest monsoon seasonal (June to September) rainfall over the country.

Now, IMD has prepared the forecast outlook for the rainfall during the October to December (OND) period and for the month of October of 2021 Northeast monsoon season.

- a. Probabilistic forecasts for the seasonal rainfall averaged over South Peninsular India consisting of five meteorological subdivisions.
- b. Probabilistic forecast for the October rainfall averaged over the south Peninsular India.
- c. Spatial distribution of probabilistic rainfall forecasts over the country for the Northeast Monsoon Season and for the month of October.

## **2. SST conditions in the Pacific and the Indian Oceans**

Currently cool ENSO neutral conditions prevailing over the equatorial Pacific Ocean. Recently negative subsurface temperature anomalies have emerged and strengthened across most of the central and east-central Pacific Ocean and climate models indicate a continued cooling trend, with a forecast of re-emergence of La Niña conditions during the Northeast monsoon season.

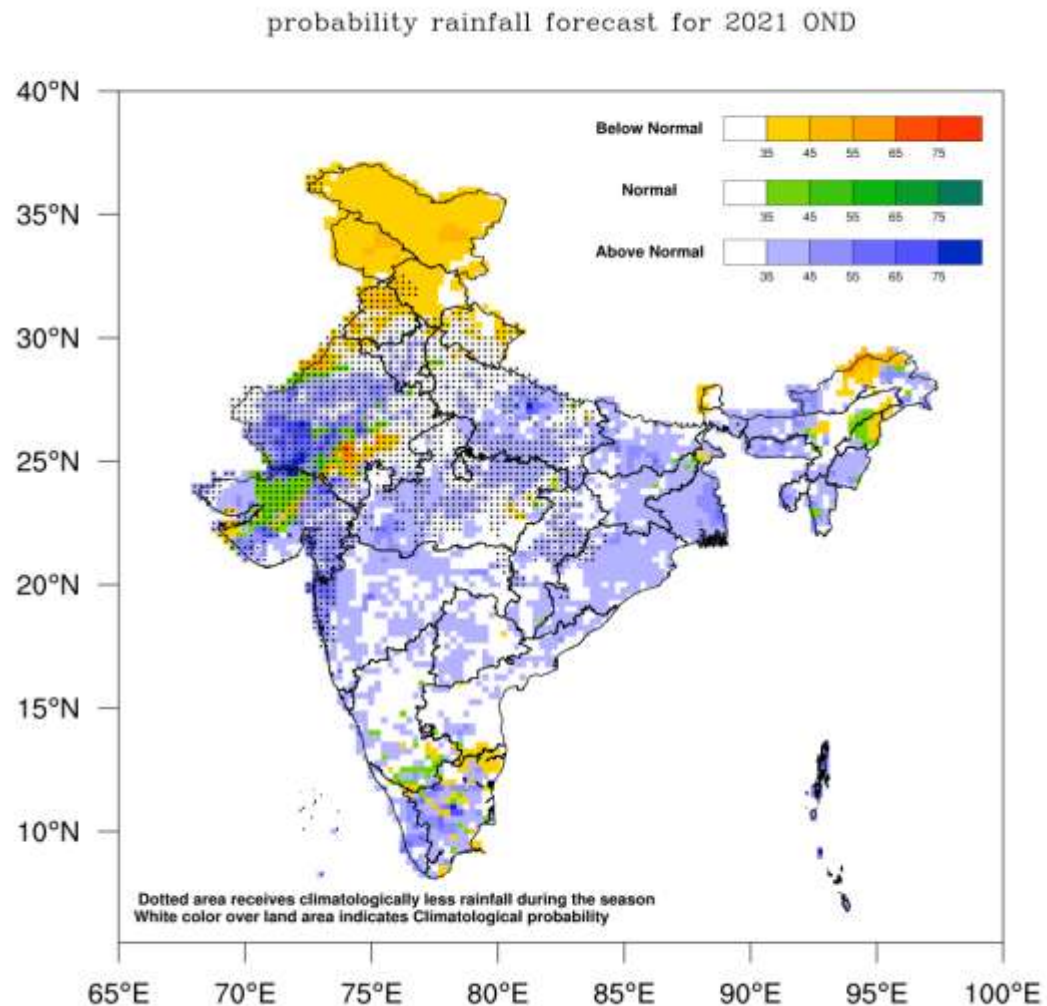
In addition to ENSO conditions over Pacific, other factors such as the Indian Ocean SSTs have also some influence on northeast monsoon. Since early June, a negative Indian Ocean Dipole (IOD) conditions are prevailing and as per the assessment of latest forecasts from various coupled models suggests the negative IOD likely to weaken during the coming months.

## **3. Probabilistic Forecast for the rainfall during October to December(OND) 2021**

The 2021 October to December (OND) rainfall averaged over the **south Peninsular India is most likely to be normal (89-111 % of LPA)**. The LPA of rainfall over the south Peninsular India during October to December season based on data of 1961-2010 is about 338 mm.

The spatial distribution of probabilistic forecasts for the tercile categories (above normal, normal and below normal) over the country for the OND season rainfall is shown in Fig.1. The spatial distribution suggests normal to above normal rainfall over most areas of south peninsular India. It is predicted that, below normal to normal rainfall probability is likely over many areas of north India and some parts of northeast India. Normal to above normal rainfall is most likely to experience over remaining parts of the country. The dotted area showed in the map climatologically receives very less rainfall

during October to December season and the white shaded areas within the land areas represent climatological probabilities.

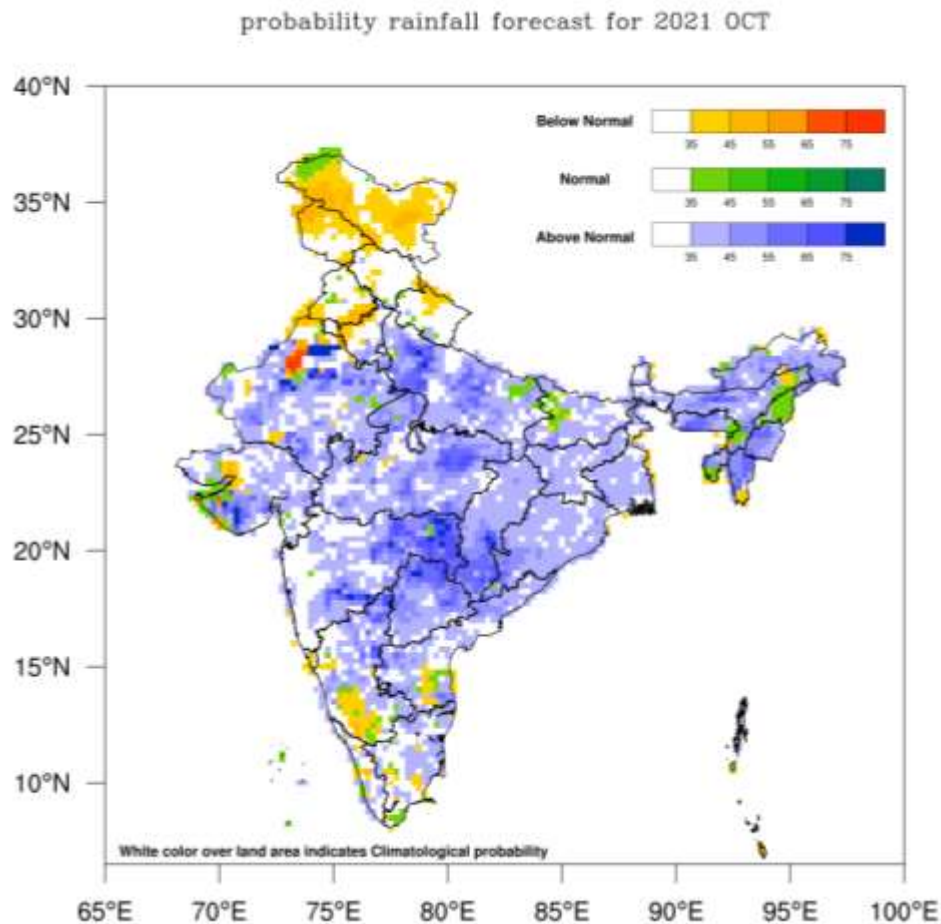


**Fig.1.** Probability forecast of tercile categories\* (below normal, normal and above normal) of rainfall for the 2021 October to December period over India. The figure illustrates the most likely categories as well as their probabilities. The white shaded areas within the land area represent climatological 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). The dotted areas receive low rainfall during the season and generally experience dry weather.

#### 4. Probabilistic Forecast for the rainfall during October 2021

The 2021 October rainfall averaged over the **south Peninsular India is most likely to be normal (87-113% of LPA)**. The LPA of rainfall south Peninsular India during October based on data of 1961-2010 is about 176 mm.

The spatial distribution of probabilistic forecasts for tercile categories (above normal, normal and below normal) over the country for the October rainfall is shown in Fig.2. The spatial distribution suggests normal to above normal rainfall over most parts of south peninsular India except few small pockets of the region. It is predicted that below normal to normal rainfall probability is likely over many areas of north and northwest India and some parts of peninsular India. Normal to above normal rainfall is most likely to experience over remaining part of the country. The white shaded areas within the land area represent climatological probabilities.



**Fig.2.** Probability forecast of tercile categories\* (below normal, normal and above normal) for the 2021 October 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).