



Government of India
Ministry of Earth Sciences (MoES)
INDIA METEOROLOGICAL DEPARTMENT

First Stage Forecast of Southwest Monsoon Season-2017 Rainfall

[IMD's ASSESSMENT SUGGESTS NORMAL SUMMER MONSOON RAINFALL]

1. Background

India Meteorological Department (IMD) issues various monthly and seasonal forecasts of rainfall for the southwest monsoon season (June to September). Operational forecasts for the southwest monsoon season rainfall are issued in two stages. The first stage forecast is issued in April and the second stage forecast is issued in June. These forecasts are prepared using state-of-the-art Statistical Ensemble Forecasting system (SEFS) that is critically reviewed and improved regularly through in-house research activities. Since 2012, IMD has been using the dynamical global climate forecasting system (CFS) model, which was developed under the Monsoon Mission. The original coupled ocean-atmospheric model framework of CFS was adopted from the National Centers for Environmental Prediction (NCEP), USA. The CFS model was further modified to provide improved rainfall forecasts over the Indian monsoon region through research efforts taken up under the Monsoon Mission.

The forecast for 2017 southwest monsoon rainfall over the country as a whole based on both the SEFS and the Monsoon Mission CFS (MMCFS) are presented here. IMD's SEFS model for the April forecast uses the following 5 predictors that require data monitored upto March.

S. No	Predictor	Period
1	The Sea Surface Temperature (SST) Gradient between North Atlantic and North Pacific	December + January
2	Equatorial South Indian Ocean SST	February
3	East Asia Mean Sea Level Pressure	February + March
4	Northwest Europe Land Surface Air Temperature	January
5	Equatorial Pacific Warm Water Volume	February + March

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

The weak La Nina conditions developed in the later part of the last monsoon season peaked in December 2016 and started weakening thereafter. Currently, neutral conditions are prevailing over the equatorial Pacific. The atmospheric conditions over the Pacific also reflect neutral El Nino conditions. The latest forecast from MMCFS indicates weak El Nino conditions to develop during the latter part of the monsoon season. However, there is no one to one

relationship between El Nino and Indian Monsoon. For example, during 34% of El Nino years, monsoon season rainfall was normal or above normal.

At present, neutral Indian Ocean Dipole (IOD) conditions are prevailing over the Indian Ocean. The latest forecast from the MMCFS indicates weak positive IOD conditions are likely to develop during the middle of the monsoon season and to persist for some more months subsequently. Positive IOD conditions are likely to be favorable for a normal/above normal monsoon.

As the extreme sea surface temperature conditions over the Pacific particularly El Nino conditions over the Pacific (El Nino or La Nina) and positive IOD development over the equatorial Indian Ocean are known to have strong influence on the Indian summer monsoon, IMD is carefully monitoring the sea surface conditions over the Pacific and Indian oceans.

3. Forecast For the 2017 Southwest monsoon Season (June – Season) rainfall over the Country as a whole

3a. Monsoon Mission Coupled Forecasting System (MMCFS) based Assessment

For generating the forecast for the 2017 southwest Monsoon season rainfall, atmospheric and oceanic initial conditions during March 2017 were used. The forecast was computed as the average of the 44 ensemble members. The forecast based on the MMCFS suggests that the monsoon rainfall during the 2017 monsoon season (June to September) averaged over the country as a whole is likely to be $96\% \pm 5\%$ of the Long Period Average (LPA).

3b. Forecast Based on the Operational Statistical Ensemble Forecasting System (SEFS)

Quantitatively, the monsoon seasonal rainfall is likely to be 96% of the Long Period Average (LPA) with a model error of $\pm 5\%$. Further, forecasts for the seasonal rainfall for the country suggest 38% probability for near normal rainfall scenario.

4. Summary of the Forecast for the 2017 southwest monsoon Rainfall

- 1. Quantitatively, the monsoon seasonal rainfall is likely to be 96% of the Long Period Average (LPA) with an error of $\pm 5\%$.**
- 2. Forecast assessment suggests 38% of probability for near normal monsoon rainfall**

IMD will issue the update forecasts in early June, 2017 as a part of the second stage long range forecast of monsoon rainfall. Along with the update forecast, separate forecasts for the monthly (July and August) rainfall over the country as a whole and seasonal (June-September) rainfall over various geographical regions of India will also be issued. By that time, more information on the evolution of El Nino and IOD will be available.
