

Ministry of Earth Sciences
INDIA METEOROLOGICAL DEPARTMENT

Long Range Forecast
For the 2016 Southwest Monsoon Season Rainfall

1. Background

India Meteorological Department (IMD) issues various monthly and seasonal operational forecasts for rainfall during the southwest monsoon season. Operational forecasts for the southwest monsoon season (June – September) rainfall are issued in two stages. The first stage forecast is issued in April and the second stage forecast is issued in June.

IMD's Ensemble Statistical Forecasting system for the April forecast uses the following 5 predictors.

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 Oceans

The El Nino conditions over equatorial Pacific Ocean that established in April, 2015 reached to strong condition in July and peaked in December, 2015. Thereafter, the El Nino conditions started weakening even though Sea Surface Temperatures over the Pacific Ocean are still above normal. The atmospheric conditions over the Pacific also reflect patterns consistent with the El Niño conditions. Analysis of previous data suggests that monsoon season rainfall over the country as a whole was deficient or below normal (<96% of LPA) during 65% of the El Nino years. However, during 71% of the years followed by El Nino years, monsoon was normal and above (≥96 % of LPA). The latest forecast from the Monsoon Mission Coupled Climate Model indicates that El Nino conditions to weaken to moderate to weak levels during the first half of the monsoon season and ENSO neutral conditions likely to get established thereafter.

At present, neutral Indian Ocean Dipole (IOD) conditions are prevailing over the Indian Ocean. The latest forecast from the Monsoon Mission Coupled Climate Model indicates positive IOD conditions are likely to establish during the middle of the monsoon season and weaken to neutral conditions thereafter.

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

3. Experimental Coupled Dynamical Model Forecasting System (Monsoon Mission Model)

Indian Institute of Tropical Meteorology (IITM), Pune, Ministry of Earth Sciences, has been coordinating and working along with different climate research centers from India and abroad on the development of a coupled model for the forecasting of Indian summer monsoon rainfall under the Monsoon Mission project. The latest high resolution research version of the Coupled Forecasting System (CFS) originally developed by the National Centers for Environmental Prediction (NCEP), USA has been used to generate experimental forecast for the 2016 southwest Monsoon season rainfall using the February initial conditions.

The experimental forecast based on the Monsoon Mission coupled dynamical model suggests that the monsoon rainfall during the 2016 monsoon season (June to September) averaged over the country as a whole is likely to be 111% ± 5% of long period model average (LPMA).

4. Summary of the ESSO-IMD's Operational long range Forecast for the 2016 Southwest monsoon rainfall

(a) Quantitatively, the monsoon seasonal rainfall is likely to be 106% of the Long Period Average (LPA) with a model error of ± 5%. The LPA of the seasonal rainfall over the country as a whole for the period 1951-2000 is 89 cm.

(b) The 5 category probability forecasts for the Seasonal (June to September) rainfall over the country as a whole is given below:

Category	Rainfall Range (% of LPA)	Forecast Probability (%)	Climatological Probability (%)
Deficient	< 90	1	16
Below Normal	90 - 96	5	17
Normal	96 -104	30	33
Above Normal	104 -110	34	16
Excess	> 110	30	17

India Meteorological Department will issue the update forecasts in June, 2016 as a part of the second stage forecast. 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 the four geographical regions of India will also be issued.
