Ministry of Earth Sciences (MoES)
India Meteorological Department

Long Range Forecast Update for the
2016 Southwest Monsoon Rainfall

HIGHLIGHTS

➢ Rainfall over the country as a whole for the 2016 southwest monsoon season (June to September) is most likely to be **ABOVE NORMAL** (>104% to 110% of long period average (LPA)).

➢ Quantitatively, monsoon season rainfall for the country as a whole is likely to be 106% of the long period average with a model error of ±4%.

➢ Region wise, the season rainfall is likely to be 108% of LPA over North-West India, 113% of LPA over Central India, 113% of LPA over South Peninsula and 94% of LPA over North-East India all with a model error of ± 8 %.

➢ The monthly rainfall over the country as whole is likely to be 107% of its LPA during July and 104% of LPA during August both with a model error of ± 9 %.

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1.   Background

India Meteorological Department (IMD) issues the operational long range forecasts for the southwest monsoon season (June-September) rainfall over the country as a whole in two stages; in April and in June. In June, in addition to the update for the forecast for the season rainfall over the country as a whole issued in April, forecasts for the monthly rainfall for July & August over the country as a whole, and forecast for the season rainfall for the 4 broad geographical regions of India (NW India, NE India, Central India and South Peninsula) are issued.

The update forecast for the southwest monsoon season (June-September) rainfall over the country as a whole is issued using a 6-parameter Ensemble Forecasting System. The 6 predictors used are: NE Pacific to NW Atlantic SST Anomaly Gradient (December + January), Southeast equatorial Indian Ocean Sea Surface Temperature (February), East Asia Mean Sea Level Pressure (February + March), Central Pacific (Nino 3.4) Sea Surface Temperature (March to May + tendency between March to May & December to February), North Atlantic Mean Sea Level Pressure (May) and Northcentral Pacific 850 zonal wind gradient (May).

2.   Sea Surface Temperature Conditions in the Pacific & Indian Oceans

The El Niño conditions over the equatorial Pacific prevailing since April, 2015 reached to strong level in July, peaked in December 2015 and started declining thereafter. The rapidly declining El Nino conditions became moderate in early April 2016, weak in early May and now

have turned to neutral ENSO conditions. Recent changes in the atmospheric conditions over the Pacific also reflect the weakening El Niño conditions. Latest forecast from IMD-IITM coupled model indicate ENSO neutral conditions are likely to continue and turn to weak La Nina conditions in the latter part of the monsoon season. There is about 50% probability of La Nina conditions to establish during the monsoon season. Most of the other models also suggest development of La Niña conditions during the latter part of the monsoon season.

Over Indian Ocean, the sea surface temperatures are warmer than normal over most parts except along the coast off central and south Africa. Currently neutral Indian Ocean Dipole (IOD) conditions are prevailing. The latest forecast from IMD-IITM coupled model indicates positive IOD conditions are most likely during early part of the monsoon season and same to turn to negative IOD during the latter part of the monsoon season.

3. Monsoon Mission Experimental Coupled Dynamical Model Forecast

The experimental forecast based on the ESSO-IMD-IITM coupled dynamical model suggest that the monsoon rainfall during the 2016 monsoon season (June to September) averaged over the country as a whole is likely to be 112% ± 5% of long period model average (LPMA). The experimental five category probability forecasts for the 2016 monsoon season rainfall over the country as a whole using the experimental dynamical prediction system are 0% (deficient), 0% (below normal), 18% (normal), 18% (above normal) and 64% (excess).

4. The second Stage Forecasts for 2016 Southwest Monsoon Rainfall

i) Seasonal (June-September) Rainfall over the country as a whole

Quantitatively, the season rainfall for the country as a whole is likely to be 106% of the long period average (LPA) with a model error of ±4%. The LPA rainfall over the country as a whole for the period 1951-2000 is 89 cm. Thus there is no change in the updated quantitative forecast from the first stage operational forecast issued on 12th April, 2016.

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

Category	Rainfall Range (% of LPA)	Forecast Probability (%)	Climatological Probability (%)
Deficient	< 90	**0**	16
Below Normal	90 - 96	**4**	17
Normal	96 -104	**33**	33
Above Normal	104 -110	**40**	16
Excess	> 110	**23**	17

ii) Season (June-September) Rainfall over Broad Geographical Regions
The season rainfall is likely to be 108% of LPA over North-West India, 113% of LPA over Central India, 113% of LPA over South Peninsula, and 94% of LPA over North-East India all with a model error of ± 8 %.

iii) Monthly (July & August) Rainfall over the country as a whole
The rainfall over the country as a whole is likely to be 107% of its LPA during July and 104% of LPA during August both with a model error of ± 9 %.