

INDIA METEOROLOGICAL DEPARTMENT

Long Range Forecast For 2010 South-west Monsoon Season Rainfall

1. Background

India Meteorological Department (IMD) follows a two-stage forecasting strategy for long range forecasting of the south-west monsoon rainfall over the country as a whole. The first long range forecast for the south-west monsoon season (June-September) rainfall is issued in April and the forecast update is issued in June.

From 2007 onwards, IMD has been using the following statistical models for preparing quantitative and probabilistic forecasts of the south-west monsoon rainfall (June – September) for the country as a whole:

- a) A 5- parameter statistical ensemble forecasting system requiring data up to March, for the first forecast in April.
- b) A 6- parameter statistical ensemble forecasting system requiring data up to May for the forecast update in June. Three of these 6-parameters are same as that used for April forecast.

For preparing the first stage forecast for the 2010 South-west monsoon rainfall for the country as a whole presented here, the 5-parameter statistical ensemble forecasting system has been used.

2. Operational Statistical Forecast System

In the IMD's Ensemble Statistical Forecasting system for April forecast, the following 5 predictors are used. The model error of the April forecasting systems is $\pm 5\%$.

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

3. Experimental Forecasts

IMD has an experimental dynamical forecast system. The experimental ensemble dynamical forecast for the 2010 south-west monsoon rainfall was computed as the ensemble average of 10 member forecasts with forecasted sea surface temperatures (SST) as boundary SST forcing.

In addition, IMD has taken into account the experimental forecasts prepared by the national institutes like Indian Institute of Tropical Meteorology, Pune, Indian Institute of Science, Bangalore, Space Applications Centre, Ahmedabad, National Aerospace Laboratories, Bangalore, Centre for Mathematical Modelling and Computer Simulation, Bangalore and National Centre for Medium Range Weather Forecasting, Noida. Operational/experimental forecasts prepared by international institutes like the National Centers for Environmental Prediction, USA, International Research Institute for Climate and Society, USA, Meteorological Office, UK, the European Center for Medium Range Weather Forecasts, UK, the Experimental Climate Prediction Center, USA, and World Meteorological Organization's Lead Centre for Long Range Forecasting - Multi-Model Ensemble were also taken into account.

4. El Nino Conditions over the equatorial Pacific

The El Nino conditions over equatorial Pacific that remained weak during mid June to October of 2009 started strengthening from late October and peaked in the 3rd week of December. From late December, the El Nino conditions have started weakening. The latest forecasts from a majority of the dynamical and statistical models indicate high probability for the present El Nino conditions to maintain till early part of the monsoon season and then weaken to become near neutral during the subsequent months. However, a few models indicate development of weak La Niña conditions by July-August 2010. It may be mentioned that as the lead time of the forecast increases there is considerable spread and uncertainty in the ENSO forecasts.

5. Forecast for the 2010 South-west monsoon rainfall

IMD's long range forecast for the 2010 south-west monsoon season (June to September) is that the rainfall for the country as a whole is likely to be Normal.

Quantitatively, monsoon season rainfall is likely to be 98% of the long period average with a model error of $\pm 5\%$. The Long period average rainfall over the country as a whole for the period 1941-1990 is 89 cm.

IMD will update the above forecast in June 2010 as a part of the second stage 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.
