

Press Release
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INDIA METEOROLOGICAL DEPARTMENT

Long Range Forecast Update For 2004 South-West Monsoon Season Rainfall

1. Background

In 2003, IMD had adopted a two-stage forecast strategy and introduced several new models for the Long Range Forecasts of South-West Monsoon Rainfall. The first stage forecasts for South-West Monsoon Season (June-September) rainfall for the country as a whole are issued in mid April using 8-Parameter Power Regression and Probabilistic Models. In the second stage, the forecast updates for South-West Monsoon Season (June-September) rainfall for the country as a whole are issued by end of June based on the 10-Parameter Power Regression and Probabilistic models. Along with the forecast update, a separate forecast for July rainfall over the country as a whole and forecasts for broad homogeneous regions of India are also issued.

2. Forecasts issued on 15 April 2004

The first stage forecasts for the 2004 South-West monsoon season rainfall (June-September) for the country as a whole were issued on 15 April. These were as follows:

- a) The 8-Parameter Power Regression Model indicated that the rainfall for the country as a whole during the 2004 South-West Monsoon Season (June-September) is likely to be 100% of the Long Period Average (LPA) with a model error of $\pm 5\%$.
- b) For the 2004 South-West Monsoon Season (June-September) rainfall for the country as a whole, the 8-Parameter Probabilistic model indicated the following probabilities.

4% for deficient rainfall (less than 90% of LPA)

16% for below normal rainfall (90% to 97% of LPA)

58% for near normal rainfall (98% to 102% of LPA)

18% for above normal rainfall (103% to 110% of LPA)

4% for excess rainfall (more than 110% of LPA)

3. Second Stage Forecasts

The following forecasts are being released now:

- a) *Quantitative forecast update for the South-west Monsoon Season rainfall for the country as a whole using the 10-Parameter Power Regression Model.*

The new 10-Parameter model uses two concurrent parameters in June besides the eight parameters used for April forecasts. The model error is $\pm 4\%$. This makes it possible to fine-tune the April forecast and provide an update enabling mid-season corrective actions to be taken, if required.

- b) *Probabilistic forecast update for the South-west Monsoon Season rainfall for the country as a whole using the 10-Parameter Probabilistic Model.*

This model indicates probabilities for rainfall to fall in each of five priori defined categories: deficient, below normal, near normal, above normal and excess.

- c) *Quantitative forecast for the July rainfall for the country as a whole using a 8-Parameter Power Regression Model.*

For this purpose, a separate 8-Parameter Power Regression model with the model error $\pm 9\%$ is used.

- d) *Quantitative forecasts for the South-west Monsoon Season rainfall for four broad homogenous regions of India*

From 1999 to 2003, IMD issued forecasts for 3 broad homogenous regions (Northwest India, Northeast India and Peninsula). This year IMD is issuing forecasts for 4 broad homogenous regions of India. The four regions are:

Northwest India – Jammu and Kashmir, Himachal Pradesh, Punjab, Rajasthan, Haryana, Chandigarh, Delhi, Uttaranchal and Uttar Pradesh.

Northeast India – Arunachal Pradesh, Meghalaya, Assam, Nagaland, Manipur, Mizoram, Tripura, Sikkim, West Bengal, Bihar and Jharkhand.

Central India – Gujarat, Madhya Pradesh, Chattisgarh, Maharashtra, Goa and Orissa.

South Peninsula – Andhra Pradesh, Karnataka, Tamil Nadu, Kerala, Lakshadweep and Andaman and Nicobar Islands.

For this purpose, individual Power Regression Models with model error of $\pm 8\%$ have been developed.

4. Onset and Advance of the Monsoon in 2004

This year, the South-West Monsoon advanced into south Andaman Sea and South-east Bay of Bengal on 13 May. South-West monsoon advanced over Kerala on 18 May, almost 2 weeks in advance and over Karnataka on 23 May. However, monsoon did not advance further till 1 June. Afterwards, monsoon steadily advanced northwards. By 18 June, monsoon had advanced into entire Arabian Sea, most parts of Gujarat State, entire Maharashtra, Chattisgarh, Jharkhand, Bihar, most parts of Madhya Pradesh and some parts of Uttar Pradesh.

So far, monsoon rainfall activity over the country has been good. Rainfall for the country as a whole for the period 1 June to 23 June 2004 was 21.2 % above its LPA. Out of the 36 meteorological sub divisions, 31 sub divisions received excess /normal rainfall and remaining 5 sub-divisions received deficient rainfall.

5. Concurrent Global Circulation Features

The 10-Parameter Power Regression Model uses eight parameters already known in April and two parameters which need data up to June-end. The speed of the easterly winds over the South Indian Ocean in June is used as the ninth parameter. The intensity of this easterly wind regime is an indicator of the strength of the cross-equatorial flow, which is responsible for bringing in the South-west monsoon currents over India. In June 2004, this parameter is favourable.

The tendency of SST's over Nino3.4 region from January to June, which is used as the tenth parameter,

however, is unfavourable this year.

At present Sea Surface Temperature (SST) anomalies over the Pacific Ocean suggest neutral conditions. Even though central Pacific Ocean had shown a tendency of slight warming since April 2004, the latest El Nino predictions suggest higher probability for near neutral conditions for the next 3-4 months. Therefore, the adverse effect of El Nino on 2004 monsoon is not expected. However, the likely evolution of neutral conditions of El Nino, remains a matter of uncertainty and IMD is carefully monitoring the developments.

6. Experimental Dynamical Prediction

After the failure of Long Range forecast in 2002, IMD had taken an initiative to implement a dynamical seasonal prediction system for the Long Range forecast of South-West monsoon rainfall. Under the collaborative programme between IMD and Indian Institute of Science, Bangalore, now a dynamical prediction system has been implemented at the National Climate Centre, IMD, Pune. An experimental forecast for 2004 July rainfall has been made with the observed SST data of May. Five ensemble predictions were made using the atmospheric data of 1-5 May. The experimental predictions suggest near normal rainfall over the country in July 2004. However, dynamical models at present do not show satisfactory skill in seasonal predictions of South-West monsoon rainfall over India. More research work is needed before the dynamical model can be made operational and IMD is working hard to achieve this goal in near future.

7. Forecast Updates for 2004

(i) South-West Monsoon Season Rainfall

IMD's Long Range Forecast update for the 2004 South-West Monsoon Season (June-September) is that for the country as a whole the seasonal rainfall is likely to be 100% of the Long Period Average (LPA) with a model error of $\pm 4\%$.

IMD's updated probabilistic forecasts for the 2004 South-West monsoon season for the country as a whole are:

- 3% for deficient rainfall (less than 90% of LPA)
- 20% for below normal rainfall (90-97% of LPA)
- 45% for near normal rainfall (98% to 102% of LPA)
- 25% for above normal rainfall (103% to 110% of LPA)
- 7% for excess rainfall (more than 110% of LPA)

ii) July rainfall

Rainfall in the month of July 2004 for the country as a whole is likely to be 98% of its LPA with a model error of $\pm 9\%$.

iii) Rainfall over homogenous regions

Over the four broad homogenous regions of the country, rainfall for the 2004 South-West Monsoon Season is likely to be 103% of LPA over North-West India, 96% of LPA over North-East India, 103% of LPA over Central India and 97% of LPA over South Peninsula, all with a model error of $\pm 8\%$.
