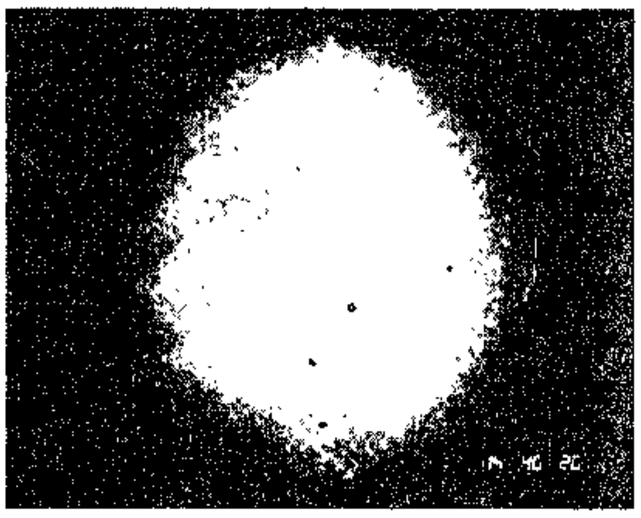

Figure 2. An example of the calcium K-line filtergram of the Sun, taken on 8 January 1990. The network pattern can be seen clearly. Also seen are other features associated with solar activity, like sunspots (dark spots) and bright emission areas surrounding sunspots, called plages.

tain enough material for studying the process of organization of active regions on the Sun.

The permanent Indian station at Maitri in Antartica is on latitude 70°45′39″S and longitude 11°44′49″E. The team selected a site for the telescope from where the Sun can be observed for maximum number of hours on a given day. The solar telescope was designed and built in the Indian Institute of Astrophysics. The converging beam from the objective of the telescope entered a narrow-band K-line filter mounted on a Minolta X-700 camera. This camera had the facility to record automatically the epoch of every exposure on a corner of each frame of the filtergram. The team had erected the telescope by 6 January. On the next three days, during the available sunshine, alignment and testing were done. During the total stay of about 50 days, there were 10 full clear days, out of which there were five days with negligible wind. It was possible to photograph the Sun through the K-line filter on seven days. On each day sunshine at the telescope was available for 20.5 hours during the second week of January and for about 18 hours towards the end of January. The filtergrams obtained show sunspots, plages and the network pattern, and provide a good collection for study.

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Monsoon forecast proved correct

Since 1988, the India Meteorological Department (IMD) has been issuing its long range (seasonal) forecast of southwest monsoon (June to September) according to the technique developed by IMD scientists working with Vasant Gowariker. The basic technique has been described by Gowariker *et al.*[1] in a paper in *Mausam* and it continues to be subjected to regular scrutiny and further refinement. While the forecast in 1988 was essentially in qualitative terms, that for 1989 gave a quantitative figure for the seasonal rainfall for the country as a whole. The technique was further refined so that in 1990, it was possible to issue a 'tentative' long-range forecast in qualitative terms as early as February 1990 and the same was confirmed (with quantitative details) in May 1990—the traditional time when the long-range forecast for the ensuing southwest monsoon is issued by IMD to the user agencies and the media.

It is a matter of considerable satisfaction to IMD that the seasonal forecasts of the southwest monsoon according to the new technique have turned out to be accurate for all the three years since the technique was introduced in 1988.

Earlier this year, there was scientific correspondence between Gopinathan

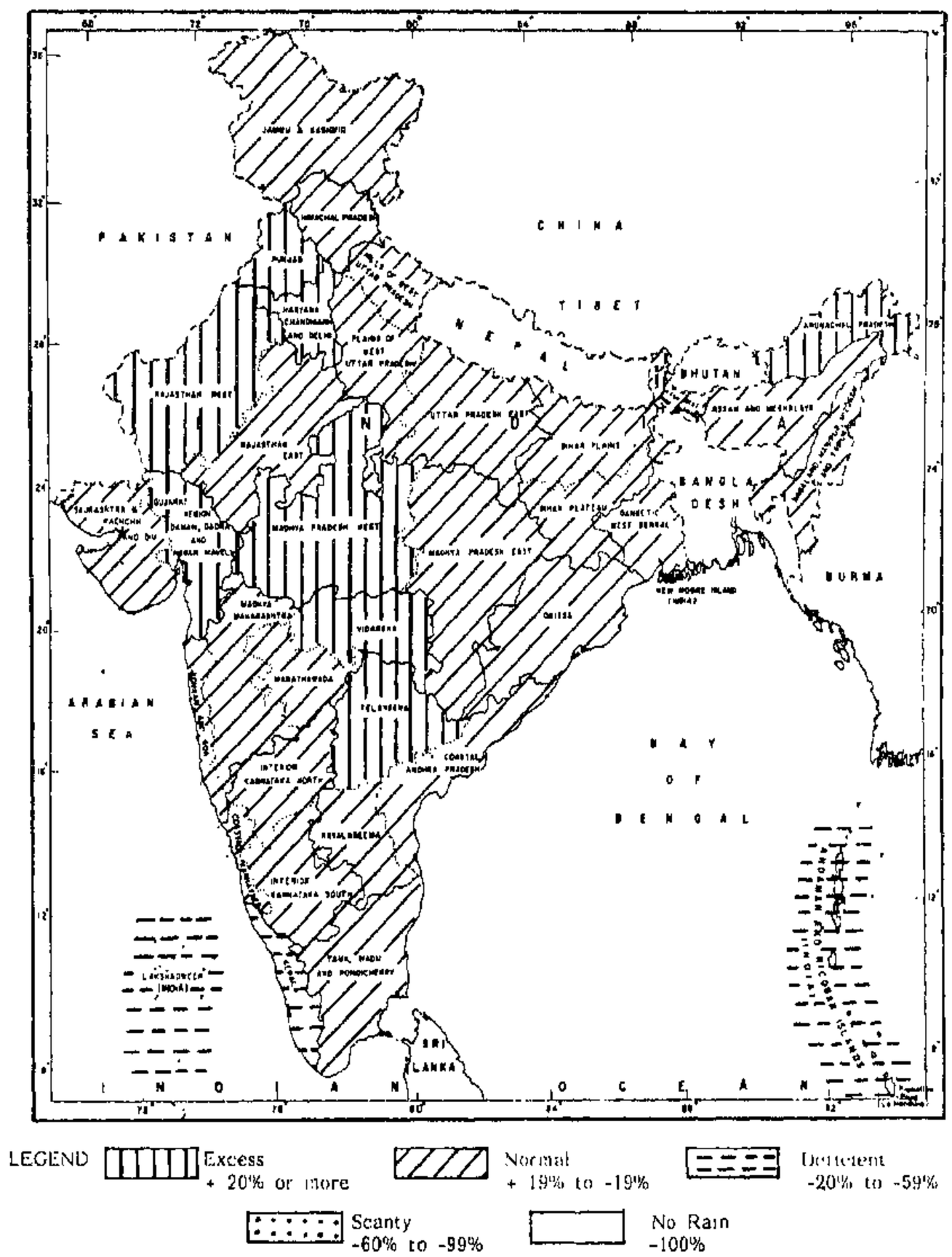

Figure 1. Cumulative rainfall for the period 1 June 1990 to 30 September 1990.

Table 1.

IMD forecast	Actual performance of monsoon 1990
Total rainfall for the season (June to September 1990) for the country as a whole: 101% of the long period average value with model error within ±4%, that is, within 97% to 105% of the long period average value.	Season's total rainfall for the country as a whole: 106% of normal.
Over 80% of the 35 meteorological sub-divisions likely to receive normal or excess.	Meteorological sub-divisions with normal or excess rainfall: 91% (32 out of 35).
The country would have another fine monsoon year.	Very good monsoon indeed.

and Sastry[2] and Gowariker and Thapliyal[3] regarding IMD's long-range forecast for the 1990 southwest monsoon. The actual performance of the 1990 southwest monsoon *vis-a-vis* the forecast issued by IMD is indicated in Table 1.

Figure 1 shows the season's total rainfall distribution over the 35 meteorological sub-divisions. The week by week cumulative rainfall position for the country as a whole can be judged from Figure 2. In fact, these two figures are good indicators of the space and time distribution of rainfall during 1990 southwest monsoon season (June to September 1990).

The above presentation brings out the following special features of the 1990 southwest monsoon:

Over 95% of the Indian landmass received normal to excess rainfall.

Rainfall was very well distributed in time and space.

There were no major floods and there was no meteorological sub-division in the 'Scanty Rain' category.

The three meteorological sub-divisions with sub-normal rainfall (Kerala, Lakshadweep and Andaman and Nicobar Islands) were only marginally deficient.

In northwest India, monsoon rains commenced about two weeks ahead and the monsoon withdrew about 2 weeks later than the normal dates—resulting in a welcome prolonging of rainy season in the traditionally deficient areas, such as Rajasthan and Gujarat.

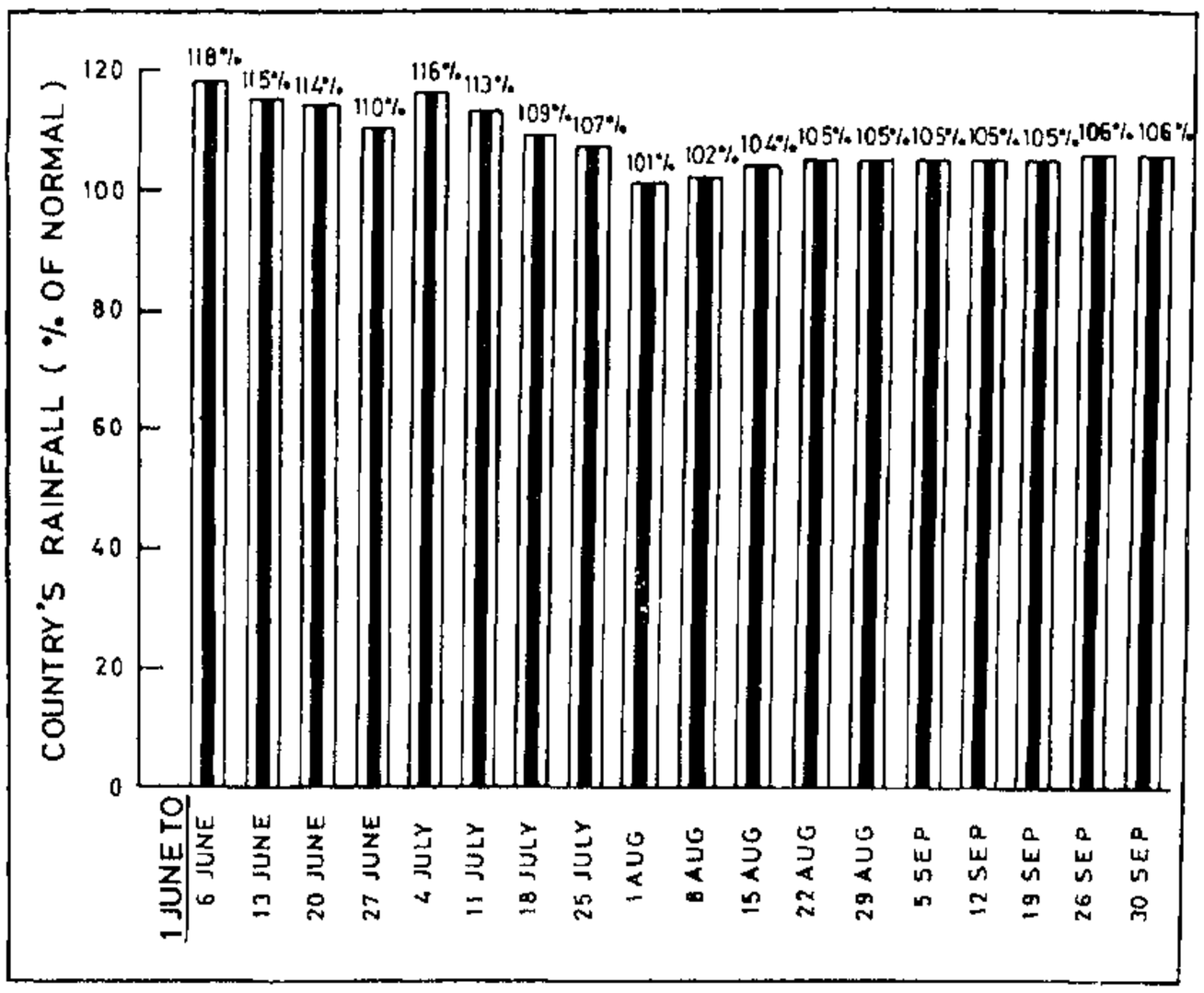

Figure 2. Week by week cumulative rainfall position from 1 June 1990, for the country as a whole.

The 1990 monsoon ranks as the third best during this decade (after 1988 and 1983 monsoons).

The year 1990 so far

With above normal rainfall during the Winter (January and February 1990), pre-monsoon (March to May 1990), and southwest monsoon (June to September, 1990) for the country as a whole, and with no major floods, the year 1990 has been a very good rainfall year so far.

1. Gowariker, V. *et al.*, *Mausam*, 1989, 115.
2. Gopinathan, C. K. and Sastry, J. S., *Curr. Sci.*, 1990, **59**, 394.
3. Gowariker, V. and Thapliyal, V., *Curr. Sci.*, 1990, **59**, 396.

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