

Letters to the Editor

551·525 (543·1) "234-1970"

UNUSUALLY LOW NIGHT TEMPERATURE AT NAGPUR IN NOVEMBER 1970

1. The lowest temperature of 7.0°C in the last five decades for the month of November was recorded at Nagpur Airport on 29 November 1970. Earlier lowest record for Nagpur was 6.7°C on 30 November 1912.

On 29 November, the minimum temperature fell by 3°C , from previous day's value. The thermometer registered a fall of temperature of approximately 2.5°C , in about 15 minutes time between 0530 to 0545 IST (about an hour before usual sunrise time) on that day. Surface wind which was NW/5 kmph 2-3 hours earlier, became almost calm at about 0520 IST and continued to be so till 0700 IST. Such a drop in temperature within such a short time and that too ahead of the usual sunrise time is rather unusual. The attendant surface and upper air features which led to cold wave conditions at Nagpur on 29 November 1970 are discussed in the following paragraphs.

2. A well-marked low pressure system lay on 29 November over southwest Bay off Tamil Nadu-Sri Lanka coasts. Also, a deep depression which moved westwards from southeast Arabian Sea lay over southwest Arabian Sea off Somalia on 29th. These were causing an incursion of cold and dry northerly to northeasterly currents at lower levels accentuating the anticyclonic cell over central India.

3.1. *Passage of upper air trough* — In the middle and upper troposphere, a well-marked trough in westerlies was observed moving from west and passing through central parts of India between 28 and 29 November. The trough line at 500 mb on 28th (00 GMT) was running from Bareilly to Aurangabad through Hoshangabad. Many places in west Madhya Pradesh and Rajasthan reported minimum temperatures appreciably below normal. Bhopal, close to the trough line on this day recorded minimum temperature 7°C which was 5°C below normal. On 29th (00 GMT) the trough at 500 mb shifted eastwards and was close to and east of Nagpur running through Gorakhpur, Umariya, Honamkonda and Cuddapah.

3.2. *Vertical time-section of Nagpur*—In the vertical time-section chart of Nagpur, the above trough could be clearly seen on 29th extending from upper troposphere to 700-mb level. Jet maximum passed over the station on 28th around 230 mb. As could be seen from the departures, markedly cold air was present in mid-tropospheric levels between 28 to 30 November with maximum depth and intensity on 29th morning. -9°C was the temperature departure at 500 mb on this day. There was also another layer of cold air in the lower troposphere with -9°C departures at 850-mb level on 29th. With the passage of the trough to the east of Nagpur, the depth of cold air from ground to 500-mb level began to shrink and was ultimately replaced by warmer air on 1 December.

Temperature changes in upper air during the period 26 November to 1 December are shown in Fig. 1. Marked fall in temperature (-6°C) in mid-tropospheric level (500 mb and 400 mb on 28 and 29 November) followed by marked rise ($+5^{\circ}\text{C}$) on 30th morning may be seen clearly although the temperature fall at lower levels was not significant.

3.3. *Surface pressure and dew point temperature*—The highest value of sea level pressure in the spell was recorded at 00 GMT of 29 November. The lowest value of dew point temperature of 2°C at the surface was also recorded in the early morning of 29th.

From the progression of 5°C dew point isopleth on sea level chart (03GMT) between 26 to 29 November (diagrams not reproduced) it could be seen that the cold and dry air from north which penetrated west Madhya Pradesh and Vidarbha on 27-28 November extended further into east Madhya Pradesh and north coastal Andhra Pradesh on 29th. Occurrence of very low dew point temperatures at the surface and also relatively low mixing ratio at 850/700 mb on 29 November was suggestive that air over Nagpur was very dry with the passage of the trough resulting in low night temperature. This is in accordance with the findings of Rao and Srinivasan (1969).

4. From the foregoing paragraphs, it would appear that the sudden drop in night temperature on 29 November reaching almost lowest recorded value for the month may be accounted for to the

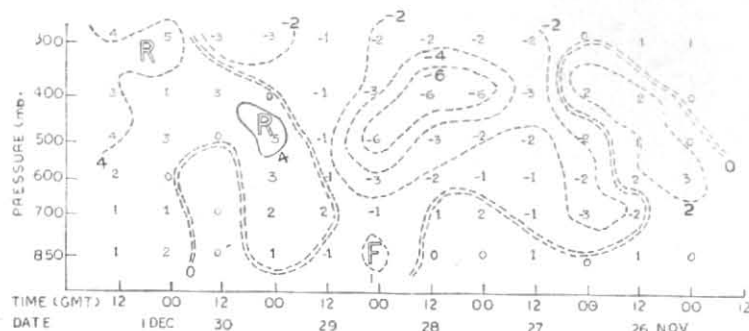


Fig. 1

Temperature changes

marked incursion of cold and dry north to north-easterly currents at lower levels over central India accentuating the anticyclonic cell over the area.

aided by the passage of the upper air trough which was an additional important factor in increasing the advection of cold air.

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February 5, 1971

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REFERENCE

Rao and Srinivasan

1939 *Forecasting Manual*, Rep, III 1-1-1., p. 30.