

Letters To The Editor

PREDICTION OF MINIMUM TEMPERATURE AT DELHI DURING WINTER FROM THE TEMPERATURE OF THE PREVIOUS NIGHT

When the prediction of the minimum temperature is based on the previous day's morning observations, there is a period of heating during the day and a period of cooling during the night in the intervening period. The actual minimum temperature obtained on the following early morning thus depends both on the magnitude of the rise of temperature in the day time and the magnitude of the fall of temperature during the night time. The uncertainties in the minimum temperature, that are caused by the daytime effects, are reduced if the prediction of the minimum temperature, required for specific purposes, can be based on later data. Previous workers have dealt with the problem of prediction of the morning minimum temperature during the winter from the temperature and humidity conditions prevailing during the previous afternoon. Gold (1934), Mackenzie, Boyden (1937), Barkat Ali and Naqvi (1941), Narasimhan and Ramdas (1937), Chakravorty (1950) have evolved different kinds of formulae representing the relationship of early morning minimum temperature to the previous afternoon temperature and humidity conditions. These methods have the limitation, *viz.*, they do not take into consideration the changed conditions that might develop after sunset on previous day.

A further simplification is expected to result if the early night temperature can be used for prediction of the minimum temperature, because in that case the uncertainties due to the daytime conditions are absent. Conditions in the early part of the night also gives a better idea as to whether clouds will appear at night, or the daytime clouding

will disappear or persist at night. All these facts are helpful for the better assessment of the minimum temperature.

With a view to find out whether early night conditions of temperature and cloudiness give any better indication of the next morning's minimum temperature during winter than the afternoon factors, the data of December and January for the 4 years 1950-53 have been studied in this note. Fall of temperature between 2100 IST at night and the early morning minimum temperature were tabulated from the thermograms of New Delhi for all days during the above period. The general conditions regarding clouding during the night and early morning were also noted down.

Table 1 shows the frequency of the fall of temperature from 2100 IST to the time of the next morning's minimum temperature for the month of December.

The fall in temperature is affected by a large number of factors each contributing to a varying extent, the effect of the presence or absence of clouds being by far the most. The fall of 7° F or more is observed on those occasions when the nights and early mornings are cloudless or have mainly high clouds. Thus, the fall of 7° F or more may be made to form a group of the non-cloudy days. Temperature falls of less than 7° F may be made to form the other group of rather cloudy days. The fall of 6° F is, however, more of a transitional type which is observed on cloudy or non-cloudy days. The fall of 5° F or less occurs when low and medium clouds prevail at night and early morning.

It will be seen from the frequencies under Group I of non-cloudy days that the number of occasions when the fall of temperature is within $\pm 2^\circ\text{F}$ of 9°F constitute 93 per cent of the group. Similarly, under the cloudy group,

TABLE 1

Frequency of fall of temperature between 2100 IST and time of the minimum temperature at New Delhi for December 1950-53

Fall of Temp., °F	Group I								Group II					
	14	13	12	11	10	9	8	7	6	5	4	3	2	1
No. of days	1	2	5	10	25	35	22	11	5	3	0	0	5	0
	93 % within $\pm 2^\circ$ of 9°F								100 % within $\pm 2^\circ\text{F}$ of 4°F					

TABLE 2

Frequency of fall of temperature between 2100 IST and the time of minimum temperature at New Delhi for January 1950-53

Fall of Temp., °F	Group I								Group II					
	14	13	12	11	10	9	8	7	6	5	4	3	2	1
No. of days	1	5	7	24	16	18	18	10	11	4	4	2	2	2
	93% within $\pm 2^\circ\text{F}$ of 10°F								89 % within $\pm 2^\circ\text{F}$ of 5°F					

the percentage of occasions when the fall is within $\pm 2^\circ\text{F}$ of 4°F constitute the entire group.

Table 2 gives similar frequencies for the month of January.

Here the non-cloudy group seems to have an average fall of about $10^\circ\text{F} \pm 2^\circ\text{F}$ when the cloudy group has a fall of $5^\circ\text{F} \pm 2^\circ\text{F}$, the intervals specified by these limits covering 90 per cent of the occasions.

In the case of Delhi during the winter months of December and January, the author found it, in practice, quite useful to follow the simple rule that the early morning's minimum temperature is likely to be 9 or 10°F below the 2100 IST temperature on clear nights and will be 4 or 5°F lower than the 2100 IST temperature in cloudy nights.

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March 31, 1955

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