

Letters To The Editor

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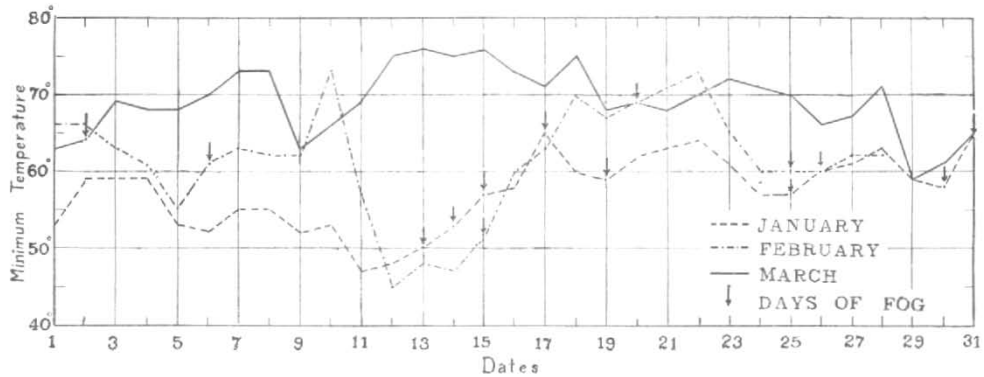
ON THE INCIDENCE OF FOG DURING WINTER IN CALCUTTA AND NEIGHBOURHOOD

Except in hilly regions, where very low fracto-nimbus clouds at times settle right down to the surface and give rise to fog conditions during rains, incidence of typical ground fog in India is, as a rule, confined to the winter season, and chiefly to stations in and near the main river valleys of northern India. A careful examination of the meteorological conditions which lead to the development of fog in this season, particularly over the Gangetic valley, in which are situated the three international airports of Delhi, Calcutta and Allahabad, is, therefore, of considerable interest from the point of view of aviation.

As is well known, the principal controlling factor of weather over north India during winter is the periodical march across the country, of western disturbances or low pressure waves affecting the normal anti-cyclonic circulation of $P_c T_c$ air over northwest and central India. While the incidence of fog over the area is, as in the case of other weather features, associated in one way or the other with these western disturbances, an important point to be borne in mind in this connection—and this is what is intended to be emphasised particularly in this note—is that the synoptic features which give rise to fog in the lower Gangetic valley, especially in the neighbourhood of Calcutta, are substantially different from those which cause fog in the Punjab and the greater part of Uttar Pradesh. To state briefly, the fundamental difference is that whereas, in the majority of cases, fog occurs in the Punjab and neighbouring regions in the rear of western disturbances, especially those which give a fair amount of precipitation, and the fog in these areas is the result usually of replacement of $T_c T_m$ or T_m air, which had been drawn in there temporarily under the influence of the disturbances, by the normal $P_c T_c$ air of

the terrain, fog in the deltaic Bengal area occurs in most cases far ahead of a western disturbance, and in some instances, when it is as far as 500 miles or more to the west of Bengal. Also, in contrast to the former case, fog in Calcutta or neighbourhood is the result generally of the incursion of $T_c T_m$ air in a shallow layer round an anti-cyclonic cell over the north Bay of Bengal, in place of the pre-existing $P_c T_c$ air at the surface, which still continues in the upper layers. Experience has shown that occasions are very rare indeed of thick fog developing in the Gangetic West Bengal in association with the passage of a cold front of a western disturbance, although this is the predominating feature of fog in the upper Gangetic valley. If a frontal association is to be indicated, fog in Calcutta may more correctly be described as of a 'warm' rather than of a 'cold' front type, although the associated warm front is, as a rule, not the typical warm front of the main western disturbance, but is a subsidiary one formed between the stagnant $P_c T_c$ air over Chota Nagpur and Orissa and the shallow layer of $T_c T_m$ air over south Bengal. In fact, by the time the western disturbance or its secondary approaches close enough to Bengal to cause it to fall within its warm sector, with $T_c T_m$ air in a fairly deep layer, conditions cease to be favourable for formation of fog and the usual feature of weather then is low stratus or stratocumulus clouds dissipating gradually by noon.

On examining the question of incidence of fog from the point of view of its association with day to day change in night temperature, it is seen that fog in Calcutta is usually associated with the rising trend of the minimum temperature, and that occasions are rare when fog occurs with a fall in the night minimum. The accompanying curve which gives the day to day minimum temperatures for January to March 1950, with the days of fog marked thereon, will serve to illustrate this feature of incidence of fog in Calcutta. It is seen from experience that the most favourable days are the second and third days of minimum temperature rise, and that if this tendency persists for a longer period



and causes the night temperature to reach a value much above normal, conditions become unfavourable again for the development of fog.

Fog of the type as we normally have at Calcutta, that is ahead of a western disturbance, sometimes extends northwards to stations, such as Patna and Gaya, and occasionally as far as Allahabad. The synoptic situations which are most favourable for such an extension are those in which, under the influence of the western disturbance which may still be over Rajasthan or the Punjab, we find an Ely stream running up the Gangetic valley and into this is fed the $T_c T_m$ air across the Gangetic West Bengal. On occasions when this feed occurs in a fairly deep layer, upto a height of about 5000 ft or so, conditions at times become favourable for a chain of thunderstorms to develop over Uttar Pradesh, a feature of weather which has to be accounted for in a way quite different from the weather sequences which follow as a result of the progressive movement of the typical warm and cold fronts of a western disturbance.

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