

LOW LEVEL CONVERGENCE RELATED TO FORMATION OF LOW CLOUDS IN MONSOON SEASON

Various authors in their studies of occurrence of low clouds/fog over Begumpet, Palam and Calcutta have suggested that the horizontal convergence in the surface layer has a positive influence on the formation of fog/low clouds. Natarajan (1962) studied the conditions for occurrence of fog or stratus clouds during the winter (1960-61) over Begumpet and inferred that given other well known favourable conditions, horizontal convergence in the surface layer had a positive influence on the formation of fog or low stratus clouds. Gangopadhyaya and George (1959) had also suggested that horizontal convergence in the surface layer was an additional factor which favoured the formation of radiation fog or stratus cloud at the Dum Dum in the winter season. An attempt has been made in this note to extend this approach to the study of the incidence of low stratus clouds in the southwest monsoon over Dundigam Airfield, Hyderabad.

2. During the monsoon months, June to September, the drifting of low stratus clouds from a westerly direction in the early morning hours is a frequent occurrence and a source of aviation hazard at this airfield. Forecasting the occurrence of those clouds and issue of timely warnings to aircraft is therefore an operational necessity. To meet this challenge a search for an objective or semi-objective method of prediction has been undertaken and this note relates to one aspect of the study.

3. The hourly current weather observations recorded at the Dundigal Airfield Meteorological

Observatory during the monsoon months of 1974, 1975 and 1976 have been used in this study. Out of the total number of 366 days significant amounts of low clouds (4/8 or more) occurred over the airfield in the morning hours on 178 days. These drifted over the airfield between 00 GMT and 02 GMT and lifted up or dissipated by 0400 GMT except during active monsoon conditions, when they persisted, much longer.

4. Values of horizontal convergence of wind over Hyderabad and adjoining areas were computed by Bellamy's triangle method as modified by Graham. Winds at 3000 ft a.s.l. in respect of Nagpur Gadag and Gannavaram based on 1200 GMT observations of the previous day were made use of and the values of convergence obtained were assumed to apply with a fair degree of validity over the local area. When wind observations were not available the values were approximated from the streamlines on upper wind charts. A scatter diagram (Fig.1) was prepared with convergence value on the X-axis and wind direction on the Y-axis. It is seen that the probability of occurrence of low clouds increases when there is convergence at 3000 ft a.s.l. With convergence value more than 3×10^{-2} /hour and wind direction between 240° and 340° the probability of occurrence of low clouds is 85 per cent. On the other extreme, with a divergence value of 3×10^{-2} /hour or more the probability of occurrence of low clouds falls to 30 per cent. The result, though encouraging, is not adequate for operational forecasting which needs an objective prediction technique which could indicate 100 per cent probability of *no* low clouds on some days and 100 per cent probability of low clouds on some other days with only a small number of marginal days in between the two extremes.

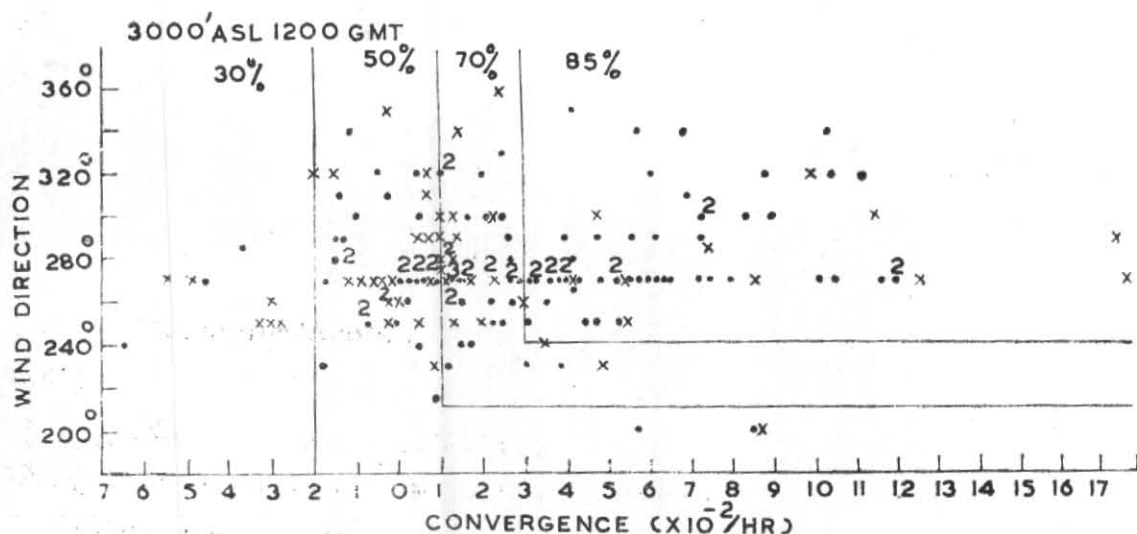


Fig. 1. Scatter diagram

5. In spite of the drawbacks mentioned above the study seems to indicate that horizontal convergence is a factor which has a definite positive influence on the formation of low clouds in the monsoon season.

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