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THE IDENTIFICATION AND REPORTING OF CUMULUS AND CUMULONIMBUS CLOUDS

In an interesting paper (Scorer 1963) and subsequent discussions (Scorer 1964) on cloud nomenclature, Scorer has called attention to the fact that the international cloud classification attaches too much importance to the appearance of clouds and made a plea for a fresh approach to the question. He has proposed a terminology which takes into account the physical processes involved in the formation of clouds and thus lead to a more rational classification.

As practical difficulties often arise in regard to identification of clouds even according to present classifications, it may be worthwhile discussing some basic aspects. In the present note consideration is cofined to Cumulus and Cumulonimbus clouds only.

Cumulonimbus clouds come for special attention in aeronautical meteorology in view of the turbulence and other aviation hazards associated with this cloud. However, a sufficiently clear and unambiguous definition of *Cb* clouds has not been evolved as yet. Available descriptions (Amer. met. Soc. 1959 and WMO 1956, 1957) meant to serve as guides for observers fall short of the practical requirement due to the following factors. Some of the observational difficulties apply equally to *Cu* and *Cb*.

(*a*) In a sky overcast with low clouds, as in the Indian monsoon conditions for example, it is often not possible to judge the type of the cloud above from the mere appearance of the visible base.

(*b*) The above difficulty is aggravated when the base becomes invisible due to rain or fog and during night.

(*c*) Pilots largely depend upon the reliability of ground-based observations for making a safe landing and take-off, especially when their aircraft are not equipped with radar facility. This imposes an unavoidable commitment on the ground observers, despite recognised limitations of observing techniques regarding the correct *identification* of clouds. Thus, it would be totally unacceptable if, judging from the appearance of the base, a *Cb* cloud is reported as Stratus.

(*d*) It is not always possible, especially during night, to judge the sequence of cloud development for ensuring accurate identification of clouds. Experience shows that in the monsoon the low cloud layer (serving as a barrier to direct, visual observation of layers or build-ups aloft) can persist for long periods, and even after *Cb* clouds have actually formed they can defy detection (except on radar) by not producing lightning or thunder for considerable periods.

A surface observation has been classified as one "made by an observer at or near ground or sea level and *using only insruments at the same level*" (WMO 1954). By extending the notion of "instruments near ground" to include the weather radar, it is possible to get a little closer to the problem of objective identification of *Cb* clouds. However, in view of the continuing uncertainties in regard to the interpretation of precipitation echoes seen on radar PPI (assuming that high grade radars with RHI, REI and contour position facilities are not available), a certain amount of reserve is called for in reporting *Cb* clouds on the basis of radar reports alone.

The main difference between *Cu* and *Cb* clouds has been stated to be that the latter has a fibrous structure (sometimes an ice anvil) while the former does not reveal any fibrous structure (Amer. met. Soc. 1959). It is doubtful whether this criterion has any practical value for, referring again to the monsoon conditions, the so-called Cumulus

clouds often have their tops well below the freezing level and yet succeed in producing heavy showery rain and violent turbulence. Even the phenomenon of lightning may not be always absent, although it is no doubt rare. There can thus be much in common in the destructive capacities of *Cu* and *Cb*. A case for reassessment of the classification nevertheless arises on account of the fact that synopticians and pilots alike have been trained for years to attach a disproportionately great importance to *Cb* compared to *Cu*.

The problem has merely been posed in this note, in the hope that synopticians and others might offer suggestions for a satisfactory solution.

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