SHORTER CONTRIBUTION

The cellular nature of the orographic cloud and shower rains of Hawaii

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One of the main features of the trade wind orographic cloud of the island of Hawaii was found by SQUIRES and WARNER (1957) to be its cellular structure, particularly near the seaward edge. It was also found that these cells moved up the mountain slopes at approximately the speed of the wind. BLANCHARD (1957) discusses the shower characteristics of the rain observed on the slopes and suggests that the shower formations also progress up the slopes at a speed roughly equal to that of the wind.

On the occasions when the aircraft was measuring the cloud liquid water and the raindrop recorders were running it is found that there is a strong correlation between precipitation rate at the ground and the water content of the cloud above. This is illustrated in Fig. 1 for the only cases available from the published material of SQUIRES and WARNER (1957) and BLANCHARD and SPENCER (1957).

If the cloud cells do not vary with time, but only move with the wind, the cloud liquid water can be compared with the precipitation rates for much longer periods than are represented by the points of Fig. 1. Thus, using a mean wind velocity obtained from the radiosonde data, the curves of Fig. 2 have been produced. In view of the fact that the aircraft track was not precisely along the line of the wind, nor directly above the ground stations, the similarity of the two sets of data is quite marked. Unfortunately, on other days of simultaneous

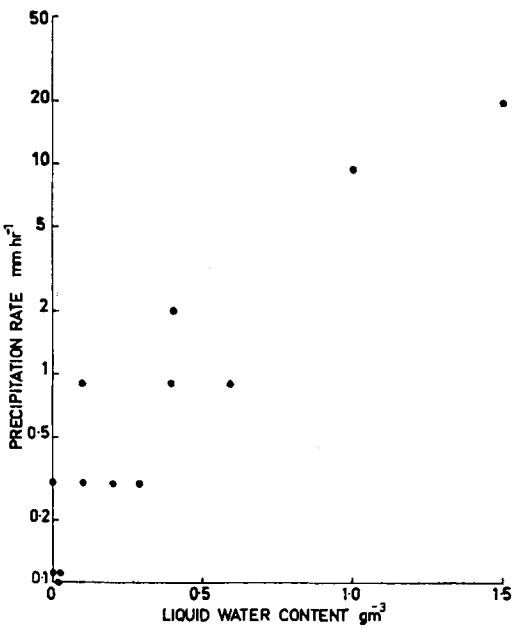

FIG. 1. Simultaneous values of precipitation rate at the ground and liquid water content in the cloud directly above.

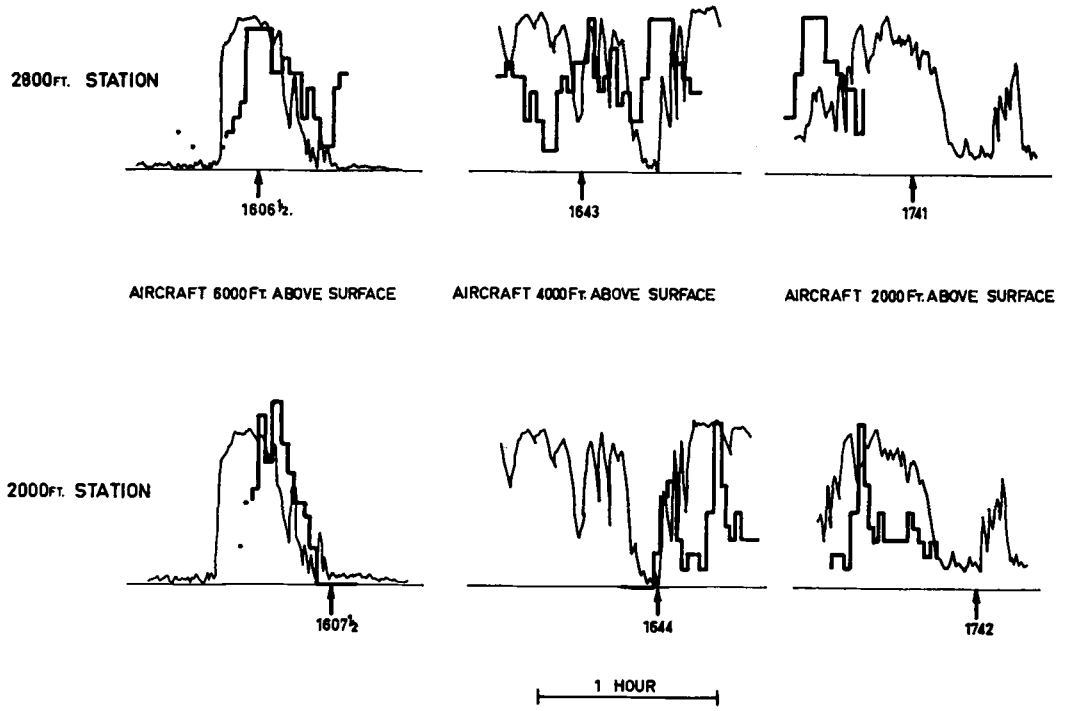

FIG. 2. The heavy lines represent the maximum drop size collected at the raindrop recorders as a function of time. This is found by Blanchard and Spencer to be related to the precipitation rate. The light lines represent the cloud liquid water content at different levels above the observing stations on the assumption that the cloud moves at the mean windspeed. The arrows indicate the times at which the aircraft observing liquid water was directly over the raindrop recorder.

observation there is not enough overlapping record to be of value.

This comparison is thought to give some support to the suggestion by WOODCOCK (1960) that the shower rains originate in specific moist parcels of air, which acquire their moisture well seawards of the island, but maintain their identity as they move inland and produce cloud.

REFERENCES

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