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Spatial distribution of convective clouds over Madras and neighbourhood

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सार – विशेष महीनों अर्थात अप्रैल, जून और सितम्बर 1978 के लिए डेका 41 रेडार में लगे मद्रास स्थित पी.पी. आई क्षेत्र में देखकर अंकित किए गए आंकड़ों के आधार पर संवहनी मेघों के आकाशीय वितरण को प्रस्तुत किया गया है । सन् 1978 के अप्रैल, जून और सितम्बर के महीनों के दिन के तीन विभिन्न भागों के दौरान स्थल और समुद्र पर प्रतिध्वनियों के आकाशीय (दैनिक परिवर्तन) वितरण को भी प्रस्तुत किया गया है ।

ABSTRACT. Spatial distribution of convective clouds as seen in PPI-scope recorded at Madras in the Decca-41 radar for the characteristic months, *viz.*, April, June and September 1978 are presented. Also the spatial distribution (diurnal variation) of echoes over land and sea during the three different parts of the day for April, June and September for the year 1978 are also presented.

1. Introduction

The importance of information on convective clouds for the safety of air navigation needs no emphasis. Quite a number of studies have been reported in literature on this subject by various authors. Lakshmanaswamy (1974) studied directional distribution of echoes over Madras for period 1964-69. He studied the diurnal variation of echoes and their development during different periods of day over land and sea and also monthly distribution of echoes for various seasons. In his study Lakshmanaswamy (1974) used data of Decca storm detecting radar (Decca Type 41).

2. Data utilised

The log books maintained at Meteorological Office, Airport, Madras record the position and heights of principal echoes observed. Hourly observations are recorded wherever the convective clouds were observed or anticipated. Due to limitations of vertical angle the data for the first 20 n. miles around station is not available.

3. Results and discussions

3.1. *Sectorwise distribution of echoes*

The echo position in log books are plotted on polar diagrams for each month and were studied in order to ascertain the favourable sectors for convective cloud development. Study of these months polar diagrams have indicated that predominant convective cloud development occurs over land in the months of April and spreads a little to the sea areas in May. In monsoon months convective cloud development over sea areas is nearly equal to that over land. Typical monthly charts belonging to April, June and September 1978 are shown in Fig. 2. In post monsoon (October and November) also, almost equal convective activity was noticed over sea and land areas. However, the data seem to indicate that convective clouds of greater vertical extent are common over land than over sea even in the months from June to November.

In order to study the diurnal variation of convective activity over land and sea areas,

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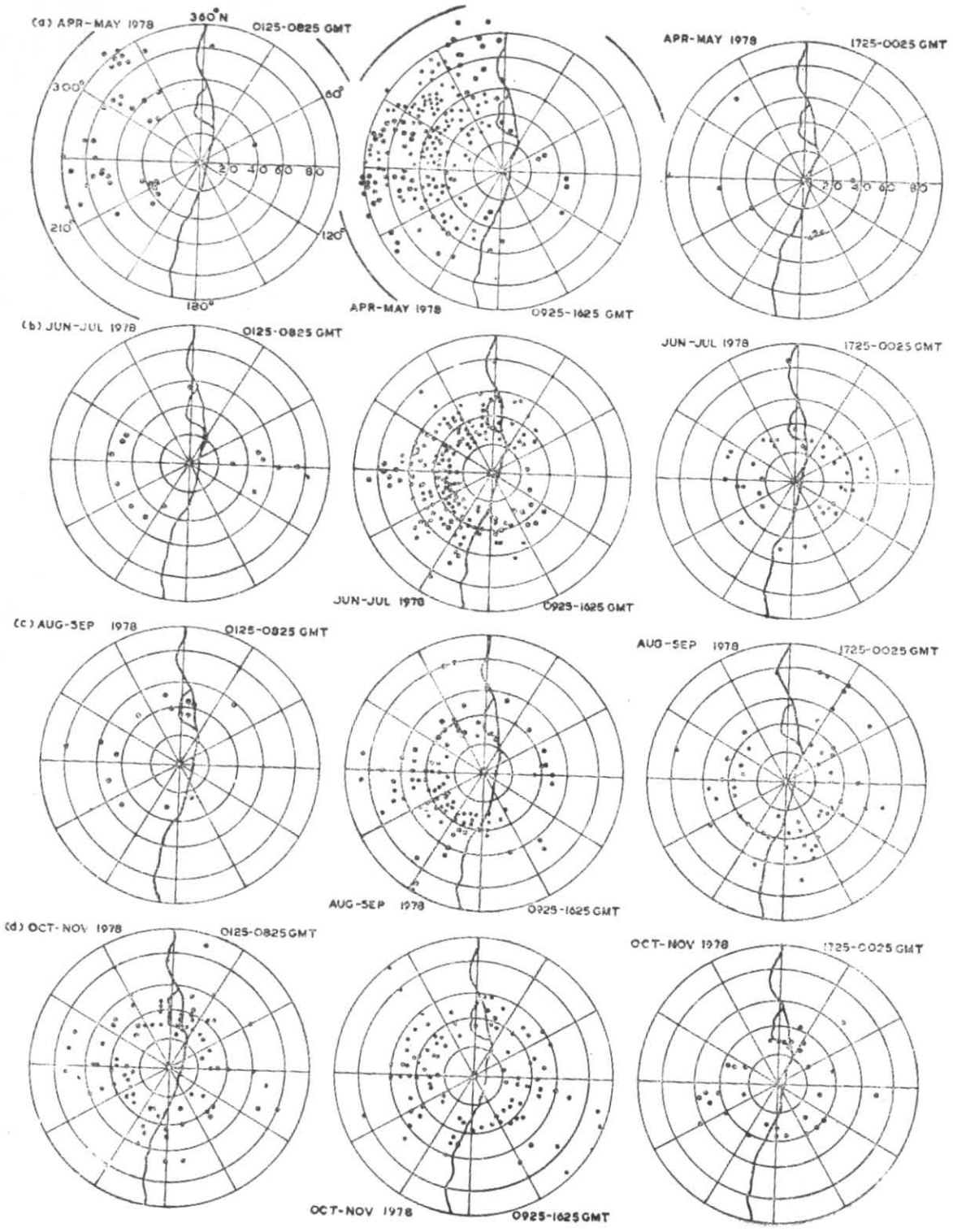

Fig. 1. Sectorwise distribution of echoes (Diurnal variation) — 1978

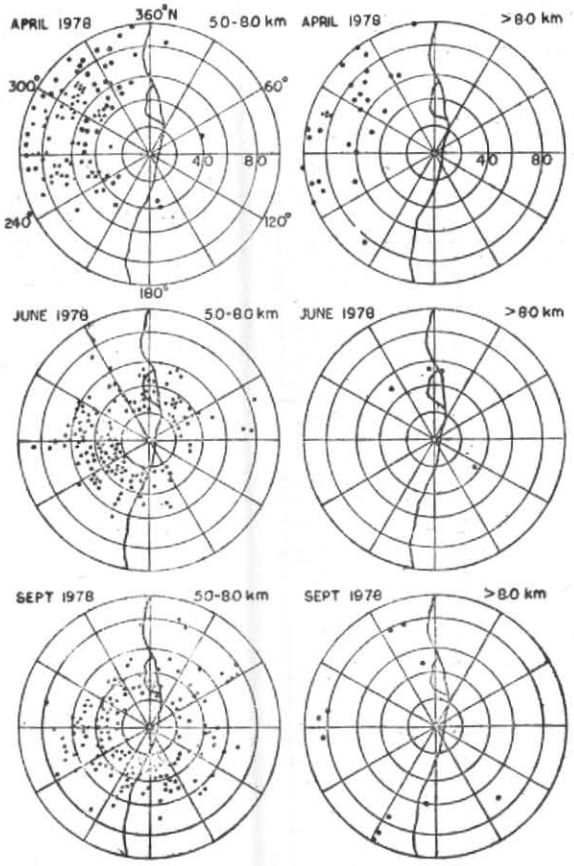

Fig. 2. Sectorwise distribution of echoes — 1978

polar diagrams of all echoes in each month were plotted on three polar diagrams, one for period 0125-0825 GMT, the second one for 0925-1625 GMT and third 1725-0025 GMT. Study of these diagrams indicated that in the month of April and May (Fig. 1a) the convective activity was maximum in the afternoon period with rapid dissipation immediately afterwards. There were hardly any echoes in early hours. There was hardly any activity over sea areas. During June and July Fig. 1 (b) the convective activity was confined mainly to afternoon period but some activity persisted into the night, the persistence being more in sea areas than over land. Similar features are seen in other two monsoon months of August and September (Fig. 1c). In October and November considerable convective activity both over land and sea was noticed during early hours (0125-0825 GMT) with a slight increase during afternoon and a definite decrease in night hours (Fig. 1d).

4. Conclusion

The general findings are in broad agreement with the earlier studies in so far as:

(a) Convective activities mainly occupied land areas in pre-monsoon season extending a little over sea areas in monsoon season and

(b) It is almost equal over land and sea in retreating monsoon season.

Diurnal variation

4.1. *Pre-monsoon season* — The echoes over land start increasing from 1400 to 2100 IST and there is abrupt decrease in the number of echoes during night hours.

4.2. *Southwest monsoon season* — The echoes grow rapidly from 1400 IST and there is a gradual shift towards sea from land areas during

night hours during June-July months while the sea echoes are more comparatively over land areas during night and early morning hours during August-September.

4.3. *Retreating monsoon season* — There is a gradual increase in the number of echoes in general from 1400-2100 IST the echoes being evenly distributed in land and sea areas. There is a gradual decrease in the number of echoes in later hours of the night. A comparison of Fig. 1 (d) with Fig. 1 (b) and Fig. 1(c) for the same period, 0925-1625 GMT, will indicate that there is reversal of the distribution of echoes. The echoes are distributed more on the sea side than on land side.

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