Mausam, (1985), **36**, 3, 387-392

Letters to the Editor

551.553.21 : 551.515.11

CYLINDRICAL CROSS-SECTION ANALYSIS OF A MONSOON DEPRESSION OVER NORTHWEST AND ADJOINING NORTHEAST BAY OF BENGAL

Monsoon depressions have been an important component of Indian weather and the observed structure of depression has been investigated by a number of investigators (Srinivasan 1953, Mulky and Banerjee 1960, Rao & Rajamani 1972, Sikka 1977, Godbole 1977, Raman *et al.* 1978 etc). Following Pedder (1979), an attempt has been made to examine the vertical cross-section based on a cylindrical projection of a monsoon depression while it was still over Bay of Bengal centred near 19.5° N, 88° E on 07 July 1979, by using data collected during MONEX-79. Cylindrical cross analysis of monsoon depression has not been attempted so far.

2. In cylindrical cross-section, a circle centred close to surface centre of depression is chosen as a base line for cross-section. The radius of circle is taken about 2 deg. latitude. A cylindrical cross-section form is then prepared by projecting upper air data (drop wind sonde as well as conventional data) on to the surface of cylinder, which stands vertically on the circle. Then the cylinder is cut and unrolled to get the plane form. Wind, temperature, relative humidity and equivalent potential temperatures at 950, 850, 700, 600 and 500 mb levels on 07 July 1979 at various positions were plotted on cylindrical cross-section.

3. This cross-section analysis when rolled back into a cylinder provides a three dimensional structure of monsoon depression at 2 deg. around centre, in all sectors.

4. Cylindrical cross-section analyses of wind field, temperature, relative humidity and equivalent potential temperature of a depression over northwest and adjoining northeast Bay on 07 July 1979 when it was centred at 19.5° N, 88° E are shown in Figs. 1 and 2. The various features seen in these diagrams are discussed below :

(a) *The wind field* — The winds are in general strong (≃ 20-30 kt) upto 700 mb in all sectors. The winds are comparatively lighter at 500 mb. The winds at 500 mb indicate shift of centre to southwest at that level.

(b) *Temperature field* — In the analysis of thermal field warmer temperature are seen in northeast and southeast sectors, while colder temperature are seen in southwest and northwest sectors. It is seen that temperatures are warmer to the rear of the centre of depression than ahead of the centre. The difference in temperature is of the order of 2°-3° C.

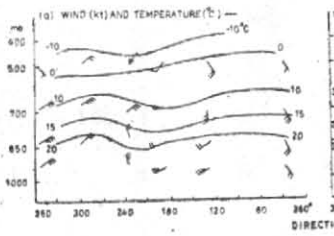

Fig. 1. Winds and Temp.

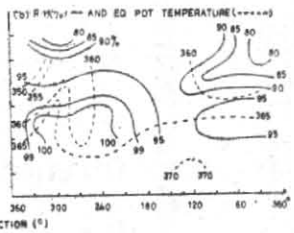

Fig. 2. R. H. (%) and Eq. Pot. Temp.

Cylindrical cross-section analysis of winds (kt) and temperature (°C) and R. H. (%) and equivalent potential temp. (°K) of monsoon depression on 07 July 79 over north Bay.

(c) *Analysis of relative humidity* — Moist region (relative humidity 90-100 per cent) is seen ahead of storm centre in southwest and adjoining northwest sectors, upto 500 mb level. Relative humidity in northwest sector is about 80 per cent at 400 mb. In southeast sector relative humidity values are 90 per cent upto 400 mb, while in northeast sector, relative humidity values are lower at 500 mb level.

(d) *Analysis of equivalent potential temperature* (θ_e) — Equivalent potential temperatures are generally seen to decrease with height (upto 500 mb). However θ_e values are nearly constant in western sector upto 500 mb. The decrease is more pronounced in northwest sector than in other sectors. The gradient of θ_e is, however, small in all the sectors. Chowdhury (1983) brought out that in the region near centre upto about 400 km, the air is more buoyant.

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Indian Air Force
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SQN. LDR. V. B. DHAWAN
WG. CDR. R. K. PALIWAL