Then, using Reynold's number, Prandtl number is calculated by

$$P_r = \frac{C_p \mu}{K_e}$$

This in turn, is used in the calculation of the Nusselt number given by

$$N_u = 2 + 0{\cdot}37\ (R_e)^{0.6}\ (P_r)^{1/3}$$

Finally the convective heat transfer coefficient is given by

$$h_t = \frac{N_u K}{d}$$

where d=diameter of thermistor and K=thermal conductivity of air.

It is logical to assume that there does not exist any temperature gradient in the thermistor itself. Knowing the convective heat transfer coefficient h_t and the dissipation factor, the time constants are calculated from Eq. (1).

Physical parameters of the thermistors are as follows :

Type	*Weight*	*Area*
Microbead	·3 milligram	$2{\cdot}8\times10^{-3}$ cm^2
Bead	2·2 milligram	$1{\cdot}5\times10^{-2}$ cm^2
Rod	196 milligram	1·367 cm^2

Fig. 2 gives time constants in the form of a graph. A slight decrease in the value of time constants between 40 and 60 km is due to the sudden increase in the thermal conductivity values. Thus the microbead thermistor is far superior to the bead thermistor. The time constant of the thermistor can be still reduced by mounting the thermistor on a mylar film, thus increasing its heat capacity. This way, the time constant can be reduced to 50 per cent. Knowing time constant, other atmospheric corrections can be easily calculated.

5. Thanks are due to Mr. H. Mitra who encouraged this work and under whose guidance payload work is being carried out.

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14 April 1975

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UNUSUAL RAINFALL DURING OCTOBER 1974

1. The spells of rain that occurred in the month of October 1974 were unusual in some respects and were more like the situation normally expected in any September month. The low pressure areas on 6th and 14th which intensified into depressions crossed the Andhra coast and moved inland westnorthwestwards and under their influence rainfall activity was carried to the central as well as western parts of the country and thereby the monsoon activity was thus kept up longer there than normal.

2. The rainfall distribution during the month was fairly widespread in almost all parts of the country. The States of Uttar Pradesh, east Rajasthan, west Madhya Pardesh, Maharashtra, Gujarat, Andhra Pradesh and Karnataka had spells of above normal rainfall since the beginning of second week of October, in particular, Rajasthan and Marathwada, had rainfall amount 5 to 8 times more than its normal (Table 1). On comparison with the rainfall of September it was noted that the rainfall of October 1974 was 2 to 4 times more in many places of east Rajasthan, Madhya Pradesh, coastal Andhra Pradesh and Maharashtra.

This note explains the synoptic situation which led to the abnormal rainfall distribution.

3. A low pressure area intensified into a depression at 1800 GMT of 6th around 15·5°N, 87·5°E and moving northwestwards it was very close to the coast at 00 GMT of 8th (Fig. 1). The depression crossed Andhra coast north of Visakhapatnam around 12 GMT of 8th with the upper air circulation ahead of the surface circulation. But the depression at 12 GMT of 9th weakened into small low pressure areas with the main low pressure system near Chandrapur with the upper air cyclonic circulation extending upto 300 mb. The low pressure area remained active on 10th (00 GMT) with 4 mb drop and moved westnorthwestwards with upper air circulation extending upto 500 mb and with a trough at 300-mb level. It moved further WNW, recurved on 11th at 00 GMT and on 13th it became less marked with an upper air circulation upto 700 mb which also later got completely dissociated by 00 GMT of 14th.

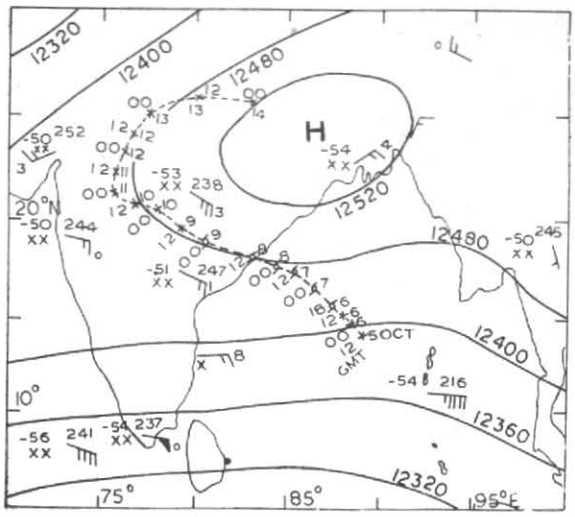

Fig. 1. Flow pattern of wind for 200 mb at 00 GMT on 8 October 1974

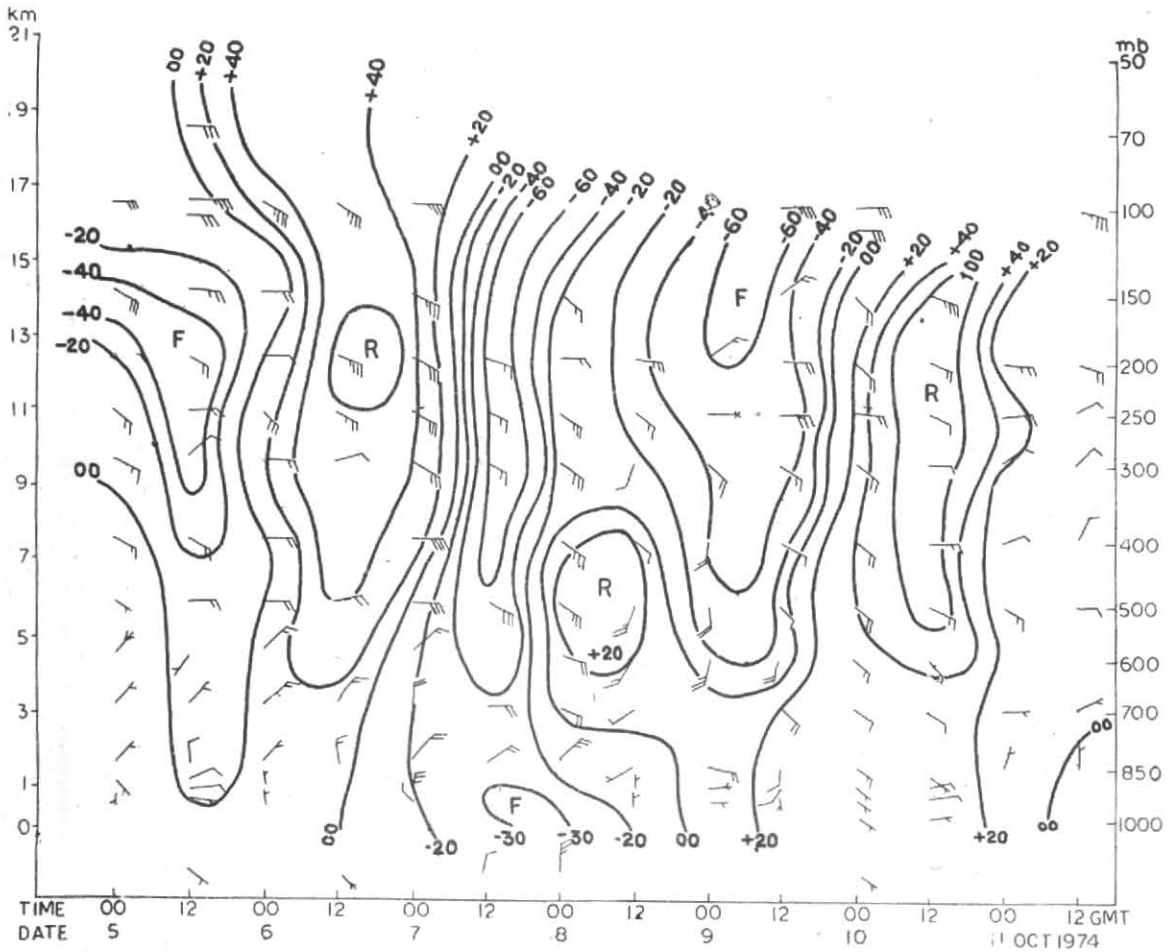

Fig. 2. Vertical time-section of winds and changes of heights of standard pressure surfaces over Visakhapatnam for the period 5-11 October 1974

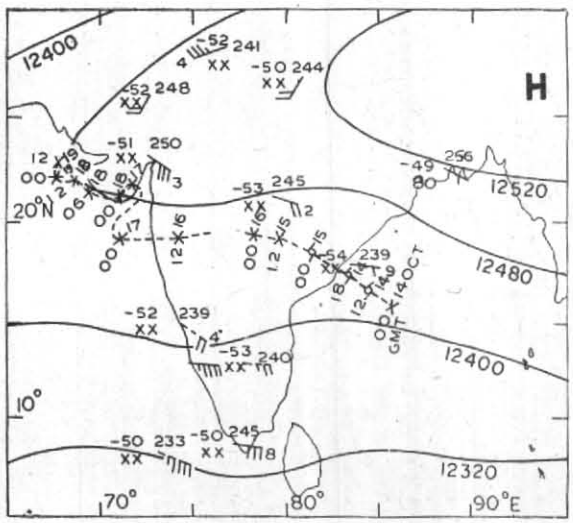

Fig. 3. Flow pattern of wind for 200 mb at 1200 GMT on 14 October 1974

TABLE 1

State	Station	Rainfall amount (cm) Sep 1974	Oct 1974
Assam	Bagdogra	67·08	38·65
	Jalpaiguri	45·50	34·28
	Dhubri	23·00	33·70
	Goalpara	37·16	31·30
Meghalaya	Shillong	31·60	39·70
Orissa	Puri	19·70	28·48
Maharashtra	Brahmapuri	5·60	26·21
	Chandrapur	4·90	25·06
	Bhira	49·16	39·90
	Jeur	35·16	32·56
Union Territory	Goa	36·43	35·02
Karnataka	Karwar	56·10	30·61
	Bangalore	42·10	27·39
	Agumbe	66·54	38·87
	Beltangadi	38·38	26·80
	Adagiri	N/A	38·70
	Gauri Bidanur	N/A	32·90
Kerala	Alleppey	25·70	30·33
	Kottayam	41·58	26·96
Tamil Nadu	Cuddalore	11·80	28·16
	Coimbatore	5·70	28·16
Andhra Pradesh	Nidadabolur	—	30·91
	Visakhapatnam	9·80	30·35
	Waltair	9·80	28·00
	Ramagundam	5·20	35·11
	Khammam	12·60	26·46

N/A — Not available

Another low pressure area over north Andaman Sea concentrated into a depression around 16·5°N, 84·5°E on 14th at 12 GMT (Fig. 3) with its upper air cyclonic circulation extending upto 500 mb and a trough at 300 mb sloping ahead westwards. On 14th at 18 GMT the depression was located very close to the coast south of Visakhapatnam where it actually crossed coast in the early morning of 15th and at 00 GMT, it was located about 100 km southwest of Jagdalpur. But it soon weakened into a low pressure area at 12 GMT of 15th near Ramagundam. It moved further westwards and emerged into Arabian Sea on 17th at 00 GMT and recurved towards Gujarat thereafter encircling the coast as traced upto 19th (12 GMT).

It was interesting to note that both the systems moved almost all along the periphery of the anticyclone at 200 mb extending over the Arabian Sea which is apparent from Figs. 1 and 3. The position of the 200 mb anticyclone during the period of the two systems was fairly stationary.

4. The vertical time-sections of winds and changes of heights of standard pressure surfaces were examined for the two depressions under study. Fig. 2 shows the plot of vertical structure for the perid 5-11 October 1974. The depression crossed Visakhapatnam coast immediately after 12 GMT of 8th. The upper air circulation associated with the depression was ahead of the surface circulation. The upper level winds showed considerable strengthening on 7th at 00 GMT, that is, 36 hours before the depression crossed the coast. The wind flow remained easterly in the lower levels throughout the week thereby making a continuous incursion of moisture which kept up the rainfall activity in the region for the period.

As shown in Fig. 4 the second depression, which crossed Visakhapatnam coast in the early morning of 15 October, had influenced upper winds over Visakhapatnam from 12 GMT of 13 October itself, *i.e.*, 30 to 36 hrs in advance. As mentioned earlier this depression weakened inland during the westward movement and the low level winds became northerly over Visakhapatnam on 16th at 00 GMT but the easterly flow was revived there

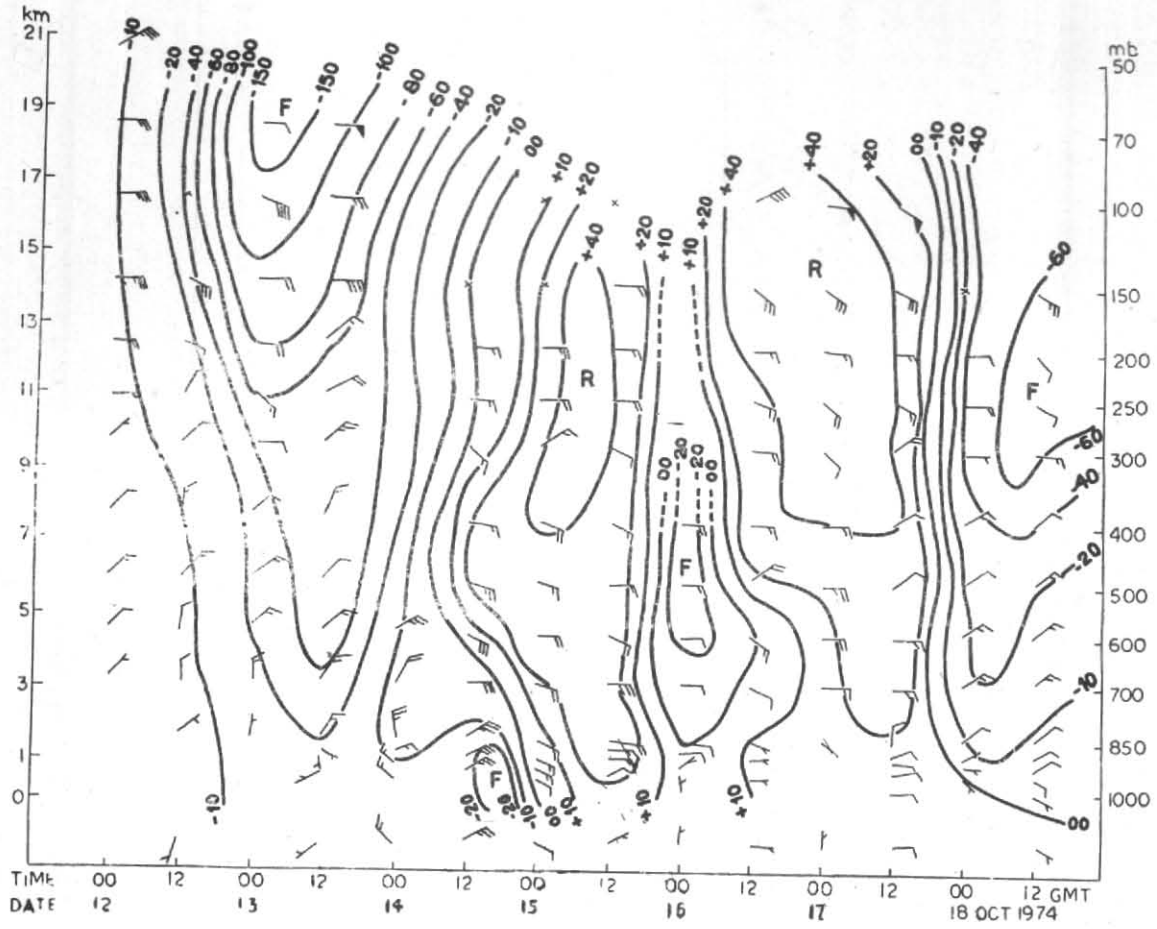

Fig. 4. Vertical time-section of winds and changes of heights of standard pressure surfaces over Visakhapatnam for the period 12-18 October 1974

after thus retaining the rainfall activity in the region.

These unusual rains broke a protracted spell of drought conditions on many parts of the country.

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10 February 1975

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