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WILL IT BE A DUSTSTORM OR THUNDERSTORM?

It has been sometimes suggested that with the same instability conditions, a duststorm is more likely when the atmosphere is comparatively drier and a thunderstorm with rain when the atmosphere is more moist. An attempt was made to find whether any optimum values for local upper air humidities exist, by which one may be able to say whether a duststorm is more likely to occur over the station than a thunderstorm. For the purpose of this

study, radiosonde data of New Delhi for the months of May and June (1946-52), during which months most of the duststorms and thunderstorms occur at Delhi, have been used and only those occasions have been taken when duststorms or thunderstorms accompanied with squalls occurred within 12 hours following the radiosonde ascent.

2. The mean relative humidities and humidity mixing ratios at various levels on days of thunderstorm (with recordable rain) and on the days when only duststorms (without recordable rain) occurred, are given in Table 1.

TABLE 1

	Mean relative humidity at					Humidity mixing ratio in gm/kgm at					No. of ocea-
	950	900	$\frac{(mb)}{850}$	700	600	950	900	(mb) 850	700	600	sions
On days of thunderstorm	42	41	43	57	66	12.6	11.2	10.4	7.8	4.7	33
On days of duststorm	46	4.5	43	69	79	$13\!\cdot\! 5$	12.5	10.8	8.9	5.7	19

TABLE 2

Date	Time of radiosonde ascent (IST)		Relative humidity at					Hun	nidity r	Weather and			
		950	900	(mb) 850	700	600	950	900	(mb) 850	700	600	$\frac{\text{duration}}{\text{To}}(\text{IST})$	
3-5-52	0530	48	73	73	73	60	14.0	27.0	22.0	7.7	4.0	${\bf Duststorm}$	$\frac{143}{1508}$
4-5-52	0530	23	18	25	33	80	8+0	5.7	5.5	4.8	5.0	Thunderstorm	1558 2005
												Shower	$\frac{1622}{1722}$
4-5-51	0530	48	49	48	76	90	15.5	14.0	12.0	11.5	6.6	Duststorm	0812
3-5-48	0530	23	19	25	45	45	8.0	7.8	7.6	7.0	6.6	Thunderstorm with rain	$\frac{1616}{1714}$
												Shower	1507
-												1517	

It may be mentioned that on the above days of duststorm, no thunderstorm occurred at any time.

It will be seen from the above table that upper air humidities on the days of dust-storm were not less than those on the days of thunderstorm, and as such the atmosphere was not drier on the days of dust-storms. Mean upper air temperatures on the days of duststorm and of thunderstorm were almost the same.

It has been seen that sometimes a duststorm takes place with very high humidities and a thunderstorm (with shower) with low humidities (see Table 2).

It would, therefore, appear that it is not possible to say from an examination of upper air humidities at the local station whether the phenomenon will be a duststorm or thunderstorm.

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Meteorological Office, New Delhi December 18, 1953.