551.515.41 (547.1)

THUNDERSTORM OVER OZAR AERODROME

1. Data for six years (1968-1973) have been utilised to study different aspects of thunderstorm occurrence over Ozar Airfield (Nasik). The orographic features of Ozar (Lat. 20°8'N, Long. 73°55'E) are such that there are uplands towards all sides of the airfield except towards southeast. Hourly and monthly distribution of thunderstorms, their seasonal variation and the associated synoptic features have been presented here.

2. *Monthly distribution of thunderstorm days* — On an average there are 20 thunderstorm days in a year, with maxiumum frequencies in the months of June and September (Table 2). The thunderstorm fequency increases progressively from February and reaches maximum in June. This is followed by a minimum in July and a secondary maximum in September. The months of December and January are completely free from thunderstorm.

Diurnal variation — Frequency of thunderstorm occurrence at different hours of the day for different months of the year during the period January 1968 to December 1973 are presented in Table 3. It is noticed that more than 80 per cent of the thunderstorms occurred in the afternoon between 1700 and 2000 IST in all the months from March to November. During February, thunderstorms occurred mainly during early morning hours. The period from 0900 to 1300 IST is practically free from thunderstorm throughout the year.

Duration of thunderstorm activity — Table 4 gives the distribution of duration of thunderstorm activity. It may be seen that on nearly 50 per cent of occasions the period of thunderstorm activity is less than 3 hours and 70 per cent are of less than 4 hours. Also, 60 per cent of thunderstorms have a duration between 1 and 4 hours.

Surface wind associated with thunderstorms — Table 1 gives the monthly frequency distribution of thunderstorms with associated maximum winds. It is seen that cases of surface wind speed > 30 kt are few and have occurred only in April and June. The maximum surface wind recorded during thunderstorm at Ozar was 270°/56 kt on 7June 1973 at 1500 IST. However, available data are too meagre to derive any inference on extreme wind speed.

3. On an examination of weather charts, the following main synoptic situations are found to be associated with the occurrence of thunderstorm activity at Ozar airfield :

TABLE 1

Monthwise distribution of thunderstorms with maximum winds

Month	<20	20-30	30-40	>40	Total
Feb	4	1	—	—	5
Mar	6	1	—	—	7
Apr	4	4	4	—	12
May	10	2	—	—	21
Jun	25	6	2	2	35
Jul	6	1	—	—	7
Aug	6	1	—	—	7
Sep	18	6	—	—	24
Oct	10	—	—	—	10
Nov	4	—	—	—	4
Total	102	22	6	2	132

(*i*) Whenever, due to the passage of a low pressure area moving across Peninsula, a trough in low level easterlies extended upto Nasik or further north with vertical extent upto 1·5 km or above, convective activity developed over the station. The wind discontinuity passing over the station during February to May, due to the western disturbances to the north of the station and westward moving low across Peninsula also resulted in thunderstorm activity.

The above systems were found to be responsible for all thunderstorms during February, March and November; 75 per cent in April, September and October and 60 per cent in May.

(*ii*) Severe thunderstorm occurred over the station when it came in the forward area of advancing monsoon. 75 per cent of thunderstorms in June occurred under the effect of advancing monsoon.

(*iii*) The passage of monsoon trough at 0·9 and 1·5 km passing over the station in association with the revival or withdrawal of monsoon also results in the development of thunderstorm activities.

(*iv*) The cases of thunderstorms associated with synoptic situations like (*a*) Induced low over north Madhya Maharashtra and neighbourbhood during hot weather season and (*b*) SW-NE oriented trough in the low level westerlies passing near the station during weak monsoon conditions, were few and all such situations have not resulted in thunderstorm over

TABLE 2

Average monthly distribution of thunderstorm days

(Based on data for period 1968–1973)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
No. of thunder-storms days	0	0·9	1·2	2·0	2.8	5·2	1·0	1·2	3·3	1·7	0·7	0	20

TABLE 3

Hourly frequency of thunderstorms (1968–73)

	Hours																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Total
Feb			1	1	3	3	2	1									1	1	1	1					15
Mar				1	1	1	1	1									2	3	4	2	2	1	1		20
Apr	1														3	3	5	7	6	4			1	1	31
May	4	1												2	4	7	9	10	9	7	5	5	4	4	71
Jun	6	5	2	3	2									1	8	16	24	26	25	20	13	12	10	7	180
Jul			1	1	1										2	3	3	4	3	3	2	3	1		27
Aug	1														1	3	3	5	6	5	4	2	2	2	34
Sep	6	4	3	2	1							1	1	4	6	3	16	16	14	10	12	10	8	5	122
Oct														2	3	4	5	6	6	5	3	2	2	2	40
Nov																	1	1	3	3	3	2	1		14
Total	18	10	7	8	8	4	3	2	—	—	—	1	1	9	27	39	69	79	77	60	44	37	30	21	554

TABLE 4

Distribution of thunderstorm duration

	<15 min.	15-30 min.	30-60 min.	1-2 hr	2-3 hr	3-4 hr	4-5 hr	5-6 hr	6-7 hr	7-8 hr	8-9 hr	9-10 hr	>10 hr
No. of occasions	2	2	8	22	33	26	11	11	6	2	5	4	—
Cumulative frequency	2	4	12	34	67	93	104	115	121	123	128	132	—
Cumulative percentage	1·5	3	9	26	50	70	80	88	93	94	97	100	—

the station. Hence, it is not possible to generalise them.

It is seen that troughs in low level easterlies is the most significant synoptic situation associated with the thunderstorms at the station. During the period of study all such troughs affecting the station have produced convective clouds at the station and 70 per cent of them have produced thunderstorm. Generally the trough is seen 12-24 hours before the occurrence of thunderstorm.

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