Letters to the Editor

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SPACIAL AND FREQUENCY DISTRIBUTION OF DAILY RAINFALL OVER EAST KHANDESH (MAHARASHTRA STATE) IN RELATION TO NETWORK OF RAIN RECORDING STATIONS

1. In the present note, the spacial distribution of rainfall over East Khandesh district (Maharashtra State) has been studied, by comparing the gradations of rainfall distribution as depicted by the synoptic stations in and around the district with the gradation obtained by considering the more intensive network of raingauge stations in the district.

2. The district of East Khandesh (Maharashtra State) has only one synoptic station, *viz.*, Jalgaon. As however, the rainfall observations at this and six other synoptic stations around the district are regularly available, rainfall at these seven observatories has been considered in the present study. In the district proper, in addition to the synoptic station at Jalgaon, there are 12 other rain recording stations. Fig. 1 shows the locations of the raingauge stations and observatories. The data have been examined for the months of June to September for a period of 5 years (1954 to 1958). Table 1 gives the number of observatories and the number of rain recording stations which according to India Meteorological Department criteria, should have recorded rainfall for each gradation of distribution. The rainfall distribution over the district has been graded each day as widespread, fairly widespread, local, scattered, as the case may be, first taking into consideration the occurrence of rainfall at 7 observatories only and then at the 13 rain recording stations in the district. All the occasions have been reduced to a frequency table under a two-way classification.

Fig. 1

3. A summary of observations is given in Table 2. The last column gives the number of occasions under each class of rainfall distribution considering only the rainfall reported by the seven observatories. It is seen that the rainfall distribution shown by observatories has been in agreement with that shown by State raingauges only on about 50 per cent occasions except in case of non-rainy days where the percentage is slightly higher. No characteristic feature is seen in the month-wise analysis.

4. Each day, the average rainfall for 13 rain recording stations in the district and the average for 7 observatories were separately calculated. Then both the series of means were separately reduced to a frequency distribution as shown in Table 3. It is seen that the agreement in the average rainfall of both has been only on about 30 per cent occasions except for amounts less than 10 cents and more than 2 inches when it was

TABLE 1

Gradation of rainfall distribution	Number of stations which should have recorded rainfall for each gradation	
	Observatories	Rain reporting stations in the district
Widespread (W)	7	13
Fairly Widespread (FW)	5—6	9—12
Local (L)	3—4	5—8
Scattered (SC)	1—2	1—4
No Rain (NR)	0	0

W—Rainfall at all stations over the area, FW—Rainfall at two thirds or more of the stations but *not* at all stations, L—Rainfall at one third of the stations or more but less than two thirds of the stations, SC—Rainfall at less than one third of the stations, NR—No rain at any station

TABLE 2

Gradation of rainfall distribution as per 13 raingauge stations

	610	W 33	FW 106	L 133	SC 181	NR 157	Total
Rainfall distribution according to seven observatories	W 20	1 2 9 1 (45) 5	4 1 10 5 (50) —	— — 1 1 (5) —	— — 0 — —	— — 0 — —	5 (Jun) 3 (Jul) 20 7 (Aug) 5 (Sep)
	FW 93	4 6 22 5 (23) 7	7 18 54 18 (58) 11	1 6 13 3 (14) 3	2 1 4 — (5) 1	— — 0 — —	14 (Jun) 31 (Jul) 93 26 (Aug) 22 (Sep)
	L 137	— 1 2 1 (1) —	4 11 34 12 (26) 7	14 19 64 18 (46) 13	9 12 35 10 (26) 4	— 1 2 1 (1) —	27 (Jun) 44 (Jul) 137 42 (Aug) 24 (Sep)
	SC 188	— — 0 — —	2 8 — (4) 4 2	4 19 52 16 (28) 13	21 24 87 22 (46) 20	8 10 41 8 (22) 15	35 (Jun) 53 (Jul) 188 50 (Aug) 50 (Sep)
	NR 172	— — — 0 —	— — — 0 —	— — 3 2 (2) 1	14 13 55 14 (32) 14	55 12 114 13 (66) 34	69 (Jun) 25 (Jul) 172 29 (Aug) 49 (Sep)
	Total	5 9 33 7 12	17 30 106 39 20	19 44 133 40 30	46 50 181 46 39	63 23 157 22 49	150 (Jun) 155 (Jul) 610 155 (Aug) 150 (Sep)

Figures in brackets show the percentage

TABLE 3

Frequency distribution of mean rainfall of raingauge stations in East Khandesh district

Main rainfall of Observatories		Less than 10 cents	Between 10 and 24 cents	Between 25 and 49 cents	Between 50 and 74 cents	Between 75 and 99 cents	Between 1″ and 1·99″	>2″	Total
		293	117	107	38	27	22	6	
<10 cents	305	79 43 53 67 } 242	11 14 8 8 } 41	5 3 7 5 } 20	— 1 — — } 1	— — 1 — } 1	— — — —	— — — —	95 61 69 80 } 305
10 to 24 cents	117	10 15 8 8 } 41	2 15 13 6 } 36	5 8 13 7 } 33	2 2 — — } 4	— 1 1 — } 2	— — 1 — } 1	— — — —	19 41 36 21 } 117
25 to 49 cents	109	2 2 — 4 } 8	3 19 3 10 } 35	7 9 13 10 } 39	5 2 5 4 } 16	3 1 4 1 } 9	1 1 — — } 2	— — — —	21 34 25 29 } 109
50 to 74 cents	36	— — 1 — } 1	1 1 1 — } 3	1 2 5 1 } 9	1 3 4 2 } 10	— — 3 1 } 4	— 3 3 3 } 9	— — — —	3 9 17 7 } 36
75 to 99 cents	19	— — — —	— — 1 — } 1	— 1 1 3 } 5	— 3 2 — } 5	2 1 1 2 } 6	1 — — 1 } 2	— — — —	3 5 4 6 } 19
1″ to 1·99″	22	— — 1 — } 1	1 — — — } 1	— 1 — — } 1	2 — — — } 2	2 2 — 1 } 5	4 — 2 2 } 8	— 2 1 1 } 4	9 5 4 4 } 22
>2″	2	— — — —	— — — —	— — — —	— — — —	— — — —	— — — —	— — — 2 } 2	— — — 2 } 2
Total	610	91 60 63 79 } 293	18 49 26 24 } 117	18 24 39 26 } 107	10 11 11 6 } 38	7 5 10 5 } 27	6 4 6 6 } 22	— 2 1 3 } 6	150 155 155 150 } 610

much higher. The number of occasions on which State raingauges recorded an average rainfall in next lower or higher ranges is quite comparable with those of agreement but as is expected, is higher in lower range than in higher one. There is no characteristic agreement brought out by month-wise analysis.

5. With a view to examine the frequency of heavy rain occurring in the district, rainfall at every station on days when the district average was 1″ or more was looked into. It is seen that on days when rainfall is widespread or fairly widespread, the number of stations reporting heavy rain (2·5″ or more) varied generally from 1 to 8. Thus the distribution of heavy rain in the district is scattered to local. On days of widespread rain, it can be said that heavy rain occurring at a number of places is quite possible for this district.

6. A frequency table showing the number of occasions when the district average rain fall was 1″ or more and the mean rainfall at

TABLE 4

No. of occasions when (a) district average rainfall was 1″ or more and (b) the mean rainfall at (i) observatories, (ii) C.D. Blocks and (iii) rain at Jalgaon was within specified limits

	(a)	(b)			
		1″ or more	75–99 cents	50–74 cents	<50 cents
(i) Observatories mean	28	14	2	9	3
(ii) C.D.Block area mean	28	17	4	4	3
(iii) Jalgaon	28	18	3	3	4

TABLE 5

Frequency distribution of rainfall at (i) C.D. Blocks at Bhusaval and Edlabad, (ii) mean rainfall of observatories, and (iii) mean rainfall of district on 36 days when Jalgaon recorded 1″ or more

	1″ or more	75–99 cents	50–74 cents	<50 cents
(i) Bhusaval	20	4	2	10
Edlabad	19	5	2	10
(ii) 7	15	2	9	10
(iii) 13	19	7	5	5

TABLE 6

Frequency distribution of rainfall (i) at Jalgaon, (ii) mean rainfall at observatories and (iii) mean rainfall of district on days when one of the C. D. Blocks recorded 1″or more

	1″ or more	75–99 cents	50–74 cents	<50 cents
(i) Jalgaon	26	8	13	20
(ii) Mean rainfall of observatories	19	11	12	25
(iii) Mean rainfall of district	23	16	16	12

(1) observatories, (2), C.D. Blocks and (3) rain recorded at Jalgaon, was within specified limits has been prepared (Table 4). It will be seen that on 50 per cent occasions the observatories recorded a mean rainfall of less than 1″ when district average was 1″ or more, while C.D. Blocks recorded less than 1″ on about 40 per cent occasions and Jalgaon on 36 per cent occasions.

Similarly the daily rainfall at each of C.D. Blocks at Bhusaval and Edlabad, on occasions when Jalgaon reported more than 1″ in 24 hrs was tabulated and a frequency table showing the number of occasions on which each Block got rain in above indicated interval is given in Table 5. Here also it is seen that on about 44 to 48 per cent occasions, C.D. Blocks recorded less than 1″ of rain.

Table 6 gives the frequency of daily rainfall at Jalgaon in the same intervals when one of the C.D. Blocks received more than 1″. It is seen that on about 60 per cent occasions Jalgaon recorded less than 1″ of rain.

7. The reports from observatories around East Khandesh district are not indicative of actual distribution of rain over the district on a fairly good number of occasions. The analysis also shows the limitations of assessing the probable amount of rain recorded at C.D. Block areas from the data of the neighbouring observatory. Some other features regarding rainfall of the district which are seen from Tables 3, 4 and the rainfall at every station on days when district average was 1″ or more, are that—(*i*) Out of 610 days under examination, fairly widespread to widespread rain occurred on about 22 per cent occasions, (*ii*) Rainfall was only scattered on 55 per cent occasions, (*iii*) On 70 per cent occasions, mean rainfall did not exceed 25 cents, (*iv*) Mean rainfall exceeded 75 cents on only 10 per cent occasions, and (*v*) On days of widespread rain, a number of places can get heavy rain in this district.

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