

NOTES AND NEWS

NATURE OF THE RAIN SPECTRUM AT A LOW LATITUDE COASTAL STATION

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The internal structure of rain falls in terms of rain rate during various instances of time can be determined by measuring rain amounts received during very short intervals of time. A system that can record the intensity of rain fall at every minute has been used for this study.

The rain gauge used for this study consists of a sensor, an electronic system, and a recorder. It directly records minute to minute intensity of rainfall in mm/hr. It also provides separate marks for every millimeter of rainfall. This is achieved by converting the rain water received at the collector into drops of exactly equal size and counting them with optical electronics. The total number of drops received at any interval of time gives the intensity of rainfall during that duration. The counts are then converted into voltages and recorded (Venugopal and Radhakrishnan, 1976).

In principle, rain water falling into the funnel of the drop-forming unit displaces the same amount of water from the cylindrical vessel and emerges through nozzle in the form of drops. The diameter of the nozzle determines the size of the drop and, this in turn, determines the number of drops for every millimeter of rainfall received. As each drop falls, a current pulse is produced that is fed into an electronic counter. The instrument is designed to give intensity. The counter is reset every minute by the controlled pulse. In addition to intensity, total rainfall during any interval of time is registered by counting the pulses. Every 120 drops correspond to 1 mm of rainfall.

The station at Cochin, India ($8^{\circ}59'N$, $76^{\circ}E$) experiences a comparatively high intensities of rainfall (Rajan, 1988). Thus, for study purposes, the maximum recordable intensity range used was 120 mm/hr.

The rain spectra at the stations were analyzed for four years by observing the intensity per minute of the rainfall. A total of 16,000 minutes of rainfall were analyzed. Of these, 13,900 minutes correspond to the south-west monsoon season, 870 minutes to the post-monsoon season, 180 minutes to the summer months (March, April), and 150 minutes to the winter months (December, January).

Of the total rain recorded during the south-west monsoon season 38% of the samples were during August, 32% during July, 16% during June and 14% during September. In the summer months, 64% during March and the remaining during April. In the post-monsoon months, 52% were during October and the remaining during November.

The minute intensity rainfall measurements were grouped into categories, for example, <2 mm/hr, 2-5 mm/hr, 5-10 mm/hr, 45-50 mm/hr, 50-60 mm/hr and up to >120 mm/hr. Using these data, frequency table was prepared (Table I).

Table I: Average frequencies of rainfall intensities at Cochin, Indian for four years.

Frequency (mm/hr)	Month									
	Mar.	Apr.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
<2	6	8	227	1044	1176	398	142	43	-	-
02-5	11	10	433	925	1072	376	92	47	2	3
05-10	32	13	505	848	1058	375	74	100	1	18
10-15	12	14	252	473	685	315	41	58	-	11
15-20	9	8	252	307	360	94	24	34	-	7
20-25	17	8	120	218	227	85	19	25	-	10
25-30	10	2	157	179	174	66	26	16	-	9
30-35	5	1	62	103	101	70	7	27	-	-
35-40	3	-	66	69	106	39	4	18	-	10
40-45	8	-	29	60	52	45	6	8	1	10
45-50	1	1	37	58	49	27	3	9	1	20
50-60	-	-	57	46	73	19	6	18	-	11
60-70	-	-	33	33	47	20	3	9	3	29
70-80	-	-	19	27	34	9	7	5	-	-
80-90	-	-	9	15	16	4	-	-	-	-
90-100	-	-	4	2	8	4	1	-	-	-
100-120	-	-	8	8	5	1	-	-	-	-
>120	-	-	9	8	6	-	-	-	-	-

Of the samples during the south-west monsoon season, 21% had an intensity of < 2 mm/hr; July had the highest frequency of 24% while June had the lowest of 10%. The seasonal frequency was 12% with intensity values between 10 and 15 mm/hr. September recorded the highest frequency (16%) and July the lowest (11%). With high intensity rainfall, the frequency was found to be 1% for rain intensities of 50 to 60 mm/hr. This range of intensity was highest for June (3%) and lowest for September (<1%). Occasionally, there were rain intensities >120 mm/hr during June, July and August.

During the summer there was no high intensity rainfall, only 35 mm/hr was observed. The post-monsoon months were similar, with high intensity rainfall. For intensities of <2 mm/hr, the frequency was 21%. November had the highest frequency rate (31%). High intensity rain spells, up to 880 mm/hr, were also recorded during these months.

The study has shown that, in general, rainfall is low intensities. But, during the south-west monsoon season, rainfall having an intensity of <2 mm/hr constitutes nearly 2% of the total rainfall in that season. Most of the rains at that time have intensities between 5 and 10 mm/hr and 10-15 mm/hr, 12% each. During the south-west monsoon, August provides 35% of the total rainfall with 14% occurring in the

range of 10-15 mm/hr. In other seasons, a similar distribution can be seen, but it is more consistent in the south-west monsoon time. High intensity rainfall is present during the monsoon months. These results provide an overall idea of how intense the rainfall is in each season and in each month. Detailed analyses will help in land use planning provided the run-off values, are known.

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