

An unusual spell of late night and morning Fog at Agartala Airfield and some associated features

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ABSTRACT. The intense spell of fog which occurred at Agartala during the last week of December 1961 has been analysed from different angles and the characteristics presented. The meteorological conditions which led to its formation have been discussed. The diameter of fog particles as calculated from coronal measurements has also been worked out.

1. Introduction

Agartala airfield ($23^{\circ} 53' N$ and $91^{\circ} 15' E$) is situated in lower Assam in a landscape dominated by ranges of hills to the east and northeast. During the severe cold wave that affected north India in the last week of December 1961, intense and persistent fog occurred on six consecutive days at Agartala airfield from 23 December 1961. A spectacular lunar corona was observed on the morning of 25th when measurements of the red ring were also taken. The conditions leading to the development of the recurrent fogs and the results of computation of fog-droplet diameters based upon coronal measurements made on the 25th are presented and discussed in this note.

2. The sequence of fogs and relevant meteorological conditions

In the wake of an active western disturbance, which moved away across northeast India on 20 December 1961, severe cold wave conditions generally prevailed over north India with persistent subnormal temperatures. Details of the times of onset, duration of fog, etc, during this period are shown in Table 1. It is interesting to see from Table 1 that, during the period of 6 days under study, fog prevailed at Agartala airfield for a total of nearly 39 hours. The temperature graphs reproduced in Fig. 1 reveal a rate of fall of mean temperature of $1^{\circ}C$ per hour before midnight during the

above period, which is steeper than the corresponding rate for the preceding and succeeding weeks. As relative humidity is usually in excess of 90 per cent during the late night and early morning hours at Agartala, such steep rates of fall of temperatures are very significant from the point of view of fog development. The low level winds prior to the onset of fogs were northeast to east and flowing from the hilly terrain, were probably katabatic in character. Natarajan and Banerji (1959) also observed fog over Agartala in association with low level easterlies or north-easterlies which did not have significant bearing on any of the usual synoptic situations that generally promote fog formation at Agartala. They have, however, indicated that some unknown topographical features are perhaps responsible for causing these fogs.

3. Structure of fog

Beautiful lunar coronal rings were observed in the early morning on 24 and 25 December. Fog was very thick and persistent on these days (Table 1). Coronal measurements were carried out on 25th morning and at the time of observation the angular distance of the moon from the zenith was $53^{\circ} 30'$ above the western horizon. At about 0525 IST, when the first observation was taken, the moon was encircled by a beautiful coronal ring coloured reddish-brown in its outer portion and bluish-white over its inner area. The coronal ring

TABLE 1

	Time of onset of fog	Time of dispersal of fog	Duration of fog		Duration when visibility was less than 100 meters	
	(IST)	(IST)	hr	min	hr	min
December 1961						
23	0345	0812	4	27	1	00
24	0130	1020	8	50	4	30
25	0000	0950	9	50	8	00
26	0430	0750	3	20	1	30
27	0210	0812	6	02	2	00
28	0200	0830	6	30	3	00
Total			38	59	20	00

TABLE 2

Coronal measurements on 25 December 1961

Time of observation (IST)	Description of the observed corona	Visibility	Outer diameter of red ring (2 θ)	Drop dia- meter (μ)
0525	Corona with inner edge bluish-white and outer edge reddish-brown	Less than 100 meters	5° 12'	15.4
0530	Do.	Do.	5° 06'	15.7
0535	Do.	Do.	5° 00'	16.0

At 0530 IST on
25-12-61

{	D. B. Temp.	46°.0 F
	W. B. Temp.	46°.0 F
	Rel. Hum.	100 %
	Surf. Wind	Calm

Wavelength of reddish-brown light
taken as 0.000571 mm

maintained this colour contrast in its exterior and interior regions for quite sometime more but the accuracy of further measurements beyond the first 15 minutes was marred by the light breeze that had set in by that time. The diffraction ring, during the course of measurement had distinct prismatic colours and as such the fog particles can be assumed to be more or less homogeneous atleast during this short spell. The ring was almost symmetrical around the luminary.

The diameter of fog particles can be calculated with the help of the well known formula

$$\sin \theta = \frac{(N + a)\lambda}{d} \quad (1)$$

where θ is the angular radius of the circular intensity maxima produced by particles of diameter d in light of wavelength λ . N is the order of maximum counting from the centre and a is equal to 0.22 for spherical particles. Equation (1) has been utilised for calculating the diameter of fog-particles and the results are given in Table 2.

The diameter of the fog-droplets appear to be in conformity with those observed by Rao

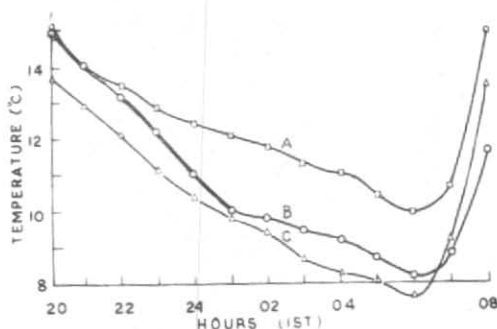


Fig. 1. Average Dry-bulb temperature curves

A—for the week preceding the foggy spell

B—for the foggy week; sharp fall in temperature between 2200-0100 IST indicated by thick line

C—for the week following the foggy spell

and Mukherjee (1958) and Mahrous (1954). The time of sun-rise on this day was 0606 IST. The fog particles scattered a bluish-white tinge from the incident twilight of the rising sun. A careful eye was kept on the fog-bow at the time of sun rise but its presence could not be clearly ascertained. The fog lifted enmasse as stratus clouds at about 1030 IST.

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