Frequency of fog at Alipore, Dum Dum and Barrackpore

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ABSTRACT. An analysis of fog formation at Alipore, Dum Dum Airport and Barrackpore Airport regarding frequency, commencement, dispersal and duration has been made. It has been shown that the variations are due to local factors and their causes discussed.

1. Introduction

The causes and prediction of fog have been discussed in earlier papers by Roy (1951), Basu (1952) and Chakravortty (1948). In this note an analysis of fog statistics of Alipore, Dum Dum and Barrackpore with regard to the frequency, commencement, dispersal and duration is presented.

All the three stations are situated on the eastern bank of river Hoogly, Alipore observatory being at about a distance of one and a half miles from the river, Dum Dum Airport at a distance of seven to eight miles and Barrackpore Airport within half a mile of the river. The distance of Alipore from the sea (Bay of Bengal) is about fifty miles, Dum Dum Airport being fifteen miles northeast of Alipore, is at a distance of about sixtyfive miles from the sea while Barrackpore Aiport is at a distance of seventyfive miles from the sea, being ten miles northwest of Dum Dum (Fig. 1).

The special features of the locality and neighbourhood of three places are as follows —

(*i*) *Alipore*—It is a thickly populated area with hard ground all over the surrounding. There is neither any factory in the neighbourhood nor any marshy land except a small lake inside the zoological garden, about 600 yds to the east.

(*ii*) *Dum Dum*—The Airport has a long strip of marshy land to the south. The surrounding grounds are mostly grassy and neighbouring factories do not work in the night, the area not being much populated.

(*iii*) *Barrackpore*—There are numerous factories and mills in the neighbourhood within a distance of 6 to 8 miles both to the north and south of the Airport. Of these factories and mills one paper mill about three miles to the south of the Airport works 24 hours, while others do not work in the night. The area is not densely populated and there are no marshy lands in the neighbourhood, except those at Palta water works on the eastern bank of the river, the surrounding grounds being mostly grassy. In this note, five years data of Alipore and Dum Dum have been taken for comparison while for Barrackpore only 3 years, data are available, but the same visibility limits, *viz.*, less than 1100 yds has been used for all the three stations.

2. Frequency of fog

The number of foggy days in different months for the three stations have been compared in Table 1. It shows that the frequency of fog is higher at Dum Dum than either at Alipore or Barrackpore. If the three-year period corresponding to which only data for Barrackpore are available, is considered, it will be seen that Dum Dum had 12 cases of fog more than Barrackpore whereas Alipore had 4 cases of fog less than Barrackpore. The number of occasions of fog in different months has been shown graphically in Figs. 2(a) and 2(b).

It will be seen from the table that in the coldest months (*i.e.*, December and January) Alipore had more cases of fog than either Dum Dum or Barrackpore.

TABLE 1

Number of occasions of fog

Year	1948	1949	1950	1951	1952	Total
			OCTOBER			
Alipore	0	0	1	0	0	1 (1)
Dum Dum	0	2	2	0	3	7 (5)
Barrackpore	—	—	0	2	2	4
			NOVEMBER			
Alipore	0	0	0	0	0	0
Dum Dum	2	0	5	3	3	13 (11)
Barrackpore	—	—	0	3	2	5
			DECEMBER			
Alipore	4	1	5	4	6	20 (15)
Dum Dum	6	2	6	3	3	20 (12)
Barrackpore	—	—	3	2	9	14

	1949	1950	1951	1952	1953	Total
			JANUARY			
Alipore	2	3	4	17	4	30 (25)
Dum Dum	2	6	5	3	2	18 (10)
Barrackpore	—	—	5	6	5	16
			FEBRUARY			
Alipore	0	0	5	9	6	20 (20)
Dum Dum	2	5	9	5	11	32 (25)
Barrackpore	—	—	7	6	8	21
			MARCH			
Alipore	2	0	2	1	1	6 (4)
Dum Dum	4	3	8	6	3	24 (17)
Barrackpore	—	—	3	2	3	8
			APRIL			
Alipore	0	0	0	0	1	1 (1)
Dum Dum	0	0	0	2	0	2 (2)
Barrackpore	—	—	0	1	1	2

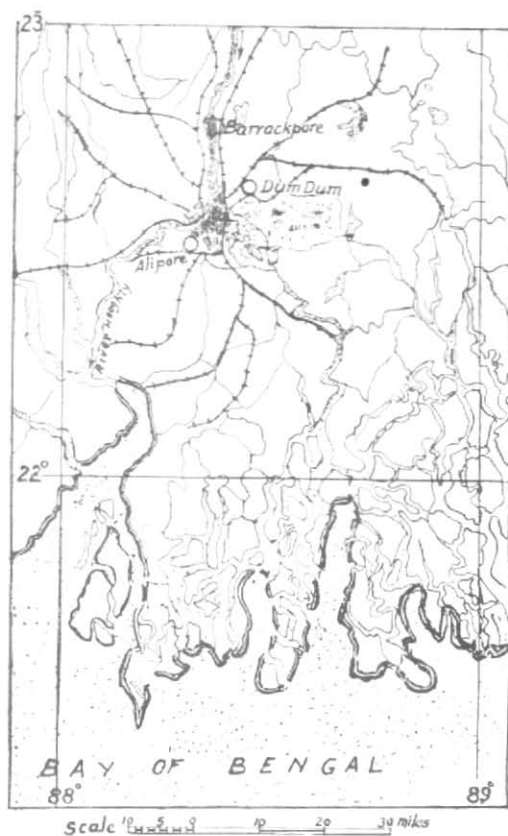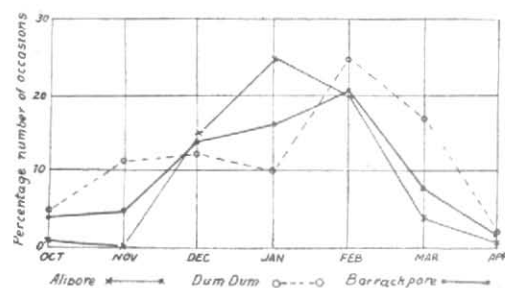Figures within brackets indicate three years' total

Fig. 1

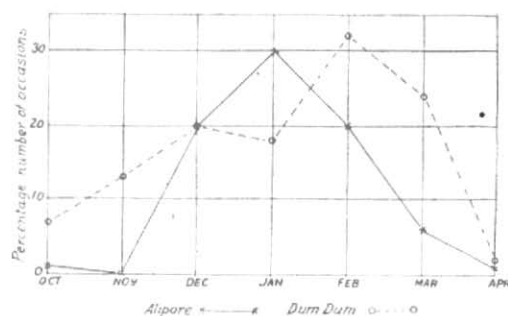Fig. 2 (a). Frequency of fog for different months (3 years' total)

Fig. 2 (b). Frequency of fog for different months (5 years' total)

TABLE 1 (a)

Frequency of Surface Wind at 1730 IST

DECEMBER

Alipore

Year	Calm	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1948	30	1															2
1949	28	1								1	1	1					2
1950	26										1			2			
1951	24	2	1		1											1	1
1952	28						1										

Dum Dum

Year	Calm	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1948	7	6					1		1					1	1	4	10
1949	17			2											1	7	4
1950	5	4		1	1					2	3		1		4	5	6
1951	3	4	1	1	1	1			1					1	8	10	
1952	8	2	4	2										1	6	8	

JANUARY

Alipore

Year	Calm	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1949	14	1				1					2	2	1	2	2	6	4
1950	25										1		1			1	2
1951	22	2														3	2
1952	30											2	1			1	1
1953	20	5				1	1									1	1

Dum Dum

Year	Calm	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1949	—	2		1	1		1			1			1	3	11	10	
1950	9	5	3						1	1	3		1	3	5	1	
1951	11	4			1			1		1	2	1	1	1	3	4	9
1952	1	5	1		1		1			1				1	3	7	6
1953	12	7	1		1												8

FEBRUARY

Alipore

Year	Calm	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1949	4	4	2							1	1	1	1		2	10	3
1950	10	2							1	3	4	2	1			4	
1951	21				1	1	1	2	1	3	4	1			2	3	1
1952	10		1					1	1	3	1	3	1		2	5	
1953	13			1					1	2	1						

Dum Dum

Year	Calm	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1949	1	4			1			1			1			1	2	10	7
1950	4	1	1						3	3	5			1	2	3	5
1951	16	2	1					1		1	1	1	1	1	1	1	1
1952	1	2	1		2	2				1	4	1	2	1	1	2	4
1953	11	2			1					2	4	1		1	1	5	

MARCH

Alipore

Year	Calm	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1949	9	1								3	4	6	1	1	1	5	
1950	12	2						1		3	3	5	4	3	1	2	
1951	10			1		1	2	1		2	1	5	4	3	1		
1952	12							1	4	7	2	1				2	2
1953	4							1	10	6	8	2					

Dum Dum

Year	Calm	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1949	2	1						1	1	3	5	3		4	1	5	2
1950		3		1	1	1		1		3	5	3	4	2		1	2
1951	6		2	1			1	1		5	11	3		1		5	1
1952	1	2		1					5	4	8	10				1	
1953	1	1	1														

TABLE 2

Temperature tendency

Average minimum and 0830 hours temperature (°F)

|	Alipore		Dum Dum	
	Min.	Temp. at 0830 hrs	Min.	Temp. at 0830 hrs
1949				
December	54	64	53	64
January	58	64	56	64
February	61	68	59	68
March	72	81	70	80
1950				
December	58	66	57	66
January	57	65	56	65
February	62	70	60	70
March	69	79	68	79
1951				
December	60	67	59	67
January	55	63	54	64
February	62	70	60	71
March	70	79	63	78
1952				
December	56	65	55	66
January	58	64	56	65
February	64	71	63	72
March	69	78	68	77
1953				
December	—	—	—	—
January	57	63	56	64
February	65	70	63	71
March	76	82	75	81
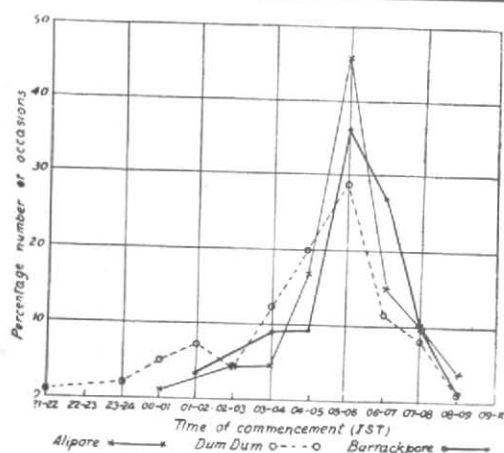
Fig. 3

During the coldest months the lower atmosphere is highly polluted by smoke from house-hold ovens. The visibility goes down to even 1000 yds during evening. This is an important factor which contributes to the cause of high incidence of fog at Alipore in winter.

From an analysis of Table 1 with Figs. 2(a) and (b), it will be seen that there is a more rapid increase in the frequency of fog at Dum Dum in February than the other two stations, whereas there is a sudden decrease in frequency at Alipore and Barrackpore in March while for Dum Dum the decrease is gradual. This can only be attributed to the stretch of marshy land to the south of Dum Dum Airport.

From a study of surface wind data in Table 1 (a) it will be seen that there is more of southerly component in the months of February and March. The larger frequency of fog at Dum Dum during this period is presumably due to the transport of moisture (to a large degree) from the stretch of marshy land to the south of Dum Dum Airport. The gradual decrease of the incidence of fog at Dum Dum when considered against the rapid decrease at Alipore in March can only be attributed to the convection started by the sun which is more rapid at Alipore due to hard ground, whereas there will be a time lag taken by the convection current to disperse the fog over Dum Dum. From a study of the temperature tendencies at Alipore and Dum Dum as shown in Table 2 it will be seen that Alipore has generally got higher minimum temperature than Dum Dum which confirms the fact that convection is more effective at Alipore than at Dum Dum.

When the frequency of Barrackpore is considered it is found that it is midway between Dum Dum and Alipore as it ought to be because neither does it possess any marshy land nor is it surrounded by hard ground like Alipore.

3. Time of commencement and dispersal of fog

The variation in the time of commencement and dispersal of fog with their

TABLE 3

Percentage number of occasions of fog commencing at different periods

	21-22	22-23	23-24	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09
OCTOBER												
Alipore									1			
Dum Dum							1	2	3			
Barrackpore							3		3		1	
NOVEMBER												
Dum Dum				1			1	2	6		1	
Barrackpore					3				2	1	1	
DECEMBER												
Alipore				1			1	3	11	4	4	3
Dum Dum			2	1			3	3	5	3	1	
Barrackpore							2		4	8	6	
JANUARY												
Alipore	1				1		2	9	18	3	5	
Dum Dum					1		2	2	3	6		
Barrackpore					1		1	3	7	9	2	
FEBRUARY												
Alipore						1	1	2	11	8	1	
Dum Dum			4		4	1	2	7	4		3	
Barrackpore					3	1	3	6	9	8	1	1
MARCH												
Alipore						2		3	4		2	
Dum Dum				2		2	3	3	6	3		
Barrackpore						1			9	1		
APRIL												
Alipore									1			
Dum Dum								1	1			
Barrackpore							1		2			
TOTAL												
Alipore	1			1		4	4	17	46	15	10	3
Dum Dum			2	5	7	4	12	20	28	12	8	1
Barrackpore					3	6	9	9	36	27	10	

percentage frequency, have been worked out for each month in Tables 3 and 4 with their graphical representations in Figs. 2 and 3 respectively.

Table 3 read with Fig. 3 shows that the time of the fog formation in maximum number of cases for all the stations is between 0500 and 0600 IST. Between 0400 and 0500 IST, Alipore had in all 17 per cent of fog. Dum Dum 20 per cent and Barrackpore 9 per cent cases. It may generally be inferred that the time of onset of fog at Alipore and Dum Dum may be taken to be about 0400 IST whereas that for Barrackpore is one hour later on these days. From a perusal of the table it will be seen that between the period 0500 and 0600 IST all the stations had their maximum number. It is, therefore, clear that maximum frequency of fog occurs at the time of the sunrise.

TABLE 4

Percentage number of occasions of fog dispersing at different periods

	Time (IST)										
	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
OCTOBER											
Alipore							1	2	2		
Dum Dum						1	2	3			
Barrackpore					1						
NOVEMBER											
Alipore							3	4	1	1	1
Dum Dum						1		4	3		
Barrackpore											
DECEMBER											
Alipore							8	6	19	3	
Dum Dum						1	3	5	3	3	3
Barrackpore								4	6	11	
JANUARY											
Alipore							3	4	24	1	
Dum Dum								4	8	3	
Barrackpore						1		6	13	2	1
FEBRUARY											
Alipore							3	1	15	4	1
Dum Dum			1	1			1	3	9	9	2
Barrackpore					1			3	9	13	5
MARCH											
Aliporo							1	4	1	3	
Dum Dum			1					2	9	7	1
Barrackporc						1		3	7	1	
APRIL											
Alipore							1				
Dum Dum							2				
Barrackpore							1	1			
TOTAL											
Alipore						4	24	26	41	5	
Dum Dum		1	1	1		3	15	33	30	10	4
Barrackpore					2	3	9	34	36	17	1

Fig. 4

Percentage number of occasions vs. Time of dispersal (IST): 00-01, 01-02, 02-03, 03-04, 04-05, 05-06, 06-07, 07-08, 08-09, 09-10, 10-11
Alipore ×——×   Dum Dum o----o   Barrackpore •——•

Fig. 5

Percentage number of occasions vs. Duration (hours): 0-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, >7
Alipore ×——×   Dum Dum o----o   Barrackpore •——•
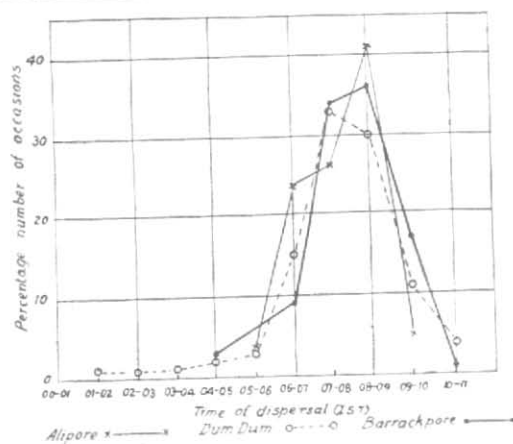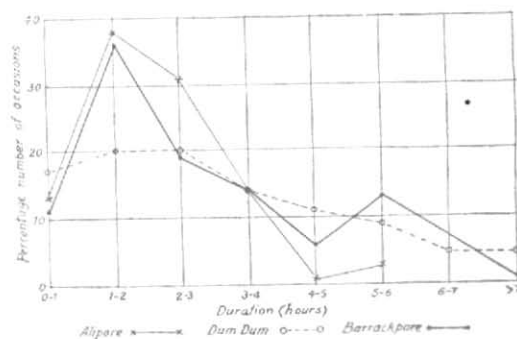
TABLE 5

Percentage number of occasions of fog of different durations

	Time (IST)							
	00-01	01-02	02-03	03-04	04-05	05-06	06-07	> 07
OCTOBER								
Alipore	1							
Dum Dum	2	1	2	2				
Barrackpore		1	3	1				
NOVEMBER								
Alipore								
Dum Dum	3	2	1		3	1		
Barrackpore	1	3	1			1		
DECEMBER								
Alipore	5	7	10	3		1		
Dum Dum	3	3	2	3	3	1		
Barrackpore	4	7	3	4		1	1	
JANUARY								
Alipore	4	13	12	7	1	1		
Dum Dum		3	6	3		2	2	
Barrackpore	2	10	7	1	1	5		1
FEBRUARY								
Alipore	3	14	7	1				
Dum Dum	3	5	4	5	2	4	2	3
Barrackpore	2	7	4	7	5	4		1
MARCH								
Alipore		3	2	3				
Dum Dum	6	4	5	1	3	2		
Barrackpore	1	8		1				
APRIL								
Alipore		1						
Dum Dum		2						
Barrackpore	1		1					
TOTAL								
Alipore	13	38	31	14	1	3		
Dum Dum	17	20	20	14	11	9		
Barrackpore	11	36	19	14	6	13	5	4 1

Table 4 associated with Fig. 4 gives an idea about the dispersal of fog for the three stations. It is seen that the general dissipation time of fog is between 0800 and 0900 IST for all the stations, but on a close scrutiny it will be found that fog dissipates in Alipore at first whereas at Barrackpore it dissipates last.

4. Duration of fog

On a comparative examination of the period of duration of fog in Table 5 associated with Fig. 5 it will be seen that fog lifts sooner at Alipore than at Dum Dum and Barrackpore, the duration being mainly same at the latter two stations. On an average the duration of fog is greatest at Dum Dum.

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