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HORIZONTAL WIND SPEEDS AND ASSOCIATED
PARAMETERS RECORDED AT NASA'S 150-METER
GROUND WINDS TOWER FACILITY AT KENNEDY SPACE
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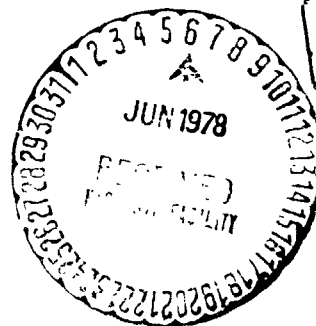
NASA TECHNICAL MEMORANDUM

NASA TM 78170

AN ANALYSIS OF MAXIMUM HORIZONTAL WIND SPEEDS
AND ASSOCIATED PARAMETERS RECORDED AT
NASA'S 150-METER GROUND WINDS TOWER
FACILITY AT KENNEDY SPACE CENTER, FLORIDA

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March 1978



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16 Abstract This report presents statistical summaries of the daily maximum horizontal wind speed and associated parameters from data recorded at the National Aeronautics and Space Administration's 150-Meter Ground Winds Tower Facility on Merritt Island, Kennedy Space Center, Florida. One year of continuous horizontal wind speed measurements processed by the Automatic Data Acquisition System is classified as a function of tower level (10, 18, 60, and 150 meters) and period of reference [day, month, season: winter (October through March) and summer (April through September), and annual]. Tabulations were made of the daily maximum horizontal wind speed, time of occurrence, and five associated parameters: mean horizontal wind speed, maximum vertical gusts (i.e., updraft and downdraft), and mean and instantaneous directions. Analyses using these data included means, extremes, standard deviations, and frequency distributions. Comparisons of intensity of maximum horizontal wind speeds determined in this year of data are made with maximum values recorded at Kennedy Space Center during another non-hurricane-occurrence year (1967) and with values during 1966 through 1972 when six hurricanes affected the area after the Ground Winds Tower Facility became operational in December 1965. The intent of this report is to provide additional information for the general description of wind flow in the lowest 150 meters of the atmosphere for the identification of hazards involved in wind shear encounter relative to ascent and descent of the Space Shuttle and conventional aircraft.			
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TECHNICAL MEMORANDUM 78170

AN ANALYSIS OF MAXIMUM HORIZONTAL WIND SPEEDS AND ASSOCIATED PARAMETERS RECORDED AT NASA'S 150-METER GROUND WINDS TOWER FACILITY AT KENNEDY SPACE CENTER, FLORIDA

INTRODUCTION

There are diverse requirements for information describing wind conditions in the lowest 150 meters of the atmosphere. Particular needs are related to determining whether horizontal gusts have more significant effect on landing an aircraft than vertical gusts — although both have noticeable effects separately and in combination [1]. It should be noted, however, that the opposite conclusion is also held [1]. In either case, the behavior of the wind in the last 30 meters of descent, particularly between 30 and 15 meters during which some aircraft travel approximately 300 meters in 4 to 5 seconds, is most important to a descending aircraft [2]. A study providing daily maximum vertical gusts (i.e., updraft and downdraft) has been published by the Atmospheric Sciences Division [3]. Detailed horizontal wind speed maxima and associated parameters presented in this report may be useful in problems concerning ground wind environment at the Kennedy Space Center (KSC) or areas with similar terrain and conditions.

DATA

Data for these summaries are from the National Aeronautics and Space Administration's (NASA) 150-Meter Ground Winds Tower Facility (Figure 1) located on Merritt Island, Florida, approximately midway between Launch Complex 39B and the Space Shuttle runway. Placement of the meteorological sensors on the tower is shown in Figure 2, and a detailed description of the facility is given in Reference 4. The Automatic Data Acquisition System samples at a rate of 10 samples per second, digitally records, and real-time processes data from the sensors [5]. Six 10-minute computational sequences of means, extremes, standard deviations, etc., are performed each hour and listed by the system teleprinter. More than 50,000 samples of horizontal wind

speed maxima for each of four levels (10, 18, 60, and 150 meters) were examined for this study, representing 95 percent of the possible data for a year (January 1973, February through October 1975, November 1974, and December 1972). Specifically, the daily maximum horizontal wind speed and associated parameters for a year at four levels were determined and tabulated according to day, month, and season. Tabulations of the daily maximum horizontal wind speed, five associated parameters: mean wind speed, vertical gusts (updraft and downdraft), directions (mean and instantaneous), and time of occurrence at the 10-meter level are given with extremes, means, and standard deviations in Tables 1 through 7. Associated is defined to be recorded in the 10-minute period of occurrence of the daily maximum horizontal wind speed. Similar tabulations for the 18-, 60-, and 150-meter levels are presented in Tables 8 through 28. All 18-meter level tabulations are measurements from the large tower sensor

ANALYSES AND COMPARISONS

Analyses and comparisons derived from the daily maximum wind speed values and associated parameters are also presented in tabular form. Tables 29 through 32 present by levels the gust factor as a function of the daily maximum horizontal wind speed, season, and annual. The gust factor is defined to be $GF = u/\bar{u}$, where u is the daily maximum horizontal wind speed and $\bar{u}$ is the associated 10-minute mean wind speed. Approximately 90 percent of the daily maximum horizontal wind speed values occurred at the

10-meter level in the $6.5 < 13.5 \text{ m s}^{-1}$ range with a mean gust factor of 1.84

18-meter level in the $6.5 < 16.5 \text{ m s}^{-1}$ range with a mean gust factor of 1.78

60-meter level in the $6.5 < 16.5 \text{ m s}^{-1}$ range with a mean gust factor of 1.54

150-meter level in the $7.5 < 18.5 \text{ m s}^{-1}$ range with a mean gust factor of 1.38.

Table 33 presents percentage frequency distributions of associated maximum updrafts (+) greater than, equal to, or less than the associated maximum downdrafts (-) by months and levels. Updrafts were greater than downdrafts at

the 18-meter level 87 to 100 percent of the time and at the 150-meter level 63 to 81 percent in September, December, and January. Downdrafts were greater than updrafts at the 10- and 60-meter levels and the remaining nine months at the 150-meter level. Updrafts and downdrafts were equal generally less than 10 percent of the time for all levels and months. A previous study [3] revealed that the coincidence of the daily maximum vertical gusts with the maximum vertical gusts associated with the daily maximum horizontal wind speed (asterisk values in tables) was 25 percent or less throughout the year at all levels.

Percentage frequency distributions of associated mean and instantaneous directions by compass segments and months for each level are presented in Tables 34 through 37. Approximately 33 percent was the greatest frequency of occurrence for mean and instantaneous directions and occurred from the east at the 150-meter level in September and August, respectively. Seasonally and annually the mean and instantaneous directions occurred by levels from the same compass segment as follows:

<u>Level (m)</u>	<u>Percent</u>		
	<u>Winter</u>	<u>Summer</u>	<u>Annual</u>
10	55	45	50
18	56	49	53
60	64	59	62
150	65	67	66

Table 38 gives percentage frequency distributions of time of occurrence of the daily maximum horizontal wind speed in four 6-hour periods by months and levels. Maxima occurred approximately 5 percent of the time from 0100 to 0700, 30 percent from 0700 to 1300, 50 percent from 1300 to 1900, and 15 percent from 1900 to 0100 EST for all levels.

Actual number of occurrences of the daily maximum horizontal wind speed within the same minute and within one (plus or minus) minute at two, three, or four levels is shown in Table 39. Coincidence of recorded precipitation with the daily maximum horizontal wind speed is shown in Table 40 by months, seasons, and levels.

The inevitable comparisons of the daily maximum horizontal wind speeds determined in this year of data are with another comparable year (1967) and with available all-time extremes. At NASA's 150-Meter Ground Winds Tower

Facility, the recorded extreme wind speeds occurred during six hurricanes which affected the area from 1966 to 1972. It should be noted that 1967 was a non-hurricane-occurrence year.

Maximum Horizontal Wind Speeds (m s^{-1})

<u>Level (m)</u>	<u>Non-Hurricanes</u>		<u>Hurricanes</u>
	<u>(1970's)</u>	<u>1967)</u>	<u>(1966-1972)</u>
10	21.5	No sensor	28.1
18	25.0	25.4	32.0
60	28.1	27.9	37.6
150	27.3	29.7	38.8

REMARKS

The intent of these statistical summaries of the daily maximum horizontal wind speed and five associated parameters, together with a previous report on daily maximum vertical gusts, is to provide information for the general description of wind flow in the lowest 150 meters of the atmosphere in the KSC Merritt Island, Florida, area. These reports provide detailed wind speed data which may be useful in wind shear encounters relative to ascent and descent of the Space Shuttle and conventional aircraft at KSC or areas with similar terrain and conditions.

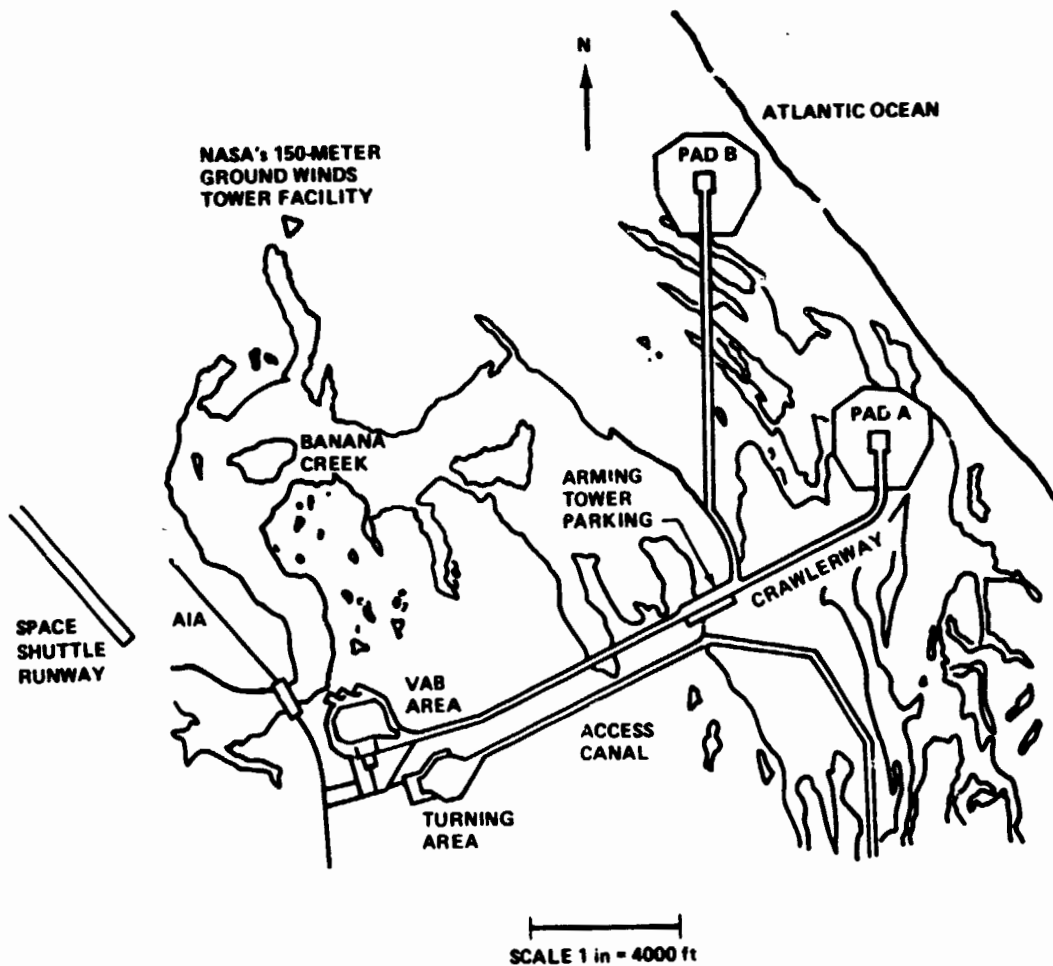


Figure 1. NASA's 150-Meter Ground Winds Tower Facility and Launch Complex 39, Kennedy Space Center, Florida.

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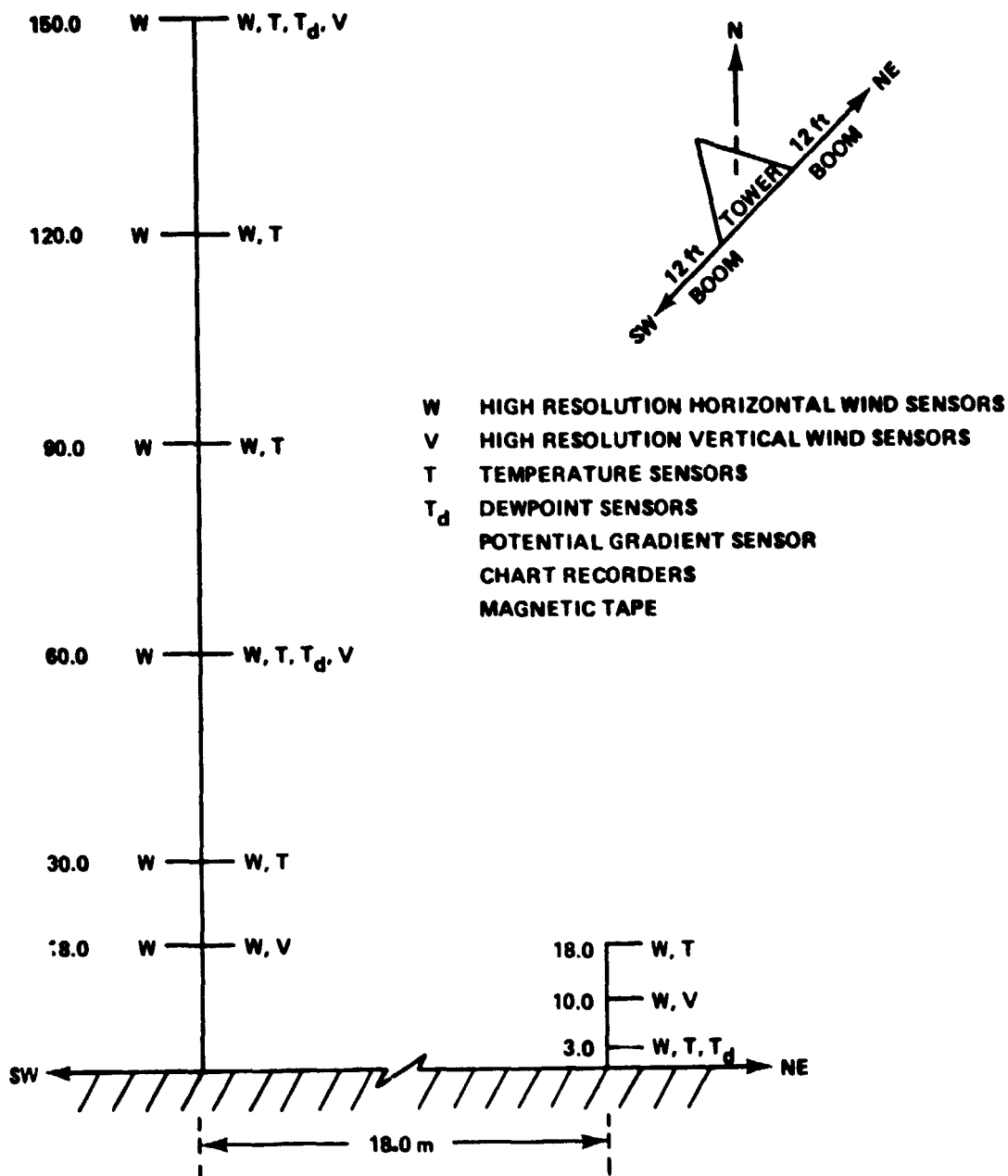


Figure 2. Placement of sensors on NASA's 150 Meter Ground Winds Tower Facility at Kennedy Space Center, Florida.

**TABLE 1. DAILY MAXIMUM HORIZONTAL WIND SPEED (m s^{-1})
RECORDED AT 10-METER LEVEL**

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1	7.5	11.0	12.7		6.1	10.4	10.3	8.6	10.8	13.4	11.0	8.4
2	16.5	8.9	6.5	4.9	6.9	12.2	9.7	8.6	13.1	11.5	8.2	8.9
3		7.6	6.8	9.6	11.5	12.7	18.4	11.0	9.2	7.7	8.3	7.3
4		7.0	7.3	6.3	10.3	9.2	11.3	11.5	7.7	8.9	9.6	6.1
5		7.0	9.2	5.8	9.9	16.3	10.4	8.6	8.3	9.9	9.4	9.7
6	8.6	6.3	9.2	8.6	19.8	11.7	11.5	7.6	8.9	12.8	8.7	10.4
7	8.9	11.5	9.9	8.6	9.4	9.6	6.9	9.6	18.9	9.7	11.0	9.4
8	8.3	8.3	12.1	12.0	8.2	13.2	11.1	8.3	11.7	14.4	11.0	9.9
9	7.2	11.4	8.2	11.5	6.2	14.4	8.7	7.9	10.4	15.2	10.1	12.4
10	8.4	12.0	5.5	9.6	8.3	10.4	8.7	14.6	10.3	13.7	9.7	8.2
11	7.9	6.8	6.8	13.9	6.5	9.0	13.8	12.1	9.0	20.3	9.4	9.2
12	8.7	10.4	10.3	20.0	10.0	12.8		8.7	7.6	14.4	7.9	7.3
13	9.7	13.1	8.7	19.7	11.7	14.6		8.7	10.7	10.4	9.3	6.6
14	9.3	6.9	10.3	11.0	10.6	16.9		8.2	8.4	8.7	8.6	8.0
15	9.0	11.0	12.1	10.0	10.3	8.6	14.8	7.6	7.3	10.1	7.9	7.5
16	9.7	7.6	21.0	8.4	13.1	11.3	11.8		14.4	8.9	7.7	7.6
17	14.4	8.9	17.0	9.6	9.6	9.3	9.0		9.6	8.0	7.0	13.9
18	9.9	6.6	8.7	7.2	8.9	11.5	13.9		7.6	10.0	7.5	10.6
19	6.9	5.8	8.4	12.2	11.7	10.0	13.9	8.4	8.4	9.0	7.7	12.0
20	11.7	14.2	6.2	6.6	11.1	8.2	12.2	9.2	7.7	10.8	7.6	10.7
21	8.2	12.4	12.5	8.7	8.9	8.9	11.4	10.0	12.7	9.2	9.7	8.2
22	10.1	9.0	19.1	15.6	8.6	10.3	11.0	9.2		6.9	8.6	12.8
23	11.0	7.7	11.5	9.2	16.5	8.7	13.4	7.0	12.2	7.9	7.9	14.9
24	14.9	7.0	10.7	10.7	21.5	12.7	10.6	8.0	7.7	7.9	7.6	10.0
25	6.9	5.8	12.1	9.0	8.0	13.2	7.7	8.2	7.3	6.5	8.0	11.0
26		11.3	10.6	13.1	7.9	11.1	6.9	7.3	7.5	7.3	10.0	10.4
27		10.3	11.3	9.9	9.9	10.0	7.3	10.0	9.4	11.7	9.4	9.7
28	10.8	6.3	7.5	15.8	6.2	13.1	10.8	9.9	10.0	9.9	10.7	9.0
29	10.4	6.8	5.8	17.6		10.8	10.8	9.9	7.5	8.7	8.2	11.3
30	13.4	8.6	11.4	11.3		14.4	10.4	12.4	9.2	9.4	10.4	9.7
31	13.7		9.6	8.2		8.4		11.7		11.7	11.8	
Mean	10.08	8.92	10.29	10.82	10.27	11.42	10.99	9.39	9.78	10.48	9.03	9.70
σ	2.60	2.39	3.62	3.83	3.72	2.34	2.62	1.78	2.60	2.95	1.28	2.10
Maximum												
Month	16.5	14.2	21.0	20.0	21.5	16.9	18.4	14.6	18.9	20.3	11.8	14.9
Season				21.5						20.3		
Annual						21.5						

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**TABLE 2. ASSOCIATED 10-MINUTE MEAN HORIZONTAL WIND
SPEED (m s^{-1}) RECORDED AT 10-METER LEVEL**

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1	4.4	5.8	7.6		4.1	6.3	5.2	5.6	5.9	7.7	6.3	4.5
2	5.2	5.4	4.2	3.2	5.1	6.2	5.6	5.5	7.0	7.0	3.4	4.2
3		4.7	4.2	5.4	7.2	6.3	8.2	7.2	4.8	4.0	4.9	3.4
4		4.4	4.7	2.3	6.2	3.8	6.6	4.1	4.4	5.5	6.1	3.9
5		3.8	5.4	3.9	5.1	8.0	5.4	5.2	5.1	4.8	4.9	4.5
6		3.9	4.9	4.4	8.2	7.0	6.8	3.5	4.5	8.0	3.9	4.7
7	5.1	6.9	5.9	4.8	5.6	5.5	4.1	6.1	6.9	5.4	6.3	5.4
8	5.2	5.1	6.1	5.6	4.8	5.6	7.0	4.2	6.6	5.6	6.9	6.2
9	4.5	6.5	5.1	7.0	2.3	8.4	5.4	4.9	5.8	6.2	6.2	7.6
10	4.9	7.0	3.5	5.5	5.1	6.1	4.1	4.5	6.2	4.7	5.6	4.8
11	4.2	4.5	4.1	8.2	4.7	5.4	5.6	8.0	6.1	9.9	5.9	5.1
12	5.4	5.9	5.9	10.8	4.8	7.5		5.4	1.6	6.2	3.8	4.2
13	5.9	7.5	5.6	12.4	7.0	8.2		2.5	6.2	6.1	3.8	3.8
14	6.5	3.1	6.3	7.0	6.3	8.0		5.1	4.5	5.5	5.1	4.9
15	4.8	7.5	6.5	5.4	3.9	5.2	6.5	3.1	4.8	5.9	4.7	4.4
16	5.8	5.1	12.1	5.5	7.3	4.4	7.0		7.9	5.5	4.9	4.8
17	8.2	5.4	9.4	5.4	4.8	5.8	5.2		5.4	4.9	4.1	6.2
18	4.8	3.0	5.7	4.1	4.4	6.9	8.2		4.7	6.5	5.1	6.6
19	3.7	3.1	5.2	5.9		5.4	8.2	4.7	4.5	2.8	3.8	5.9
20	6.6	7.0	3.2	4.2	6.3	4.8	7.2	5.4	4.4	6.5	4.4	4.8
21	4.8	5.9	7.0	6.3	5.6	4.4	7.5	6.3	8.3	4.2	5.6	4.8
22	6.8	5.9	11.3	7.9	5.2	4.8	6.8	4.7		2.7	5.8	7.0
23	6.3	4.5	6.1	5.9	9.6	5.4	7.3	4.5	7.0	5.6	4.7	7.2
24	7.3	4.4	6.9	6.8	9.2	7.0	6.8	3.9	2.5	4.4	3.7	5.5
25	3.9	2.3	6.5	5.5	3.8	7.2	4.9	4.1	4.4	3.2	5.2	6.5
26		6.2	6.3	5.8	3.8	6.3	3.2	4.5	5.2	3.5	6.1	6.3
27		5.8	6.8	5.2	4.4	5.8	4.4	6.2	4.5	6.5	5.4	6.6
28	6.2	3.8	4.5	6.3	3.5	6.9	5.9	6.1	4.5	4.1	3.4	5.9
29	6.2	3.7	3.5	9.0		6.1	6.2	6.3	4.1	5.5	4.7	6.9
30	7.0	4.9	6.9	6.6		6.2	5.4	6.9	5.5		4.1	3.7
31	8.3		5.1	4.5		4.2		7.0		4.9	5.4	
Mean	5.68	5.10	6.00	6.03	5.49	6.10	6.10	5.20	5.29	5.44	4.97	5.34
σ	1.25	1.40	2.02	2.09	1.73	1.21	1.33	1.29	1.44	1.56	0.97	1.16
Maximum												
Month	8.3	7.5	12.1	12.4	9.6	8.4	8.2	8.0	8.3	9.9	6.9	7.6
Season				12.4						9.9		
Annual							12.4					

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**TABLE 3. ASSOCIATED MAXIMUM UPDRAFT ($m s^{-1}$) RECORDED
AT 10-METER LEVEL**

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1	1.2	1.4	1.5		0.9	1.6	2.7	1.6	2.5	1.3	2.1	1.3
2	1.3	1.2	0.8	0.5	1.4	2.5	1.5	1.2	2.2	2.6	1.4	1.7*
3		1.1	1.0	0.9	1.7	3.3	3.3	2.1	1.8	0.9	1.6	2.5*
4		0.7	0.9	0.7	1.4	3.1*	3.2*	1.3	1.8	1.6	1.9	1.1
5		1.2	0.8	1.2*	2.9	2.0	1.5	1.2	1.3	2.0	2.3*	1.8
6	1.8	0.8	0.5	1.0	2.9	1.9	2.2	1.5	1.8	2.2	1.3	2.4*
7	1.4	1.8	1.3	1.4*	1.6	2.2	1.1	3.1*	3.1	1.6	2.1	2.3
8	1.4	0.8	0.9	1.3	1.5	2.1	2.6*	1.8	2.5	2.3*	1.6	1.7
9	1.0	1.4	0.7	1.4	1.6	2.6	2.0	1.3	2.3*	0.9	2.2	2.8*
10	1.2	2.5	0.3	1.5	1.9	1.5	1.9	1.6*	1.6	3.2*	1.5	1.0
11	1.5	1.2	0.3	2.1	1.2	1.8	2.9	1.8	1.7	4.6*	1.3	2.2
12	1.0	1.7	0.9	3.4*	1.9	2.4		1.5	1.1	3.9*	1.2	1.2
13	1.4	2.2	0.6	2.6	1.8	3.5		1.6	1.8	2.3	1.6	0.9
14	1.6	1.2	0.7	2.1*	1.7	4.0		2.0	1.6	2.0	1.3	0.8
15	1.3	1.9	1.2	1.6	1.9	1.4	1.8	1.9*	1.5	1.7	1.2	1.0
16	1.7	0.9	3.6	1.1	2.4	3.4*	2.2		2.9*	1.9	1.0	1.5
17	3.2	1.3	1.9	0.9	1.7	1.4	1.8		0.9	1.3	1.2	1.9
18	1.4	0.8	1.1	0.8	1.8	2.1	2.9		1.1	2.4*	1.2	1.8
19	1.3	1.1	0.9	2.3		1.9	2.1	2.0	2.1	0.9	1.4	1.6
20	1.9	3.0	0.3	1.0	1.5	1.1	3.9*	1.3	0.9	1.9	1.0	1.3
21	1.0	2.2	1.3	1.2	1.4	2.0	1.7	2.3	2.2	1.5	2.2	1.6
22	1.0	1.6	1.5	1.6	1.7	2.3	2.1	1.3		0.5	1.7	1.8
23	1.1	1.2	1.9*	1.3	3.6	1.6	2.4	1.8	1.7	1.2	1.3	1.4
24	2.3	1.2	1.6*	1.5	4.3	2.0	2.3	1.1	1.0	1.4	1.3	1.0
25	0.3	1.2	1.9	1.0	1.7	2.3	1.4	1.0	0.6	1.9	1.4	1.3
26		1.3	1.3	0.6	1.2	1.6	1.2	2.2*	1.9	1.1	1.6	1.3
27		1.2	1.3	0.6	2.9*	2.3	1.8	2.1	1.4	2.8	2.5	1.0
28	0.8	1.0*	1.6*	1.5	1.2	1.7	2.1	1.9	1.9	1.1	1.7	0.8
29	1.0	0.4	0.1	2.3		1.8	2.0	2.1*	0.9	1.5	2.6*	1.3
30	1.4	0.9	0.6	0.4		3.0	2.4	3.3*	1.1		1.2	0.7
31	1.4		0.6	0.1		1.4		2.9		1.7	3.4*	
*Daily Maximum												
Mean	1.34	1.35	1.09	1.33	1.91	2.19	2.19	1.81	1.70	1.87	1.65	1.50
σ	0.55	0.56	0.68	0.71	0.73	0.71	0.66	0.58	0.62	0.89	0.54	0.54
Maximum												
Month	3.2	3.0	3.6	3.4	4.3	4.0	3.9	3.3	3.1	4.6	3.4	2.8
Season				4.3						4.6		
Annual							4.6					

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**TABLE 4. ASSOCIATED MAXIMUM DOWNDRAFT ($m\ s^{-1}$) RECORDED
AT 10-METER LEVEL**

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1	1.4	2.0	1.5		2.0*	1.9		1.5	3.5*		1.8	1.8
2	2.3	2.1		0.6	1.2	3.1	2.8*	1.6	3.5	1.9		2.1*
3		1.6	0.4	1.7		2.1	3.5	2.1	2.9*	1.6		1.2
4		1.4	0.6	1.3	2.4	2.6	2.4	2.4	1.3	1.7	1.6	1.6
5		1.6			2.2	3.0	2.4	1.6	1.6		3.3*	1.7
6	2.5*	1.8*	1.7	1.0		3.3*	2.4	1.7	1.8		1.3	1.9*
7	1.5	2.4	0.7	0.8		1.6	1.5	1.5	5.0*	2.2	3.0	
8	1.6	1.5			1.9	3.0*		2.1	3.5	2.4*	1.9	1.8
9	1.6	2.5	1.3	1.2	1.3	2.4			1.8	1.8	2.0	3.0*
10		2.9	0.8		1.6	1.9	1.7	1.5	1.3	2.4*	1.4	1.6
11		1.9	1.0	1.8*	1.4	1.7	1.8	2.0	1.7		1.8	1.3
12	1.8	2.2			2.2			1.8	1.6	3.4*	1.4	1.6
13	1.7	2.1		2.2	2.7	2.5		2.4	4.5*		3.1*	1.4
14	1.8	1.2			2.1	2.8		1.8	2.0	1.6	1.9	1.9
15	1.5	2.1		1.5	3.4*		2.6	2.4*	1.5	1.8	1.1	1.3
16	1.3	1.6		1.1		1.9	3.0		3.3	1.8	1.2	1.5
17		2.0	1.6		2.0	2.3	1.7		2.1	1.0	1.4	2.9*
18	2.6*	1.9	1.2		2.0	2.3			1.6		1.6	2.2
19	1.6	1.7	1.0				2.9	2.0	2.1*	1.0	2.3*	1.7
20	2.5	3.6*			1.7	1.7		1.9	2.0*	1.9	1.0	2.0
21	1.8	2.3			2.0	1.9	1.9	2.8*	3.0*	2.0*	1.7	1.5
22		1.8				2.5	2.9	3.0*			1.8	1.7
23	2.6	1.4		1.0		1.7	3.0	2.1	2.1	1.7	1.8	
24	2.9	1.4			3.5	2.8	2.4	1.9	1.4	1.9	2.0	3.1*
25	1.3	1.6			1.7	2.2	1.8	2.3	1.8	1.2	1.8	2.2*
26		3.3		1.9	1.6	1.9	1.9	1.9	1.8	1.7	1.7	
27		2.2	1.7	1.7	1.7	2.7*	1.7	2.0	1.7	2.7	2.2	
28	1.5		1.0	2.5	1.5	2.1		1.8		1.6	2.0	1.2
29	1.5	0.7	1.0				1.7		1.5	1.6		2.1
30	1.5		1.9				2.3	2.1	1.3		1.6	1.4
31	1.5		1.4			3.7*		1.8		2.2		
* Daily Maximum												
Mean	1.76	1.96	1.18	1.45	2.00	2.40	2.30	2.00	2.26	1.87	1.84	1.83
σ	0.50	0.61	0.44	0.55	0.60	0.72	0.57	0.38	1.00	0.53	0.56	0.52
Maximum												
Month	2.9	3.6	1.9	2.5	3.5	5.0	3.5	3.0	5.0	3.4	3.3	3.1
Season				5.0						5.0		
Annual							5.0					

TABLE 5. ASSOCIATED 10-MINUTE MEAN DIRECTION RECORDED AT 10-METER LEVEL

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1	S	NE	NNW		E	NNW	WSW	SE	WSW	ENE	SE	SSE
2	W	ENE	ENE	ENE	SSE	W	NNW	ENE	NW	NE	W	NW
3		E	N	S	N	N	W	SSE	ESE	NNE	S	S
4		SSE	NNW	SE	NNW	NE	NW	SW	E	SSW	SSE	ENE
5		SSW	SE	N	W	NNW	NNW	N	SE	WNW	N	ESE
6	NNE	SE	WSW	W	W	NNW	N	E	ESE	SSW	WSW	SE
7	SE	NNW	NNW	N	NNW	SW	ENE	SE	NW	SSW	W	ESE
8	SE	NNE	SSE	NNW	N	W	SSE	W	W	NW	ESE	ESE
9	NE	NNW	SSE	NNW	NW	NW	SSW	ENE	S	ESE	SE	E
10	N	ENE	NE	NNW	S	S	W	NNW	SSE	SW	SSE	ENE
11	ENE	NNW	S	NNW	NNW	SSE	W	N	ENE	SW	SSE	SE
12	NE	E	SE	NNW	W	S	W	ESE	NE	W	WSW	SE
13	ENE	NW	SSE	NW	N	S		W	W	S	W	E
14	ESE	SSE	S	NNW	N	SW		ESE	W	SSE	ESE	NNE
15	ESE	NNW	SW	W	E	NNE	SW	SW	SSE	SE	ESE	ESE
16	SSE	ENE	N	NW	S	W	NNW	SW	NW	SE	ZSE	ESE
17	SW	SE	N	E	SSW	N	SSE		W	ESE	ESE	SE
18	SW	W	E	SE	SW	SE	S		ESE	ESE	E	SSE
19	NNW	E	E	W	SW	SW	SW	NE	E	NE	W	E
20	N	W	S	N	NNW	NNW	S	NNE	E	S	SSE	S
21	NE	W	SSW	S	NNW	SSE	NNW	N	ENE	W	ESE	SE
22	NE	NW	SSW	SSW	S	WSW	ESE	ENE	ENE	SSW	SE	SSE
23	N	E	W	NNW	S	SSE	SE	ENE	ENE	SSE	ESE	SW
24	NW	SE	NW	NNW	WSW	SW	SSE	ESE	ENE	ESE	ENE	W
25	W	N	W	N	SSW	NNW	SE	ESE	NNW	ESE	ESE	NNW
26		NNE	NNE	S	NE	NNW	ENE	ESE	ESE	W	E	N
27		ENE	NW	SW	ESE	SE	ESE	SSE	SSE	WNW	E	N
28	NNE	SSE	NNW	W	WNW	ESE	S	SE	WSW	SW	ESE	NNE
29	NNW	ESE	SSE	W		S	SSE	SSE	NE	SSE	E	N
30	NNW	NNW	S	NW		WSW	S	SSW	NE	ESE	S	N
31	NE		S	SSE		W		S		ESE	WSW	

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TABLE 6. ASSOCIATED INSTANTANEOUS DIRECTION RECORDED AT 10-METER LEVEL

Day	Winter							Summer						
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept		
1	ESE	ENE	NNW		E	NNW	SW	SSE	W	ENE	SE	S		
2	NNW	ENE	E	ENE	SSE	W	NNW	ENE	NNW	ENE	W	WNW		
3		E	NNW	S	NNW	NNW	W	SSE	WNW	NNE	SE	SSE		
4		SSE	NNW	SE	NNW	N	NW	SSW	ENE	S	SSE	E		
5		S	SE	NW	W	NNW	NW	NNE	SE	W	NNW	SE		
6	ESE	SE	SW	W	WNW	NNW	N	ESE	ESE	SSW	W	SSE		
7	SE	NNW	NNW	NW	NW	SSW	E	SE	WNW	SSW	W	SE		
8	S	NE	SE	NW	N	WNW	SSE	W	W	NNW	E	ESE		
9	NE	NNW	SSE	NNW	NNW	NW	SSW	E	S	SW	SE	E		
10	NNW	ENE	NE	NNW	S	S	W	N	SSE	W	SE	NE		
11	NNE	NW	SSE	NNW	NNW	SE	W	N	ENE	SW	S	SSE		
12	NE	W	SSE	NNW	W	SSE		E	NE	W	WNW	SSE		
13	ENE	NW	SSE	NNW	N	SSW		WNW	WSW	S	W	ENE		
14	E	SSE	S	NNW	N	SW		E	W	SSE	ESE	N		
15	ESE	NNW	WSW	WNW	ESE	NNE	NW	WSW	SSE	ESE	E	ESE		
16	ESE	E	N	NNW	S	W	NNW	WSW	NNW	SE	ESE	ESE		
17	SW	SSE	N	SE	SW	NNW	ESE		W	SE	ESE	SSE		
18	WNW	W	ENE	ESE	SW	SE	S		E	E	E	SSE		
19	NNW	E	E	W	W	SW	SW	ENE	E	WNW	NW	SE		
20	N	W	SW	NNE	NNW	NNW	SSW	ENE	SE	S	S	S		
21	NNE	W	SW	S	NNW	SE	NNW	N	ENE	W	ESE	ESE		
22	NE	NW	SW	SSW	S	SW	SE	E	E	SW	ESE	SSE		
23	N	ESE	W	NNW	SSW	SSE	ESE	ENE	E	SSE	E	SSW		
24	NW	SE	NNW	NNW	W	SW	SE	FNE	E	ESE	NE	WNW		
25	W	W	W	N	W	NW	ESE	E	N	ESE	ESE	NNW		
26		NE	WNW	SSW	NNE	NNW	NE	E	SE	W	E	N		
27		ENE	NW	SW	SSW	ESE	E	SSE	SSE	WNW	SE	N		
28	NNE	SE	NNW	W	NW	E	S	SE	SSW	SSW	E	N		
29	NNW	ESE	SSE	W		SSE	SSE	S	NNE	SSE	E	N		
30	N	NNW	S	WNW		SW	SSW	SSW	NE	ESE	SSW	NNW		
31	ENE		S	SSE		W	S	S		ESE	WSW			

TABLE 7. TIME OF OCCURRENCE (GMT) OF DAILY MAXIMUM HORIZONTAL WIND
SPEED AT 10-METER LEVEL

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1	2030	1934	1751		1922	1523	1756	2048	2050	2124	1716	1914
2	2050	1745	1609	1956	2045	2007	0006	2109	1819	1651	2316	2200
3		1605	2258	2036	2149	1838	1918	1952	1737	1756	2110	1830
4		1454	1537	1744	0132	1917	1442	0050	2122	2225	2012	1730
5		1608	1712	1405	1601	0739	1656	1530	2037	2033	2032	1850
6	1500	1940	1538	1855	2317	0037	1731	1957	1918	0253	1707	1820
7	1850	1745	2218	2348	1436	1817	1817	1808	2012	0019	2107	2130
8	1740	0354	0141	2352	1656	1524	2032	1611	1602	2345	1917	1810
9	1900	0751	1832	2045	1558	0428	0253	2037	2217	2119	1947	1910
10	1820	1454	1937	1839	1643	2130	1744	0159	2138	2119	2042	1610
11	1520	1719	1632	1711	1421	2120	1715	1724	1010	1747	1913	1810
12	1530	1648	1624	2339	1925	1936		1750	1706	1954	2101	1820
13	1600	0657	1958	0004	2037	2150		1708	0043	1847	2209	1940
14	1850	1708	2016	1719	0051	1723		1922	0035	2119	2017	1440
15	1520	1803	1608	1831	1907	1707	1555	0217	0012	1738	2033	1910
16	1550	1348	1610	1611	1553	2122	1902		2155	2120	2014	1910
17	1810	1525	1935	1500	0514	1912	1952		1545	2039	1900	2100
18	0930	1747	1645	1732	1759	1746	2107		1525	1625	1859	2040
19	1550	1847	1540	1821	1456	0412	1415	1916	1806	1810	1643	0810
20	1810	2303	0129	1901	2315	1534	0011	1804	1902	2230	2124	1320
21	1910	0104	1659	1747	2350	1923	2128	1809	2206	0017	1904	1840
22	1840	1618	0336	1306	0102	1522	1933	1910		1911	1938	1940
23	2020	1552	1849	1755	2042	2122	1952	1838	1429	2102	1959	1550
24	1820	1939	1658	1655	1656	1739	1644	1906	0309	2010	1731	2100
25	0302	1910	1601	0948	1734	1724	2115	1832	1126	1541	2253	1900
26		1728	1557	1819	1637	1642	1605	2021	2002	2116	1911	2130
27		0054	1609	0431	1751	1611	1823	2153	2113	2154	1813	1540
28	2351	1703	1631	1850	1919	1610	2302	2103	2141	0008	0830	2000
29	2307	1850	2032	1710		2253	2028	2019	1846	1837	1802	1900
30	1741	1201	1632	0405		1741	0237	2153	1849	1526	1544	1610
31	1823		1832	1943		0018		2151		1245	0150	

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TABLE 8. DAILY MAXIMUM HORIZONTAL WIND SPEED (m s^{-1})
RECORDED AT 18-METER LEVEL

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1	7.7	10.7	13.4		6.2	10.3	12.2	9.6	12.5	16.6	12.5	9.3
2	15.5	9.7	6.8	5.1	7.5	13.9	11.3	9.3	14.2	12.4	8.7	8.9
3	6.9	8.2	8.2	10.0	12.0	13.1	18.7	12.4	10.0	8.2	9.3	7.2
4	5.2	7.2	8.2	10.1	11.0	8.0	12.9	12.7	8.3	9.7	12.1	8.4
5		7.5	9.4	6.3	11.7	16.3	10.1	8.6	8.2	9.4	11.7	9.2
6	7.2	6.5	9.6	8.6	21.1	12.7	12.2	8.2	9.3	14.2	11.0	8.7
7	9.3	12.0	10.1	8.9	9.9	10.0	7.3	9.7	25.0	9.2	11.1	10.1
8	9.2	9.6	12.4	12.2	9.0	12.0	11.3	8.7	12.5	16.9	11.8	10.6
9	6.6	12.2	8.2	12.9	6.3	15.5	9.3	7.9	11.3	14.2	11.7	12.8
10	8.4	12.7	5.5	11.0	9.0	12.8	9.7	14.9	11.1	18.3	10.4	9.3
11	8.7	7.5	7.6	15.5	7.5	9.4	14.5	12.9	9.9	20.5	10.1	11.1
12	9.6	11.0	10.3	24.1	12.0	13.8		9.9	7.2	19.7	8.7	7.9
13	9.7	14.6	8.0	22.1	13.9	15.6		7.5	12.8	10.8	10.1	6.1
14	10.3	6.9	9.9	12.4	11.8	21.2		9.2	9.6	10.3	8.3	8.4
15	9.3	12.0	13.7	10.8	9.6	9.0	15.9	9.3	7.9	10.4	8.2	7.0
16	11.3	8.0	23.5	9.4	13.8	14.2	13.5		16.0	10.3	8.0	8.6
17	15.5	9.6	18.3	10.0	9.2	10.1	9.4		9.3	9.3	7.3	15.1
18	10.4	6.3	8.9	7.7	8.6	12.2	15.3		7.9	11.3	9.2	10.8
19	7.0	6.6	8.7	13.5	11.5	11.7	15.8	8.2	8.9	10.4	8.7	12.8
20	12.0	15.9	6.8	7.2	10.8	8.6	12.9	8.0	7.9	11.3	7.7	11.3
21	8.0	12.5	13.2	10.8	9.7	8.9	12.4	10.6	13.4	9.3	11.3	8.3
22	10.3	9.6	20.7	16.3	10.4	12.1	11.4	8.2		8.3	9.9	12.8
23	11.5	7.9	11.1	9.9	15.3	8.9	13.4	7.6	12.7	8.6	9.2	17.3
24	15.5	7.3	11.8	11.1	18.6	14.4	11.4	7.5	7.5	8.2	7.7	11.4
25	7.6	5.6	13.4	9.3	9.6	15.9	8.3	8.2	8.2	6.3	9.2	10.8
26		12.1	19.0	12.8	8.2	11.7	7.6	7.6	8.6	7.2	11.0	11.0
27		11.5	11.8	11.7	10.6	10.0	7.9	10.3	9.3	12.4	10.1	10.3
28	11.1	7.0	7.6	16.3	7.0	12.9	11.0	10.1	11.1	10.3	13.9	9.3
29	11.7	6.9	5.9	18.7		10.7	10.3	10.8	8.2	9.3	8.3	11.7
30	15.1	9.7	12.1	12.2		15.6	10.7	13.5	10.0	10.7	8.9	9.4
31	15.1		11.7	9.3		9.0		12.8		13.7	17.0	
Mean	10.20	9.49	11.15	11.87	10.78	12.27	11.73	9.79	10.65	11.54	10.10	10.20
σ	2.96	2.68	4.32	4.28	3.41	2.96	2.76	2.08	3.56	3.61	2.07	2.38
Maximum												
Month	15.5	15.9	23.5	24.1	21.1	21.2	18.7	14.9	25.0	20.5	17.0	17.3
Season			24.1						25.0			
Annual							25.0					

**TABLE 9. ASSOCIATED 10-MINUTE MEAN HORIZONTAL WIND
SPEED (m s^{-1}) RECORDED AT 18-METER LEVEL**

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1	4.2	6.2	8.9		4.1	5.8	7.5	6.3	6.6	9.2	6.5	2.8
2	5.6	5.8	4.7	3.2	4.4	7.2	6.9	5.9	8.3	8.7	4.9	4.8
3	4.9	5.1	5.6	6.5	8.3	8.6	8.9	5.9	5.4	4.2	4.8	4.4
4	2.1	3.9	5.5	2.7	6.9	3.8	7.9	7.9	4.5	6.1	4.9	4.5
5		4.4	6.2	4.5	7.7	10.1	5.4	4.9	5.5	4.9	6.2	5.1
6		4.4	5.9	4.9	9.6	7.6	7.7	4.7	4.8	8.0	5.2	5.1
7	5.8	7.7	6.6	5.8	6.5	5.6	4.5	6.5	7.9	4.9	5.4	5.5
8	4.4	5.6	7.7	6.9	4.9	7.5	7.0	4.7	7.3	6.3	7.7	6.3
9	4.7	8.6	5.1	8.3	3.7	9.7	6.1	5.2	6.2	8.9	6.9	8.7
10	5.4	8.0	3.2	6.9	5.4	7.2	5.6	5.1	6.6	6.8	5.8	5.9
11	4.8	3.8	4.2	8.9	4.8	5.4	8.0	8.9	4.9	12.0	6.3	5.4
12	5.2	6.9	6.5	12.5	6.3	8.9		5.8	4.2	9.3	3.0	4.5
13	6.3	9.0	6.2	13.1	7.7	9.6		2.7	6.8	6.6	5.9	3.8
14	6.8	4.4	5.9	7.6	7.3	10.7		6.1	5.6	5.4	5.5	5.5
15	5.2	8.4	6.6	5.8	4.1	5.4	7.7	5.1	5.5	6.3	5.2	4.5
16	5.4	5.5	13.8	6.1	8.6	5.2	7.2		9.2	5.9	5.6	4.9
17	8.6	6.3	10.6	5.9	5.5	5.9	5.5			5.9	4.1	6.6
18	5.6	3.2	5.8	4.5	4.9	7.6	9.4		4.9	7.6	2.7	7.2
19	3.8	3.7	5.8	6.8		6.5	8.6	4.8	5.6	6.2	5.8	6.3
20	7.3	7.9	3.9	4.5	6.8	5.5	8.2	4.8	4.5	7.6	5.1	6.9
21	5.1	7.7	7.3	6.9	6.3	4.7	7.6	6.1	9.2	4.9	7.3	4.9
22	6.8	6.3	12.9	8.2	6.2	7.5	7.5	5.1		5.1	6.3	7.5
23	8.0	4.2	6.2	6.8	9.7	3.9	8.6	4.1	7.6	5.6	4.7	10.0
24	8.6	4.2	7.7	8.2	10.6	8.2	7.5	3.8	3.2	5.1	3.9	6.6
25	4.2	2.1	7.3	6.1	4.9	9.4	4.2	4.2	4.2	3.4	6.5	6.8
26		5.9	4.1	8.2	4.1	7.9	4.5	4.9	5.8	4.2	7.6	7.2
27		6.6	3.8	6.9	3.0	5.9	4.7	7.2	5.1	7.0	6.1	7.0
28	6.6	4.4	5.4	7.2	3.5	8.0	7.3	6.5	6.5	4.4	4.7	6.2
29	6.1	4.1	3.4	9.6		7.2	6.5	6.9	3.5	4.1	4.2	7.9
30	8.6	5.8	7.5	7.7		8.9	6.6	7.3	5.5	5.8	4.1	4.1
31	9.3		6.2	5.1		4.4		8.0			8.4	
Mean	5.90	5.65	6.47	6.88	6.14	7.09	6.93	5.69	5.89	6.35	5.53	5.90
σ	1.70	1.75	2.43	2.27	2.04	1.88	1.43	1.39	1.57	1.91	1.32	1.55
Maximum												
Month	9.3	9.0	13.8	13.1	10.6	10.7	9.4	8.9	9.2	12.0	9.4	10.0
Season			13.8							12.0		
Annual							13.8					

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TABLE 10. ASSOCIATED MAXIMUM UPDRAFT ($m s^{-1}$) RECORDED
AT 18-METER LEVEL

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1	3.0	2.4	2.9		1.7	4.0	4.8	3.1	4.7	2.6	3.5	2.0
2	2.9	2.8	1.9	1.6	2.7	3.6	3.3	3.1	3.4	3.1	3.5	3.2
3	1.5	2.3	2.3	3.1*	2.8	3.9	5.5	5.2	2.4	2.3	3.8	2.2
4	2.3	2.8	2.0	8.3*	2.6	2.6	3.2	3.5	2.3	3.6	4.2	4.9
5		2.7	2.4	1.1	3.0	4.2	3.6	2.2	2.9	2.8	3.8	3.6
6	3.3	3.1	2.0	2.0	8.3*	3.0	4.4	3.0	3.1	5.2*	2.9	4.0
7	2.8	3.9	2.2	1.9	3.9	2.9	2.7	3.0	5.3	2.8	3.0	3.6
8	4.1	2.2	3.6*	3.6	6.3*	3.9	4.3	2.5	3.2	6.1*	4.0	3.8
9	2.6	3.1	2.5	3.1	3.2	5.2*	3.6	2.8	3.3	3.3	4.7	4.2*
10	2.9	3.6	1.1	2.6	3.3	3.9	3.2	1.9	3.1	2.4	3.6	3.0
11	3.3	3.6	1.8	2.7	2.4	3.1	4.6	2.8	3.5	6.3*	3.0	3.9
12	2.9	3.8	3.1	3.6	3.5	5.4		3.0	2.6	4.7*	2.5	3.4
13	2.8	4.9*	2.2	3.5	3.5	4.7		2.9	4.1	3.5	3.6	3.0
14	2.4	2.0	2.7	2.6	2.9	4.2		2.3	2.1	3.0	3.8*	2.5
15	3.0	4.1	2.3	2.7	3.3	3.4	3.9	3.5*	2.9	3.5	4.6*	2.7
16	3.0	2.9	4.0	1.4	6.1*	4.5	4.8		4.2*	3.1	2.6	2.3
17	1.9	3.4	3.6	2.2	2.7	2.7	3.6			3.7	2.9	5.5
18	2.8	2.1	2.1	2.1	2.3	3.4	5.5		2.6	2.6	2.8	4.2
19	2.9	2.3	1.8	2.4		3.0	5.3	3.2	3.2	3.7	3.1	4.0*
20	2.9	4.9	2.3	1.9	2.9	3.3	3.3	2.9	2.6	4.2	3.3	4.6
21	3.1	4.7	3.8*	2.6	2.7	3.6	3.0	3.4	3.8	3.8	3.3	4.1
22	3.4	3.6	5.1	3.6	2.4	3.8	3.7	2.9		3.2	3.3	4.1
23	3.6	3.5	2.7	2.2	6.6	2.7	4.9	3.9	4.2	3.9	3.7	6.0*
24	3.7	2.9	2.4	1.1	9.3*	5.0	3.3	3.0	2.6	2.6	3.0	3.5
25	2.4	2.7	3.5	1.4	3.6	3.5	3.0	4.0	2.8	2.2	2.8	3.2
26		2.6	2.3	2.3	2.8	3.6	2.1	2.9	3.2	2.7	3.3	2.9
27		3.0	2.5	2.8*	5.7	3.2	3.1	3.6	5.2*	4.6*	2.9	3.5
28	3.0	2.2	1.9	5.1*	3.0	4.0	3.3	3.9	3.5	2.2	3.2	3.4
29	3.0	1.5	2.6	6.1*		4.2	4.2	3.6	3.7	1.5	2.8	3.1
30	2.9	2.3	2.6	2.6		3.6	3.5	5.2	3.5	2.3	3.3	3.4
31	3.4		2.6	1.6		4.3		4.2			4.1	
*Daily Maximum												
Mean	2.98	3.06	2.61	2.79	3.83	3.75	3.85	3.27	3.36	3.38	3.38	3.59
σ	0.65	0.87	0.80	1.51	1.91	0.72	0.88	0.77	0.82	1.13	0.55	0.91
Maximum												
Month	4.9	4.9	5.1	4.3	9.3	5.4	5.5	5.2	5.3	6.3	4.7	6.0
Season				9.3						6.3		
Annual						9.3						

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 TABLE 11. ASSOCIATED MAXIMUM DOWNDRAFT ($m s^{-1}$)
 RECORDED AT 18-METER LEVEL

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1	1.5	1.5	0.1		0.3	1.4	1.3	1.2	2.3	1.7	1.8	1.8*
2	2.6	1.0	0.6	0.4	1.0	3.8	1.6	1.0	2.2	2.0	1.6	1.5
3	0.7	1.1	1.2	1.0	2.8*	2.5	4.8	2.1	2.0*	1.4	1.0	0.6
4	0.7	0.7	0.9	0.4	1.4	1.0	2.3	2.5	1.2	2.0	2.2*	1.0
5		0.5	1.5	0.8	1.2	2.9	1.7	1.0	1.3	2.6*	2.2	1.0
6	1.6	0.8	0.8	1.0	5.3*	2.3	2.1	1.4	1.0	3.2*	0.9	1.0
7	1.2	3.0	2.3*	0.8	1.5	1.0	0.9	1.0	5.0	1.3	2.0	1.8
8	1.0	1.6	1.8*	1.4	1.2	2.5	1.8	1.0	1.0	1.4	1.7	1.5
9	0.8	2.3	0.7	2.2	1.2	4.7*	1.7	1.5	3.0		1.7	2.5
10	1.6	2.4	0.6	2.0	1.0	1.8	0.8	0.9	1.7	1.8	3.0*	1.1
11	1.3	1.1	1.5*	1.9	1.1	0.9	2.8	2.2	1.5	2.6*	1.5	1.4
12	1.7	2.4	1.9*	4.0*	0.8	2.8		1.4	1.9*	2.4*	1.9	1.3
13	2.1	2.2	0.8	2.9	1.9	2.6		3.5	3.0	0.7	1.3	1.0
14	1.5	0.7	1.7	1.6	1.7	2.3		1.1	0.8	0.8	1.8	1.2
15	1.4	4.2*	2.6*	1.1	4.7*	1.3	3.0	1.0	0.7	1.6	1.3	0.5
16	0.9	1.5	2.4	1.0	2.2	2.2	1.4		4.0*	1.4	1.3	1.0
17	2.1	1.0	3.0	1.1	1.4	1.2	2.0			0.9	1.0	3.1
18	1.4	1.3	1.2	1.0	1.0	1.5	1.9		1.9	1.0	0.6	1.3
19	0.8	1.4	1.1	1.5			2.3	1.0	1.6	1.5	0.9	1.9*
20	2.6	2.6	0.6	1.0	1.4	1.0	1.6	1.2	1.6	3.0	0.6	1.0
21	1.0	1.8	1.9	2.2*	1.1	1.1	2.4	3.0*	2.0	0.8	1.4	1.3
22	2.1	1.7	2.8	2.4	1.4	1.3	1.8	1.3		0.7	2.4	1.7
23	3.0	1.4	2.1	0.9	2.6	0.5	4.1	1.6	1.9	1.1	1.7	3.5
24	2.3	0.8	1.5	1.1	3.7	1.6	1.8	1.6	0.8	1.1	1.8	3.6*
25	1.8	3.4	2.0	1.0	1.0	2.9	1.1	2.3*	2.2*	0.9	1.4	2.1
26		1.7	1.1	2.4	1.5	2.8	0.5	0.7	1.4	1.0	1.3	1.8
27		2.2	1.5	1.4	1.8	1.6	1.4	1.1	1.4	2.0	2.0	1.4
28	1.9	0.9	1.6*	2.6	1.8	2.7	1.2	1.8*	1.0	0.6	1.8	1.2
29	1.7	0.4	0.7	4.0		0.8	1.3	1.2	3.0*	2.0*	1.6	2.1
30	3.3	1.2	1.7	1.8		2.4	2.0	1.7	1.1		1.6	2.3
31	3.4		1.6*	1.0		1.9		1.7		2.9*	2.1*	
* Daily Maximum												
Mean	1.67	1.63	1.48	1.60	1.78	1.98	1.91	1.54	1.92	1.66	1.59	1.62
σ	0.78	0.89	0.71	0.92	1.16	0.96	0.93	0.67	1.01	0.76	0.53	0.77
Maximum												
Month	3.4	4.2	3.0	4.0	5.3	4.7	4.8	3.5	5.3	3.2	3.0	3.6
Season			5.3						5.3			
Annual							5.3					

TABLE 12. ASSOCIATED 10-MINUTE MEAN DIRECTION RECORDED AT 18-METER LEVEL.

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1		NNE	NNW			NNW	S	NE	SSE	ENE		
2		ENE	NE	NE		N	NW	NE	NW	NE		
3		ENE	NW	SSE		NNW	W	SE	SSW	NNE		
4		ESL	NNW	SW		NNE	NW	SSW	WNW	SSE		
5		SSW	ESE	NNW	NNW	NW	N	SW	E	NW		
6		ESE	SSW	NE	NNW	NW	N	ENE	E	SSW		
7		NNW	NNW	NNW	NNW	SW	NE	SE	W	SSW		
8		N	ESE	SW		W	ESE	SE	SW	WSW		
9		NW	SE	NW		NW	SSE	NE	SE	NW		
10		NE	N	NNW	NNW	SSE	SSW	NNW	S	SE		
11		NNW	E	NW		ESE	SSW	N	SW	S		
12		NNW	ESE	NW	NNW	SE		ENE	NW	S		
13		NNW	SE	NW		SE		SE	WSW	SE		
14		ENE	SSE	NNW	NNW	SSW		ENE	SW	ESE		
15		NNW	SSW	NNE		NNE	NW	SSW	SE	E		
16		N	NNW	NNW	NNW	N	NW		NW	E		
17		ESE	NNW	NNW	E	N	ESE			ENE		
18		SE	NE	ENE	E	F	SE		E	ENE		
19		E	ENE	SSW	SSW	S	S	N	NE	E		
20		W	SE	NNW	NNW	NNW	SE	N	NE	SE		
21		NNW	S	SE	NNW	SE	NNW	N	NE	NE		
22		NW	SSE	SSE	SSE	SSW	ENE	N	NE	E		
23		ENE	NNW	NNW	NNW	S	E	NNE	NE	ESE		
24		E	NW	NNW	NNW	SSW	ESE	E	NE	E		
25		NNE	SSE	NNW	NNW	NW	E	E	NE	NE		
26		NNE	W	SSE	NNW	NNW	ESE	E	NE	ESE		
27		NNE	NNW	NNW	SSE	E	ENE	ESE	ENE	SSW		
28		ESE	NNW	NNW	W	E	SSE	ESE	E	SW		
29		S	ESE	N	N	ESE	SE	SE	N	ESE		
30		NNW	SE	NW	NNW	SSW	SE	SSE	NE			
31			SSE	SE	SW	SW		SSE		E		

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TABLE 13. ASSOCIATED INSTANTANEOUS DIRECTION RECORDED AT 18-METER LEVEL

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1		NE	NNW			NW	SSW	NE	WNW	ENE		
2		NE	ENE	NE		W	NW	NNE	NW	NE		
3		ENE	NW	SSE		NNW	W	SE	W	NE		
4		ESE	NNW	ENE		N	NW	SSW	NW	SSE		
5		SSW	ESE	NW		NW	N	WSW	E	WNW		
6		E	S	WSW		NW	NNW	NE	ENE	S		
7		NW	N	NNW		SW	NE	SE	WNW	SSW		
8		NNW	ESE	SW		W	ESE	SSE	SSW	NNW		
9		NW	SE	NW		NW	SSE	ENE	SE	WNW		
10		ENE	N	NNW		S	SW	NNW	S	SW		
11		NNW	E	NW		ESE	S	NNW	SSW	S		
12		NW	ESE	NW		SE		E	W	SSW		
13		NW	ESE	NW		SE		W	W	SE		
14		ENE	SE	NW		SSW		E	SW	ESE		
15		NNW	SSW	W		NNE	NNW	SSW	ESE	E		
16		N	NNW	NNW		W	NW	NW	NW	ENE		
17		E	N	ENE		NNW	E		E	ENE		
18		SW	ENE	ENE		E	SE		E	ENE		
19		ENE	ENE	WSW		S	S	NNW	NE	ENE		
20		W	S	NW		NW	SE	N	E	SE		
21		NW	S	SE		ESE	NNW	N	NE	W		
22		NW	S	SSE		SSW	ENE	NE	ENE	ENE		
23		ENE	WNW	NNW		S	E	NNE	NE	E		
24		E	WNW	NNW		SSW	SE	E	ENE	ENE		
25		NNW	W	NNW		NW	E	ENE	NNE	NE		
26		NE	WNW	SSE		NNW	ESE	ESE	E	ESE		
27		NE	WNW	SSE		SE	E	ESE	E	W		
28		SE	NW	W		E	SE	SE	SSE	SW		
29		ESE	ESE	W		ESE	SE	SE	NNE	SE		
30		NNW	ESE	NW		SSW	SE	S	NE			
31			SSE	SE		SW		SSE		E		

TABLE 14. TIME OF OCCURRENCE (GMT) OF DAILY MAXIMUM HORIZONTAL WIND SPEED AT 18-METER LEVEL

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1	2037	1934	1709		1938	1603	1754	1813	2052	2124	1716	2021
2	2057	1745	1606	1927	2020	2018	0032	2113	1821	1631	1729	2202
3	1634	1539	2312	1910	2121	1717	1726	2310	1736	1530	2029	2039
4	1429	1658	1544	1745	0013	1917	1432	1636	0257	2234	2251	1910
5		1718	1734	1405	1641	0724	1620	1531	2056	2033	2155	1935
6	1842	1944	1617	1852	2315	0026	1800	2053	1918	0247	1707	1756
7	1829	1745	1950	2348	1436	1759	1734	2140	2012	1735	0059	1615
8	1340	0018	0133	1856	1722	1417	2026	0431	1320	2345	1918	1838
9	1756	0715	1753	2056	1746	0426	0253	2037	2219	2105	1911	1913
10	1821	1454	1721	2200	1657	1546	1517	0159	2243	2118	1830	2345
11	1628	1734	2002	0137	1415	2046	1632	1724	0010	1746	1913	1816
12	1702	1737	1620	2339	1836	1519		1821	0038	1953	2039	1655
13	1609	0654	1854	0030	2119	2101		1708	0044	1757	2151	1752
14	1911	2017	1800	1750	0056	1832		1953	2025	1900	2015	1346
15	1605	1804	1736	1831	1807	1508	1555	0222	2342	1733	2033	2015
16	2035	0049	1703	1445	1506	2122	1558		2155	2121	1940	2215
17	1429	1640	1854	1500	0027	1850	1952		0006	1920	1900	2109
18	0931	1747	1642	1647	1850	1558	2241		1944	1623	1630	2044
19	1626	2017	2016	1803	1408	0412	1451	1757	1712	1742	2035	0808
20	1720	2303	0129	1745	2325	1533	0011	1759	1902	2259	2124	1321
21	1920	0703	2307	1747	2341	1923	2117	1841	2209	0017	1920	1842
22	1850	1625	0338	1217	0011	1534	1744	2031		1851	1937	2030
23	1940	1713	1904	1752	2041	1721	1404	1757	1429	1935	1623	1933
24	1825	1803	1654	1551	1656	2151	1648	1808	0309	2232	1742	2105
25	0259	1911	1725	0844	1835	1708	1637	2006	1704	1827	2252	1836
26		2359	1849	1723	1646	1412	0026	2249	2002	1900	1911	2017
27		0124	1437	0302	1736	1501	1741	2259	2113	2155	1727	1541
28	2350	1702	1635	1855	1905	1726	2217	2052	2141	2210	0830	2009
29	2311	0139	2010	1850		2131	2129	2122	1717	1836	1652	1823
30	1730	1201	1653	0401		1726	0259	2149	1944	1530	1544	1619
31	1823		1533	1943		0018		2308		1245	0156	

**TABLE 15. DAILY MAXIMUM HORIZONTAL WIND SPEED (m s^{-1})
RECORDED AT 60-METER LEVEL**

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1	7.6	12.0	14.1		7.2	11.0	13.1	9.6	14.6	17.6	12.4	10.7
2	17.9	10.6	9.0	6.8	5.8	15.9	11.8	9.6	15.5	13.4	9.9	9.9
3		8.6	10.7	11.1	13.5	13.9	21.1	13.1	12.2	8.6	10.0	7.7
4		7.5	8.4	9.2	12.2	9.7	12.9	13.7	10.0	11.4	12.5	9.3
5		7.7	11.5	7.0	12.9	18.3	12.1	10.0	9.2	11.1	15.9	9.9
6	7.9	8.0	10.6	8.9	24.3	14.4	12.9	7.3	9.9	16.9	12.8	9.2
7	9.9	12.7	11.1	8.3	11.1	11.7	8.0	10.1	26.6	10.8	13.9	10.1
8	10.3	11.0	14.4	13.7	9.0	13.8	11.7	10.0	14.8	15.6	12.8	10.6
9	7.6	14.1	8.4	13.9	7.0	17.6	11.4	8.6	12.2	15.1	12.2	14.6
10	9.2	13.9	7.0	12.4	9.4	13.8	9.6	14.6	12.0	20.1	10.4	10.3
11	10.0	8.3	7.3	17.0	7.6	9.9	17.7	12.7	11.4	25.6	11.7	10.1
12	10.3	12.2	10.1	24.6	14.1	14.8		9.6	9.9	21.8	10.1	7.9
13	10.4	17.7	10.0	24.3	13.5	16.7		8.4	15.9	12.1	13.2	7.0
14	10.3	7.5	11.0	12.5	13.5	19.8		9.0	11.3	10.6	9.4	8.6
15	10.3	12.7	14.5	11.0	10.8	10.7	16.2	10.6	9.4	11.3	8.7	8.2
16	12.0	9.4	24.9	10.8	14.9	13.8	13.2		19.3	11.1	8.7	8.0
17	15.1	10.3	19.0	12.0	13.1	11.0	10.1		10.8	9.7	7.0	17.0
18	11.7	9.0	10.4	10.7	10.4	15.2	16.7		8.9	12.4	8.6	11.5
19	8.4	6.6	9.3	14.1	14.4	12.5	17.2	10.1	9.3	10.1	8.4	14.6
20	12.9	18.9	9.3	9.7	12.5	8.3	14.9	8.6	8.4	12.9	8.2	13.2
21	9.2	15.3	16.3	12.0	10.6	9.7	12.4	11.5	15.6	10.6	10.6	8.9
22	12.0	13.4	23.2	19.0	11.1	12.7	12.4	9.6		9.2	10.4	13.9
23	12.0	9.0	13.2	11.1	18.6	10.4	14.4	9.0	13.5	9.0	11.1	15.8
24	16.3	8.4	12.1	11.7	25.1	15.6	11.4	8.3	9.6	8.6	9.0	13.7
25	9.9	6.6	14.8	11.1	10.3	17.0	8.9	8.7	9.2	6.6	9.6	12.4
26		13.4	12.1	14.2	9.2	12.4	8.6	8.3	8.9	8.3	12.4	11.7
27		13.1	12.0	14.2	9.6	10.7	8.6	11.1	10.0	15.9	10.3	11.5
28	12.5	6.8	8.2	22.9	7.3	13.2	12.2	11.0	13.4	11.1	14.8	10.3
29	12.7	8.9	6.3	21.2		12.1	11.1	12.0	8.9	9.4	9.6	13.4
30	14.2	10.1	13.4	14.9		16.6	12.4	14.1	11.3	10.6	9.7	10.4
31	17.4		12.7	8.7		11.8		13.9		15.5	18.9	
Mean	11.46	10.79	12.11	13.30	12.21	13.39	12.70	10.47	12.14	12.68	11.07	11.01
σ	2.84	3.24	4.27	4.81	4.90	2.86	3.08	2.02	3.88	4.28	2.53	2.56
Maximum												
Month	17.9	18.9	24.9	24.6	28.1	19.8	21.1	14.6	26.6	25.6	18.9	17.0
Season				28.1						26.6		
Annual							28.1					

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**TABLE 16. ASSOCIATED 10-MINUTE MEAN HORIZONTAL WIND SPEED
(m s⁻¹) RECORDED AT 60-METER LEVEL**

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1	3.9	9.2	10.6		6.3	8.3	8.6	6.8	8.7	10.0	7.7	3.7
2	13.4	5.8	7.2	6.1	3.8	9.0	9.2	7.3	11.3	9.2	5.8	5.8
3		6.2	8.6	8.0	10.3	9.7	12.4	10.0	6.8	5.5	5.9	4.5
4		5.5	6.1	6.9	8.7	8.3	9.3	9.7	6.6	8.3	7.2	5.9
5		5.1	8.2	5.5	9.2	13.5	9.2	8.3	6.3	5.8	8.7	5.9
6		6.1	8.9	5.5	13.8	11.1	9.2	5.1	5.2	11.8	5.8	5.8
7	6.3	8.2	7.9	7.3	7.7	7.9	4.5	8.2	9.6	8.0	10.3	6.8
8	5.9	8.0	10.8	8.2	7.7	10.1	8.7	5.6	9.6	7.7	8.7	6.2
9	5.1	11.1	6.3		3.9	13.1	8.6	5.8	8.2	10.1	5.9	11.7
10	5.6	10.0	5.4	9.3	7.6	9.2	5.1	6.8	8.7	8.9	7.6	7.7
11	7.6	6.9	5.1	12.1	5.1	6.8	9.2	9.9	6.1	16.2	7.7	5.8
12	5.9	8.7	7.5	16.9	8.9	10.6		4.5	6.1	13.8	3.7	5.5
13	6.8	14.4	7.7	19.1	9.4	12.2		4.2	10.8	7.9	6.9	4.2
14	7.9	4.5	7.7	8.9	10.4	12.4		5.8	8.4	7.7	6.5	6.5
15	6.3	9.6	9.7	7.3	7.3	7.3	8.7	7.6	7.3	7.6	5.5	5.2
16	7.2	6.9	18.0	8.9	11.3	6.5	8.4		11.7	7.2	6.1	5.3
17	10.0	5.9	14.2	9.6	8.2	6.5	6.2		6.5	5.6	4.4	12.0
18	5.8	6.2	8.2	9.3	5.9	6.8	11.8		4.9	9.9	6.1	8.4
19	7.3	4.1	7.5	8.9		9.7	11.3	6.1	6.2	7.0	4.8	8.3
20	8.3	8.7	7.3	8.2	9.0	5.8	10.8	6.2	5.5	9.4	5.1	9.0
21	6.2	10.4	11.1	8.3	9.3	5.4	8.0	7.6	11.7	7.0	7.6	5.8
22	8.4	10.3	17.6	13.5	8.2	8.9	7.6	6.3		4.7	7.5	10.6
23	8.4	6.9	8.7	8.9	13.5	5.6	10.4	5.5	10.3	5.9	6.1	12.0
24	10.7	6.9	8.9	8.0	14.4	10.3	8.4	4.2	5.8	6.8	4.4	9.6
25	7.7	2.4	6.2	8.9	5.6	11.3	6.5	5.4	6.6	2.7	4.8	9.2
26		7.2	8.4	10.3	4.8	8.2	6.6	6.2	5.8	5.2	8.7	8.6
27		9.4	8.4	9.2	3.9	6.9	4.8	8.0	6.9	9.7	6.8	8.2
28	9.9	4.8	5.1	10.0	4.4	9.9	9.0	8.3	9.0	7.5	6.5	6.6
29	9.9	7.5	3.8	15.6		9.9	9.2	8.4	4.4	6.3	6.6	9.6
30	10.4	7.3	9.2	10.1		11.3	8.7	9.3	6.6		4.4	7.7
31	12.9		9.3	6.1		7.7		10.1		8.4	11.5	
Mean	7.91	7.47	8.70	9.48	8.10	9.04	8.53	7.04	7.64	8.06	6.62	7.42
σ	2.36	2.45	3.17	3.22	2.98	2.24	1.98	1.78	2.12	2.69	1.76	2.29
Maximum												
Month	13.4	14.4	18.0	19.1	14.4	13.5	12.4	10.1	11.7	16.2	11.5	12.0
Season			19.1							16.2		
Annual						19.1						

TABLE 17. ASSOCIATED MAXIMUM UPDRAFT (m s^{-1}) RECORDED
AT 60-METER LEVEL

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1	0.6	1.3	1.6		0.0	0.7	2.0	0.3	1.1	1.2	1.6	0.2
2	3.1	1.0	0.5	0.4	0.8	1.6	0.9	0.1	1.7	1.2	1.0	0.4
3		0.0	0.9		1.1	2.2	3.0	0.1	1.5	1.6	1.6	1.0
4		1.2	1.5	0.6	0.3	0.0	1.6	0.3	0.0	0.9	1.6	1.2
5		0.8	1.9*	0.9	1.6	1.9	0.1	0.1	1.3	0	0.9	1.3
6	0.7	0.0	0.8	0.9	2.0	1.3	2.1	0.9	1.9	2.0	0.9	1.0
7	1.2	1.3	2.1*	0.6	1.2	1.6	1.4	0.9	2.2	1.3	0.6	1.1
8	0.7	1.1	2.1	1.8	0.0	1.5	1.6	2.4	1.1	2.5	2.2	1.5
9	0.8	1.2	1.2		0.9	1.8	1.3	2.3	1.1	1.4	1.6	0.9
10	0.9	1.6	1.0	1.6	1.0	1.9	1.2	4.0*	1.7*	2.9	1.2	0.6
11	0.4	0.3	1.6	1.6	0.6	1.9	1.9	2.2	1.1	3.5*	2.0	0.9
12	1.3	0.8	1.8	2.8*	1.0	2.1		1.6	0.0	2.3*	0.4	1.1
13	0.9	0.9	1.0	1.9	1.7	2.3		1.6	1.7	1.3	1.4	1.4
14	1.0	1.0	1.4	1.5	1.1	3.0		1.1	0.9	1.5	1.2	0.1
15	0.8	1.4	1.5	1.1	1.3	1.0	1.5	0.9*	0.3	1.1	1.0	1.1
16	1.1	0.9	2.6	0.8	2.0	2.3	1.7		3.2	1.8	1.4	0.9
17	1.6	1.8	2.1	1.0	2.3*	1.1	1.6		0.6	2.0*	0.9	1.4
18	0.9	0.5	1.5	0.5	1.4	1.3	2.3		0.5	1.7*	1.1	0.8
19	0.1	1.5	1.0	1.4		1.9	1.8	1.2	1.9	1.1	0.9	1.9*
20	1.5	2.5	0.9	0.3	1.4	1.6	1.4	1.8	1.7	1.4	1.5	0.9
21	0.3	1.5	2.6	0.3	1.1	1.9	1.5	1.7	3.6*	1.6*	1.6	0.9
22	0.9	0.4	4.2*	2.3	1.4	2.0	1.7	1.2		1.3	1.2	1.1
23	0.9	0.7	1.8	0.8	2.4	0.2	1.6	1.3	0.7	1.0	4.4*	1.0
24	1.1	0.3	2.0*	0.9	4.6*	2.8	1.1	1.6	2.3*	0.6	0.9	0.6
25	0.4	2.8*	0.9	0.3	1.3	2.9*	0.8	1.6	1.0	1.1	1.8	0.9
26		2.3	1.1	1.9	1.7	1.3	0.6	0.7	1.6	0.8	0.8	0.9
27		1.0	1.7	0.5	3.2	1.5	1.3	1.1	0.8	2.8	1.2	1.8*
28	0.9	1.5	1.2	1.7*	1.0	2.0	0.4	1.6	0.9	0.6	1.4	0.9
29	1.0	0.7	1.4	2.0		1.4	0.0	1.3	2.0	1.6	0.0	0.8
30	0.9	1.2	1.7	1.3		2.8	0.1	1.7	1.8		1.6	0.6
31	2.0		1.2	1.1		0.3		1.3		1.7	1.5	
* Daily Maximum												
Mean	0.96	1.12	1.58	1.17	1.42	1.70	1.35	1.32	1.39	1.55	1.34	0.97
σ	0.62	0.67	0.70	0.65	0.95	0.72	0.70	0.82	0.83	0.70	0.73	0.39
Maximum												
Month	3.1	2.8	4.2	2.8	4.6	3.0	3.0	4.0	3.6	3.5	4.4	1.8
Season			4.6						4.4			
Annual						4.6						

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TABLE 18. ASSOCIATED MAXIMUM DOWNDRAFT (m s^{-1})
RECORDED AT 60-METER LEVEL

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1	2.9	2.6	2.6		0.7	2.3	4.7*	2.7	2.7	2.3	3.4	2.7
2	2.7	2.4	0.7	0.3	1.3	4.5	2.2	3.5	3.7	3.4	3.4	2.2
3		0.4	1.1	0.6	2.5	4.9	5.1	0.3	2.4	2.9	2.9	2.9
4		2.4	1.6	0.5	0.9	0.8	4.9	1.9	0.4	2.0	3.8	2.5
5		2.0	1.2	1.2	2.0	3.5	1.4	1.6	2.1	2.9	3.7	2.3
6	2.5	0.4	0.9	2.0	8.0*	3.2	4.1	3.0	3.1	3.1	2.8	1.8
7	2.2	2.8	1.4	1.4	3.1	2.6	3.0	1.8	5.7	2.8	3.0	3.3
8	1.2	1.8	2.3	2.6*	1.0	4.0	3.0	4.1*	1.6	3.2	2.3	3.3
9	2.6	2.5	1.6		2.9	4.2	2.3	2.9	2.0	3.4	2.2	2.4
10	2.7	2.5	0.7	1.6	1.7	3.6	3.6	4.4*	0.7	2.3	2.7	1.3
11	1.7	1.0	1.7	3.4*	2.0	2.9	3.5	2.8	2.1	5.1*	3.9	2.9
12	2.7	3.0	2.4	3.4	3.1	4.1		4.3	0.8	5.1*	2.1	3.0
13	2.5	2.5	1.5	3.4	4.4	2.9		3.2	5.3*	4.4*	2.4	3.0
14	2.7	3.6	0.7	2.4	2.9	3.9		4.0	0.8	2.4	2.8	1.6
15	2.4	4.0	1.2	2.4	2.7	2.1	5.0*	1.3	1.7	3.3	3.1	2.5
16	2.7	2.4	3.3	1.1	4.1*	3.8	3.6		4.3	3.2	2.7	2.1
17	3.0	3.2	2.1	1.1	2.7	2.5	2.4		2.1	3.0	2.1	2.8
18	2.4	1.1	2.3	0.4	1.7	2.1	4.1		1.7	2.1	3.2*	2.0
19	0.8	2.1	0.8	1.5		2.6	4.2	2.7	3.0	2.6	2.5	2.3
20	3.3	3.9	0.7	0.8	2.3	2.3	2.3	3.1	4.7*	2.7	2.1	1.8
21	1.0	4.3	3.0	0.4	2.3	2.8	3.6	3.2	3.3	2.6*	1.8	1.5
22	2.1	1.7	3.5	2.2	1.8	2.1	3.2	3.6		2.8	3.2	2.8
23	1.8	1.1	4.0	1.5	3.7	1.0	2.7	2.8	1.8	2.1	2.4	1.8
24	2.3	1.0	3.9*	1.6	7.4*	2.7	2.2	3.8	3.3	1.4	3.4	1.5
25	1.5	3.9	2.2	0.8	2.5	4.0	1.4	2.9	1.7	4.3*	2.2	2.5
26		4.1	2.2	1.1	3.4	3.1	1.9	2.6	3.0	1.0	2.3	2.1
27		2.9	3.2	0.7	7.0	3.5	3.1	2.1	1.9	4.9*	2.6	0.4
28	2.1	2.6	3.0	4.0*	2.1	3.2	0.7	2.8	5.5*	3.0	2.2	2.4
29	2.2	1.2	2.1	3.0		2.5	0.6	3.7	2.3	3.0	0.9	2.4
30	2.6	1.7	1.0	1.4		3.0	0.8	3.8	2.5		3.2	2.1
31	2.1		1.3	1.6		2.7		2.8		3.0	2.9	
* Daily Maximum												
Mean	2.14	2.37	1.94	1.67	2.97	3.01	2.95	2.94	2.63	3.01	2.72	2.27
σ	0.69	1.10	0.99	1.03	1.86	0.93	1.32	0.90	1.42	0.98	0.65	0.64
Maximum												
Month	3.3	4.3	4.0	4.0	8.0	4.9	5.1	4.4	5.7	5.1	3.9	3.3
Season				8.0					5.7			
Annual						8.0						

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TABLE 19. ASSOCIATED 10-MINUTE MEAN DIRECTION RECORDED AT 60-METER LEVEL

Day	Winter					Summer				
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July
1	WSW	NE	NNW		SE	NW	SSW	ENE	ENE	NE
2	NW	NNE	NW	ENE	S	N	NW	NE	NW	NE
3		ENE	NW	SSE	NNW	NNW	WSW	SSE	NW	NE
4		ENE	NNW	SSE	NNW	W/NW	NW	SW	W	SSE
5		SSW	E	N	SW	NW	W	W	E	SW
6	W	S	ESE	S	E	NW	N	NE	E	SSW
7	ENE	NNW	NNW	NW	WNW	S	ENE	ESE	W	SSW
8	ESE	N	ESE	SW	WNW	W	ESE	SSW	W	SSE
9	N	NW	ESE	NNE	NNE	NW	SSE	NNE	SE	N
10	NNW	NNE	ESE	NW	SE	SSE	SW	ENE	S	WNW
11	N	NE	SE	NW	NW	ESE	NNE	ENE	SW	SSE
12	N	W	ESE	NW	WSW	SSE	NNE	ENE	W	SSW
13	NE	NW	ESE	NW	NNW	SSE		ENE	WSW	SW
14	ENE	ESE	ESE	NW	NNW	SSW		ENE	SW	SE
15	ENE	NNW	SSW	S	SE	WNW	NW	SSW	SE	E
16	ESE	N	NNW	NW	SE	NNW	NW	NNW	NNW	ESE
17	SSE	ESE	N	NE	S	N	ESE		ESE	NE
18	SW	ESE	ENE	E	SW	ESE	SE		E	E
19	W	ESE	E	SSW	NW	SSW	SE		E	E
20	NW	ESE	E	SW	NW	NNW	SE		E	E
21	NNE	WNW	S	SE	SE	ESE	SE	N	ESE	E
22	N	NW	SSE	SSE	SE	SSW	SE		E	E
23	NW	ENE	NW	NW	SSE	SSW	SE		E	E
24	WNW	ENE	WNW	NW	E	SSW	SE		E	E
25	W	N	S	NNW	WSW	NW	SE		E	E
26		NE	N	SE	NNE	NNW	SE		E	E
27		NE	NW	SSE	ESE	E	SE		E	E
28	N	ESE	NW	SE	WNW	E	SE		E	E
29	NW	S	ESE	SE		SE	SE		E	E
30	NW	NNW	SE	WNW		S	SE		E	E
31	N		SSE	ESE		SW	SE		E	E

TABLE 20. ASSOCIATED INSTANTANEOUS DIRECTION RECORDED AT 60-METER LEVEL

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1	WSW	NE	NNW		SE	NW	SSW	ENE	W	NE	E	WNW
2	W	NE	NW	ENE	S	W	NW	NE	NW	NE	E	W
3		ENE	NNW	SE	NNW	NW	W	SSE	W	NE	SE	ENE
4		ESE	NW	SSE	NW	NNW	NW	SW	WNW	SSE	W	NE
5		SW	E	NNW	SW	NNW	NNW	W	E	WSW	WSW	E
6	W	SSE	ESE	W	NNW	NW	N	NE	E	SSW	SW	E
7	ENE	NW	NNW	NNW	NNW	S	ENE	ESE	W	SSE	W	E
8	ESE	N	ESE	SW	NNW	W	ESE	W	SSW	SW	ENE	ESE
9	NNE	NW	ESE		NNE	NW	SE	NE	SE	NW	S	NE
10	NW	NNE	SE	NW	SE	SSE	WSW	N	S	SW	ESE	ENE
11	N	ENE	SE	NNW	NNW	ESE	NNW	N	SSW	S	SE	E
12	N	W	ESE	NW	SW	S	NNW	NE	W	SW	W	ENE
13	NNE	NW	ESE	NW	NNW	SSE		NE	WSW	SE	SW	NE
14	ENE	ESE	SSE	NW	NNW	NNW		ENE	SSW	SE	E	W
15	ENE	N	SW	W	SE	NNW	NNW	SSW	SE	ESE	E	E
16	ESE	N	NNW	NW	SSE	WSW	NW		N	ESE	E	E
17	SSE	ESE	N	NE	SSE	N	ESE		ESE	ENE	E	E
18	W	ESE	ENE	E	SW	ESE	SE		E	E	E	ESE
19	W	ESE	E	W	WSW	SW	SSE	NNW	E	SE	W	E
20	NW	W	E	W	NW	NNW	SE	NNE	NE	SSE	E	SE
21	NE	WNW	S	SE	NW	ESE	NW	NNW	NE	WSW	E	ESE
22	NNW	NW	SSE	SSE	ESE	SSW	E	NE	NE	NNE	ESE	SE
23	NW	ENE	W	NW	SE	SSW	E	NE	NE	ESE	ENE	S
24	WNW	ENE	NW	NW	W	SSW	E	E	ENE	ESE	NE	W
25	W	NW	W	NNW	W	NNW	ESE	ENE	NNW	E	ENE	NW
26		NE	W	SE	N	E	SE	ESE	E	SSW	NE	NNW
27		ENE	NNW	S	SW	E	E	ESE	SE	W	NE	N
28	N	ESE	NW	WSW	W	E	SSE	ESE	SE	SSE	ENE	N
29	WNW	S	E	W		SE	SE	S	N	E	ENE	NNE
30	NW	NNW	SE	NNW	NNW	S	SSE	SE	NNE	E	SSE	NNW
31	N		SSE	ESE		SW		SE			SW	

TABLE 21. TIME OF OCCURRENCE (GMT) OF DAILY MAXIMUM HORIZONTAL
WIND SPEED AT 60-METER LEVEL

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1	1940	1946	1654		0439	1335	1751	1816	2041	2119	1716	2031
2	2100	1426	1244	2336	2215	2007	0033	2113	1821	1650	1738	2200
3		1416	2310	1913	2214	1738	1726	2245	1737	1540	2124	1810
4		1950	1546	0413	0025	1225	1439	1635	0257	2219	2258	2000
5		1716	2335	1406	1643	0727	0420	0157	2016	1642	2154	2000
6	1440	0518	0020	1848	2318	0037	1752	2040	1918	0248	1707	2100
7	1850	2036	2117	2352	0066	1817	2015	2225	2011	0018	0104	2100
8	1340	0027	0133	1839	0857	1419	2025	1612	1320	2345	1917	1710
9	1900	0715	1826	1330	2043	0426	0253	1945	2219	2106	0247	1910
10	1810	0405	0336	1839	1649	1550	1809	0200	2313	2119	2004	2340
11	0140	0323	1606	0148	1340	2144	1714	1724	0002	1744	1913	1710
12	1700	1648	1620	2339	1826	1554		1415	0036	1953	2039	1700
13	1800	0700	1854	0001	2133	2304		1901	0041	1847	2157	1730
14	1910	1831	1721	1554	0037	1739		1859	2024	2235	2017	0330
15	1410	1800	1742	1830	2142	0558	1556	0223	2341	1736	1829	2010
16	2030	0050	1703	0805	1530	2120	1841		2155	2222	2027	2130
17	1830	1949	1935	1356	0526	1910	1952		1810	1806	1907	2110
18	0920	0518	1633	0055	1609	1246	2239		2245	1620	2104	2010
19	0500	2022	2305	2157	1543	0412	1420	1802	2025	0257	1642	0800
20	1730	2258	0008	0253	2306	1533	0103	1804	1821	2308	1740	1320
21	1510	0653	2251	2345	2349	1922	1738	1746	2207	0017	1932	0650
22	1850	0750	0333	1152	2357	1459	2033	2031		1846	1933	1950
23	2110	2337	1848	1753	2031	0842	0237	1851	1313	1942	1751	1610
24	1720	0019	1654	1519	1656	1732	0717	1808	0307	0027	1804	2100
25	0251	1910	0949	0844	1844	1724	0229	1814	1116	1759	1952	1900
26		1858	0741	1904	1827	1332	0016	2249	1925	2036	1910	2130
27		0054	1544	0350	1753	1542	2003	2245	2113	2154	1727	1540
28	2350	1702	1622	1850	1905	1822	2301	2056	2141	0010	0830	1820
29	2307	0147	2010	1842		2234	2222	2214	1717	1929	0141	1850
30	1730	1139	1631	0401		1711	0303	2134	1905	1530	1744	1950
31	0713		1548	1912		0002		2337		1245	0155	

TABLE 22. DAILY MAXIMUM HORIZONTAL WIND SPEED (m s^{-1})
RECORDED AT 150-METER LEVEL

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1	8.2	12.2	16.2		8.3	14.5	13.9	9.7	14.2	17.2	11.4	11.7
2	19.0	11.3	9.0	6.3	7.9	17.2	11.8	9.7	17.0	13.5	10.3	11.4
3		9.2	11.8	11.0	13.2	13.5	21.2	13.8	10.4	9.0	8.9	8.7
4		7.7	9.7	12.2	12.9	8.4	13.5	13.8	10.6	10.6	13.4	9.3
5		9.3	11.7	7.7	13.9	19.7	14.8	13.4	9.3	11.5	15.6	9.6
6	8.9	9.2	12.4	8.4	26.2	13.8	13.2	7.7	9.3	18.2	8.9	9.4
7	10.0	13.1	12.9	10.0	13.4	11.4	7.7	9.9	25.3	12.1	13.8	9.7
8	9.2	12.0	16.3	15.8	10.0	15.8	12.0	12.1	13.8	15.1	13.1	10.6
9	7.7	14.9	9.4	14.4	5.5	18.2	13.8	8.9	13.5	16.3	11.1	15.2
10	9.3	15.1	9.3	13.2	10.1	13.5	12.2	12.2	13.8	14.4	10.8	10.4
11	9.9	8.6	8.2	17.9	8.7	11.3	17.9	12.4	12.5	27.0	10.3	10.6
12	9.0	12.7	10.7	25.9	13.4	14.9		10.1	10.1	21.8	11.0	8.6
13	10.7	20.0	11.7	25.9	13.7	18.9		9.2	17.0	12.2	12.5	7.6
14	10.6	7.5	12.1	13.7	14.2	20.8		10.0	8.7	10.3	9.4	9.0
15	10.6	12.1	15.9	11.4	12.2	12.8	15.5	12.2	9.0	10.8	9.7	8.9
16	11.8	10.1	25.6	15.8	15.5	12.9	14.1		21.5	11.0	8.6	8.7
17	17.7	10.1	19.8	13.4	14.8	10.6	9.2		13.1	9.7	7.7	16.7
18	12.1	10.6	11.4	12.2	13.5	13.2	17.0		8.2	11.8	10.0	11.5
19	8.6	6.9	10.7	15.1	14.5	15.6	16.9	9.2	9.7	11.5	8.9	14.6
20	13.1	19.4	11.5	13.9	12.9	8.2	16.5	9.3	8.9	12.2	7.7	12.5
21	9.3	17.7	18.4	15.2	12.1	18.6	12.9	11.7	14.6	12.7	10.3	9.9
22	11.4	17.7	27.3	22.7	13.2	13.7	12.4	10.3		8.2	10.3	13.7
23	12.9	9.2	13.2	12.0	21.1	12.4	14.8	8.7	13.8	10.3	9.2	17.9
24	17.4	9.3	12.5	12.4	26.2	15.9	12.5	8.3	9.6	8.4	7.6	15.1
25	12.7	7.7	14.2	12.5	10.1	18.2	9.6	8.2	9.7	6.5	9.3	12.4
26		12.9	13.8	15.3	10.3	12.4	10.0	8.7	9.2	8.4	11.5	12.5
27		13.4	12.8	18.2	10.0	11.5	8.4	11.1	10.8	15.2	9.9	11.0
28	13.2	7.6	9.6	25.3	7.9	12.9	12.9	11.1	12.7	12.0	13.5	10.1
29	12.8	10.1	6.9	24.2		13.1	12.2	12.9	8.3	9.7	9.4	14.4
30	13.9	12.4	13.5	16.3		18.9	14.1	5.5	10.6	11.0	9.3	10.7
31	17.0		15.5	9.7		13.2		13.9		13.2	18.2	
Mean	11.81	11.67	13.35	14.93	13.06	14.39	13.37	10.85	12.25	12.64	10.70	11.41
σ	3.12	3.57	4.55	5.29	4.80	3.19	3.02	2.08	4.00	4.18	2.38	2.60
Maximum												
Month	19.0	20.0	27.3	25.9	26.2	20.8	21.2	15.5	25.3	27.0	18.2	17.9
Season			27.3							27.0		
Annual							27.3					

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TABLE 23. ASSOCIATED 10-MINUTE MEAN HORIZONTAL WIND
SPEED (m s^{-1}) RECORDED AT 150-METER LEVEL

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1	3.7	9.0	12.0		7.5	9.4	10.3	5.8	11.1	12.4	7.7	4.2
2	13.7	7.3	6.6	5.8	7.0	13.1	10.0	6.5	10.8	9.7	5.9	6.3
3		5.8	10.8	8.7	11.4	10.3	15.3	10.7	6.1	4.5	6.3	4.4
4		6.5	8.6	11.4	10.8	4.5	9.0	9.7	8.6	8.6	8.2	5.9
5		7.9	9.7	6.8	10.1	16.2	13.4	11.1	6.1	10.3	9.3	5.5
6		8.3	11.5	6.9	17.2	12.1	9.2	5.4	4.2	15.1	5.1	5.9
7	7.2	9.4	10.6	8.3	10.6	8.7	2.8	5.9	10.3	10.3	9.6	7.5
8	6.2	9.4	12.7	11.1	9.0	11.0	10.1	10.6	10.3	8.6	9.0	6.9
9	4.8	11.7	6.2		3.7	14.2	11.1	7.6	11.3	8.3	6.9	8
10	7.5	12.9	8.3	11.7	9.0	9.9	5.9	6.3	8.9	10.8	8.0	8.3
11	8.4	7.0	7.3	15.2	6.9	8.3	14.4	9.6	6.9	18.4	7.7	6.6
12	6.6	11.4	8.3	21.4	10.1	12.0		5.9	8.2	16.0	7.3	5.6
13	7.7	17.3	10.1	22.1	10.1	14.9		5.5	13.4	8.3	6.9	4.2
14	8.2	4.8	10.7	12.4	11.8	16.3		6.9	7.9	8.0	6.8	6.9
15	6.5	9.9	12.2	10.4	7.7	11.1	9.9	10.6	7.2	7.5	5.8	5.9
16	8.0	8.6	19.0	14.2	12.5	7.3	9.7		15.9	7.9	5.8	6.1
17	12.0	7.3	15.5	11.7	11.0	7.2	7.6			8.7	3.9	13.4
18	10.6	9.6	9.9	11.1	12.2	9.7	13.1		6.9	9.9	9.3	9.3
19	7.2	6.5	8.7	11.3	11.3	12.7	13.7	8.0	6.3	8.3	8.0	8.4
20	9.2	11.8	9.9	12.4	10.7	4.2	13.5	5.9	5.8	10.6	4.9	8.4
21	7.7	14.4	14.1	13.5	9.3	2.3	9.9	8.2	11.4	8.3	6.9	8.2
22	8.9	15.9	19.8	17.3	11.0	9.2	9.0	6.6		7.6	7.7	11.3
23	9.3	7.6	9.3	10.3	16.5	10.0	11.0	5.4	10.7	9.2	5.5	14.4
24	13.7	7.6	8.3	9.3	15.6	12.4	10.6	4.7	8.0	6.2	3.4	10.3
25	10.7	2.8	8.6	11.0	4.7	13.7	8.3	4.5	7.0	3.9	6.9	10.4
26		9.9	11.7	12.9		10.3	8.9	5.4	6.9	6.9	8.2	9.4
27		11.1	9.2	12.9	3.8	7.6	4.2	9.4	5.6	11.4	7.2	8.6
28	11.0	6.8	8.6	12.7	4.5	10.0	10.7	8.7	8.9	9.0	8.7	8.3
29	11.3	8.2	4.2	18.7		11.1	8.6	8.9	5.9	8.7	5.8	11.1
30	11.0	8.3	10.3	12.8		12.5	11.4	12.4	6.6		5.8	7.9
31	14.5		12.8	9.0		9.6		11.7		9.6	12.1	
Mean	9.02	9.17	10.50	12.18	9.85	10.38	10.06	7.78	8.47	9.42	7.21	7.88
σ	2.75	3.15	3.32	3.89	3.48	3.27	2.89	2.33	2.67	3.02	1.69	2.53
Maximum												
Month	14.5	17.3	19.8	22.1	17.2	16.3	15.3	12.4	15.9	18.4	12.1	14.4
Season				22.1						18.4		
Annual						22.1						

TABLE 24. ASSOCIATED MAXIMUM UPDRAFT (m s^{-1})
RECORDED AT 150-METER LEVEL

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1	4.0	1.8	2.5		0.0	0.3		0.9	1.1	2.1	0.8	1.5
2	3.8	2.4*	0.8	0.0	0.0	0.0		1.6	3.3*	1.6	0.2	1.6
3		1.1	0.0	3.3	0.1	0.6		0.0	2.1*	1.7	0.4	3.5
4		0.2	0.6	0.7	0.0	0.6		0.9	0.0	0.0	2.1	2.6
5		0.2	0.9	0.5	0.8	0.0		0.4	1.1	0.0	1.3	3.1
6	2.8	0.0	0.7	0.2	2.6*	0.0		0.9	3.7*	1.1	0.7	2.9
7	3.4	1.9	1.1	1.1	0.0	0.8		0.7	5.1	0.5	0.9	1.5
8	2.1	0.8	2.1	4.2*	0.4	0.0		0.0	1.2	1.9	0.8	3.1
9	1.5	1.0	2.8		0.3	0.2		1.2	0.0	4.9*	0.0	3.9*
10	0.1	0.7	0.7	1.6	0.3	0.8*		4.5*	0.7	0.0	0.0	0.9
11	0.9	0.3	0.7	2.8	0.0	0.2		1.6	0.2	1.6	5.1*	3.6
12	2.5	0.0	1.4	3.0	0.5	0.3		1.7	0.3	0.1	0.4	1.9
13	1.9	0.8	0.9	3.0	0.3	0.5		1.1	1.4	0.9	0.7	1.9
14	2.7	1.4	1.3	0.0	0.1	0.6		1.0	0.0	0.5	0.4	1.2
15	3.1	2.3	2.2	0.0	0.5	0.0	4.4*	0.6*	0.0	0.9	1.0	2.4
16	4.1*	0.3	4.3	0.0	0.9	1.0	2.1		3.1*	0.9	0.9	3.9
17	4.1	2.3	5.1	0.6	0.4	0.9	0.0			0.0	1.2	3.1
18	1.3	0.0	0.9	0.5	0.0	1.0	0.0		0.0	0.0	1.1	2.6
19	0.0	0.0	0.6	2.6	0.3	0.5	0.6	0.4	2.3*	0.0	0.0	5.3*
20	3.0*	2.7	0.7	1.0	0.0	1.1	0.0	1.5	1.1	0.0	2.6*	2.1
21	0.3	1.8	3.3	1.3	0.2	0.6	2.2	2.0	1.1	1.6*	1.6	0.9
22	1.6	0.0	4.3	5.0	0.1	0.8	1.0	0.9		0.0	1.4	3.2
23	2.1	0.1	3.3	1.4*	1.0	0.0	0.7	1.1	0.9	0.0	2.4*	3.1
24	1.8	0.4	2.7	1.5	2.8*	0.0	0.0	1.4	0.0	0.1	1.6	1.3
25	0.0	2.6	2.9	0.9	0.7	0.0	0.0	2.0	1.2	1.6	0.1	0.9
26		1.1	1.2	1.5		0.0	1.2	0.7	0.3	0.2	0.2	1.0
27		1.3	3.4	3.7*	1.6*	0.0	1.6	0.2	0.0	4.5*	1.5	2.6
28	0.7	0.6	0.0	6.0*	0.6	1.6	0.0	0.3	1.0	0.0	0.3	0.5
29	0.3	1.4	2.1	3.7		0.0	0.6	0.2	0.3	0.0	3.2	1.3
30	2.1	2.2	2.6	1.5		0.0	0.0	0.1	2.4		1.4	1.7
31	0.9		1.7	0.4		0.0		0.0		0.0	1.9	
* Daily Maximum												
Mean	2.01	1.06	1.86	1.79	0.54	0.40	0.90	1.00	1.21	0.89	1.17	2.30
σ	1.38	0.90	1.34	1.62	0.73	0.44	1.21	0.92	1.32	1.26	1.09	1.14
Maximum												
Month	4.1	2.7	5.1	6.0	2.8	1.6	4.4	4.5	5.1	4.9	5.1	5.3
Season												
Annual												

TABLE 25. ASSOCIATED MAXIMUM DOWNDRAFT (m s^{-1})
RECORDED AT 150-METER LEVEL

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1	3.8*	1.7	1.6		0.6	1.0	0.7	3.9	2.4	2.0	5.6*	1.3
2	3.9	1.2	1.0	0.1	0.5	1.0	0.5	3.1	1.4	3.7	3.3	3.7*
3		2.0	0.1	1.1	1.0	1.1	1.0	3.7	2.7	3.6	3.6	1.7
4		1.0	0.5	0.2	0.9	1.5	1.4	4.3	1.0	2.9	3.8	3.6
5		0.6	0.8	0.1	1.1	0.8	0.5	1.5	3.4	3.0	4.3	2.0
6	1.4	0.5	0.3	0.4	1.4	0.7	0.9	3.7	4.6	3.2	2.7	1.8
7	2.1	2.2	1.0	0.8	0.7	0.9	0.8	5.4*	4.1	1.8	3.3	1.4
8	0.8	1.5	1.4	2.7*	0.5	0.5	0.6	3.0	4.1	2.7	3.8	3.0*
9	2.6	2.0	0.9		1.0	2.1*	0.6	1.9	3.0*	5.7*	3.9	1.3
10	1.5	1.5	0.3	1.2	0.5	1.0	0.9	3.1	2.1	4.0	3.3	1.7
11	1.7	1.0	0.3	1.7	0.8	0.9	0.7	3.3	1.7	5.3	3.8	3.0*
12	2.5	1.0	0.4	2.4	0.7	0.9		7.0*	1.0	2.7	2.4	4.5*
13	2.2	1.6	0.2	2.7	0.8	0.8		4.2	2.8	3.0	2.9	1.6
14	1.7	2.0	0.5	0.4	0.7	1.2		2.8	1.6	2.8	3.8	2.1
15	2.2	1.9	2.3*	0.1	1.0	0.7	4.1	2.0	2.6	5.5*	3.5	1.9
16	1.0	1.4	2.7	0.2	0.8	1.5	3.5		4.6	5.7	4.2	1.7
17	1.2	1.7	2.3	0.8	0.7	0.8	2.3			1.9	1.5	1.3
18	1.0	0.5	0.9	0.4	0.2	0.9	4.3		1.9	2.5	1.5	1.0
19	1.1	0.6	0.1	1.4	0.6	1.3	4.3	1.9	5.3*	2.9	1.6	1.1
20	3.1	3.1	0.2	0.6	0.5	1.1	3.8	3.4	4.3	3.1	4.6	1.1
21	1.7	1.9	1.4	0.8	0.8	0.4	2.3	3.6	3.0	2.9	3.4	0.7
22	2.6	0.6	2.4	2.4	0.9	0.8	5.8	3.3		1.7	3.0	1.0
23	3.6	1.0	1.5	1.5*	0.1	0.6	3.3	4.2	2.6	2.2	2.6	1.1
24	2.6	1.1	2.3	1.9	1.7*	0.4	2.3	3.1	1.7	2.1	5.2	2.4
25	1.5	2.1	1.1	0.7	0.8	0.4	2.9	3.8	1.1	3.7	2.5	2.3
26		1.7	0.8	1.0		0.4	2.0	3.1	2.9	1.6	4.2	2.2
27		1.3	1.6	2.2	2.6*	0.5	4.7	3.0	2.2	3.4	3.4	2.5
28	2.2	0.2	0.2	2.1	1.0	1.2	3.3	3.4	1.7	3.8	3.2	1.8
29	2.3	0.5	1.7	2.4		1.0	3.0	4.6	1.7	2.0	3.1	2.2
30	2.7	0.8	1.9	1.5		0.7	3.5	4.2	2.4		1.3	2.3
31	2.3		1.7	0.2		0.5		3.2		3.8	2.1	
*Daily Maximum												
Mean	2.16	1.34	1.11	1.17	0.85	0.89	2.37	3.49	2.64	3.17	3.27	1.98
σ	0.83	0.66	0.79	0.47	0.48	0.38	1.56	1.10	1.18	1.16	1.03	0.89
Maximum												
Month	3.9	3.1	2.7	2.7	2.6	2.1	5.8	7.0	5.3	5.7	5.6	4.5
Season	3.9						7.0					
Annual	7.0											

TABLE 26. ASSOCIATED 10-MINUTE MEAN DIRECTION RECORDED AT 150-METER LEVEL

Day	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1	S	NE	NNW		SSE	WNW	SSW	NE	WNW	E	ESE	NE
2	NNW	NE	N	E	SSE	SW	NNW	NE	N	E	SW	NW
3		ENE	NNW	SSE	NW	NW	W	SSE	W	ENE	SE	E
4		ESE	N	SSE	NW	NNE	NW	SW	WSW	SSW	ESE	NE
5		SE	ESE	SSE	SSW	NW	NW	W	E	SW	SW	E
6	W	SE	SE	WNW	E	NW	N	ENE	ESE	WSW	SSW	E
7	ESE	NNW	N	N	WSW	S	SSW	SE	E	WSW	SSW	E
8	SSE	N	SE	NW	NW	WSW	SE	SSE	W	NNW	E	E
9	NNE	NNW	SE	NNW	NE	NW	SSE	SSE	SE	E	S	NE
10	N	NNE	SE	NNW	SE	SSE	SW	ENE	SW	S	SE	E
11	NNE	ENE	ESE	NNW	NNW	SE	SSW	N	SW	WSW	SE	ESE
12	NNE	NW	SE	NW	SW	SE		E	WNW	WNW	W	E
13	ENE	NW	SSE	NW	NNW	SE		S	W	WNW	WSW	E
14	E	E	SE	NW	N	SSW		E	S	SE	E	N
15	FSE	NNW	SSW	WNW	E	W	NW	SSW	SE	E	E	E
16	SE	N	NNW	WNW	SSE	NNW	NNW		NW	E	E	ESE
17	S	NW	N	ENE	SSE	W	SE		SE	E	S	ESE
18	SSW	ESE	ENF	E	S	E	SSE		ESE	E	SSW	SE
19	NW	ESE	ESI	W	WSW	SSW	S	W	NE	SE	S	E
20	N	S	SE	WSW	WSW	NW	SSE	NNE	ENE	SE	ENE	SSE
21	N	W	SSE	SSE	NNW	ENE	N	N	NE	ESE	E	ESE
22	NNE	WNW	SSE	SSE	SE	SSW	E	NE	ENE	SE	ENE	SSE
23	N	ENE	WSW	NNW	SSE	SSW	F	ENE	ENE	SE	ENE	SSE
24	NW	E	WNW	NNW	ESE	SSE	ESE	E	ENE	SE	E	SE
25	WNW	ENE	S	N	WSW	NW	SE	E	ENE	SSE	ENE	SSE
26		NNE	WNW	SSE	N	N	SE	E	NNW	NE	ENE	WSW
27		NE	NW	S	SW	ESE	E	SE	E	SSW	NE	NNW
28	NNE	SSE	WNW	S	WNW	E	SSE	SE	SE	S	ENE	N
29	NNW	SSE	ESE	W	SE	SE	ESE	ESE	N	S	ENE	NNE
30	NNW	SSE	SE	NW	SSW	SSW	ESE	S	WSW	SSE	E	N
31	NNE		SSE	SE		WSW	SSE	S	E	E	ESE	N

TABLE 27. ASSOCIATED INSTANTANEOUS DIRECTION RECORDED AT 150-METER LEVEL

Day	Winter					Summer						
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1	ESE	NE	NNW		SSE	WNW	SW	ENE	WNW	E	ESE	WNW
2	WNW	NE	N	E	SSE	SSW	NNW	NE	N	E	WSW	WNW
3		E	NNW	SSE	NNW	NW	W	SE	W	E	SSE	ENE
4		ESE	NNE	SSE	NNW	NE	NW	SSW	WSW	SSW	W	NE
5		SE	ESE	SSE	SSW	NNW	NW	W	E	SW	SW	E
6	ENE	SE	SE	WNW	W	NW	N	ENE	S	WSW	SW	E
7	ESE	NNW	NNW	NNW	W	SSW	S	SSE	W	WSW	W	ESE
8	SE	N	SE	WNW	NW	W	SE	SSE	W	NNW	E	ESE
9	NNE	NW	SE	NNW	NNE	NW	SSE	SSE	SE	SW	S	ENE
10	NNE	NNE	SE	NNW	SSE	S	WSW	NE	SW	S	SE	E
11	NNE	ENE	ESE	NNW	NNW	SE	SSW	N	SW	WSW	SSE	ESE
12	NNE	NW	SE	NW	SW	SE	SSW	ESE	W	W	W	E
13	NE	NW	SSE	NW	NNW	SE		WSW	WSW	WNW	WSW	E
14	F	E	SE	NW	N	SW	NNW	E	S	SE	F	NNE
15	E	NNW	SSW	WNW	ESE	W	NNW	SW	SE	ESE	E	E
16	SE	N	NNW	WNW	SSE	WSW	NNW		NW	E	E	ESE
17	S	SE	N	ENE	SE	N	SE			E	S	ESE
18	SSW	ESE	ENE	E	S	E	SE		ESE	E	SSW	SE
19	NW	ESE	ESE	W	WSW	SSW	S	W	NE	SE	S	ESE
20	NNW	W	SSE	W	SW	WNW	SE	NNE	ENE	SE	E	SSE
21	N	W	SSE	SSE	NNW	SW	N	NNE	NE	W	E	ESE
22	NNE	WNW	S	SSE	SE	SSW	E	NE	ENE	SE	E	SE
23	N	ENE	WSW	NNW	SE	SW	E	NE	ENE	SSE	NE	SSE
24	NW	ENE	WNW	NNW	W	SSE	ESE	E	ENE	ESE	E	W
25	WNW	W	W	N	W	NW	ESE	E	NNW	NE	ENE	NNW
26		NNE	WNW	SSE		N	SE	E	E	SW	NE	NNW
27		NE	NW	S	WSW	SE	F	SE	SE	W	ENE	N
28	NNE	SSE	NW	WSW	W	ESE	SSE	SE	WSW	S	E	NNE
29	NNW	SSE	ESE	W		SE	SE	S	WSW	SSE		N
30	NNW	SSE	SE	NW		SSW	SSE	S	E			NNE
31	NE		SSE	SE		WSW		SSE		E	SW	

TABLE 28. TIME OF OCCURRENCE (GMT) OF DAILY MAXIMUM HORIZONTAL
WIND SPEED AT 150-METER LEVEL

Day	Winter							Summer						
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept		
1	2030	1939	1645		0504	0945	1825	1726	2053	2120	1716	2030		
2	2100	1426	0719	2354	2354	0656	0003	2018	1841	1617	2315	2200		
3		1556	2309	1905	2239	1706	1727	2248	1734	1536	2124	1810		
4		0452	2211	0320	0136	1916	1409	1800	0726	2323	2258	1640		
5		0537	2121	0200	1258	0739	0520	0417	1946	0211	2153	1750		
6	1650	0256	0718	1349	2316	0033	1737	2106	1918	0245	1707	1750		
7	1900	1824	2217	2357	0200	1819	1603	1658	2012	0542	0058	2120		
8	1430	0012	0138	2350	0817	0619	2354	0425	1634	2339	1917	1730		
9	1800	0721	1818	1337	1910	0450	0225	0240	2222	2118	0248	1900		
10	1150	0357	0335	1836	1647	1550	1805	0201	2356	2022	2030	2340		
11	0200	0231	2151	0132	1408	2226	1631	1718	0016	1751	1913	1750		
12	1520	2349	2257	2357	1937	2258		2009	0059	1952	2056	1700		
13	1620	0658	0356	0001	2115	2301		1508	0043	2006	2207	1940		
14	1850	1824	2355	1012	0103	1811		1950	0604	2232	2011	1400		
15	1630	1803	1735	1403	1817	0548	1556	0222	2354	1736	1711	2050		
16	2030	0045	1407	0530	1530	2121	1910		2157	2121	1922	1950		
17	1830	1705	1925	1331	0343	1847	2350		0017	0159	0648	2110		
18	0020	0517	1639	0020	0714	2105	2139		0155	1621	0744	2200		
19	0610	2353	2300	2143	2207	0442	1415	1201	1755	0258	0513	0800		
20	1710	2258	0441	0121	0135	1606	0002	1850	1855	2258	1842	1320		
21	0620	0058	2233	2309	2359	1519	2132	1746	2206	0018	1953	0150		
22	1900	0745	0334	1200	2351	1531	1812	2031		2343	1937	1950		
23	2020	2311	1931	1747	2311	0019	1418	1851	1508	0159	1925	2010		
24	0000	0811	1637	1557	1656	0503	0724	1636	0308	2251	1516	2100		
25	0241	1911	0949	0849	1917	1719	0253	1530	1132	1835	2200	1900		
26		1701	0740	2255	0342	1327	0257	2034	2001	2049	1911	2140		
27		0055	1528	0321	1751	1549	1944	2256	2310	2153	1755	1540		
28	2347	2358	0912	1850	1919	1817	2300	2057	0024	0007	0830	0200		
29	2301	0149	2010	1841		2359	2021	2213	0404	0253	1744	1900		
30	1730	0559	1620	0401		1739	0255	2218	1905	1525	2105	1950		
31	0216		1545	2315		0016		2314		1247	0155			

TABLE 29. GUST FACTOR AS A FUNCTION OF DAILY MAXIMUM HORIZONTAL WIND SPEED,
SEASON, AND ANNUAL AT THE 10-METER LEVEL

Maximum Horizontal Wind Speed (m s ⁻¹)	Winter			Summer			Annual		
	Freq	Max	Min	Mean	Freq	Max	Min	Mean	
4.5 < 5.5	1	2.74	1.49	1.53					1.53
5.5 < 6.5	13	2.23	1.35	1.89	1	2.56	1.52	1.56	1.87
6.5 < 7.5	17	2.11	1.49	1.70	14	4.75	1.41	1.85	1.77
7.5 < 8.5	20	2.42	1.38	1.73	41	3.48	1.48	1.89	1.84
8.5 < 9.5	27	2.64	1.49	1.71	32	2.62	1.47	1.88	1.80
9.5 < 10.5	28	2.57	1.47	1.84	32	3.15	1.52	1.83	1.83
10.5 < 11.5	17	2.14	1.60	1.75	19	2.80	1.51	1.78	1.76
11.5 < 12.5	18	2.36	1.67	1.82	15	1.87	1.53	1.87	1.84
12.5 < 13.5	11	2.32	1.65	1.91	6	2.91	1.70	1.74	1.85
13.5 < 14.5	6	2.04	1.78	1.86	8	3.24	2.07	2.22	2.06
14.5 < 15.5	2	2.51	1.97	1.91	4			2.51	2.31
15.5 < 16.5	3	3.17	1.72	2.17	0				2.17
16.5 < 17.5	4			2.20	0				2.20
17.5 < 18.5	1			1.96	1			2.24	2.10
18.5 < 19.5	1			1.69	1			2.74	2.22
19.5 < 20.5	3	2.41	1.59	1.95	1			2.05	1.98
20.5 < 21.5	1			1.74					1.74
21.5 < 22.5	1			2.34					2.34
4.5 < 22.5	174	3.17	1.35	1.87	175	4.75	1.41	2.01	1.96
4.5 < 6.5									1.70
6.5 < 13.5									1.84
13.5 < 22.5									2.13

TABLE 30. GUST FACTOR AS A FUNCTION OF DAILY MAXIMUM HORIZONTAL WIND SPEED,
SEASON, AND ANNUAL AT THE 18-METER LEVEL

Maximum Horizontal Wind Speed (m s ⁻¹)	Winter				Summer				Annual			
	Freq	Max	Min	Mean	Freq	Max	Min	Mean	Freq	Max	Min	Mean
4.5 < 5.5	2	2.48	1.59	2.04	0				2	2.48	1.59	2.04
5.5 < 6.5	7	2.67	1.40	1.82	1			1.85	8	2.67	1.40	1.82
6.5 < 7.5	14	2.00	1.40	1.65	7	1.78	1.56	1.66	21	2.00	1.40	1.66
7.5 < 8.5	20	2.11	1.29	1.68	35	2.78	1.43	1.77	55	2.78	1.29	1.74
8.5 < 9.5	21	2.28	1.50	1.74	33	3.41	1.48	1.90	54	3.41	1.48	1.84
9.5 < 10.5	27	3.74	1.46	1.75	24	2.34	1.43	1.72	51	3.74	1.43	1.74
10.5 < 11.5	13	3.53	1.35	1.80	26	2.12	1.45	1.67	39	3.53	1.35	1.71
11.5 < 12.5	26	3.11	1.43	1.71	11	2.47	1.43	1.75	37	3.11	1.43	1.72
12.5 < 13.5	11	1.84	1.51	1.64	15	2.03	1.45	1.68	26	2.03	1.45	1.66
13.5 < 14.5	8	2.73	1.55	1.93	6	2.96	1.60	1.96	14	2.96	1.55	1.95
14.5 < 15.5	4	1.76	1.58	1.65	4	2.92	1.63	2.16	8	2.92	1.58	1.90
15.5 < 16.5	12	2.77	1.60	1.89	2	2.06	1.74	1.90	14	2.77	1.60	1.89
16.5 < 17.5	0				4	2.68	1.73	2.06	4	2.68	1.73	2.06
17.5 < 18.5	1		1.75	1.73	2	2.69	1.84	2.27	3	2.69	1.73	2.09
18.5 < 19.5	3	4.63	1.75	2.78	1			2.10	4	4.63	1.75	2.61
19.5 < 20.5	0				1			2.12	1			2.12
20.5 < 21.5	3	2.20	1.60	1.93	1			1.71	4	2.20	1.60	1.87
21.5 < 22.5	1			1.69	0				1			1.63
22.5 < 23.5	0				0				0			
23.5 < 24.5	2	1.93	1.70	1.82	0				2	1.93	1.70	1.82
24.5 < 25.5					1			3.16	1			3.16
4.5 < 25.5	175	4.63	1.29	1.84	174	3.41	1.43	1.97	349	4.63	1.29	1.95
4.5 < 6.5									10			1.93
6.5 < 16.5									319			1.78
16.5 < 25.5									20			2.18

TABLE 31. GUST FACTOR AS A FUNCTION OF DAILY MAXIMUM HORIZONTAL WIND SPEED,
SEASON, AND ANNUAL AT THE 60-METER LEVEL

Maximum Horizontal Wind Speed (m s ⁻¹)	Winter				Summer				Annual				
	Freq	Max	Min	Mean	Freq	Max	Min	Mean	Freq	Max	Min	Mean	
5.5 < 6.5	2	1.66	1.53	1.60						2	1.66	1.53	1.60
6.5 < 7.5	10	2.75	1.11	1.55	4	2.44	1.43	1.78		14	2.75	1.11	1.62
7.5 < 8.5	15	1.95	1.14	1.42	12	2.00	1.34	1.64		27	2.00	1.14	1.52
8.5 < 9.5	16	1.92	1.17	1.39	29	2.05	1.26	1.55		45	2.05	1.17	1.49
9.5 < 10.5	21	2.46	1.17	1.56	33	2.73	1.20	1.64		54	2.73	1.17	1.61
10.5 < 11.5	20	1.83	1.14	1.38	21	2.89	1.21	1.58		41	2.89	1.14	1.48
11.5 < 12.5	19	2.02	1.22	1.45	22	2.07	1.25	1.47		41	2.07	1.25	1.46
12.5 < 13.5	18	1.86	1.26	1.43	16	2.21	1.28	1.52		34	2.21	1.26	1.47
13.5 < 14.5	18	2.12	1.27	1.46	8	1.52	1.31	1.39		26	2.12	1.27	1.43
14.5 < 15.5	8	2.39	1.32	1.66	8	2.28	1.25	1.69		16	2.39	1.25	1.68
15.5 < 16.5	4	1.77	1.47	1.57	9	2.03	1.32	1.63		13	2.03	1.32	1.61
16.5 < 17.5	5	1.50	1.35	1.42	4	1.52	1.42	1.45		9	1.52	1.35	1.43
17.5 < 18.5	4	1.36	1.23	1.32	2	1.92	1.76	1.84		6	1.92	1.23	1.49
18.5 < 19.5	4	2.17	1.34	1.58	2	1.65	1.64	1.65		6	2.17	1.34	1.60
19.5 < 20.5	1			1.60	1			2.26		2	2.26	1.60	1.93
20.5 < 21.5	1			1.36	1			1.70		2	1.70	1.36	1.58
21.5 < 22.5	0				1			1.58		1			1.58
22.5 < 23.5	2	2.29	1.32	1.81	0					2	2.29	1.32	1.81
23.5 < 24.5	2	1.76	1.27	1.52	0					2	1.76	1.27	1.52
24.5 < 25.5	2	1.46	1.38	1.42	0					2	1.46	1.38	1.42
25.5 < 26.5	0				1			1.58		1			1.58
26.5 < 27.5	0				1			2.77		1			2.77
27.5 < 28.5	1			1.95						1			1.95
5.5 < 28.5	173	2.75	1.11	1.52	175	2.89	1.20	1.71		348	2.89	1.11	1.63
5.5 < 6.5										2			1.60
6.5 < 16.5										311			1.54
16.5 < 28.5										35			1.72

TABLE 32. GUST FACTOR AS A FUNCTION OF DAILY MAXIMUM HORIZONTAL WIND SPEED,
SEASON, AND ANNUAL AT THE 150-METER LEVEL

Maximum Horizontal Wind Speed (m s ⁻¹)	Winter			Summer			Annual					
	Freq	Max	Min	Mean	Freq	Max	Min	Mean	Freq	Max	Min	Mean
5.5 < 6.5	2	1.49	1.09	1.29					2	1.49	1.09	1.29
6.5 < 7.5	2	1.64	1.06	1.35	1			1.67	3	1.67	1.06	1.46
7.5 < 8.5	14	2.75	1.11	1.55	14	2.75	1.08	1.63	28	2.75	1.08	1.59
8.5 < 9.5	15	1.59	1.11	1.29	30	2.21	1.10	1.51	45	2.21	1.10	1.43
9.5 < 10.5	13	2.63	1.08	1.38	29	1.75	1.08	1.39	42	2.63	1.08	1.39
10.5 < 11.5	14	1.63	1.10	1.32	17	1.93	1.18	1.46	31	1.93	1.10	1.39
11.5 < 12.5	21	1.58	1.07	1.25	21	2.79	1.12	1.41	42	2.79	1.07	1.33
12.5 < 13.5	28	1.77	1.13	1.28	15	1.81	1.18	1.44	43	1.81	1.13	1.34
13.5 < 14.5	14	1.65	1.10	1.28	19	1.55	1.19	1.34	33	1.65	1.10	1.32
14.5 < 15.5	9	1.54	1.13	1.29	8	2.24	1.10	1.53	17	2.24	1.10	1.40
15.5 < 16.5	11	1.44	1.11	1.28	4	1.96	1.25	1.62	15	1.96	1.11	1.37
16.5 < 17.5	3	1.31	1.17	1.25	7	1.57	1.22	1.32	10	1.57	1.17	1.30
17.5 < 18.5	8	1.48	1.11	1.29	4	1.50	1.21	1.30	12	1.50	1.11	1.29
18.5 < 19.5	5	3.74	1.27	1.91	0				5	3.74	1.27	1.91
19.5 < 20.5	3	1.28	1.16	1.22	0				3	1.28	1.16	1.22
20.5 < 21.5	2	1.28	1.28	1.28	1			1.39	3	1.39	1.28	1.32
21.5 < 22.5	0				2	1.36	1.35	1.36	2	1.36	1.35	1.36
22.5 < 23.5	1			1.31	0				1			1.31
23.5 < 24.5	1			1.29	0				1			1.29
24.5 < 25.5	1			1.99	1			2.46	2	2.46	1.99	2.23
25.5 < 26.5	5	1.68	1.17	1.39	0				5	1.58	1.17	1.39
26.5 < 27.5	1			1.38	1			1.47	2	1.47	1.38	1.43
5.5 < 27.5	173	3.74	1.06	1.37	174	2.79	1.08	1.52	347	3.74	1.06	1.43
5.5 < 7.5									5			1.38
7.5 < 18.5									318			1.38
18.5 < 27.5									24			1.50

TABLE 33. PERCENTAGE FREQUENCY DISTRIBUTIONS OF ASSOCIATED MAXIMUM UPDRAFTS
GREATER THAN, EQUAL TO, OR LESS THAN ASSOCIATED MAXIMUM
DOWNDRAFTS BY MONTHS AND LEVELS

Level (m)	Winter							Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	
10	+>-	3.23	3.33	16.13	19.35	21.43	32.36	23.33	29.03	13.33	25.81	22.58	20.00
	+=-	3.23	3.33	3.23	6.45	3.57	0	0	6.45	13.33	3.23	6.45	3.33
	+<-	74.19	86.67	32.26	19.35	50.00	51.61	46.67	48.39	66.67	45.16	58.06	63.33
	M	19.35	6.67	48.39	54.84	25.00	16.13	30.00	16.13	6.67	25.81	12.90	13.33
18	+>-	87.10	93.33	93.55	87.10	89.29	93.55	90.00	87.10	90.00	96.77	100.00	96.67
	+=-	3.23	0	0	3.23	3.57	0	0	0	3.33	0	0	0
	+<-	3.23	6.67	6.45	6.45	3.57	3.23	0	3.23	0	0	0	3.33
	M	6.45	0	0	3.23	3.57	3.23	10.00	9.68	6.67	3.23	0	0
60	+>-	3.23	0	29.03	19.35	0	3.23	0	0	10.00	3.23	3.23	3.33
	+=-	0	0	3.23	3.23	0	0	0	0	0	0	0	0
	+<-	90.32	100.00	67.74	70.97	96.43	96.77	90.00	90.32	86.67	93.55	96.77	96.67
	M	6.45	0	0	6.45	3.57	0	10.00	9.68	3.33	3.23	0	0
150	+>-	32.26	26.67	80.65	64.52	14.29	12.90	3.33	3.23	10.00	6.45	9.68	63.33
	+=-	3.23	3.33	6.45	3.23	0	6.45	0	0	3.33	0	0	0
	+<-	58.06	70.00	12.90	25.81	82.14	80.65	86.67	87.10	80.00	90.32	90.32	36.67
	M	6.45	0	0	6.45	3.57	0	10.00	9.67	6.67	3.23	0	0

M missing

**TABLE 34. PERCENTAGE FREQUENCY DISTRIBUTIONS OF ASSOCIATED
MEAN AND INSTANTANEOUS DIRECTIONS BY COMPASS SEGMENTS
AND MONTHS FOR THE 10-METER LEVEL**

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
<u>Mean</u>												
NNE	3.23	6.67	3.23			3.23		3.23		3.23		6.67
NE	16.13	3.33	3.23		3.57	3.23		3.23	10.00	6.45		
ENE	6.45	13.33	3.23	3.23			6.67	12.90	13.33	3.23	3.23	6.67
E		13.33	6.45	3.23	7.14			3.23	10.00		12.90	10.00
ESE	6.45	3.33			3.57	3.23	6.67	16.13	13.33	19.35	29.03	16.67
SE	6.45	10.00	6.45	6.45		6.45	6.67	9.68	3.33	6.45	9.68	16.67
SSE	3.23	10.00	12.90	3.23	3.57	9.68	13.33	9.68	10.00	9.68	12.90	10.00
S	3.23		16.13	9.68	14.29	12.90	13.33	3.23	3.33	6.45	6.45	6.67
SSW		3.33	6.45	3.23	7.14		3.33	3.23		12.90		
SW	6.45		3.23	3.23	3.57	12.90	6.67	6.45		9.68		3.33
WSW			3.23		3.57	6.45	3.33		6.67		9.68	
W	6.45	10.00	6.45	16.13	10.71	12.90	10.00	6.45	13.33	9.68	12.90	3.33
WNW					3.57					6.45		
NW	3.23	6.67	6.45	9.68	3.57	3.23	3.33		10.00	3.23		3.33
NNW	9.68	16.67	12.90	25.81	17.86	19.35	13.33	2.23	3.33			3.33
N	9.68	3.33	9.68	12.90	14.29	6.45	3.33	9.68			3.23	13.33
M	19.35			3.23	3.57		10.00	9.68	3.33	3.23		
<u>Instantaneous</u>												
NNE	9.68			3.23	3.57	3.23		3.23	3.33	3.23		
NE	9.68	6.67	3.23				3.33	3.23	6.67		3.23	3.33
ENE	6.45	13.33	3.23	3.23				12.90	10.00	6.45		3.33
E	3.23	10.00	6.45		3.57	3.23	6.67	19.35	13.33	3.23	22.58	6.67
ESE	9.68	6.67		3.23	3.57	3.23	10.00	3.23	3.33	12.90	19.35	13.33
SE	3.23	10.00	6.45	6.45		9.68	6.67	6.45	10.00	6.45	16.13	10.00
SSE		10.00	16.13	3.23	3.57	9.68	6.67	9.68	10.00	9.68	3.23	23.33
S	3.23	3.33	9.68	6.45	10.71	3.23	6.67	6.45	3.33	9.68	6.45	6.67
SSW				6.45	7.14	6.45	10.00	6.45	3.33	9.68	3.23	3.33
SW	3.23		12.90	3.23	7.14	16.13	6.67			9.68		
WSW			3.23					3.23	3.33		3.23	3.33
W	3.23	16.67	6.45	12.90	17.86	9.68	10.00	3.23	13.33	16.13	12.90	
WNW	3.23		3.23	6.45	3.57	3.23		3.23	6.67	6.45	3.23	3.33
NW	3.23	10.00	3.23	9.68	7.14	6.45	10.00				3.23	
NNW	12.90	13.33	19.35	29.03	21.43	22.58	10.00		6.67	3.23	3.23	6.67
N	9.68		6.45	3.23	10.71	3.23	3.33	9.68	3.33			16.67
M	19.35			3.23			10.00	9.68	3.33	3.23		

M missing

**TABLE 35. PERCENTAGE FREQUENCY DISTRIBUTIONS OF ASSOCIATED
MEAN AND INSTANTANEOUS DIRECTIONS BY COMPASS SEGMENTS
AND MONTHS FOR THE 18-METER LEVEL**

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
<u>Mean</u>												
NNE		13.33		3.23		6.45		3.23		3.23		
NE		3.33	6.47	6.45			3.33	13.90	20.00	9.68		
ENE		13.33	3.23				6.67	9.68	6.67	9.68		
E		6.67	3.23	6.45		9.68	6.67	6.45	13.33	19.35		
ESE		13.33	12.90			6.45	13.33	9.68	3.33	12.90		
SE		3.33	12.90	6.45		9.68	13.33	12.90	6.67	9.68		
SSE			12.90	12.90		3.23	6.67	9.68	3.33	3.23		
S		3.33	3.23			6.45	6.67		3.33	6.45		
SSW		3.33	6.45	3.23		12.90	6.67	6.45	3.33	9.68		
SW				6.45		6.45		3.23	10.00	3.23		
WSW									3.33	3.23		
W		3.33	3.23	3.23		3.23	3.33		3.33			
WNW		10.00							3.33			
NW		6.67	6.45	19.35		12.90	13.33		10.00	6.45		
NNW		13.33	25.81	25.81		12.90	3.33	3.23				
N		6.67	3.23	3.23		9.68	6.67	12.90	3.33			
M	100.00			3.23	100.00		10.00	9.68	6.67	3.23	100.00	100.00
<u>Instantaneous</u>												
NNE						3.23		6.45	6.67			
NE		13.33		3.23			3.33	9.68	13.33	9.68		
ENE		16.67	9.68	9.68			3.33	6.45	6.67	22.58		
E		10.00	3.23			6.45	13.33	9.68	16.67	9.68		
ESE		6.67	19.35			9.68	6.67	6.45	3.33	6.45		
SE		3.33	6.45	6.45		9.68	20.00	12.90	3.33	9.68		
SSE			3.23	12.90			3.33	6.45	3.33	3.23		
S			12.90			9.68	6.67	3.23	3.33	6.45		
SSW		3.33	3.23			12.90	3.33	6.45	6.67	6.45		
SW		3.33		3.23		6.45	3.33		3.33	6.45		
WSW				6.45				3.23	3.33			
W		3.33	3.23	9.68		9.68	3.33	3.23	10.00	6.45		
WNW			12.90	25.81					3.33	6.45		
NW		20.00	6.45	19.35		19.35	10.00		10.00			
NNW		16.67	9.68			9.68	10.00	9.68		3.23		
W		3.33	9.68			3.23	3.33	6.45				
M	100.00			3.23	100.00		10.00	9.68	6.67	3.23	100.00	100.00

M missing

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TABLE 36. PERCENTAGE FREQUENCY DISTRIBUTIONS OF ASSOCIATED
MEAN AND INSTANTANEOUS DIRECTIONS BY COMPASS SEGMENTS
AND MONTHS FOR THE 60-METER LEVEL

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
<u>Mean</u>												
NNE	3.23	6.67			7.14		3.33	3.23	3.33			3.33
NE	3.23	13.33		3.23				12.90	13.33	16.13	9.68	10.00
ENE	9.68	10.00	3.23	3.23			3.33	19.35	6.67		25.81	16.67
E			9.68	3.23	7.14	6.45	13.33	3.23	13.33	16.13	22.58	20.00
ESE	6.45	23.33	22.58	3.23	3.57	9.68	10.00	12.90	6.67	12.90	6.45	10.00
SE			6.45	12.90	17.86	3.23	16.67	6.45	10.00	9.68	9.68	6.67
SSE	3.23		9.68	12.90	3.57	9.68	10.00	3.23		12.90		
S		6.67	6.45	6.45	7.14	6.45		3.23	3.33	6.45	3.23	3.33
SSW		3.33	3.23	3.23		16.13	3.33	6.45	3.33	9.68	3.23	
SW	3.23			6.45	7.14	3.23	3.33	3.23	6.67	6.45	9.68	
WSW	3.23				7.14				6.67		3.23	
W	6.45	3.33				3.23	3.33	3.23	10.00		3.23	6.67
WNW	3.23	3.33	3.23	3.23	10.71	6.45	3.33			3.23		3.33
NW	16.13	10.00	16.13	29.03	10.71	16.13	13.33		6.67		3.23	3.33
NNW	3.23	10.00	12.90	3.23	14.29	12.90	3.33	3.23	6.67			10.00
N	19.35	10.00	6.45	3.23		6.45	3.33	9.68		3.23		6.67
M	19.35			6.45	3.57		10.00	9.68	3.33	3.23		
<u>Instantaneous</u>												
NNE	6.45	3.33			3.57			3.23	3.33	3.23		3.33
NE	3.23	10.00		3.23			3.33	22.58	10.00	16.13	9.68	10.00
ENE	9.68	16.67	3.23	3.23				9.68	3.33	3.23	16.13	10.00
E			12.90	3.23		6.45	13.33	3.23	16.67	12.90	29.03	26.67
ESE	6.45	20.00	16.13	3.23	3.57	9.68	10.00	12.90	3.33	12.90	6.45	10.00
SE			9.68	9.68	14.29	3.23	16.67	6.45	10.00	9.68	6.45	6.67
SSE	3.23	3.33	9.68	6.45	7.14	6.45	10.00	3.23		12.90	3.23	
S		3.33	3.23	3.23	3.57	9.68		3.23	3.33	3.23	3.23	3.33
SSW						9.68	3.33	3.23	13.33	6.45		
SW		3.33	3.23	3.23	14.29	6.45		3.23		9.68	9.68	
WSW	3.23			3.23	3.57	3.23	3.33		3.33	6.45	3.23	
W	12.90	6.67	9.68	16.13	10.71	6.45	3.33	6.45	13.33	3.23	12.90	10.00
WNW	6.45	3.33	3.23	3.23	10.71	12.90	6.67		3.33			3.33
NW	12.90	16.67	12.90	22.58	10.71	16.13	13.33		3.33	3.23		3.33
NNW	3.23	3.33	12.90	12.90	14.29	6.45	3.33	6.45	3.33			6.67
N	12.90	10.00	3.23		3.57	3.23	3.33	6.45	6.67			6.67
M	19.35			6.45			10.00	9.68	3.33	3.23		

M missing

**TABLE 37. PERCENTAGE FREQUENCY DISTRIBUTIONS OF ASSOCIATED
MEAN AND INSTANTANEOUS DIRECTIONS BY COMPASS SEGMENTS
AND MONTHS FOR THE 150-METER LEVEL**

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
<u>Mean</u>												
NNE	17.35	6.67				3.23		3.23				3.33
NE		10.00			3.57			9.68	6.67	3.23	6.45	10.00
ENE	3.23	13.33	3.23	3.23		3.23		9.68	10.00	3.23	16.13	
E	3.23	6.67		6.45	7.14	6.45	10.00	16.13	13.33	25.81	19.35	33.33
ESE	6.45	10.00	12.90		3.57	3.23	6.67	3.23	6.67	9.68	12.90	13.33
SE	3.23	6.67	25.81	3.23	7.14	12.90	13.33	6.45	10.00	12.90	9.68	6.67
SSE	3.23	10.00	12.90	19.35	17.86	6.45	16.67	12.90		6.45		6.67
S	6.45	3.33	3.23	6.45	3.57	3.23	3.33	9.68	3.33	6.45	9.68	
SSW	3.23		3.23		3.57	16.13	10.00	3.23		6.45	9.68	
SW					7.14	3.23	3.33	3.23	6.67	3.23	9.68	
WSW			3.23	3.23	14.29	6.45			6.67	9.68	3.23	3.33
W		3.33		9.68		9.68	3.33	9.68	10.00		3.23	
WNW	3.23	3.33	9.68	9.68	3.57	3.23			6.67	6.45		
NW	6.45	10.00	3.23	16.13	10.71	19.35	10.00		3.33			3.33
NNW	9.68	10.00	9.68	9.68	10.71	3.23	6.67		3.33	3.23		3.33
N	12.90	6.67	12.90	3.23	3.57		6.67	3.23	6.67			16.67
M	19.35			6.45	3.57		10.00	9.68	6.67	3.23		
<u>Instantaneous</u>												
NNE	19.35	6.67	3.23		3.57			6.45				10.00
NE	6.45	10.00				3.23		12.90	6.67	3.23	6.45	3.33
ENE		10.00	3.23	3.23				6.45	10.00		6.45	6.67
E	6.45	6.67		6.45		3.23	10.00	12.90	10.00	22.58	32.26	20.00
ESE	6.45	10.00	12.90		3.57	3.23	6.67	3.23	3.33	6.45	6.45	23.33
SE	6.45	10.00	22.58	3.23	10.71	16.13	20.00	9.68	10.00	12.90	3.23	6.67
SSE		10.00	12.90	19.35	14.29	3.23	10.00	12.90		6.45	6.45	6.67
S	3.23		3.23	3.23	3.57	3.23	6.67	6.45	6.67	6.45	9.68	
SSW	3.23		3.23		3.57	16.13	3.33	3.23		3.23	3.23	
SW					7.14	9.68	3.33	3.23	6.67	9.68	9.68	
WSW			3.23	3.23	3.57	6.45	3.33	3.23	13.33	9.68	6.45	
W		10.00	3.23	9.68	17.86	6.45	3.33	6.45	13.33	9.68	9.68	3.33
WNW	6.45	3.33	6.45	12.90	3.57	6.45			3.33	3.23		6.67
NW	6.45	10.00	6.45	12.90	3.57	12.90	6.67		3.33			
NNW	9.68	6.67	12.90	16.13	17.86	3.23	10.00		3.33	3.23		6.67
N	6.45	6.67	6.45	3.23	3.57	6.45	6.67	3.23	3.33			6.67
M	19.35			6.45	3.57		10.00	9.68	6.67	3.23		

M missing

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE 38. PERCENTAGE FREQUENCY DISTRIBUTIONS OF TIME OF OCCURRENCE OF DAILY
MAXIMUM HORIZONTAL WIND SPEED IN TIME PERIODS OF 1900<0100, 0100<0700,
0700<1300, AND 1300<1900 EST BY MONTHS AND LEVELS

Level (m)	Time (EST)	Winter					Summer						
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
10	1900<0100	3.23	10.00	9.68	9.68	14.29	12.90	13.33	9.68	6.67	12.90	3.23	0
	0100<0700	3.23	6.67	0	3.23	0	3.23	0	0	3.33	0	3.23	3.33
	0700<1300	29.03	56.67	58.06	38.71	46.43	41.94	33.33	16.13	20.00	25.81	16.13	23.33
	1300<1900	48.39	26.67	32.26	45.16	39.29	41.94	43.33	64.52	66.67	61.29	77.42	73.33
	M	16.13	0	0	3.23	0	0	10.00	9.68	3.33	0	0	0
18	1900<0100	3.23	13.33	9.68	12.90	14.29	12.90	16.67	9.68	20.00	6.45	6.45	0
	0100<0700	3.23	10.00	0	3.23	0	3.23	0	0	0	0	3.23	3.33
	0700<1300	41.94	46.67	54.84	38.71	39.29	51.61	50.00	22.58	20.00	32.26	29.03	26.67
	1300<1900	45.16	30.00	35.48	41.94	46.43	32.26	23.33	58.06	56.67	61.29	61.29	70.00
	M	6.45	0	0	3.23	0	0	10.00	9.68	3.33	0	0	0
60	1900<0100	9.68	30.00	16.13	22.58	17.86	16.13	26.67	9.68	16.67	19.35	12.90	3.33
	0100<0700	6.45	16.67	6.45	9.68	3.57	6.45	3.33	0	3.33	0	3.23	6.67
	0700<1300	22.58	16.67	45.16	19.35	35.71	48.39	26.67	16.13	13.33	29.03	25.81	23.33
	1300<1900	41.94	36.67	32.26	45.16	42.86	29.03	33.33	64.52	63.33	51.61	58.06	66.67
	M	19.35	0	0	3.23	0	0	10.00	9.68	3.33	0	0	0
150	1900<0100	16.13	40.00	16.13	29.03	25.00	22.58	23.33	16.13	26.67	29.03	12.90	6.67
	0100<0700	9.68	13.33	16.13	6.45	7.14	12.90	3.33	0	10.00	0	9.68	3.33
	0700<1300	19.35	13.33	25.81	22.58	21.43	29.03	26.67	25.81	13.33	22.58	19.35	30.00
	1300<1900	35.48	33.33	41.94	38.71	46.43	35.48	36.67	48.39	46.67	48.39	58.06	60.00
	M	19.35	0	0	3.23	0	0	10.00	9.68	3.33	0	0	0

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OF POOR QUALITY

TABLE 39. FREQUENCY OF OCCURRENCE OF DAILY MAXIMUM HORIZONTAL WIND SPEED
WITHIN SAME, PLUS ONE, OR MINUS ONE MINUTE AT TWO, THREE, OR
FOUR LEVELS BY MONTHS AND SEASONS

Levels (m)	Same Minute											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
10, 15, 60	1	7	1	7	3	5	3	4	10	5	9	0
10, 15, 60, 150	0	0	0	1	1	1	0	1	4	3	4	0
10, 15, 60, 150	0	0	0	0	1	0	0	0	1	0	4	0
15, 60, 150	1	0	1	1	1	0	0	1	1	0	4	0
15, 60	4	2	5	3	2	3	3	5	9	5	6	0
60, 150	1	2	2	3	2	1	1	3	2	1	4	12
* One Minute												
10, 15	3	2	0	1	1	1	0	1	2	6	3	2
10, 15, 60	1	1	0	0	0	1	0	0	0	1	0	0
10, 15, 60, 150	0	0	0	0	0	0	0	0	0	0	0	0
15, 60, 150	0	0	0	0	0	0	1	0	0	0	2	3
15, 60	1	2	0	3	0	1	3	2	3	4	4	3
60, 150	0	3	4	1	0	1	2	4	3	6	3	1
Totals												
10, 15	4	9	1	5	4	6	3	5	12	11	12	2
10, 15, 60	1	1	0	1	1	2	0	1	4	4	4	0
10, 15, 60, 150	0	0	0	0	1	0	0	0	1	0	4	0
15, 60, 150	1	0	1	1	1	0	1	1	1	0	5	3
15, 60	5	4	6	6	2	4	6	7	12	9	10	3
60, 150	4	5	6	4	2	2	3	7	5	7	11	13
Winter Summer Annual												
10, 15	32	45	77									
10, 15, 60	6	13	19									
10, 15, 60, 150	1	5	6									
15, 60, 150	1	12	16									
15, 60	27	47	74									
60, 150	23	46	69									

TABLE 40. FREQUENCY OF COINCIDENCE OF RECORDED PRECIPITATION WITH DAILY
MAXIMUM HORIZONTAL WIND SPEED BY MONTHS, SEASONS, AND LEVELS

Level (m)	Winter						Summer					
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
10	2	0	0	4	1	2	0	0	3	2	5	5
15	5	0	0	6	6	1	1	0	3	3	0	3
60	5	1	0	5	0	1	0	0	4	2	5	4
150	3	3	0	2	0	1	1	1	0	3	3	3
	Winter						Annual					
10	9						24					
15	12						22					
60	12						27					
150	9						20					
Total	42						93					

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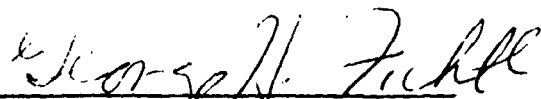
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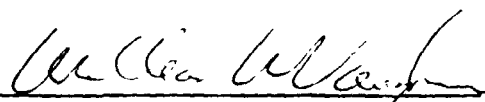
APPROVAL

AN ANALYSIS OF MAXIMUM HORIZONTAL WIND SPEEDS AND ASSOCIATED PARAMETERS RECORDED AT NASA'S 150-METER GROUND WINDS TOWER FACILITY AT KENNEDY SPACE CENTER, FLORIDA

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The information in this report has been reviewed for security classification. Review of any information concerning Department of Defense or nuclear energy activities or programs has been made by the MSFC Security Classification Officer. This report, in its entirety, has been determined to be unclassified.


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