

### 3.4 Meteorology and Ambient Air

#### 3.4.1 Meteorological situation

##### Seasons

The climate of the study area is humid and tropical. A hot and humid pre-monsoon from March to mid May, a prolonged southwest monsoon or rainy season from mid May to September, a pleasant post-monsoon or retreating monsoon from October to November and a cold pleasant winter from December to February are the characteristics of the general climate. Summer runs concurrently with the later part of the pre-monsoon season and continues throughout the monsoon season.

The four climatic seasons viz. pre-monsoon, monsoon, post-monsoon and winter could be considered as comprising of the following months:

- A. **Premonsoon** : March, April and May
- B. **Monsoon** : June, July, August and September
- C. **Postmonsoon** : October and November
- D. **Winter** : December, January and February

Sometimes, the monsoon commences in mid-May and ends in mid-September. Therefore, the boundaries between the seasons are not very rigid.

##### Past records

The past records of meteorological data for various locations in the large study area are not available. However, some data for the period of 2001 – 2004 for Dibrugarh have become available from Indian Meteorological Department (IMD) through its meteorology station at Dibrugarh Airport. These are given In Table 3.5 (Temperature), Table 3.6 (Rainfall) and Table 3.7 (Thunder storms).

It is seen that December and January are the coldest months in the study area, but the minimum temperature rarely goes down to single digit. These were also the driest months along with November. Thunder storms are rare excepting in the months of March to May, most occurring in the month of April.

**Table 3.5. Maximum and minimum temperature (oC) at Dibrugarh IMD station for four years**

S/N	Month	2001		2002		2003		2004	
		Max	Min	Max	Min	Max	Min	Max	Min
1	January	23.2	09.8	22.8	10.6	23.2	09.4	23.1	10.2
2	February	24.5	13.6	26.4	14.0	24.5	13.3	25.7	12.2
3	March	28.2	16.5	27.1	16.8	25.9	15.4	27.0	18.2
4	April	27.2	18.9	27.3	20.0	27.5	19.8	27.1	19.5
5	May	30.8	22.5	30.6	22.2	29.2	21.8	28.5	22.1
6	October	29.7	21.4	30.9	20.9	28.7	22.0	28.6	20.2
7	November	28.0	16.9	27.8	16.3	27.3	16.2	27.9	14.8
8	December	25.0	10.6	24.7	12.0	24.3	11.8	22.1	11.2

**Table 3.6. Maximum and minimum rainfall (mm) and days with no rain (NR) at Dibrugarh IMD Station for four years**

S/N	Month	2001			2002			2003			2004		
		Min	Max	NR	Min	Max	NR	Min	Max	NR	Min	Max	NR
1	January	00	8.5	18	00	14.4	18	00	14.4	18	00	179	24
2	February	00	5.5	19	00	19.6	19	00	19.6	19	00	221	18
3	March	00	5.9	15	00	21.0	13	00	21.0	13	00	700	15
4	April	00	31.8	07	00	566	08	00	566	08	00	658	12
5	May	00	38.2	09	00	450	09	00	450	09	00	1373	05
6	October	00	67.0	22	00	270	22	00	270	22	00	383	17
7	November	00	12.6	22	00	164	22	00	164	22	00	00	30
8	December	00	3.9	27	00	07	27	00	07	27	00	00	31

**Table 3.7. Occurrence of thunder storms (in days) at Dibrugarh IMD Station for four years**

S/N	Month	2001	2002	2003	2004
		Occurrence (days)	Occurrence (days)	Occurrence (days)	Occurrence (days)
1	January	04	04	01	03
2	February	06	04	11	03
3	March	09	11	04	09
4	April	17	15	18	09
5	May	08	10	11	09
6	October	06	01	07	05
7	November	00	01	01	00
8	December	01	00	00	00

Some recent data were also collected from Indian Meteorology Department's North Lakhimpur (Leelabari Airport) station. However, the data are not regularly monitored, and many gaps exist in the same. These are discussed below,

### Temperature

The maximum and minimum daily temperatures fluctuate throughout the year and sometimes, these may be very large inside the study area. Table 3.8 shows that during the last three years, the minimum temperature fluctuated between 8.7 oC (January 2006), 9.4 oC (December 2005) and 9.5 oC (January 2007) to 24.6 or 24.7 oC during July – August. The hottest months are usually from May to September and during the last three years, the maximum temperature hovered around 34 to 35 oC in this period. The maximum temperature remained around 23 – 24 oC during December and January which were the coldest months.

### Relative Humidity

Past data for the relative humidity of the study area are not available and hence, no conclusion can be drawn on the past trends of the same. However, some data could be obtained for the last two years from the IMD's North Lakhimpur station (Table 3.9).

**Table 3.8. Monthly minimum and maximum temperatures (oC) as recorded by the IMD's North Lakhimpur station**

S/N	Month	2005		2006		2007	
		Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
1	January	9.7	23.6	8.7	25.4	9.5	24.3
2	February	14.1	23.8	13.9	25.8	--	--
3	March	17.0	24.8	15.6	28.4	--	--
4	April	18.9	27.6	18.2	28.4	19.0	27.6
5	May	21.3	29.5	22.0	31.4	23.0	32.5
6	June	24.6	32.7	23.4	30.7	23.7	30.7
7	July	24.9	32.3	24.5	33.4	24.7	31.8
8	August	24.9	31.6	24.9	34.8	24.6	32.9
9	September	24.5	34.2	24.1	32.4	--	--
10	October	20.8	31.8	20.3	32.7	--	--
11	November	13.8	28.9	15.5	27.6	--	--
12	December	9.4	26.9	10.3	26.5	--	--
13	Minimum	9.4	23.6	8.7	25.4	9.5	24.3
14	Maximum	24.9	34.2	24.9	34.8	24.7	32.9

**Table 3.9. Monthly minimum and maximum relative humidity (%) from the IMD's North Lakhimpur station**

S/N	Month	2005		2006	
		08.30 hrs	17.30 hrs	08.30 hrs	17.30 hrs
1	January	83	80	83	76
2	February	86	83	88	80
3	March	88	83	74	70
4	April	83	81	81	78
5	May	85	79	78	75
6	June	87	80	93	84
7	July	91	82	89	80
8	August	94	88	83	79
9	September	79	81.5	--	--
10	October	78.6	84	--	--
11	November	75	83.5	--	--
12	December	73.5	77.8	--	--
13	Minimum	73.5	77.8	74	70
14	Maximum	94	88	93	84

It is seen from Table 3.8 that June to August is the period when the relative humidity is maximum attaining values of more than 90% while the values are minimum during the dry months, notably December, when the relative humidity is around 70%. The other notable feature is that the relative humidity is more during the early hours than in the later hours of the day.

### Rainfall and Wet Days

From the data available for the last three years (Table 3.10) it is seen that June, July and August were the wettest months with maximum monthly rainfall occurring in any of these months. The driest months were December and January. The total annual rainfall exceeds 3000 mm in all the years.

**Table 3.10. Monthly total rainfall (mm) data from the IMD's North Lakhimpur station**

S/N	Month	2005	2006	2007
1	January	46.8	2.5	13.3
2	February	140.0	116.9	79.3
3	March	194.8	36.4	47.1
4	April	260.4	242.3	314.5
5	May	311.3	393.0	429.1
6	June	604.2	738.2	--
7	July	462.1	566.6	853.8
8	August	737.7	560.9	747.3
9	September	191.8	312.4	535.1
10	October	87.3	162.7	--
11	November	40.8	62.5	--
12	December	Trace	13.3	--
13	Minimum	40.8	2.5	13.3
14	Maximum	737.7	738.2	853.8
15	Annual Total	3077.2	3207.7	3019.5

### Cloud Cover

No records of cloud cover for the study area are available and therefore, it is impossible to comment on the same.

### Atmospheric Pressure and vapour pressure

Data on atmospheric pressure as well as the vapour pressure over the study area are not directly available. The North Lakhimpur station of the Indian Meteorological Department had records of 2005 only which are relevant also to Jonai because of the proximity of the two places. These data are given in Table 3.11 and Table 3.12 respectively for the atmospheric pressure and the vapour pressure. The variations were not very large. From the vapour pressure data, it is seen that the values were highest during the wet months.

**Table 3.11. Monthly mean atmospheric pressure (kPa) at 08.30 and 17.30 hours during 2005 recorded by the IMD's North Lakhimpur station**

S/N	Month	08.30 hrs	17.30 hrs
1	January	1005.4	1001.5
2	February	1003.0	999.7
3	March	1001.9	998.4
4	April	1001.3	997.2
5	May	996.6	992.9
6	June	990.7	987.2
7	July	992.3	988.3
8	August	991.5	988.0
9	September	995.3	990.2
10	October	1001.2	996.7
11	November	1001.5	996.6
12	December	1005.2	1000.8
13	Minimum	990.7	987.2
14	Maximum	1005.4	1001.5

**Table 3.12. Monthly mean vapour pressure (kPa) at 08.30 and 17.30 hours during 2005 recorded by the IMD's North Lakhimpur station**

S/N	Month	08.30 hrs	17.30 hrs
1	January	15.1	16.5
2	February	17.9	18.7
3	March	20.7	20.7
4	April	23.0	24.2
5	May	26.4	27.2
6	June	32.4	33.8
7	July	33.3	34.7
8	August	33.5	35.4
9	September	32.8	32.9
10	October	27.7	30.9
11	November	23.2	22.8
12	December	15.6	17.0
13	Minimum	15.1	16.5
14	Maximum	33.5	35.4

### Wind speed and Direction

No past records were found for the wind speed and wind direction data of the study area. The IMD's North Lakhimpur station had the records for the year 2005 collected at 08.30 and 17.30 hours daily for the 12 months. These are given in Tables 3.13 and 3.14.

The data show various degrees of turbulence in the atmosphere throughout the year although on a microscopic basis, the actual situation may be quite dynamic from one location to another. The wind direction changes from time to time and some of the favourable wind directions are NE, NNE, ENE, etc. The wind is usually strong in the months of February, March and April.

**Table 3.13a. Daily wind direction and speed (kmph) at 08.30 hours during 2005 (January-June) recorded by the IMD's North Lakhimpur station**

Date	January		February		March		April		May		June	
	Dir	Speed	Dir	Speed	Dir	Speed	Dir	Speed	Dir	Speed	Dir	Speed
1	E	04	N	02	C	00	ENE	03	C	00	C	00
2	E	04	C	00	E	01	N	01	E	02	C	00
3	E	02	C	00	NNE	01	E	01	C	00	S	02
4	E	04	C	00	SSE	02	NNE	20	W	05	C	00
5	NE	06	SW	02	E	02	C	00	E	04	C	00
6	SE	04	S	02	NE	03	E	01	E	01	C	00
7	E	02	C	00	NE	02	NN	02	C	00	C	00
8	C	00	NE	01	C	00	NE	02	C	00	NE	05
9	C	00	NE	01	NE	01	N	01	E	03	C	00
10	C	00	C	00	NE	05	WNW	02	NE	04	C	00
11	SE	04	E	04	NE	02	ENE	02	C	00	S	02
12	C	00	C	00	E	05	NNE	03	NE	05	NE	02
13	SE	04	S	03	E	02	C	00	C	00	NE	02
14	C	00	SE	03	SE	01	E	02	C	00	N	03
15	C	00	E	02	W	01	NE	02	C	00	NE	03
16	C	00	NE	04	E	01	E	02	C	00	C	00
17	E	02	E	02	NE	01	C	00	E	03	SW	03
18	NE	04	NE	02	ENE	01	NE	02	SW	03	C	00
19	E	02	C	00	C	00	NE	05	C	00	C	00
20	NE	04	NE	02	NE	03	C	00	NNE	04	C	00
21	E	04	E	02	E	05	ENE	01	NNE	04	C	00
22	E	04	ENE	02	W	02	NW	02	C	00	N	02
23	E	02	ENE	02	W	01	S	01	C	00	C	00
24	E	02	E	02	ENE	02	NE	01	NE	02	SW	02
25	E	02	SW	02	E	02	C	00	C	00	C	00
26	C	00	C	00	NE	02	W	02	C	00	E	02
27	NE	02	C	00	C	00	C	00	SE	02	SW	02
28	E	02	C	00	C	00	NW	01	E	03	C	00
29	NE	02			NW	02	N	01	NE	03	E	03
30	NE	04			NE	01	C	00	C	00	ESE	02
31	N	04			W	02			W	02		

**Table 3.13b. Daily wind direction and speed (kmph) at 08.30 hours during 2005 (July - December) recorded by the IMD's North Lakhimpur station**

Date	July		August		September		October		November		December	
	Dir	Speed	Dir	Speed	Dir	Speed	Dir	Speed	Dir	Speed	Dir	Speed
1	W	02	C	00	NEN	02	C	00	E	02	E	02
2	C	00	C	00	E	02	N	04	C	00	C	00
3	NNE	03	NNE	05	WSW	03	C	00	C	00	ENE	03
4	NE	02	C	00	C	00	E	04	C	00	NE	03
5	C	00	NE	03	NE	02	C	00	VRB	02	C	00
6	C	00	NNE	03	C	00	C	00	C	00	NE	02
7	C	00	NE	02	SW	03	VRB	02	C	00	C	00
8	C	00	C	00	NNW	03	VRB	03	C	00	C	00
9	SW	04	C	00	C	00	C	00	C	00	E	02
10	C	00	C	00	SW	04	E	03	C	00	C	00
11	C	00	NNE	02	C	00	C	00	C	00	NE	02
12	NE	02	C	00	C	00	C	00	C	00	C	00
13	NE	02	C	00	C	00	C	00	NE	02	C	00
14	NE	02	C	00	N	02	C	00	C	00	NE	02
15	C	00	SW	03	E	02	C	00	C	00	NE	03
16	SW	04	C	00	C	00	C	00	N	02	N	03
17	SW	03	ESE	03	N	04	SW	03	C	00	E	02
18	SW	03	C	00	ESE	02	C	00	C	00	NE	02
19	C	00	NW	02	C	00	C	00	ENE	02	C	00
20	N	03	C	00	C	00	C	00	C	00	E	02
21	N	02	SW	06	C	00	C	00	NE	02	C	00
22	C	00	C	00	C	00	NNE	04	C	00	C	00
23	C	00	C	00	SW	06	C	00	N	02	C	00
24	E	02	C	00	NE	03	NNE	03	C	00	C	00
25	C	00	NE	02	C	00	NE	04	C	00	C	00
26	C	00	C	00	C	00	E	03	C	00	C	00
27	C	00	W	03	C	00	NE	03	C	00	NE	02
28	C	00	NNE	03	C	00	C	00	C	00	N	02
29	ENE	04	NNE	03	C	00	C	00	C	00	C	00
30	C	00	NE	03	C	00	C	00	C	00	E	02
31	C	00	ENE	02			E	02			C	00

**Table 3.14a. Daily wind direction and speed (kmph) at 17.30 hours during 2005 (January-June) recorded by the IMD's North Lakhimpur station**

Date	January		February		March		April		May		June	
	Dir	Speed	Dir	Speed	Dir	Speed	Dir	Speed	Dir	Speed	Dir	Speed
1	C	00	NE	02	NE	01	E	02	C	00	NE	06
2	E	02	C	00	N	02	E	02	E	01	NE	03
3	C	00	NE	02	E	01	NE	01	C	00	C	00
4	C	00	E	02	C	00	C	00	E	01	C	00
5	C	00	NE	01	NE	02	NE	02	C	00	C	00
6	C	00	C	00	NE	03	N	01	E	03	C	00
7	C	00	W	02	NE	05	C	00	C	00	C	00
8	C	00	C	00	NE	02	E	01	C	00	C	00
9	C	00	E	02	NE	03	NNE	02	E	01	C	00
10	C	00	E	02	NE	05	NNE	04	NE	03	C	00
11	C	00	C	00	NE	02	C	00	NE	05	C	00
12	NE	02	NE	02	C	00	NNE	03	C	00	C	00
13	C	00	NE	02	NE	02	ENE	02	NE	03	C	00
14	C	00	NE	05	NE	02	C	00	C	00	W	02
15	C	00	NE	02	ENE	02	NE	02	NE	04	C	00
16	C	00	NE	02	NE	01	C	00	NE	03	C	00
17	E	03	E	02	C	00	NE	03	C	00	SW	03
18	NE	02	NE	02	C	00	NE	06	C	00	C	00
19	C	00	NE	03	NE	01	E	05	NEN	02	NNE	02
20	E	04	NE	02	NE	04	ENE	02	C	00	NNE	02
21	E	04	E	02	E	05	E	01	E	04	N	02
22	C	00	C	00	NE	02	C	00	C	00	N	03
23	NW	03	NE	02	ENE	03	C	00	C	00	NE	03
24	SW	04	W	02	NE	01	NE	03	C	00	NE	03
25	E	02	C	00	C	00	C	00	C	00	E	02
26	NE	04	E	04	NE	01	NE	03	C	00	ENE	02
27	E	02	E	02	E	01	NE	03	C	00	SW	02
28	NE	04	NE	01	NE	02	NE	02	C	00	SW	02
29	NE	04			NE	02	C	00	C	00	E	02
30	C	00			NE	03	C	00	SW	03	E	03
31	SE	04			C	00			C	00		

**Table 3.14b. Daily wind direction and speed (kmph) at 17.30 hours during 2005 (July-December) recorded by the IMD's North Lakhimpur station**

Date	July		August		September		October		November		December	
	Dir	Speed	Dir	Speed	Dir	Speed	Dir	Speed	Dir	Speed	Dir	Speed
1	W	02	C	00	C	00	C	00	C	00	C	00
2	C	00	C	00	C	00	C	00	C	00	C	00
3	NE	02	C	00	C	00	C	00	C	00	C	00
4	NE	02	E	04	NE	02	C	00	C	00	C	00
5	C	00	C	00	C	00	C	00	C	00	C	00
6	C	00	C	00	C	00	C	00	C	00	C	00
7	C	00	C	00	C	00	C	00	C	00	C	00
8	C	00	C	00	C	00	C	00	C	00	C	00
9	SW	08	C	00	C	00	C	00	C	00	C	00
10	E	02	NNE	02	C	00	C	00	C	00	C	00
11	NE	08	N	02	C	00	C	00	C	00	C	00
12	C	00	C	00	C	00	C	00	C	00	C	00
13	C	00	C	00	C	00	C	00	C	00	C	00
14	SW	02	C	00	C	00	C	00	C	00	C	00
15	C	00	C	00	C	00	C	00	NE	04	C	00
16	SW	04	C	00	C	00	C	00	C	00	C	00
17	SW	03	C	00	C	00	C	00	NE	02	C	00
18	SW	03	C	00	C	00	C	00	C	00	C	00
19	N	03	C	00	C	00	C	00	C	00	C	00
20	C	00	C	00	C	00	C	00	C	00	C	00
21	C	00	SW	03	C	00	C	00	C	00	C	00
22	C	00	C	00	C	00	C	00	C	00	C	00
23	C	00	SE	02	NE	04	C	00	C	00	C	00
24	C	00	C	00	C	00	C	00	C	00	C	00
25	C	00	C	00	C	00	C	00	C	00	C	00
26	C	00	C	00	C	00	C	00	C	00	ENE	02
27	C	00	NNE	02	C	00	C	00	C	00	C	00
28	C	00	N	03	C	00	C	00	C	00	C	00
29	C	00	E	02	C	00	C	00	C	00	C	00
30	NE	02	C	00	C	00	C	00	C	00	C	00
31	C	00	C	00			C	00			C	00

### Conclusions from the Meteorological Data

From the meteorological data obtained from IMD Meteorological Station at North Lakhimpur station, the following conclusions can be made:

The data show that October is moderately warm with pleasant evenings and nights, (ii) atmosphere pressure has minor fluctuations, (iii) Relative Humidity is moderate, (iv) Moderate wind is present throughout the month, (v) rainfall is scarce, but a few days with rain could be observed, and (vi) the sky is mostly clear with the clouds receding.

During November, the temperature begins to fall and the nights become considerably cold. Rains become more scarce and only on a very few occasions, drizzles could be recorded. The sky is both clear and cloudy, and fogs begin to appear in some days particularly during nights and mornings.

December is very cold, particularly during the nights. Due to fog, the Sun rises late. The relative humidity is relatively low and rainfall is almost absent. Atmospheric pressure fluctuations are less and the dry period sets in.

As a whole, the climate can be considered as moderate during October, windy at times and with foggy mornings and evenings. Rain is usually rare at this time of the year although sometimes post-monsoon rains can be expected even during October. With November, the winter begins and December, the cold weather is felt everywhere in the study area.

The frequency distribution of wind speed and direction at Jonai on the basis of onsite monitoring is given in Tables 3.15, 3.16 and 3.17 respectively for the months of October, November and December 2007. The corresponding Wind Rose diagrams are given in Figs. 3.10, 3.11 and 3.12.

**Table 3.15. Frequency Distribution of Wind Speed and Direction (Oct 2007)**

Wind direction	% frequency of occurrence of wind speed (km/h) within the class				Total
	1.80 – 3.60	3.60 – 7.20	7.20 – 14.40	>14.40	
N	0.65	0.00	0.00	0.00	0.65
NNE	2.16	4.65	4.10	0.00	10.91
NE	5.72	11.18	6.24	0.54	23.68
ENE	4.91	4.25	3.11	0.23	12.50
E	3.52	3.12	1.20	0.00	7.84
ESE	1.86	1.55	0.00	0.00	3.41
SE	2.01	1.67	0.00	0.00	3.68
SSE	0.00	0.00	0.00	0.00	0.00
S	0.00	0.00	0.00	0.00	0.00
SSW	0.00	0.00	0.00	0.00	0.00
SW	0.00	0.00	0.00	0.00	0.00
WSW	0.00	0.00	0.00	0.00	0.00
W	0.00	0.00	0.00	0.00	0.00
WNW	0.00	0.00	0.00	0.00	0.00
NW	0.00	0.00	0.00	0.00	0.00
NNW	0.00	0.00	0.00	0.00	0.00
CALM					37.33
TOTAL					100.00

**Table 3.16 : Frequency Distribution of Wind Speed and Direction (Nov 2007)**

Wind direction	% frequency of occurrence of wind speed (km/h) within the class				Total
	1.80 – 3.60	3.60 – 7.20	7.20 – 14.40	>14.40	
N	0.00	0.00	0.00	0.00	0.00
NNE	2.84	2.01	0.43	0.00	5.28
NE	13.45	5.69	1.05	0.00	20.19
ENE	7.52	3.83	0.67	0.00	12.02
E	3.10	0.92	0.00	0.00	4.02
ESE	1.26	0.22	0.00	0.00	1.48
SE	0.00	0.00	0.00	0.00	0.00
SSE	0.00	0.00	0.00	0.00	0.00
S	0.00	0.00	0.00	0.00	0.00
SSW	0.00	0.00	0.00	0.00	0.00
SW	0.00	0.00	0.00	0.00	0.00
WSW	0.00	0.00	0.00	0.00	0.00
W	0.00	0.00	0.00	0.00	0.00
WNW	0.00	0.00	0.00	0.00	0.00
NW	0.00	0.00	0.00	0.00	0.00
NNW	0.00	0.00	0.00	0.00	0.00
CALM					57.01
TOTAL					100.00

**Table 3.17 : Frequency Distribution of Wind Speed and Direction (Dec 2007)**

Wind direction	% frequency of occurrence of wind speed (km/h) within the class				Total
	1.80 – 3.60	3.60 – 7.20	7.20 – 14.40	>14.40	
N	0.00	0.00	0.00	0.00	0.00
NNE	1.55	1.85	0.43	0.00	3.83
NE	10.25	6.45	0.50	0.00	17.20
ENE	8.31	4.25	0.45	0.00	13.01
E	2.80	1.10	0.00	0.00	3.90
ESE	1.10	0.40	0.00	0.00	1.50
SE	0.00	0.00	0.00	0.00	0.00
SSE	0.00	0.00	0.00	0.00	0.00
S	0.00	0.00	0.00	0.00	0.00
SSW	0.00	0.00	0.00	0.00	0.00
SW	0.00	0.00	0.00	0.00	0.00
WSW	0.00	0.00	0.00	0.00	0.00
W	0.00	0.00	0.00	0.00	0.00
WNW	0.00	0.00	0.00	0.00	0.00
NW	0.00	0.00	0.00	0.00	0.00
NNW	0.00	0.00	0.00	0.00	39.44
CALM					60.56
TOTAL					100.00

Wind Rose October 2007

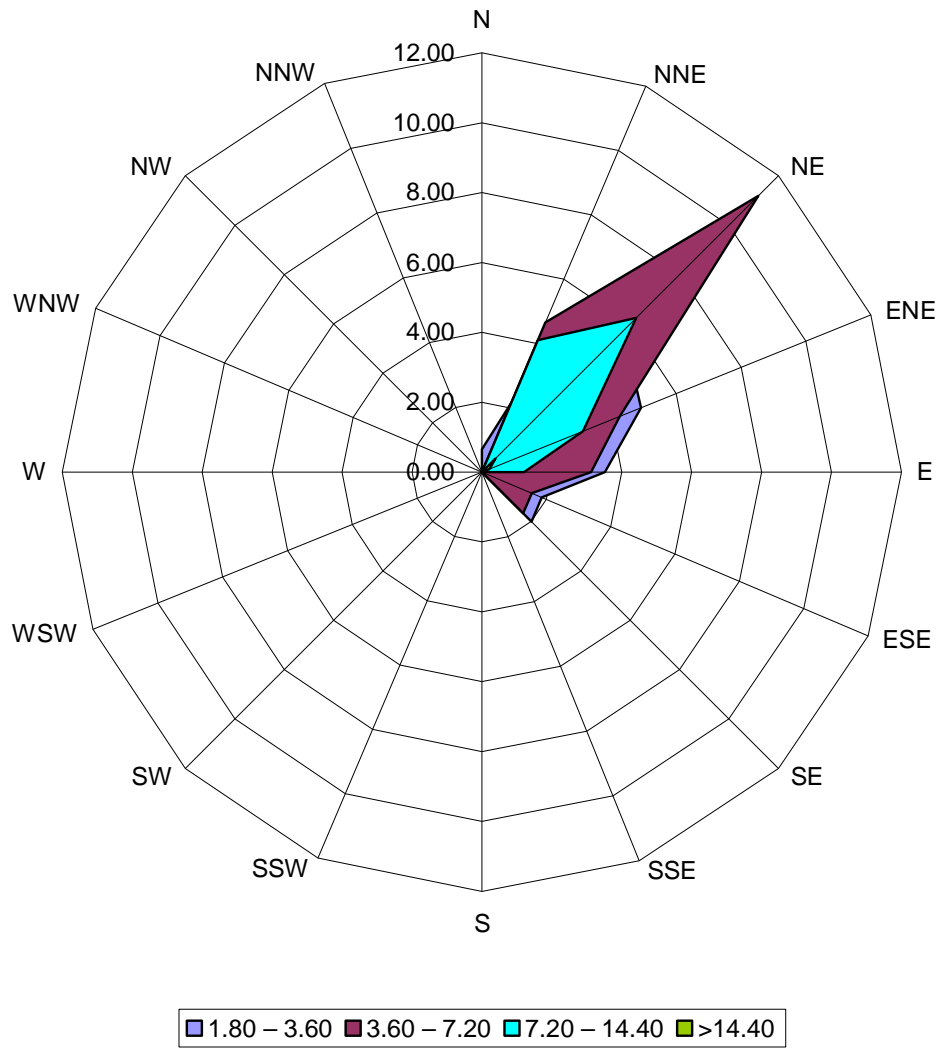


Fig. 3.10. Wind rose for October 2007. The legends give the wind speed in km/h.

Wind Rose November 2007

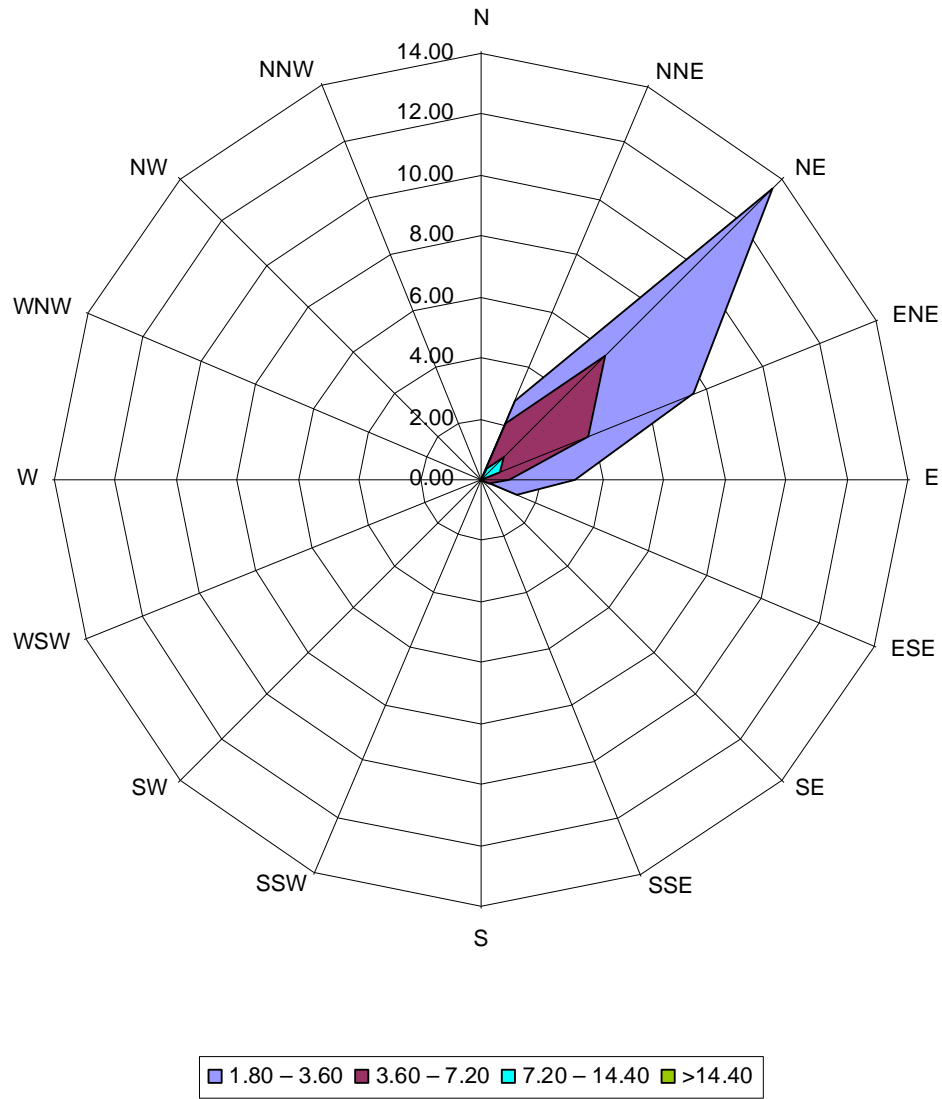


Fig. 3.11. Wind rose for November 2007. The legends give the wind speed in km/h.

Wind Rose for December 2007

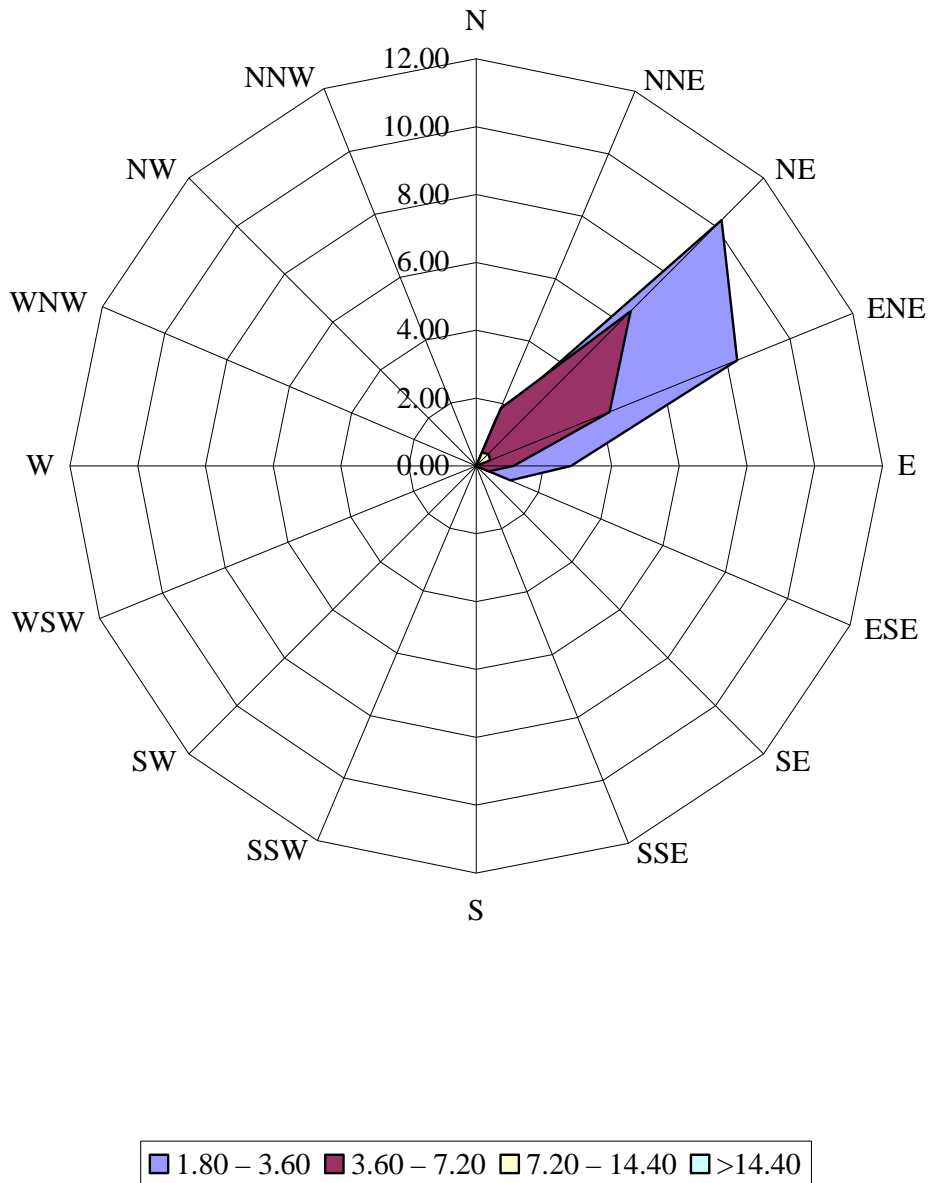


Fig. 3.12. Wind rose for December 2007. The legends give the wind speed in km/h.