

DNMI

DET NORSKE METEOROLOGISKE INSTITUTT

klima

HANØYTANGEN , NOVEMBER 1993

Knut A. Iden

RAPPORT NR. 14/94 KLIMA



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TITLE

HANØYTANGEN , NOVEMBER 1993

PREPARED BY

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ORDERED BY

KVÆRNER CONCRETE CONSTRUCTION
CONTRACT NO: KCC/PAC004/001

SUMMARY

Monthly summary based on the meteorological data measured at the building site of Kværner at Hanøytangen, Askøy near Bergen.

SIGNATURE

Knut A. Iden

.....
Knut A. Iden
PROJ. RESPONSIBLE

Bjørn Aune

.....
Bjørn Aune
HEAD OF DIVISION

MONTHLY REPORT NOVEMBER 1993

**PAC 004 WEATHER ANALYSIS IN HANØYTANGEN
REPORT 1 : 27 April 1994**

CLIENT : DNMI
CONTRACT NO. : KCC/PAC004/001
PROJECT NO. :
DOCUMENT NAME : RAPPNOV.93
PROJ. MANAGER : Knut A. Iden
EXECUTED BY : Bjørn. H. Halvorsen and Knut A. Iden
APPROVED BY : Bjørn Aune *Bjørn Aune 28.04.1994*
COMPLETION DATE : 01 March 1994
REV. 1 : 05 April 1994
REV. 2 : 27 April 1994

PAC 004 WEATHER ANALYSIS IN HANØYTANGEN
REPORT 1 : 27 April 1994

DSU : seriel no. 6602
Received : 27 January 1994

Comments regarding the data :

The DSU contains data stored from 23/11/93 to 20/01/94.

The DSU is read by the standard software (P3059) delivered from Aanderaa a/s. The calibration factors applied is provided by Aanderaa in a fax dated January 21 1994. Application of the calibration factors is another option in the standard software (P3059) and this results in a data set with meteorological data in engineering units.

The processing is based on this data set and conducted after the following scheme :

- . generate a SAS data set of the data

In this step 10 min mean wind speed > 35 m/s and gust wind > 40 m/s are replaced with missing values. The wind speed in 30 m is also compared to the wind speed measured 18 m above the ground. If deviation is 10 m/s above or 5 m/s below the wind speed measured in 18 m, the wind speed in 30 m is replaced by missing value. This is because there seem to be some disturbances connected to the measurements in the top of the mast (30 m). The other meteorological parameters are tested to be inside reasonable intervals.

- . Plots of the time series are generated and examined.
- . Unphysical values (spikes) are eliminated.
- . Final plots of the time series are generated.

For wind speed and wind direction 10 min values are plotted. For the parameters air temperature (T), humidity (UU) and air pressure reduced to mean sea level (QFF), hourly means are plotted. The hourly mean for 11.00^h is defined by the measurements for 10.30^h, 10.40^h, 10.50^h, 11.00^h, 11.10^h and 11.20^h.

- . Distribution tables wind speed /direction are generated. 22.5° intervals are applied for the direction. N='348.76° - 11.25', NNE = '11.26 - 33.75' ...
- . Wind roses are generated.
- . Coefficient transfert tables (not produced this month).
- . Duration table (not produced this month).

Logging each 10 minute

WIND

Parameter	Height	Cover.	Unit	Mean	ST.D.	Max	Dir ¹	D.:Hour	Min	Dir ¹	D.:Hour
Wind speed	30 m	24.5 %	m/s	5.4	2.2	13.5	152	26:0129	0.8	80	30:1239
Wind speed	18 m	24.5 %	m/s	5.5	2.3	13.6	N/A	26:0129	0.6	N/A	30:1239
Wind speed	10 m	24.5 %	m/s	5.5	2.4	13.7	155	26:0119	0.9	62	30:1239
Wind gust	30 m	24.4 %	m/s	6.9	2.7	18.0	152 ²	26:0129	1.3	80 ²	30:1239
Wind gust	18 m	24.5 %	m/s	7.0	2.7	17.7	N/A	26:0129	1.3	N/A	30:1239
Wind gust	10 m	24.5 %	m/s	7.0	2.9	17.7	155 ²	26:0159	1.6	106 ²	27:1329

OTHER METEOROLOGICAL DATA

Parameter	Height	Cover.	Unit	Mean	ST.D.	Max	D.:hour	Min	D.:hour
Air Temp.	2. m ³	24.2 %	C	2.8	1.5	6.5	25:1639	-0.7	30:0649
Rel. Hum.	2. m ³	24.4 %	%	64	10.8	84	27:0739	36	25:0839
Air pr.	0. m ³	24.2 %	hPa	1027.2	7.9	1037.7	27:2319	1011.6	30:2359

- 1 Direction is referenced to True North (accuracy +- 2°)
- 2 Direction of gust wind is not measured. The mean wind direction for the ten minute period when it has occurred is applied.
- 3 Air temperature sensor and humidity sensor are placed in the mast 2 m above the reference point on the ground while the pressure sensor have the same height as the reference.

The reference point on the ground is located 15.64 m above the mean sea level (NGO).

Unphysical values has been removed both due to an automatic filter and due to a manual inspection of the time series plot. In the corrected data set a missing value notation has replaced these data.

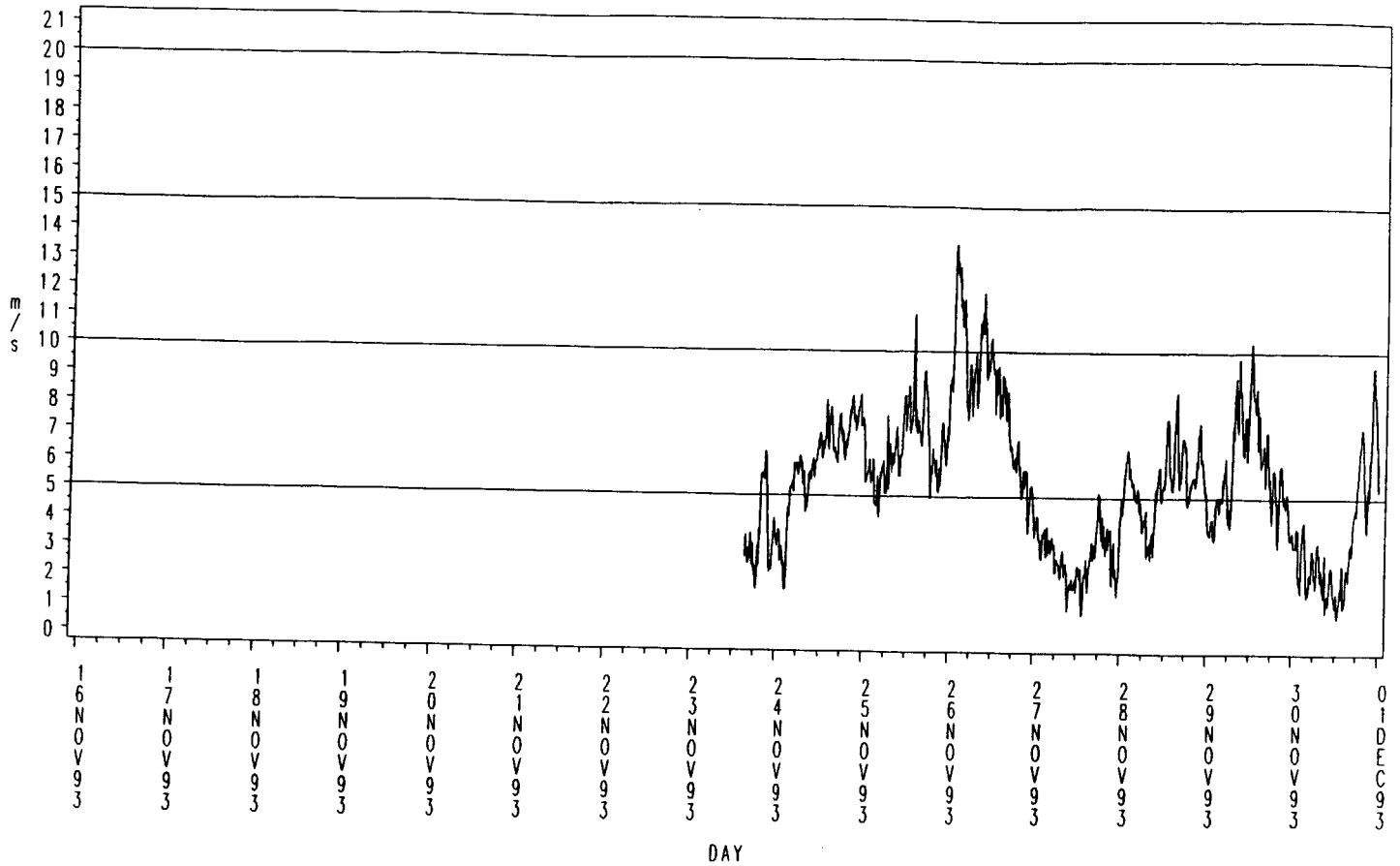
It is important to note that data for the calibration of the anemometers gives 0.4 m/s as the lowest wind speed. The Beaufort 0 is therefore not present in the data.

PLOT OF TIME SERIES

PAC 004 WEATHER ANALYSIS IN HANØYTANGEN
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HANØYTANGEN 1993

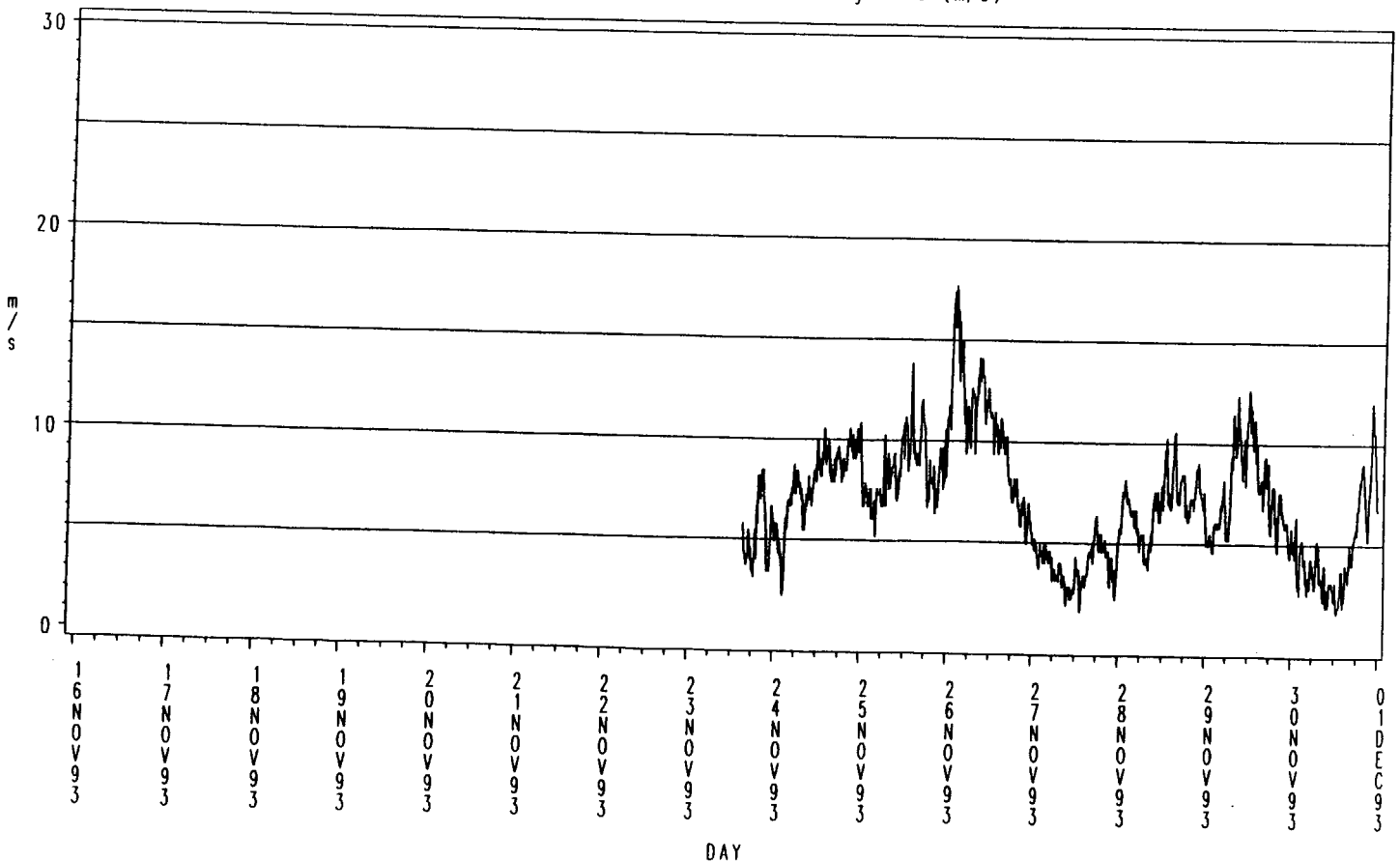
Wind speed 10 m above the ground (m/s)



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HANØYTANGEN 1993

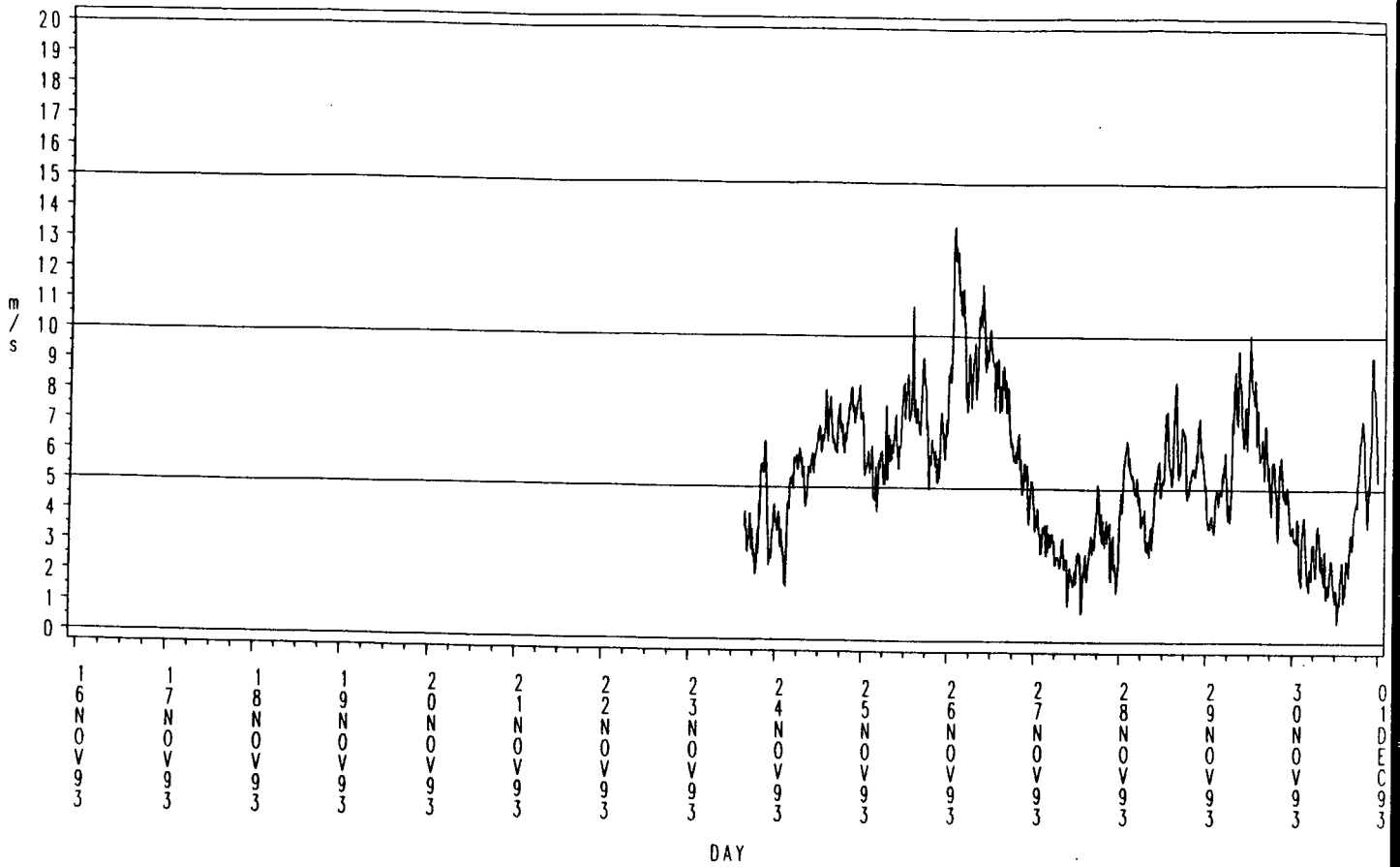
Gust Wind speed 10 m above the ground (m/s)



DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1993

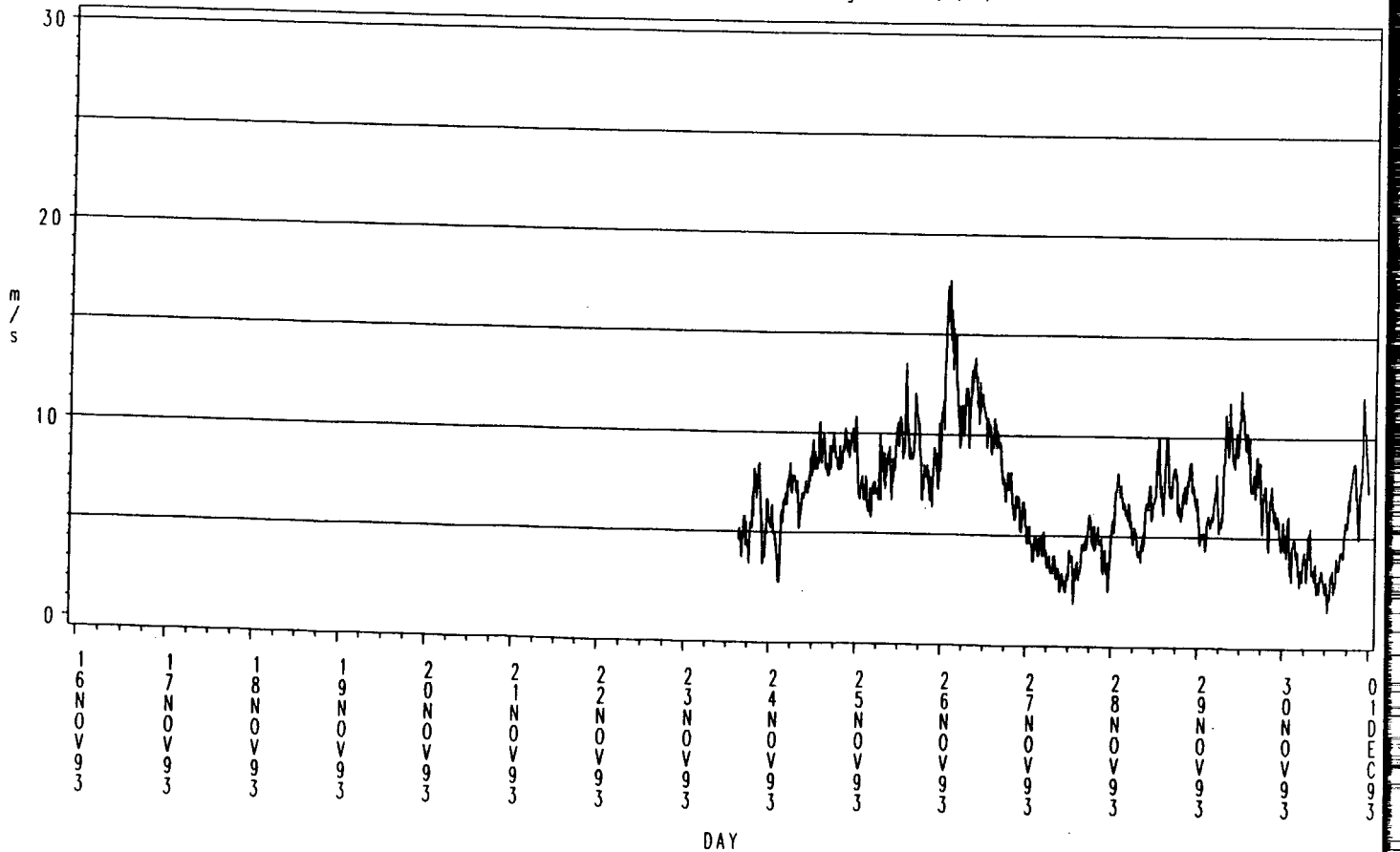
Wind speed 18 m above the ground (m/s)



DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1993

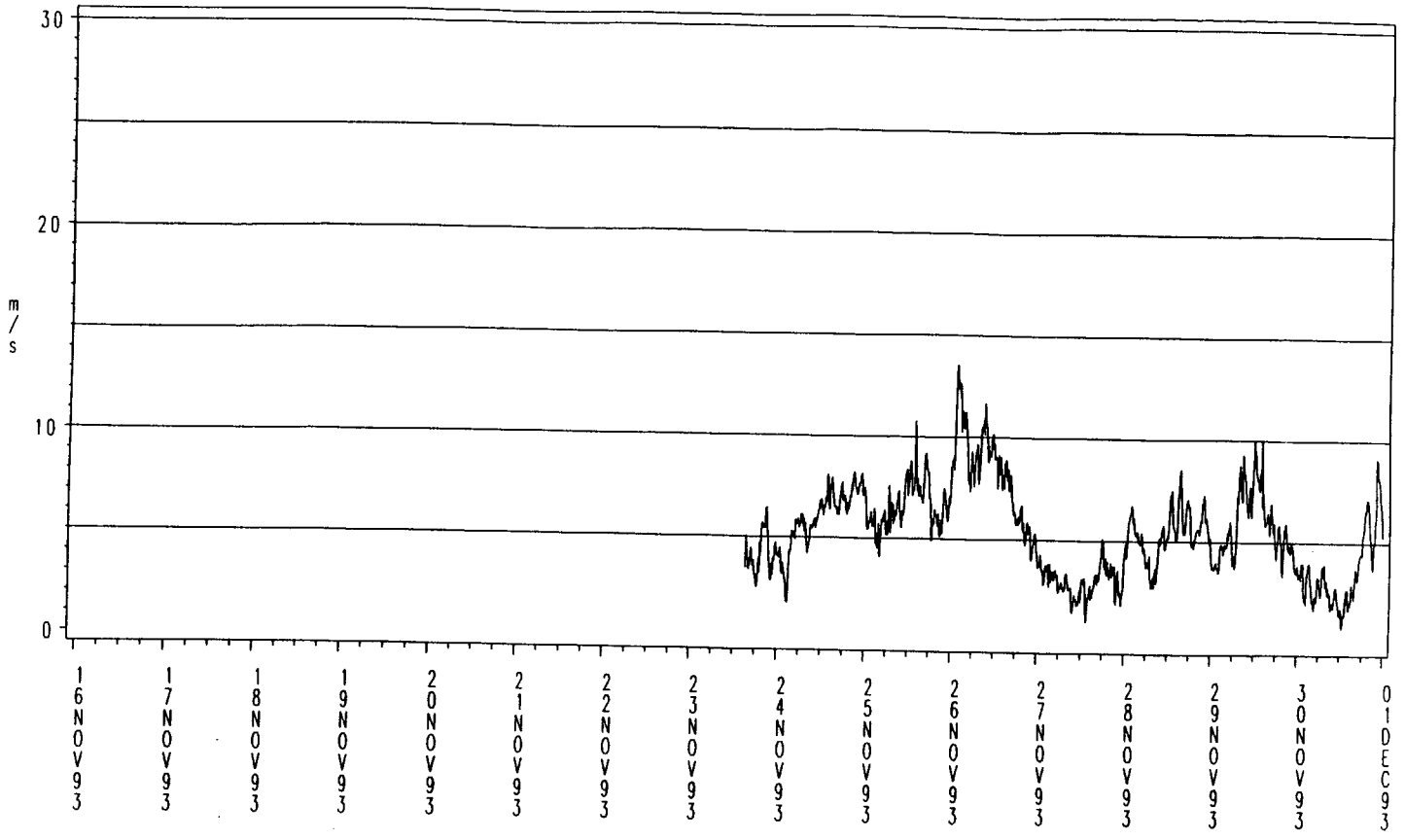
Gust Wind speed 18 m above the ground (m/s)



DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1993

Wind speed 30 m above the ground (m/s)

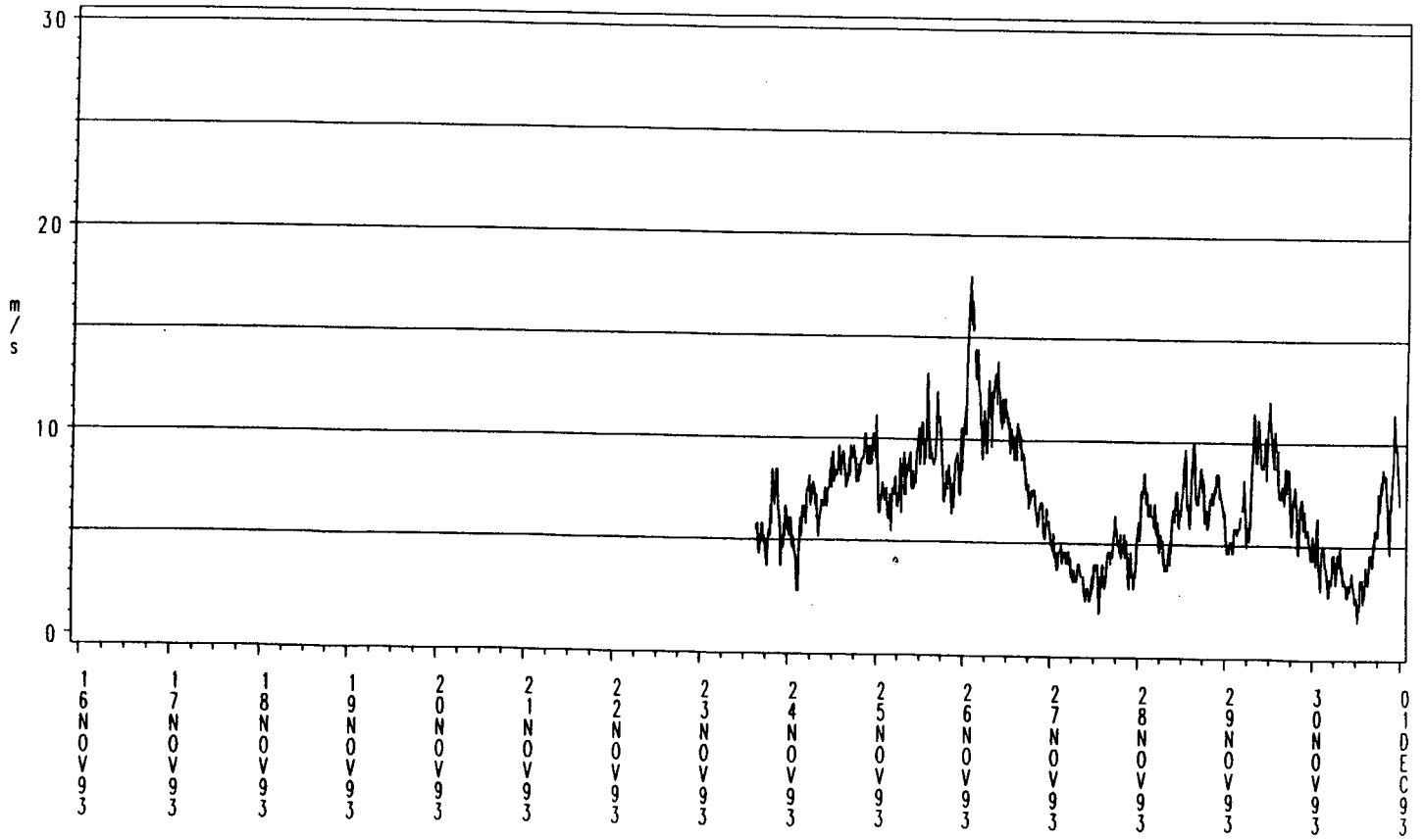


DAY

DNMI - KLIMAÅVDELINGEN

HANØYTANGEN 1993

Gust Wind speed 30 m above the ground (m/s)

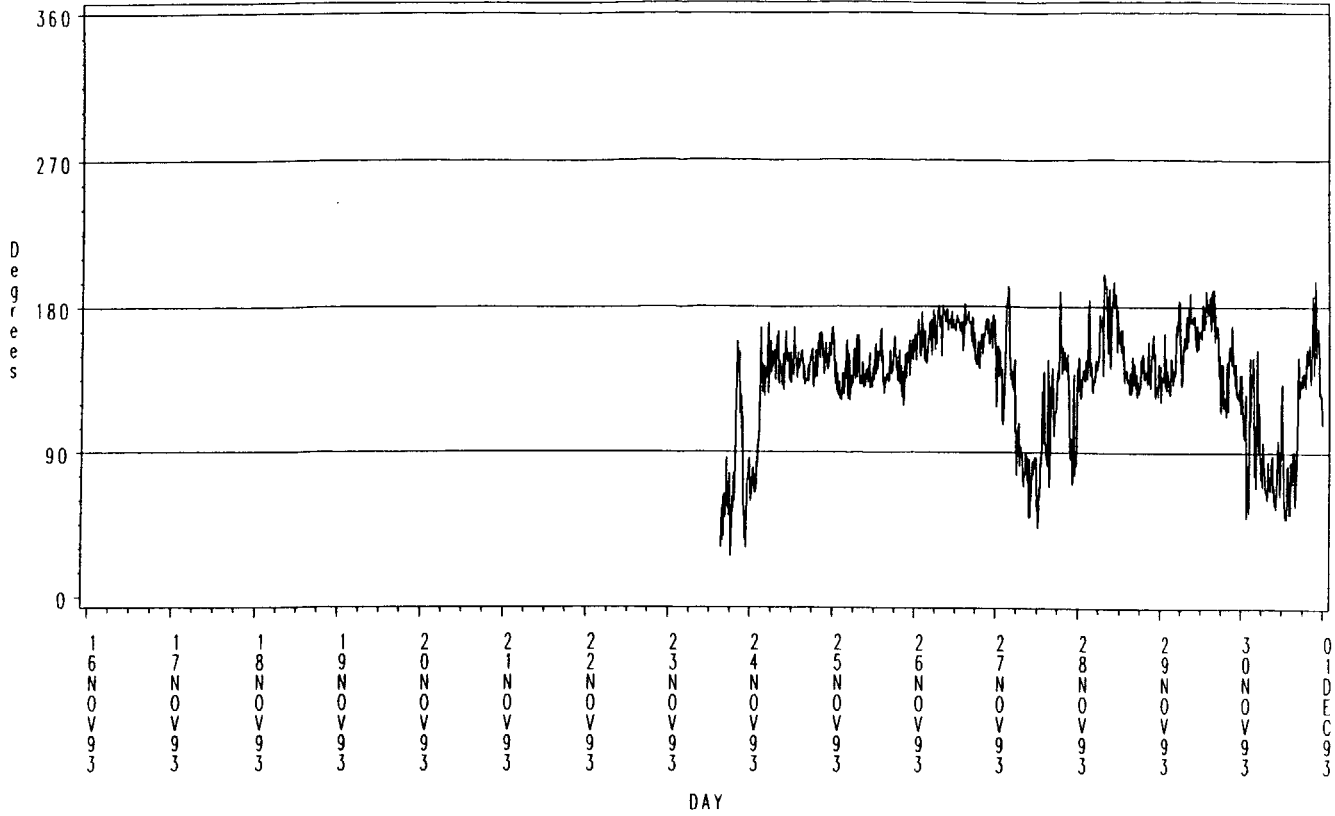


DAY

DNMI - KLIMAÅVDELINGEN

HANØYTANGEN 1993

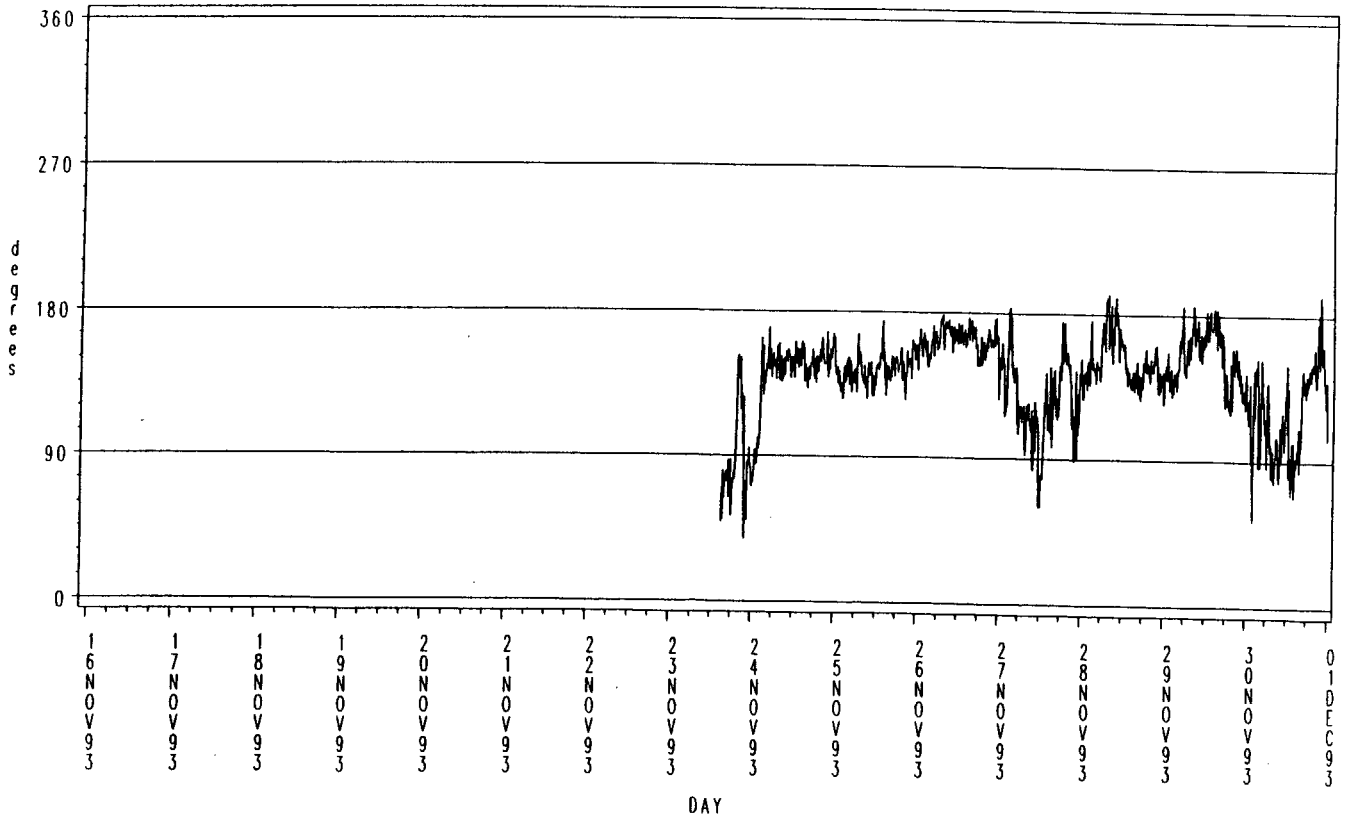
Wind direction 10 m above the ground



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HANØYTANGEN 1993

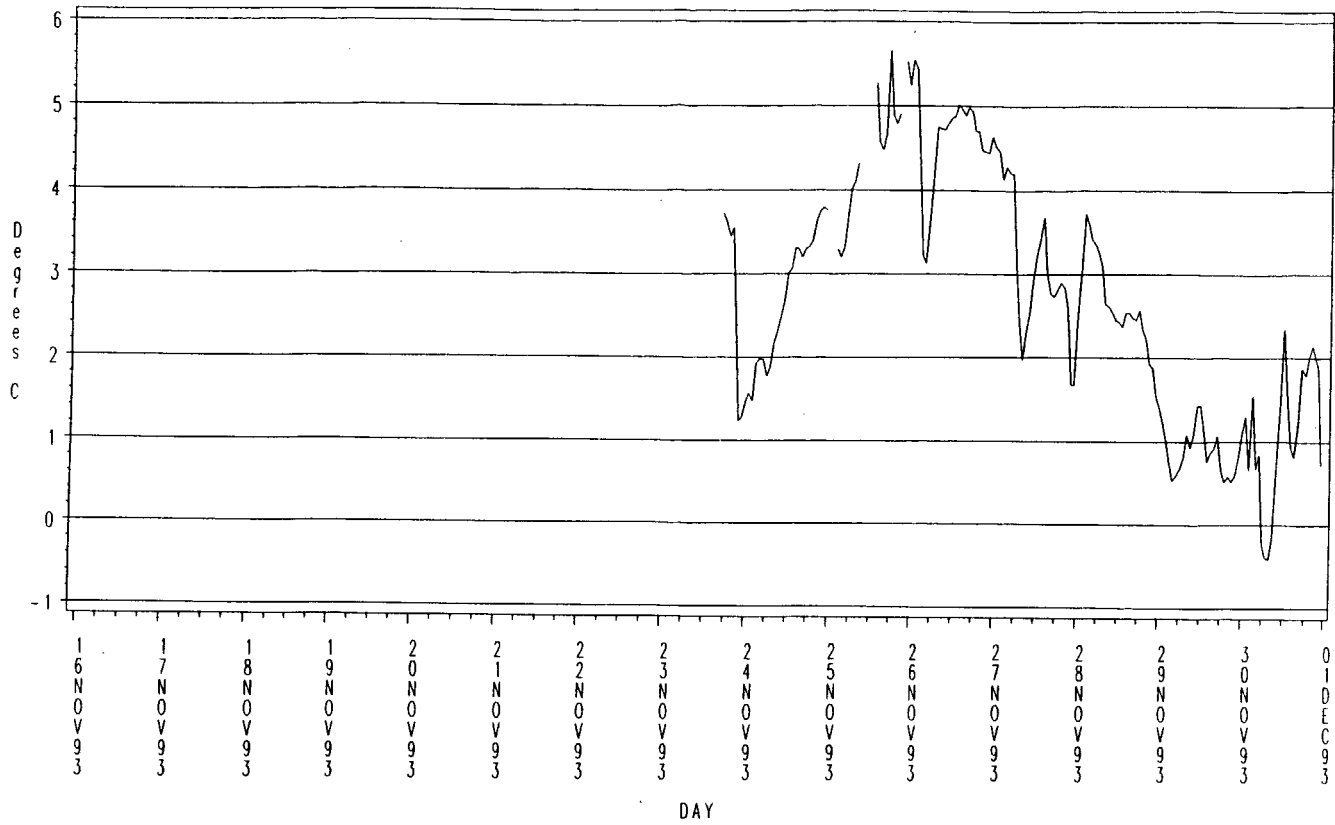
Wind direction 30 m above the ground



DNMI - KLIMADELINGEN

HANØYTANGEN 1993

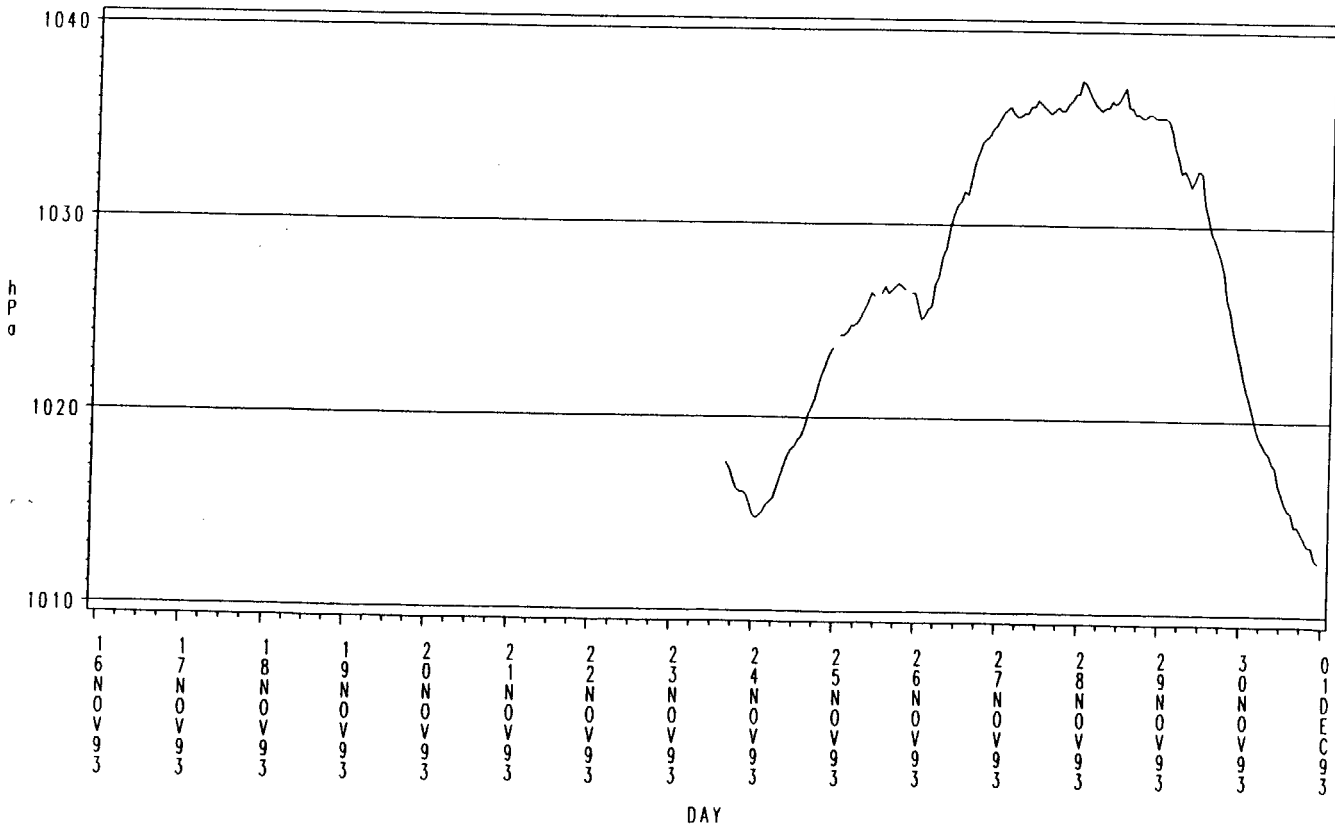
Air Temperature in degrees C (Hourly Means)



DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1993

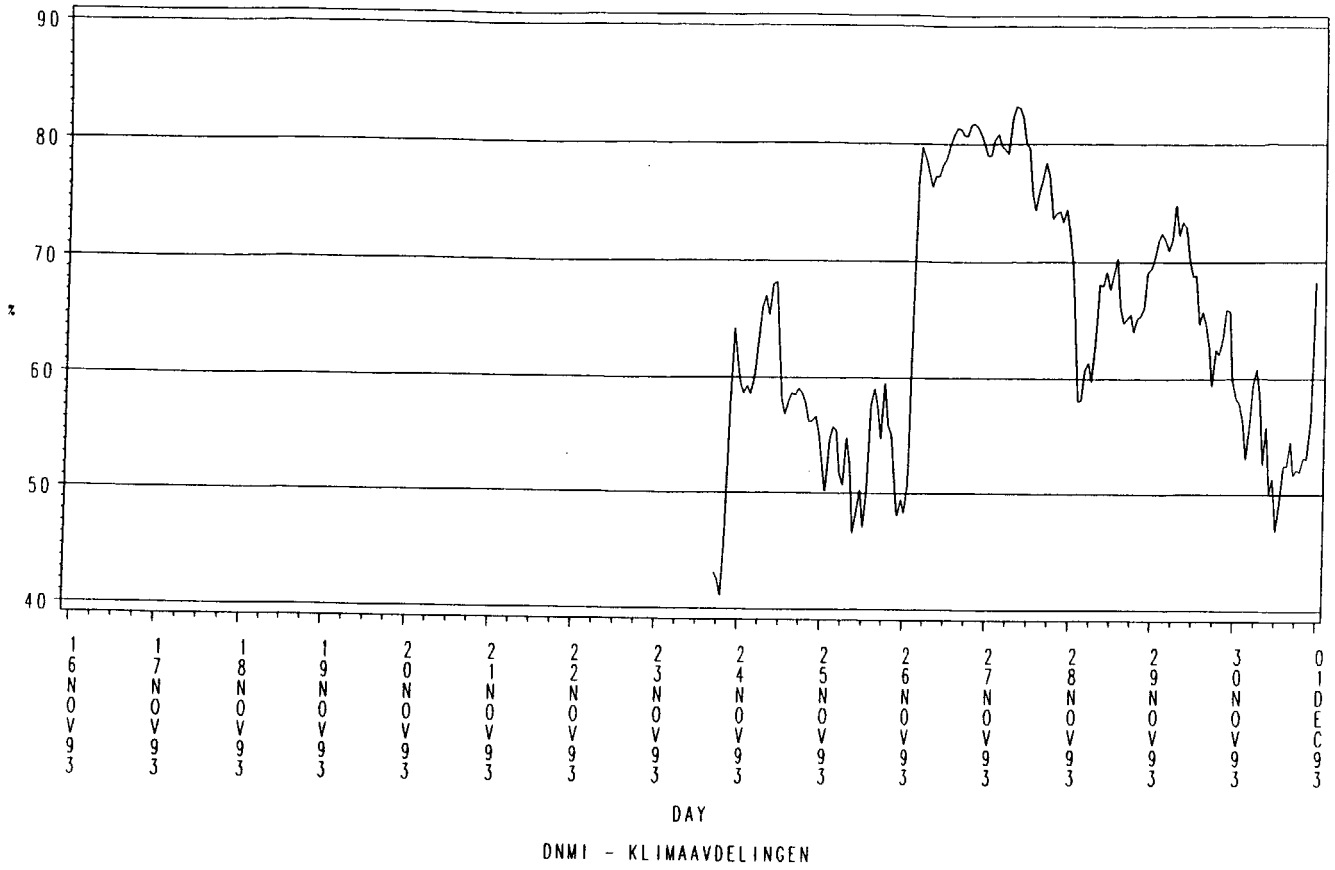
Air Pressure (QFF) in hPa (Hourly Means)



DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1993

Air Humidity in % (Hourly Means)



DISTRIBUTION TABLES / WIND ROSES

The distribution table gives details about the distribution of the wind speed for a certain wind direction or the distribution of the wind directions for a certain wind speed.

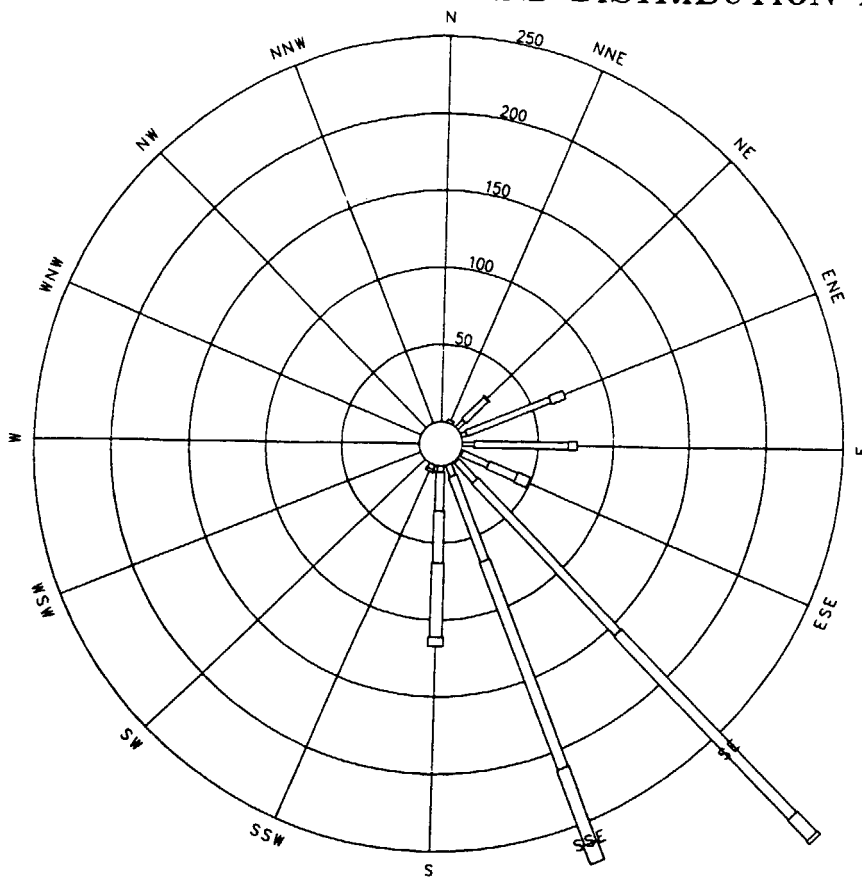
If for example, it is of interest to know the directions for which wind force 8 Beaufort have occurred this month, one has to look at the line for 8 Beaufort in the table.

If the information of the wind forces that have occurred this month for a certain direction is of interest, one has to look at the column for that specific direction.

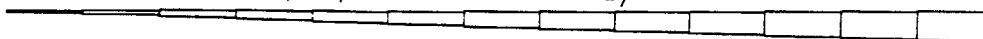
The frequencies in the table are given per thousand (Prm) of the data available this month.

The wind rose is a graphic representation of the information in the distribution table. The same number of classes is applied. The first class is 0-0.2 m/s. Due to the calibration of the wind sensors, this class will always be empty at Hanøytangen.

HANOYTANGEN NOV 1993 WIND DISTRIBUTION 10 m



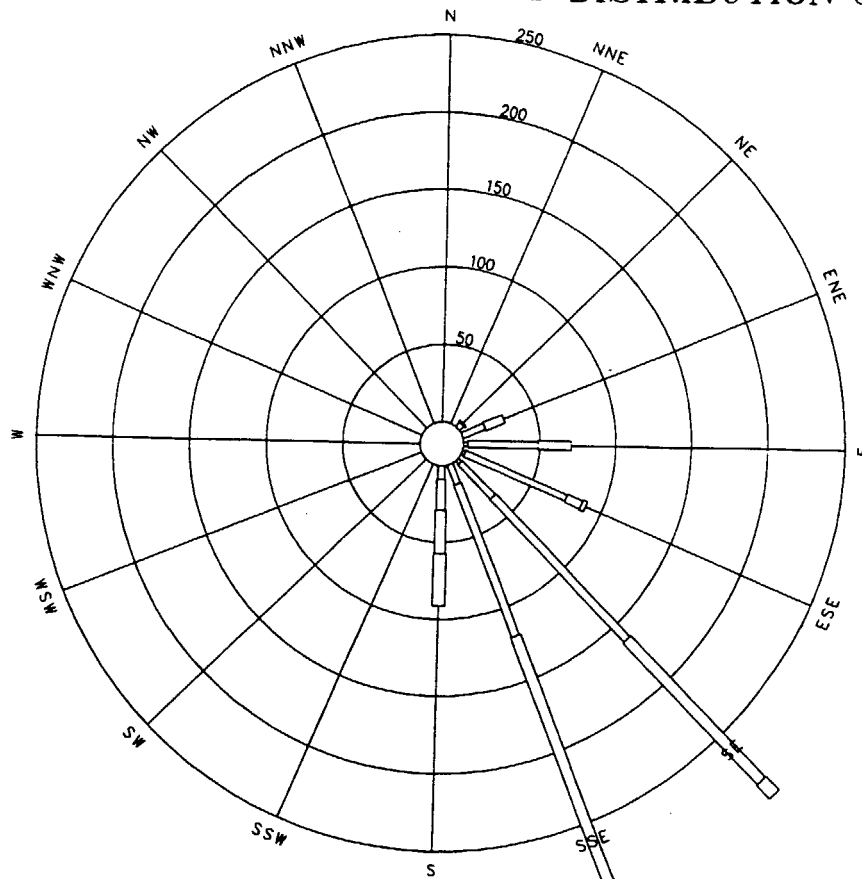
LENGTH : (NUMBER OF OBS/NUMBER OF DATA) * 1000
 WIDTH = SPEED (M/S / BEAUFORT SCALE)



Wind direction (DD) / Wind speed (Beaufort and m/s) 10 m above the ground

m / Be- au- f- ort	DD															ALL
	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	
0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.2	1	0	7	4	8	1	1	.	.	.	.	.	.	.	.	.
1.5	2	2	20	59	62	19	18	8	4	3	.	.	.	.	.	25
3.3	3	.	1	10	6	20	137	59	25	2	.	.	.	.	.	200
5.4	4	.	.	.	.	9	166	145	34	0	.	.	.	.	.	263
7.9	5	.	.	.	.	.	18	52	48	.	.	.	.	.	.	357
10.7	6	.	.	.	.	.	3	13	6	.	.	.	.	.	.	121
13.8	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	24
17.1	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20.7	9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24.4	10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28.4	11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32.6	12	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ALL	3	29	74	78	52	346	281	119	8	.	.	.	.	.	.	1000

HANOYTANGEN NOV 1993 WIND DISTRIBUTION 30 m



LENGTH : (NUMBER OF OBS/NUMBER OF DATA) * 1000
 WIDTH = SPEED (M/S / BEAUFORT SCALE)

Wind direction (DD) / Wind speed (Beaufort and m/s) 30 m above the ground

m / s	Be- au- fo- rt	DD															ALL
		NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
		Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	
.2	0
1.5	1	.	.	.	3	2	3	0	12
3.3	2	.	4	16	46	73	31	14	9	0	.	.	.	.	.	198
5.4	3	.	1	13	22	11	128	106	20	.	.	.	.	.	.	304
7.9	4	.	.	.	.	3	128	186	28	0	.	.	.	.	.	349
10.7	5	.	.	.	.	.	13	64	34	.	.	.	.	.	.	113
13.8	6	.	.	.	.	.	.	13	0	.	.	.	.	.	.	14
17.1	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20.7	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24.4	9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28.4	10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32.6	11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	12	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	ALL	.	6	30	73	92	305	387	94	2	.	.	.	.	.	1000

OCCURRENCE TABLES

Not produced this month.

TRANSFERT TABLES

Not produced this month.

CLIMATOLOGICAL SUMMARY

Not produced this month.

Appendix

BEAUFORT SCALE OF WIND

BEAUFORT NUMBER	DESCRIPTIVE TERM	MEAN VELOCITY IN KNOTS	MEAN VELOCITY IN m/s
0	Calm	< 1	0 - 0.2
1	Light air	1 - 3	0.3 - 1.5
2	Light breeze	4 - 6	1.6 - 3.3
3	Gentle breeze	7 - 10	3.4 - 5.4
4	Moder. breeze	11 - 16	5.5 - 7.9
5	Fresh breeze	17 - 21	8.0 - 10.7
6	Strong breeze	22 - 27	10.8 - 13.8
7	Near gale	28 - 33	13.9 - 17.1
8	Gale	34 - 40	17.2 - 20.7
9	Strong gale	41 - 47	20.8 - 24.4
10	Storm	48 - 55	24.5 - 28.4
11	Violent storm	56 - 63	28.5 - 32.6
12	Hurricane	64 and over	32.7 and over