DNMI
DET NORSKE METEOROLOGISKE INSTITUTT
klima

HANØYTANGEN , JUNE 1994

Knut A. Iden

RAPPORT NR. 29/94 KLIMA

DNMI - RAPPORT

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HANØYTANGEN , JUNE 1994

PREPARED BY

Knut A. Iden

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 .... Bjørn Aune

Knut A. Iden
PROJ. RESPONSIBLE

Bjørn Aune
HEAD OF DIVISION

MONTHLY REPORT JUNE 1994

PAC 004 WEATHER ANALYSIS IN HANØYTANGEN
REPORT 8 : August 22 1994

CLIENT	:	DNMI
CONTRACT NO.	:	KCC/PAC004/001
PROJECT NO.	:	
DOCUMENT NAME	:	RAPPJUNE.94
PROJ. MANAGER	:	Knut A. Iden
EXECUTED BY	:	Bjørn. H. Halvorsen and Knut A. Iden
APPROVED BY	:	Bjørn Aune /Tori Håland
COMPLETION DATE	:	AUGUST 22 1994
REV 1.	:	

HANØYTANGEN MET-DATA **Monthly Report**
JUNE 1994

DSU : serial no. 6642
Received : AUGUST 01 1994

Comments regarding the data :

The DSU serial no.6642 contains data for the period 8/6/94 to 08/7/94, however, no data were recorded from 31/5/94 to 8/6/94 as the cable from the mast to the storage unit was burnt off. The DSU is read by the standard software (P3059) delivered from Aanderaa a/s. The calibration factors applied is as provided by Aanderaa in a fax dated January 21 1994.

The processing is based on this data set and the following steps are conducted :

. A SAS data set of the data for May is generated

  In this step 10 min mean wind speed > 35 m/s and gust wind speed > 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. The reason for this handling is there seem to be some disturbances connected to the measurements in the top of the mast (30 m above the ground).
  The other meteorological parameters are checked to be inside reasonable intervals. The original data which is replaced due to the specified criterions are saved for an assessment. Appendix 2 gives a listing of these records.

. Plots of the time series are generated and examined.
. Un physical 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 are generated.
. Duration table are generated.
. Climatological summary table are updated.
. Preliminary estimates for 10/100 year values for the wind are computed.

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	76.9 %	m/s	5.8	2.6	13.0	181	28:1814	0.4	273	9:1913
Wind speed	18 m	76.9 %	m/s	5.6	2.5	12.9	N/A	28:1814	0.4	N/A	2:2037
Wind speed	10 m	76.9 %	m/s	5.5	2.5	13.0	180	28:1814	0.4	322	2:2037
Wind gust	30 m	76.9 %	m/s	7.5	3.2	18.0	312[2]	23:0354	0.4	273[2]	9:1913
Wind gust	18 m	76.9 %	m/s	7.4	3.2	18.0	N/A	23:0354	0.4	N/A	9:1913
Wind gust	10 m	76.9 %	m/s	7.4	3.3	17.4	282[2]	14:1224	0.4	296[2]	9:1913

OTHER METEOROLOGICAL DATA

Parameter	Height	Cover.	Unit	Mean	ST.D.	Max	D.:hour	Min	D.:hour
Air Temp.	2. m[3]	76.4 %	C	10.2	2.0	18.4	29:1054	4.0	16:0424
Rel. Hum.	2. m[3]	76.9 %	%	78	10.0	93	13:0644	40	25:1214
Air pr.	0. m[3]	76.9 %	hPa	1012.2	8.7	1028.1	11:1114	991.9	18:2344

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 occured 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).

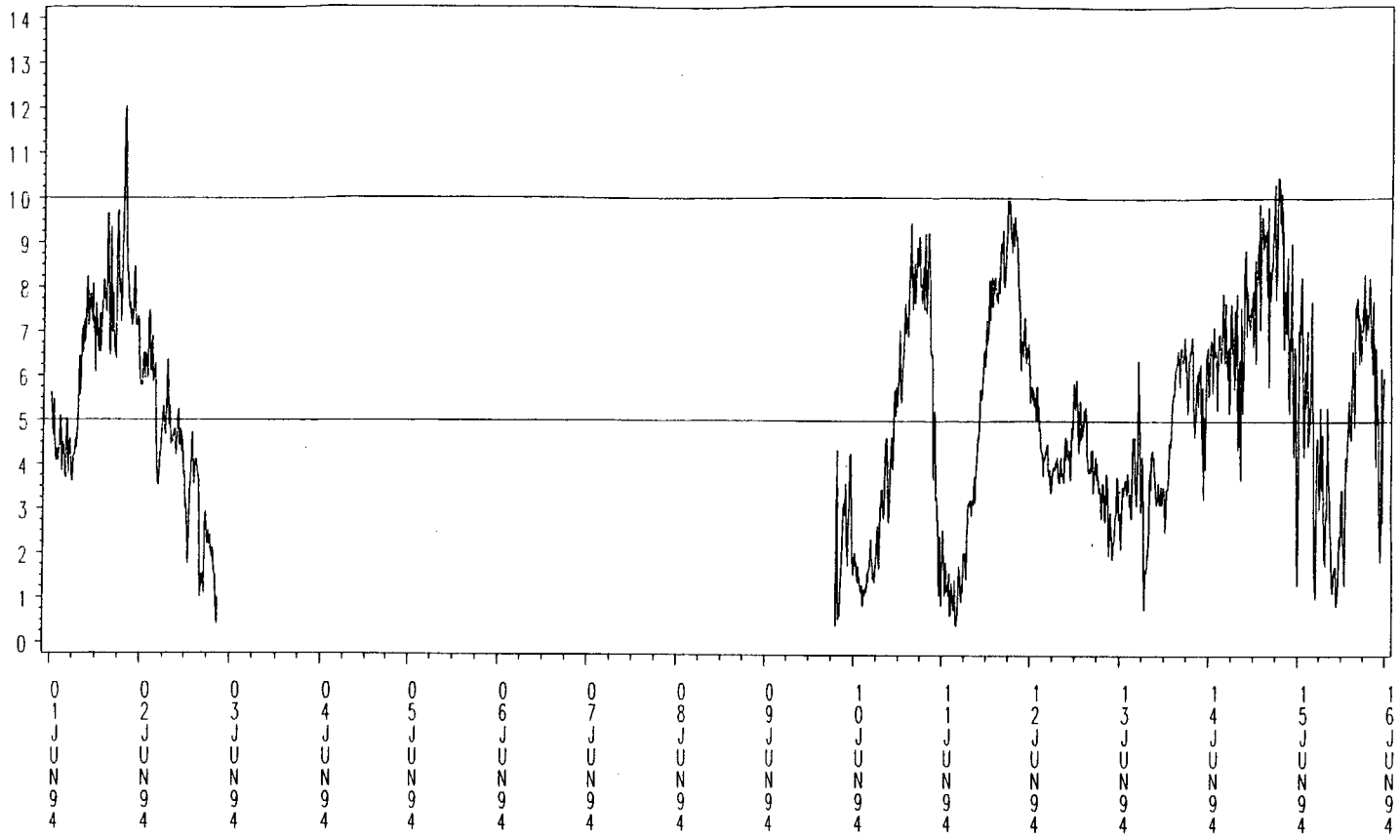
The time for the logging this month is not 00,10,20,30... as should be the case. In the beginning of the month the logging is made 07,17,27.. Later in the month the logging is made 03,13,23 ... 04,14,24 giving some problems to the computing of the hourly means strictly after the definition given.
On June 11 and 14 un-physical values are encountered for the variations of the air temperature. This is probably due to burning in the area near the temperature measurements (not confirmed by Kværner).
The variations are also questionable on other days (especially 25 and 29), however the data is kept.
The temperature values for periods on 11 and 14 are replaced with a missing value notation. The measuring of the air humidity and pressure will also be disturbed.

The minimum of the wind speed (0.4 m/s) has occurred several times this month. It is the first occurrence which is given in the table.

PLOT OF TIME SERIES

HANØYTANGEN 1994

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

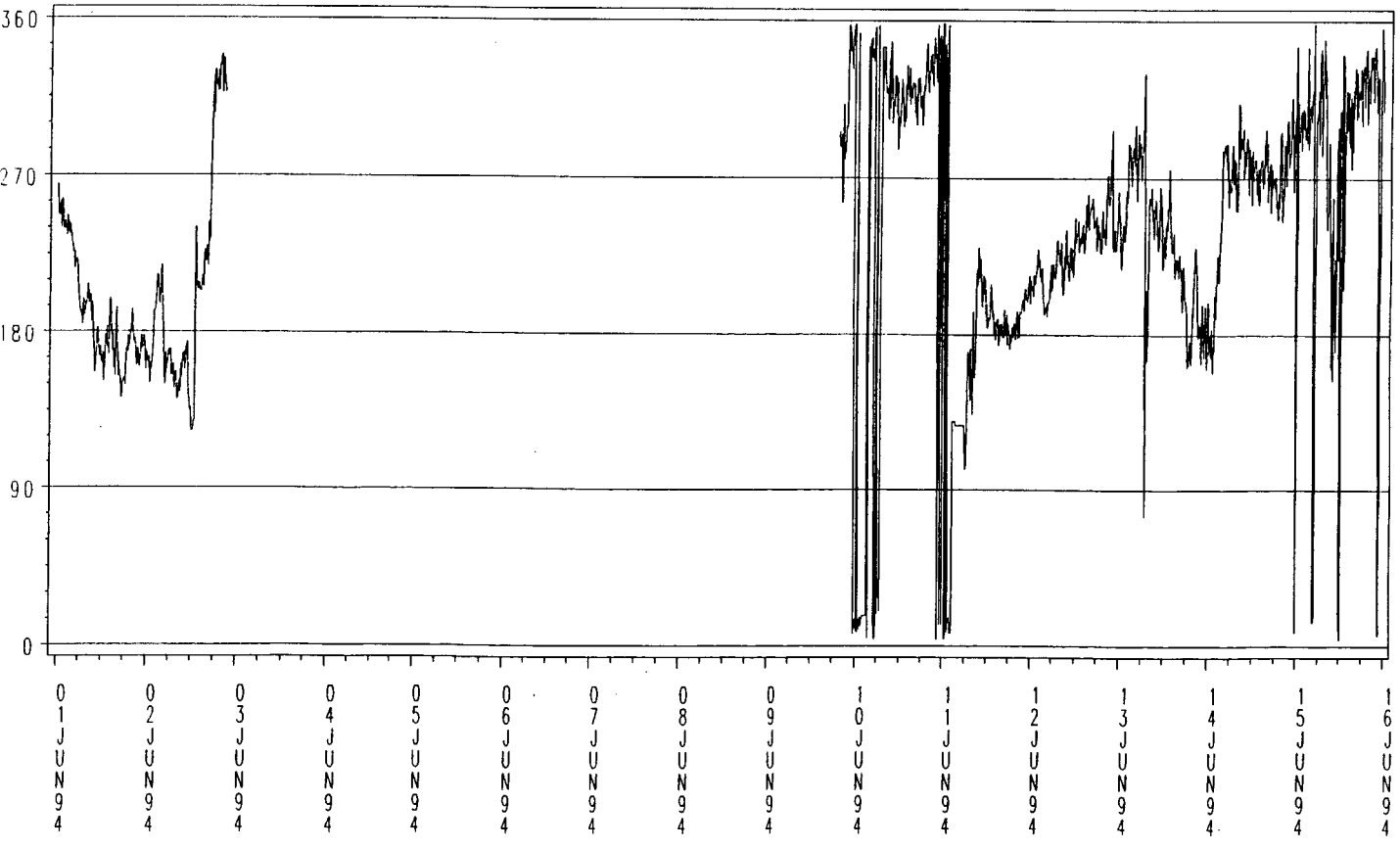


DAY

DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1994

Wind direction 10 m above the ground

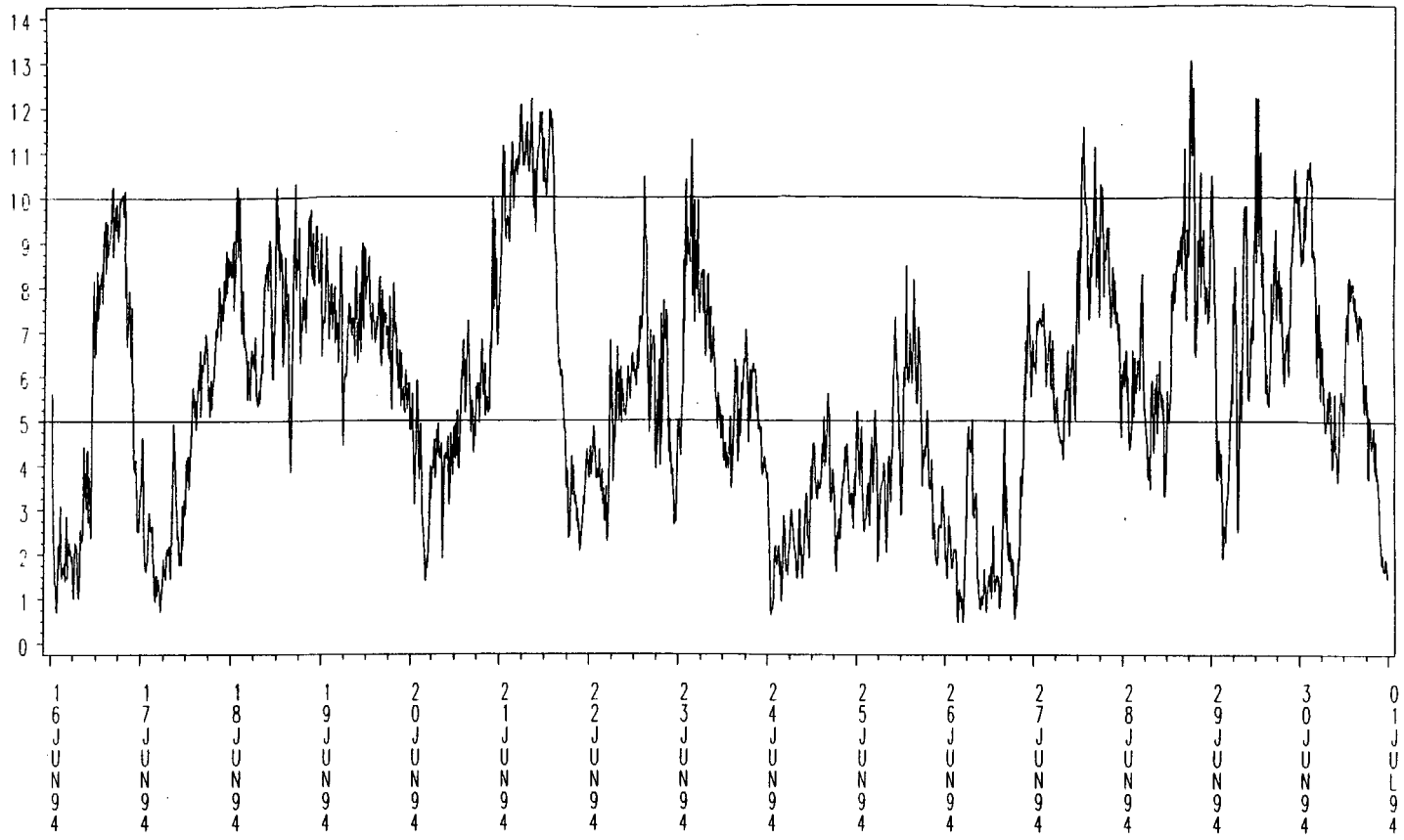


DAY

DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1994

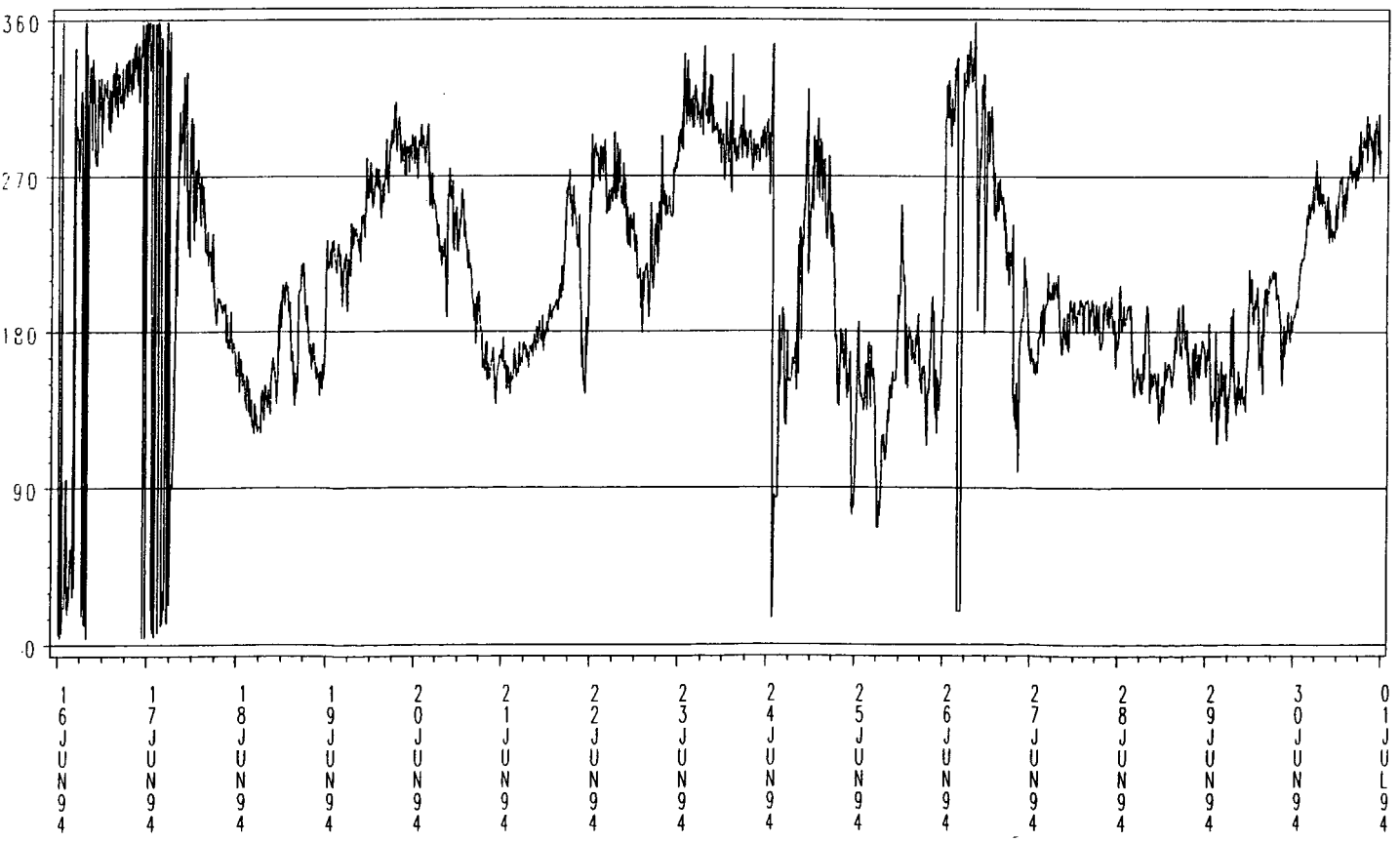
Wind speed 10 m above the ground (m/s)



DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1994

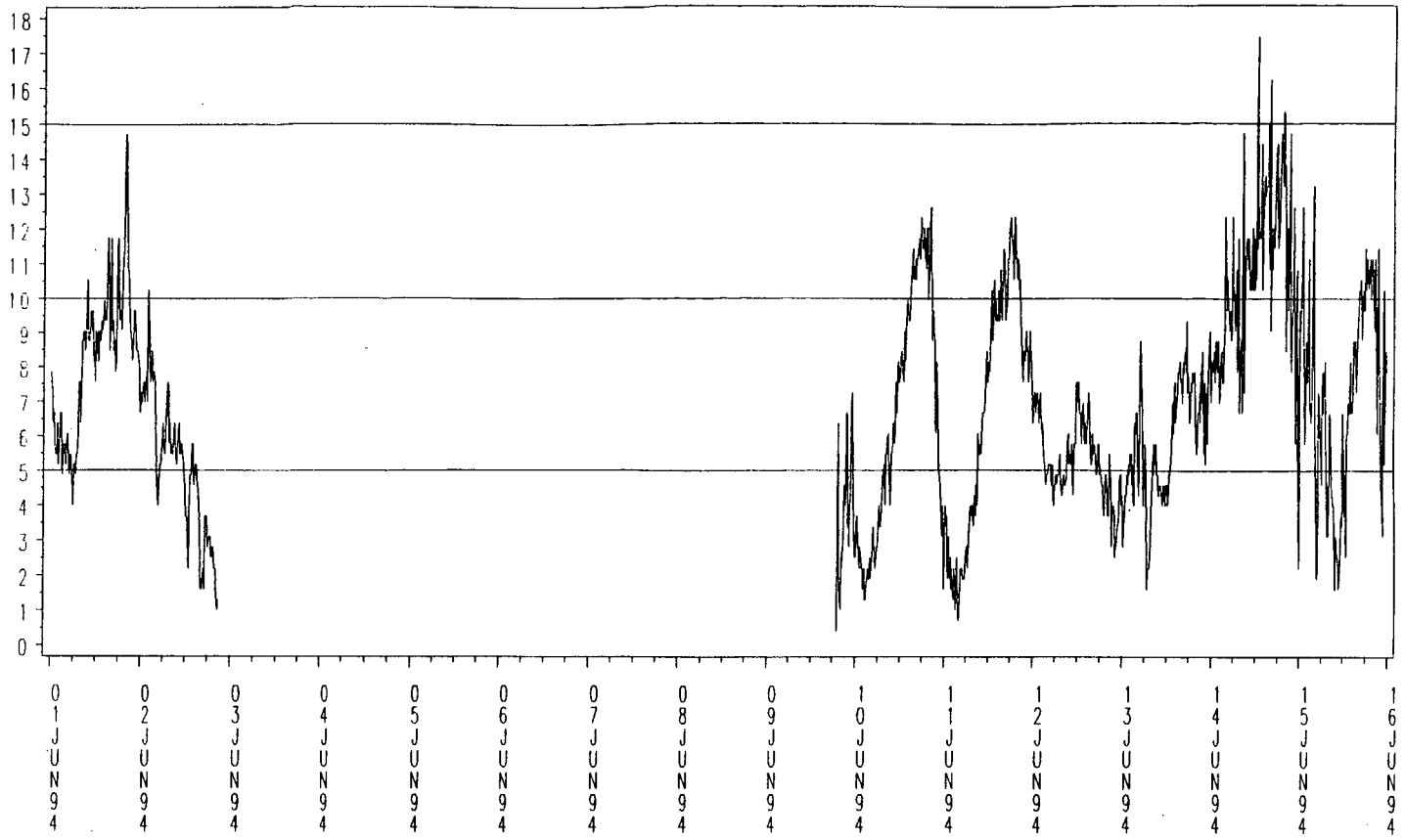
Wind direction 10 m above the ground



DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1994

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

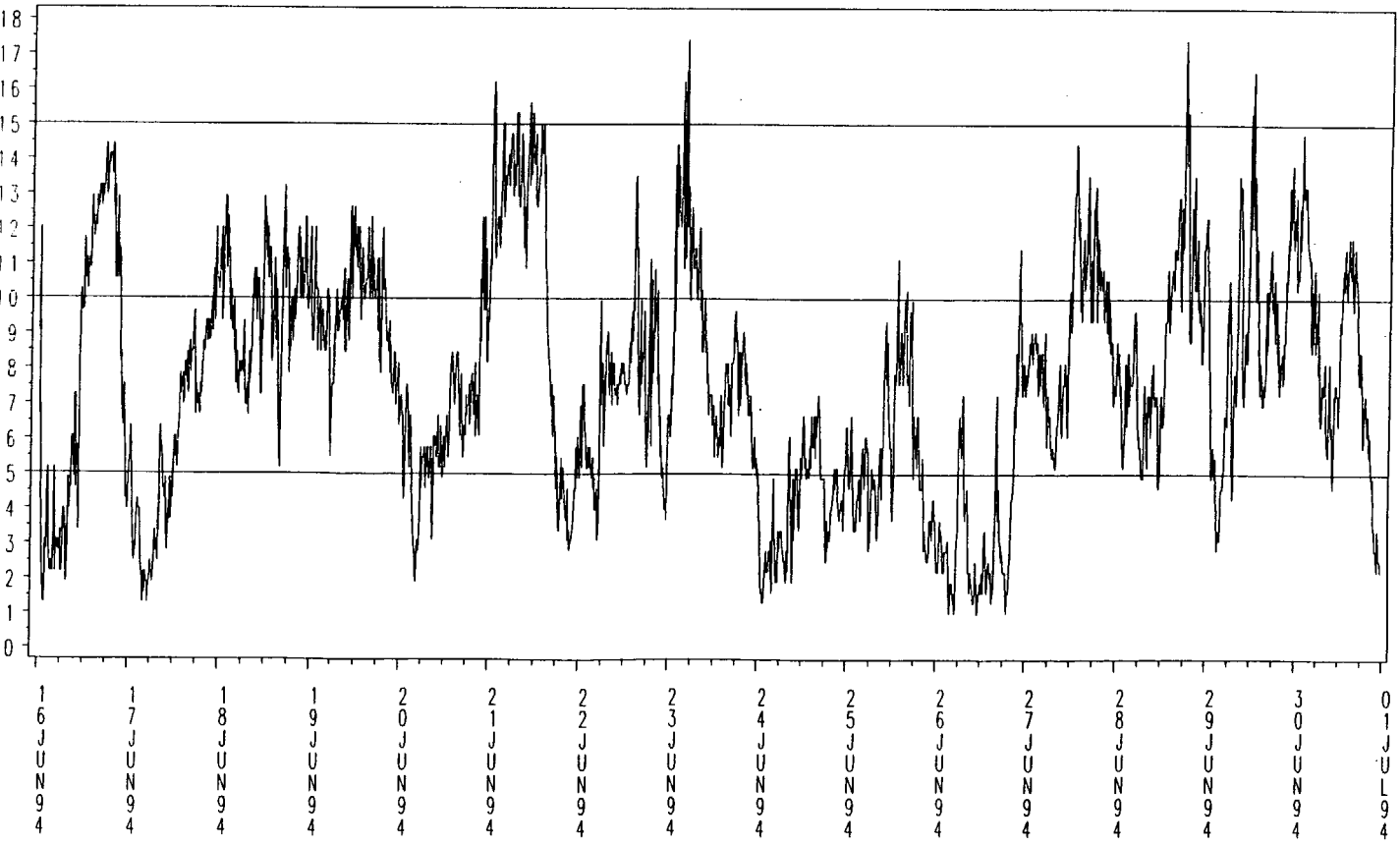


DAY

DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1994

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

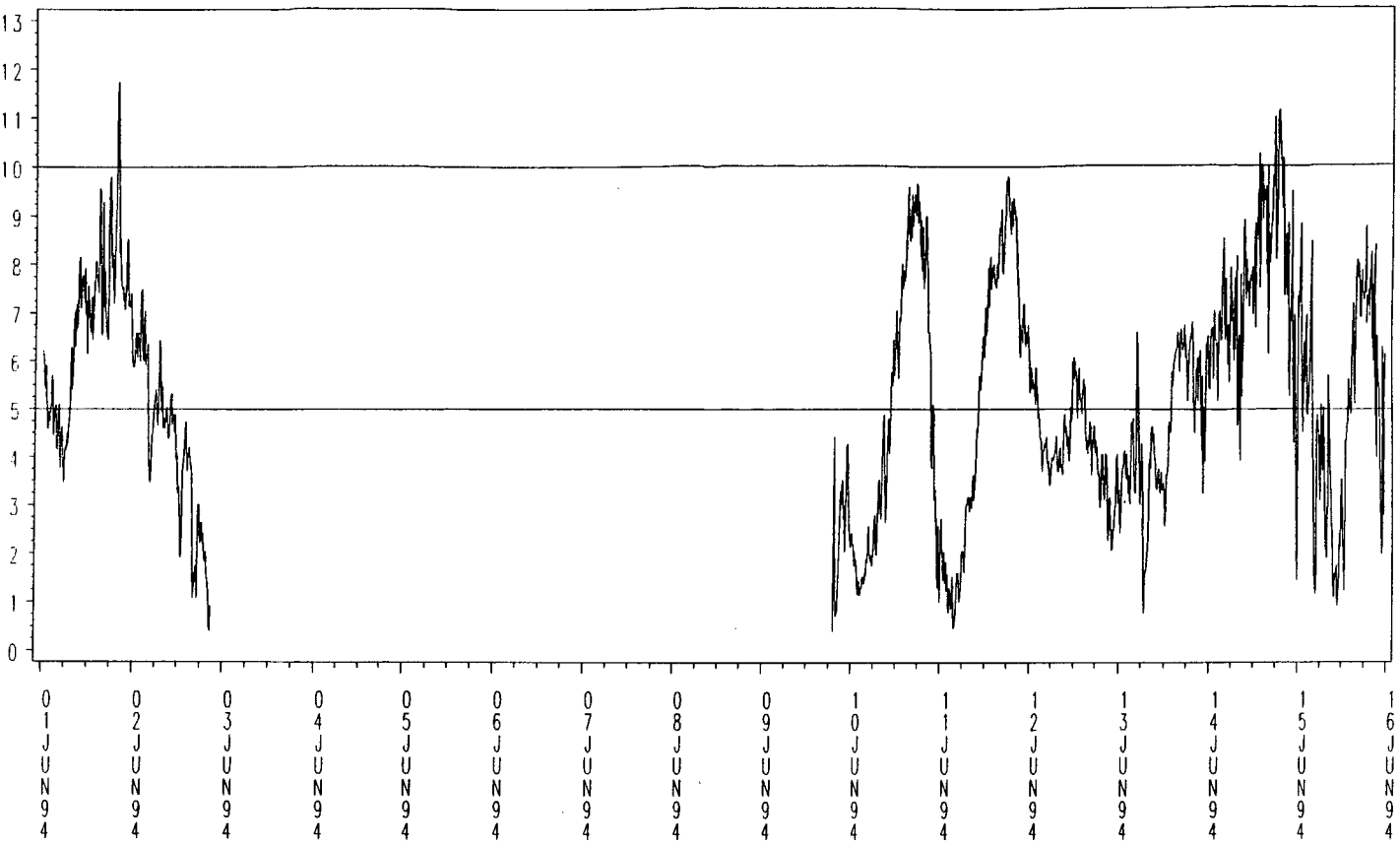


DAY

DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1994

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

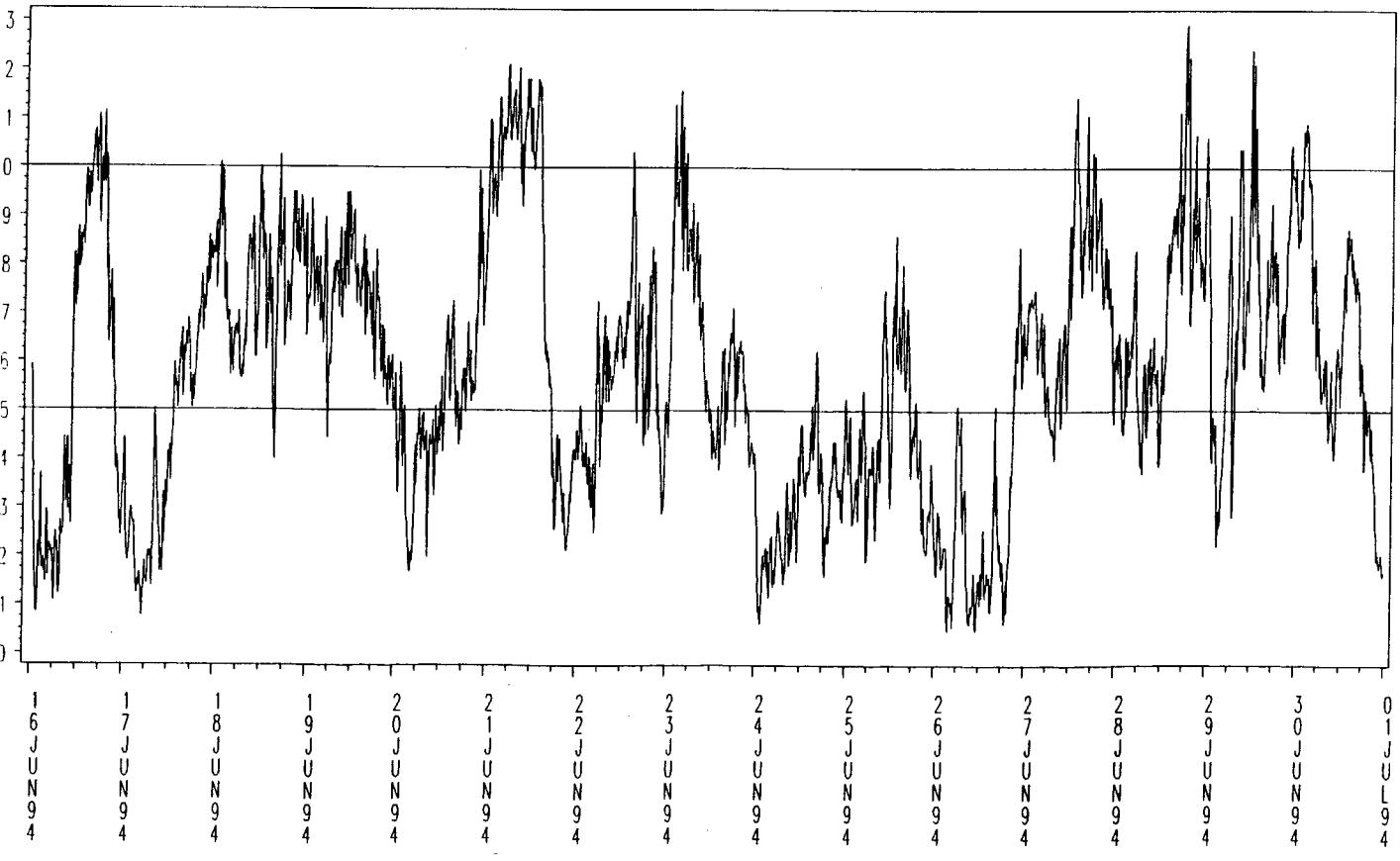


DAY

DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1994

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

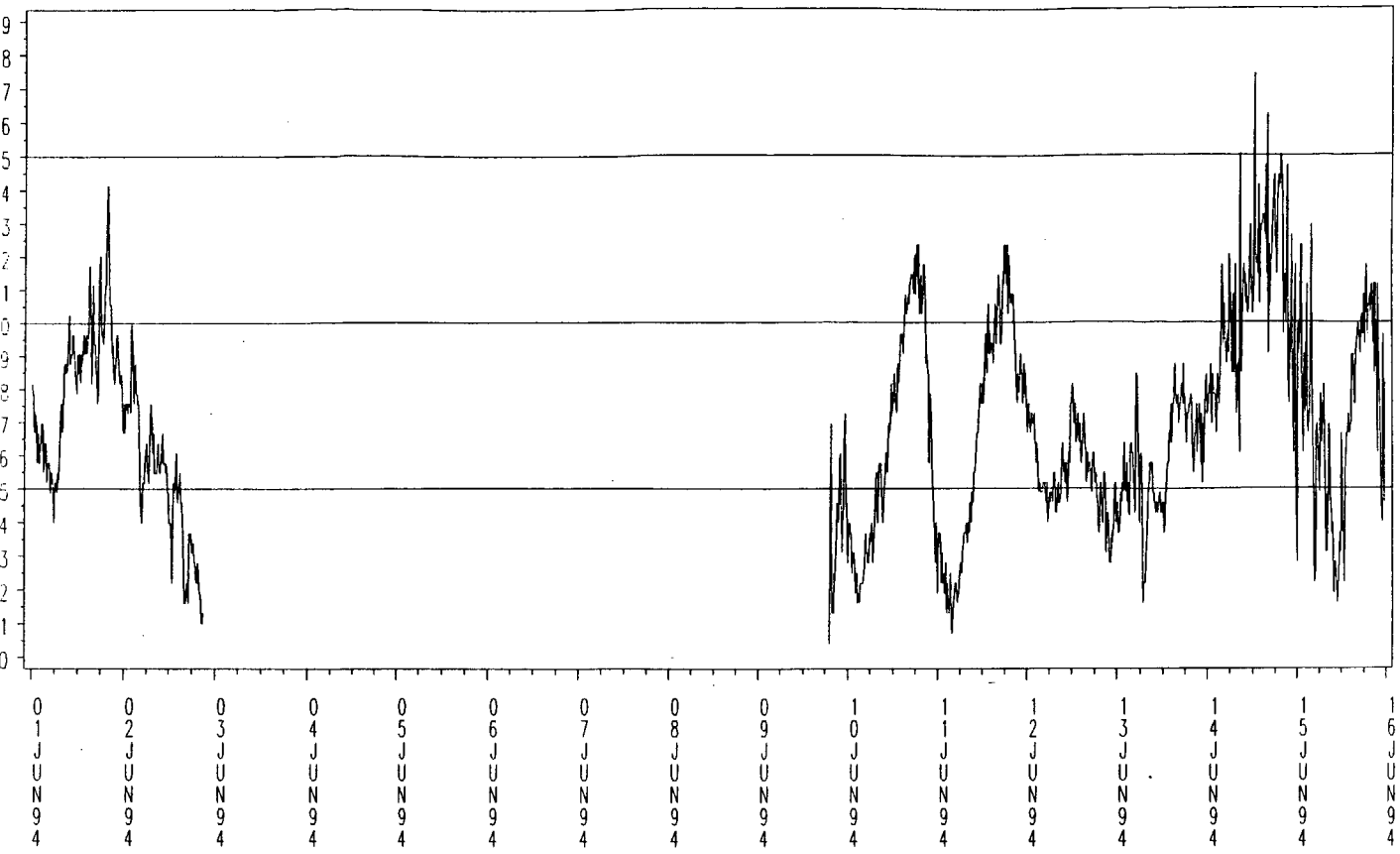


DAY

DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1994

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

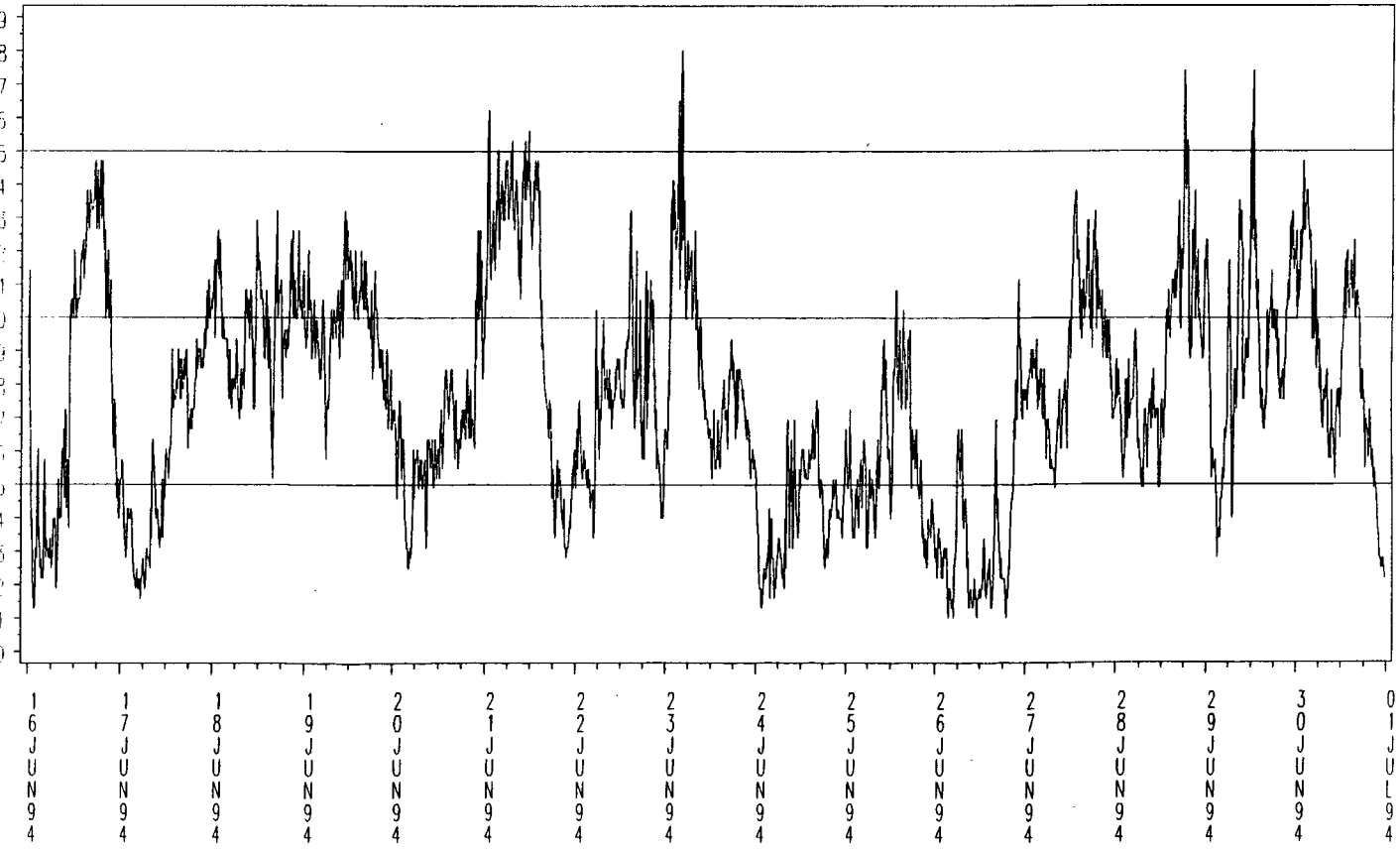


DAY

DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1994

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

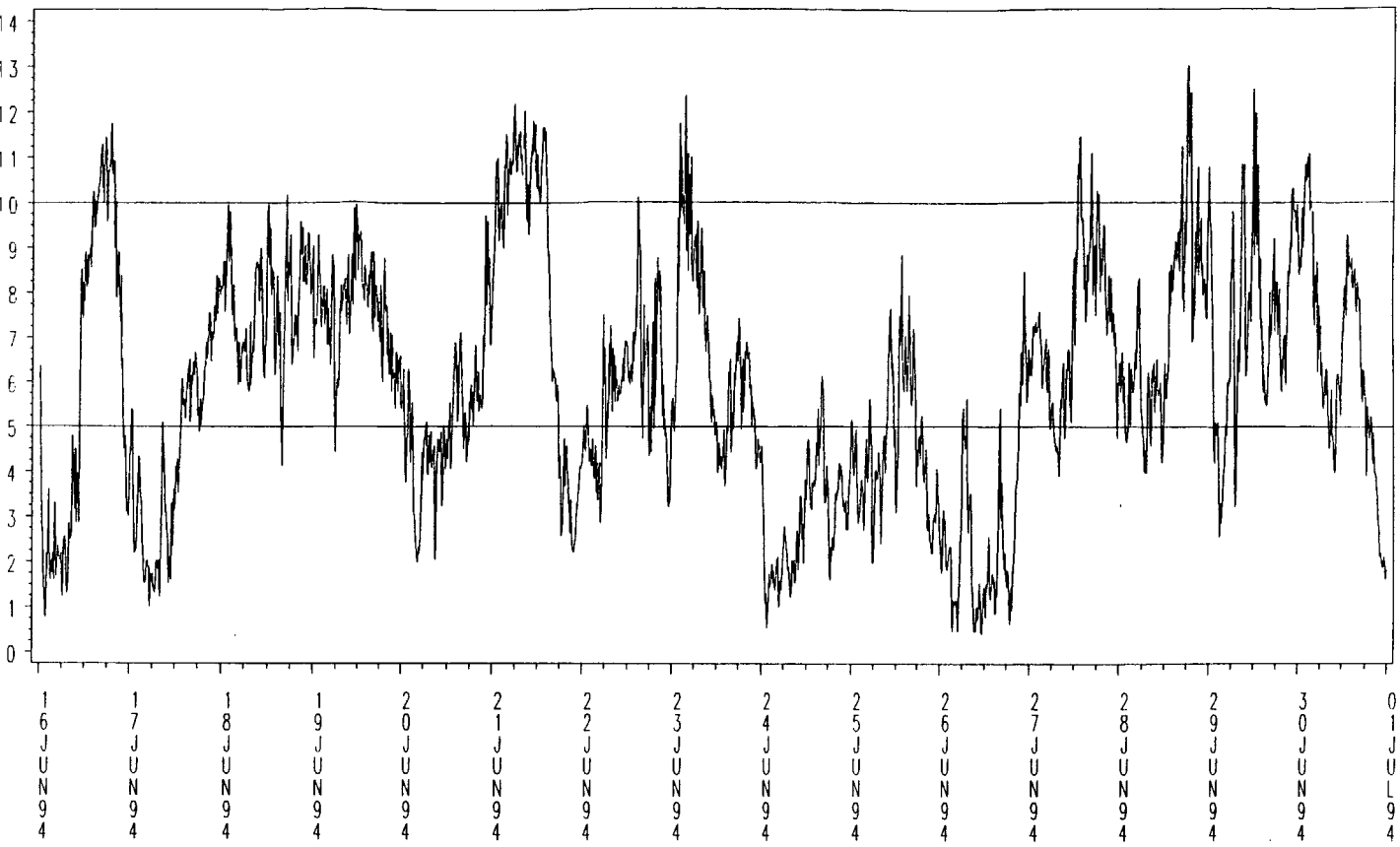


DAY

DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1994

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

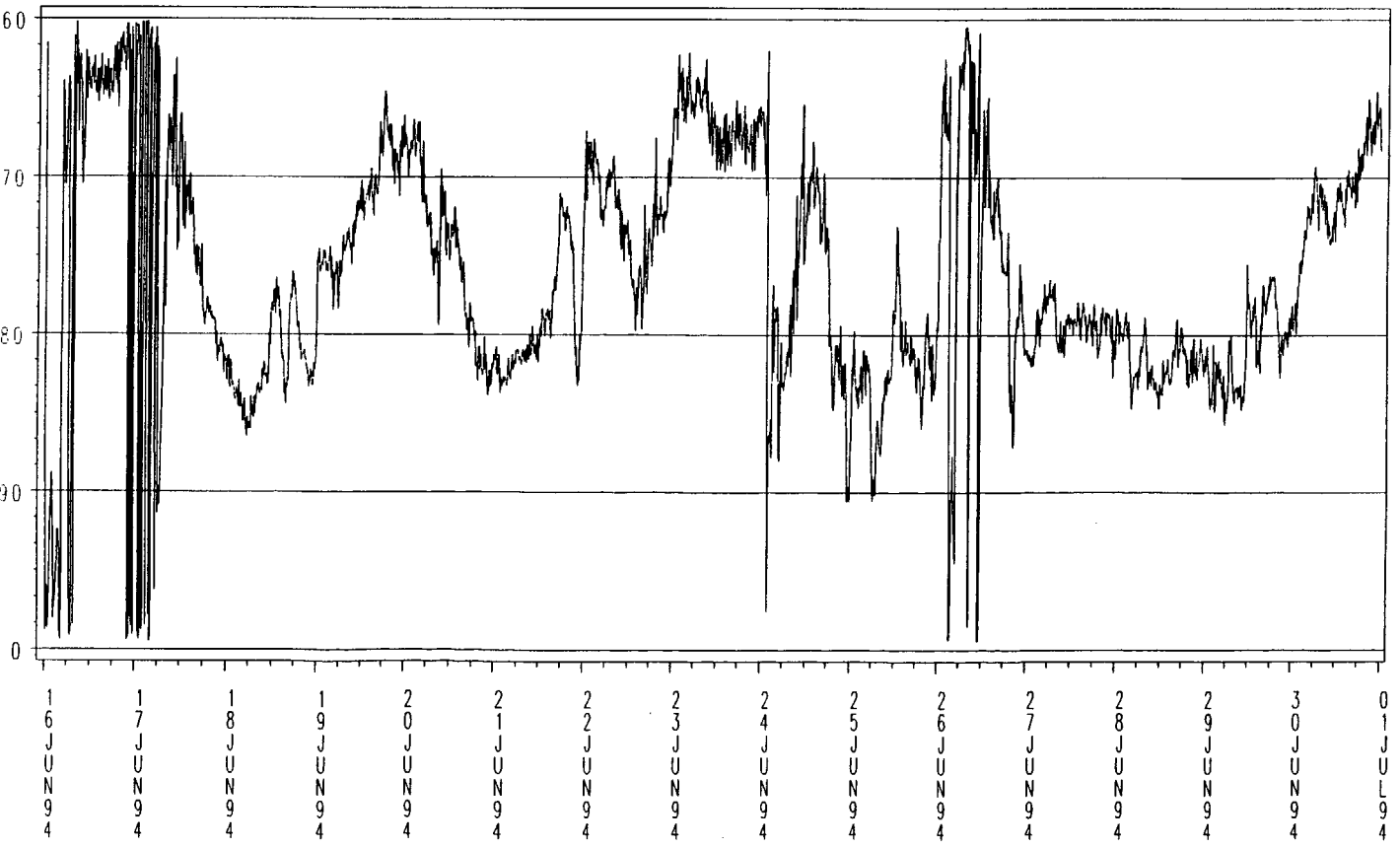


DAY

DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1994

Wind direction 30 m above the ground

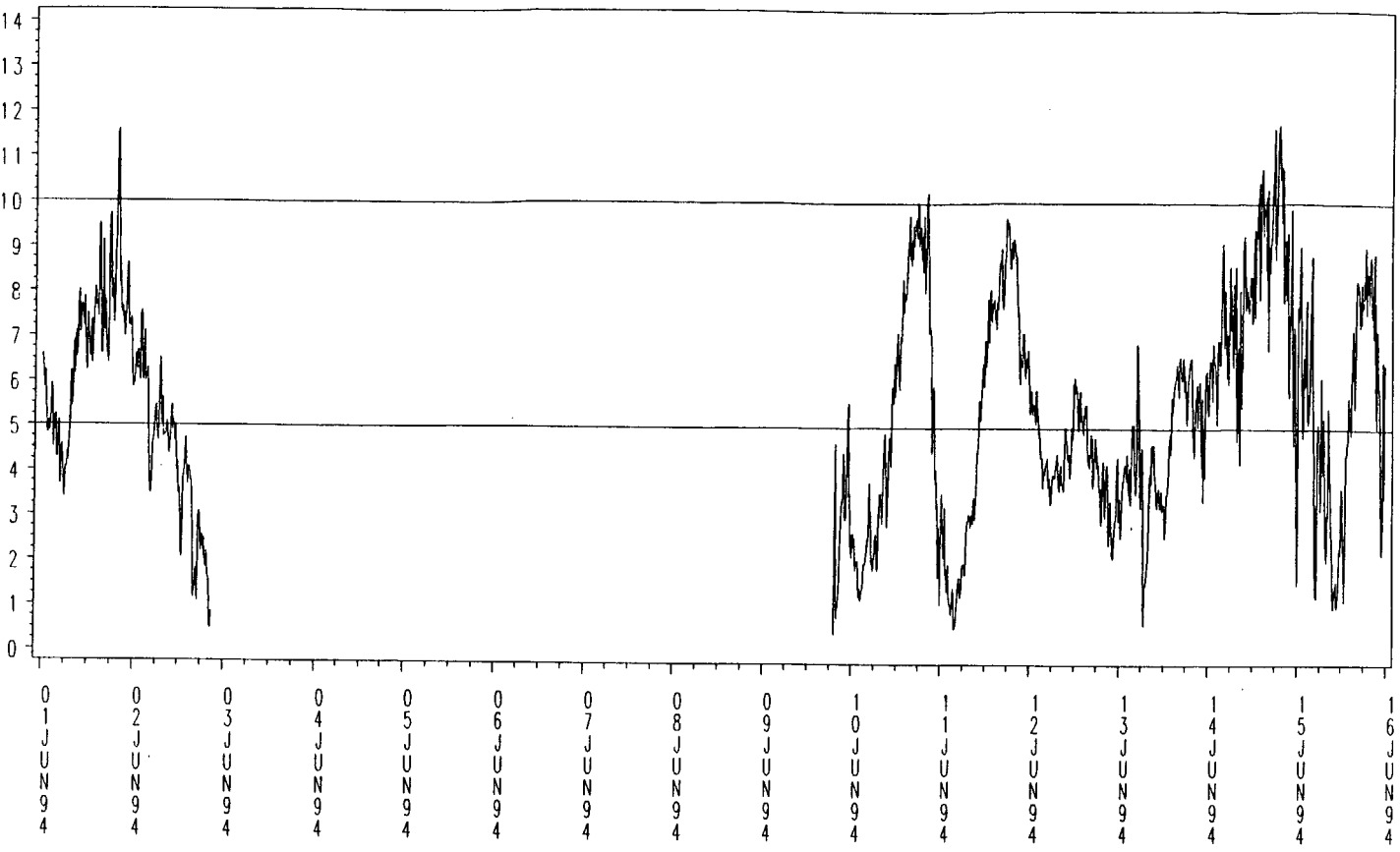


DAY

DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1994

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

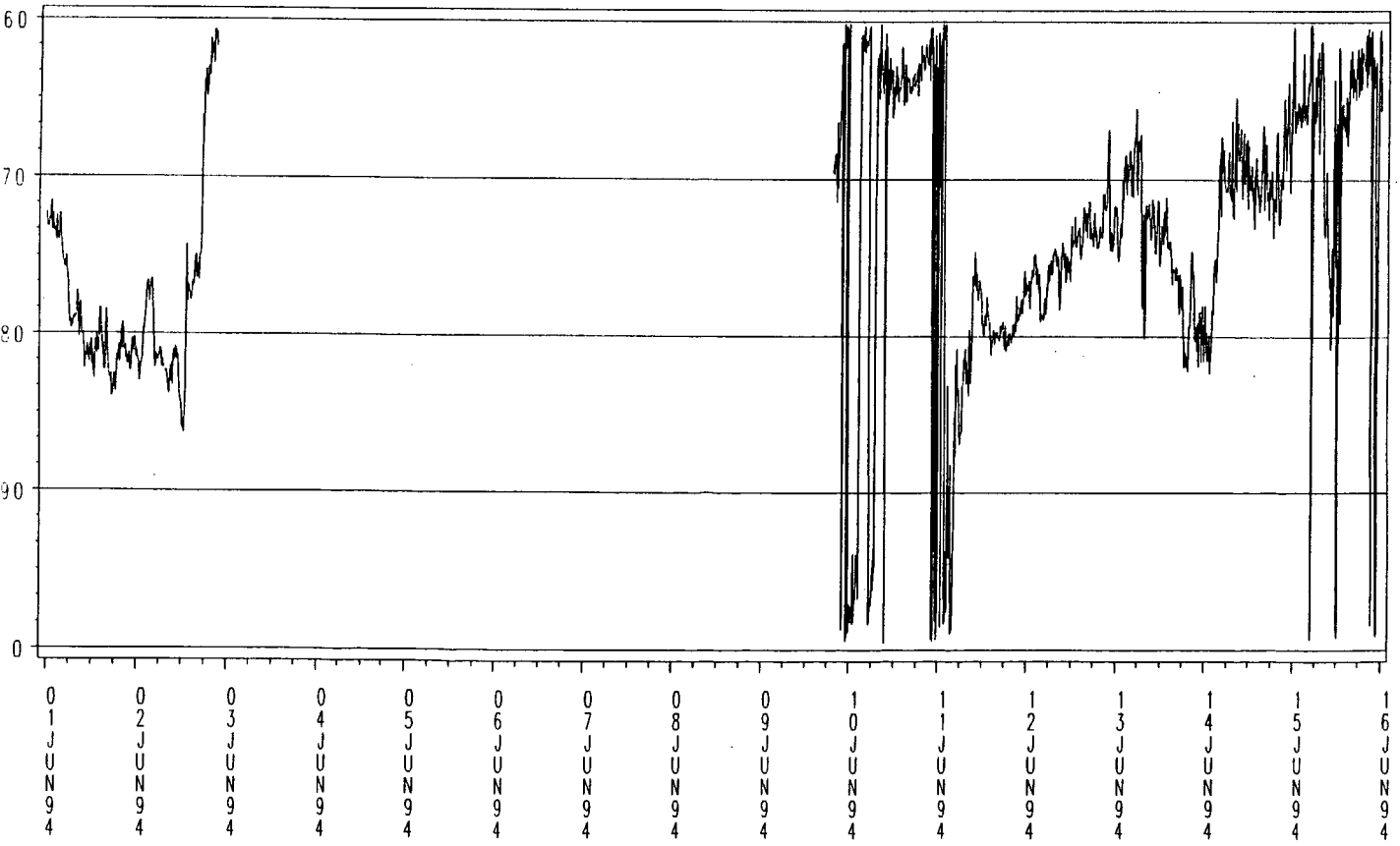


DAY

DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1994

Wind direction 30 m above the ground

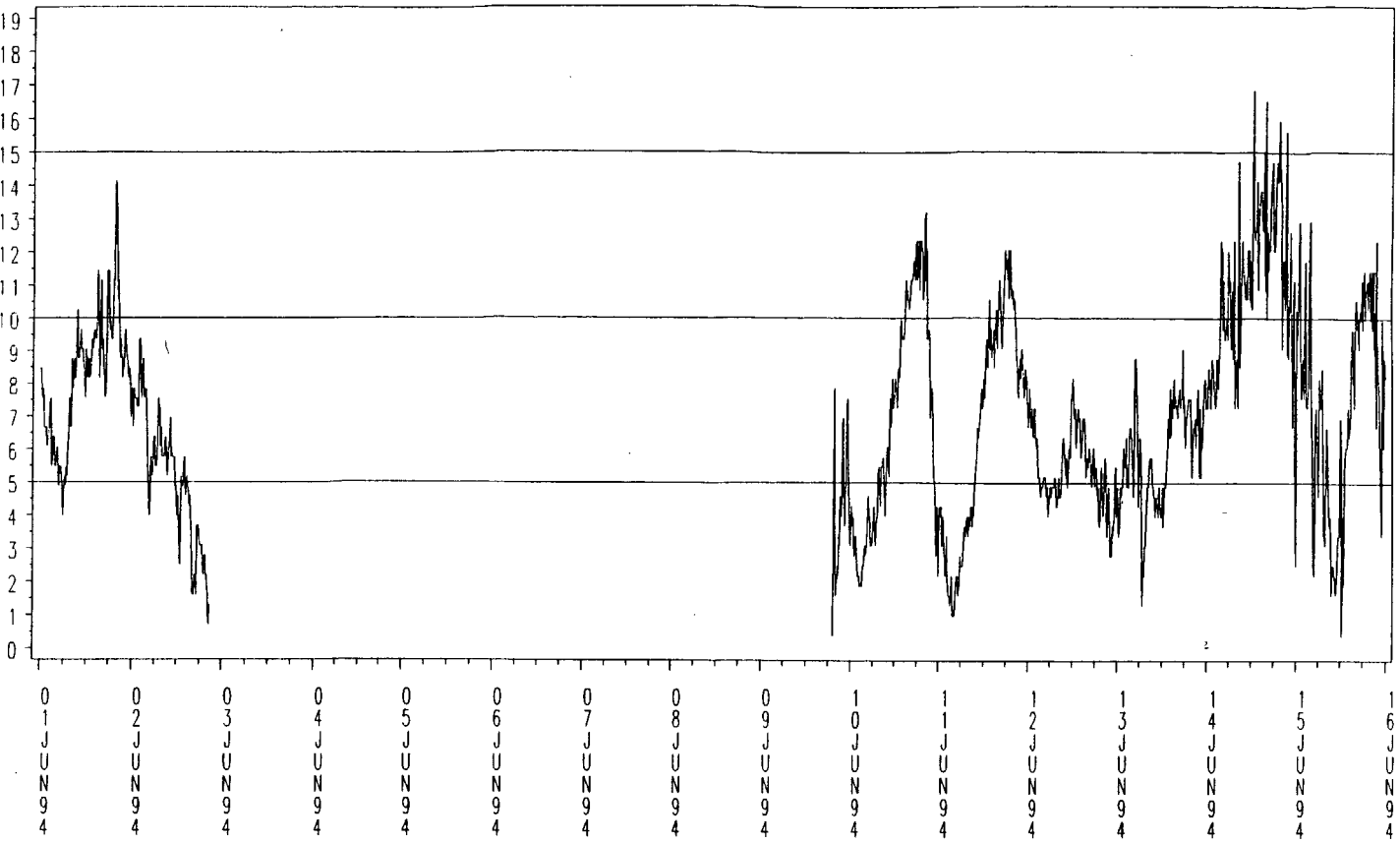


DAY

DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1994

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

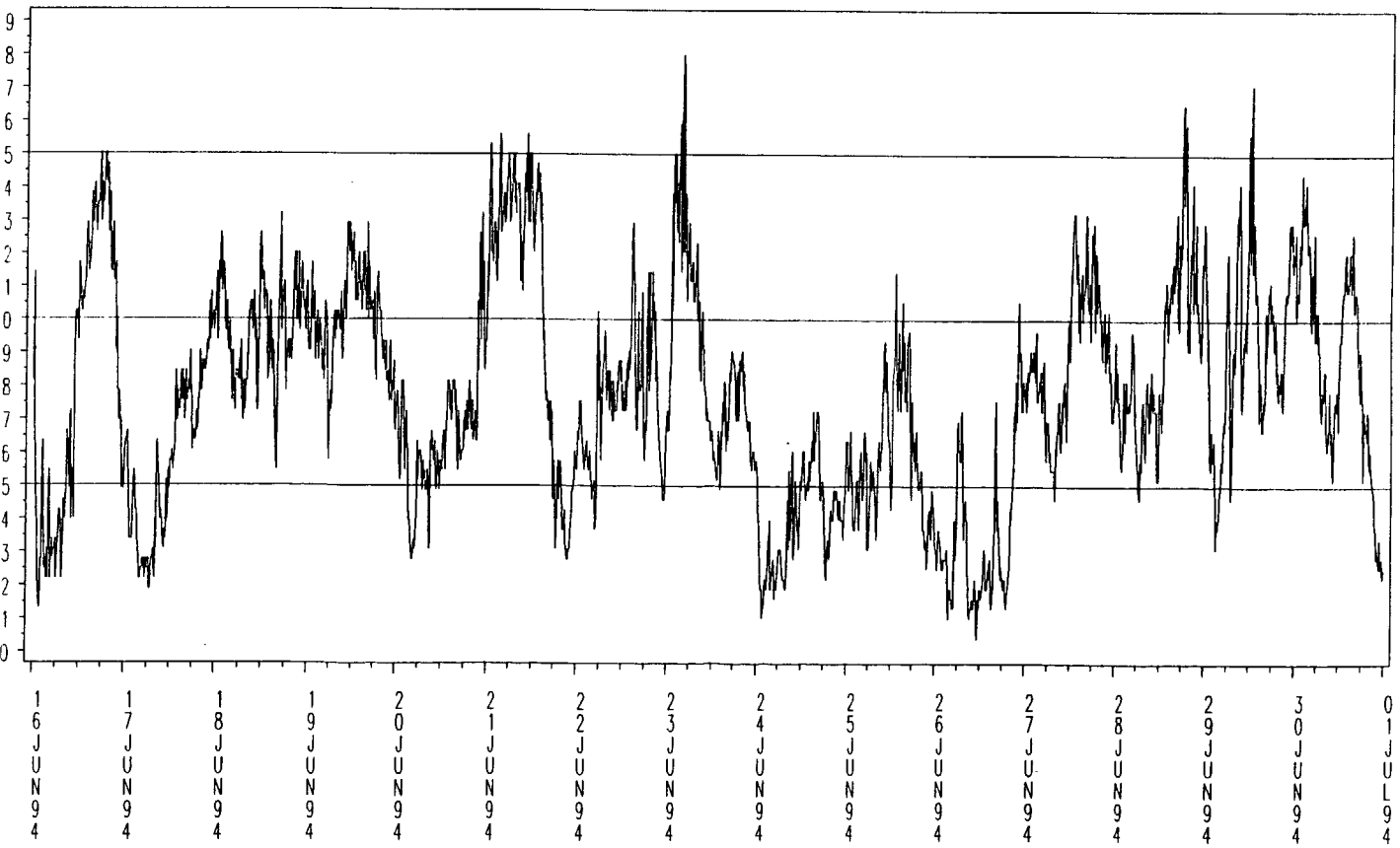


DAY

DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1994

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

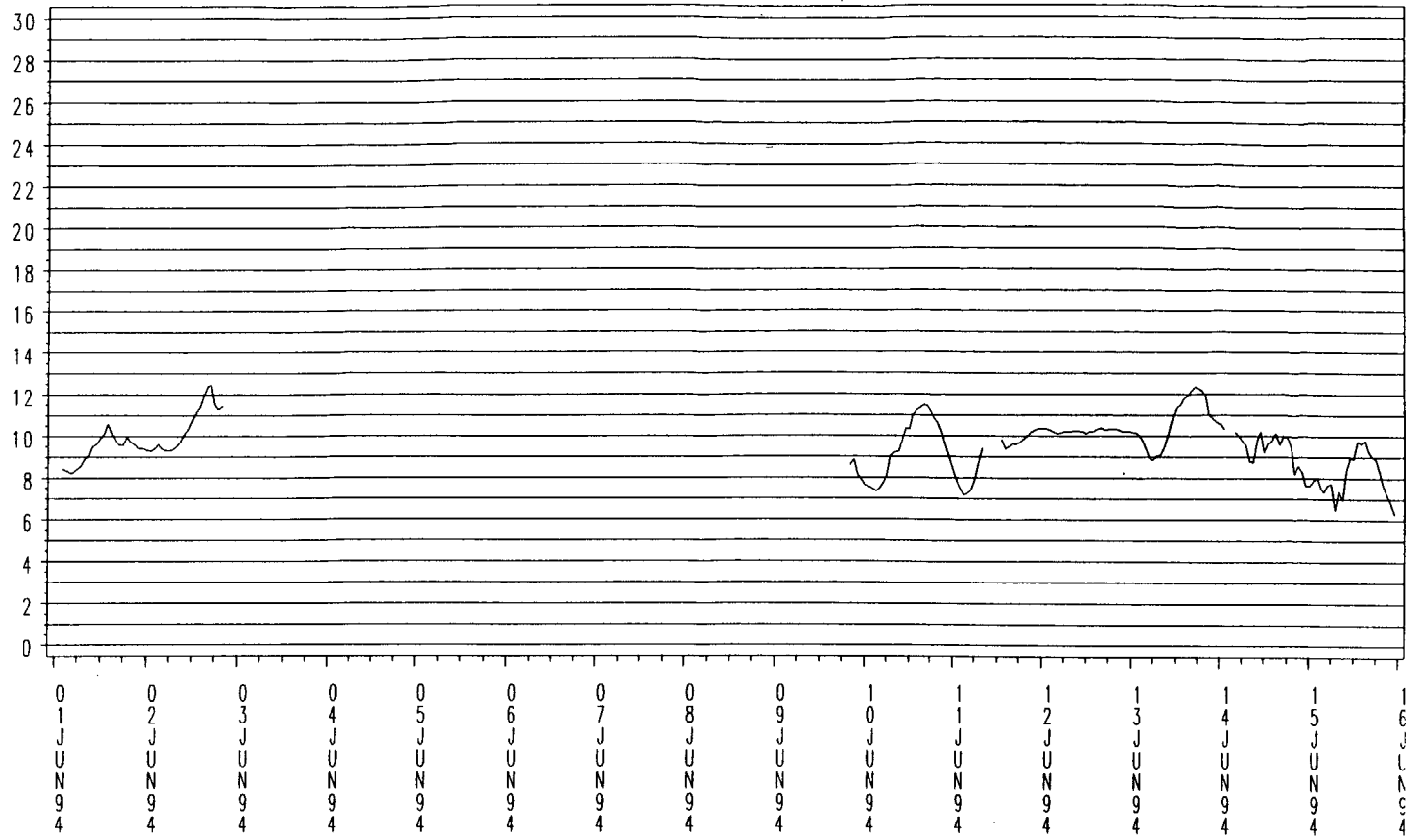


DAY

DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1994

Air Temperature in degrees C (Hourly Means)

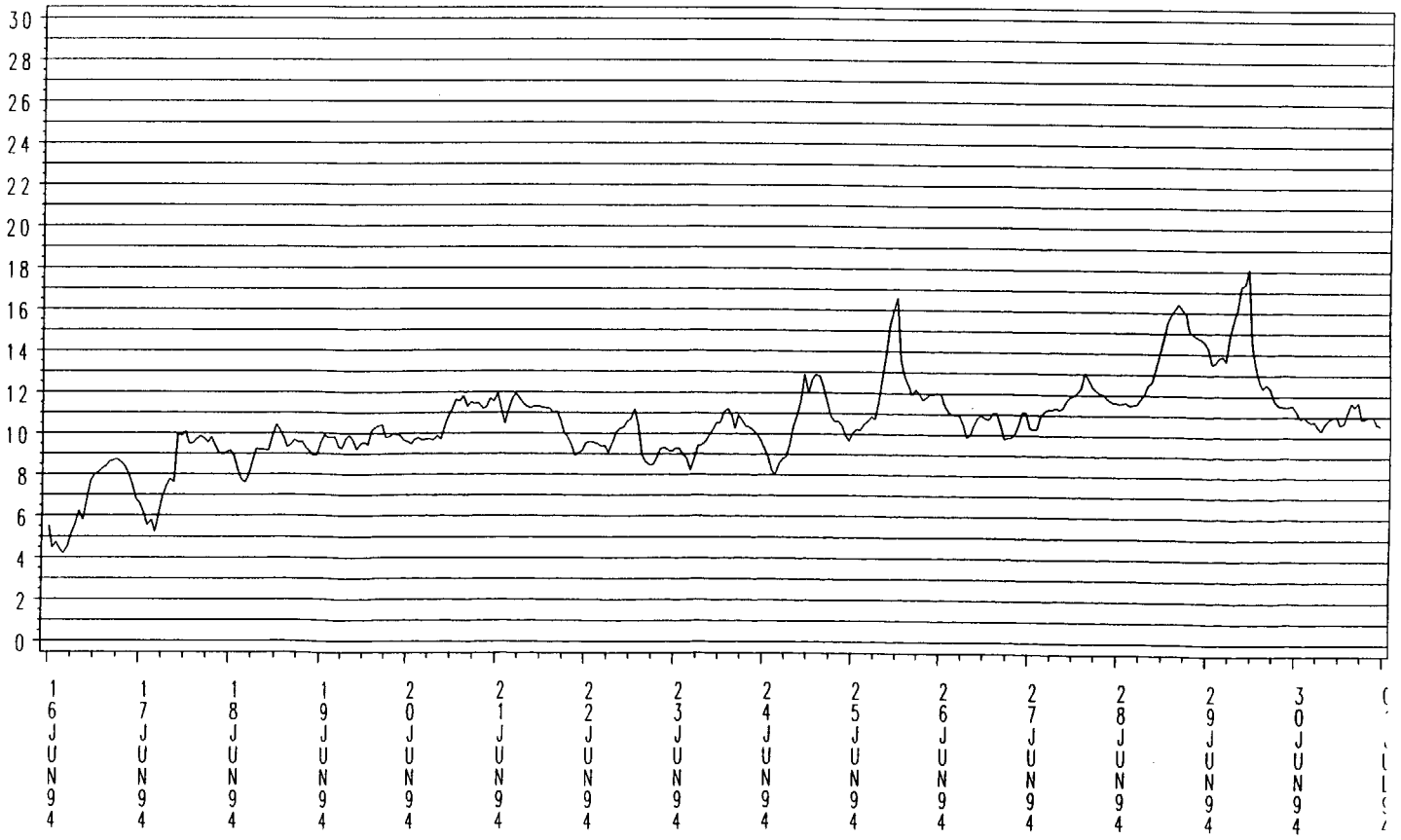


DAY

DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1994

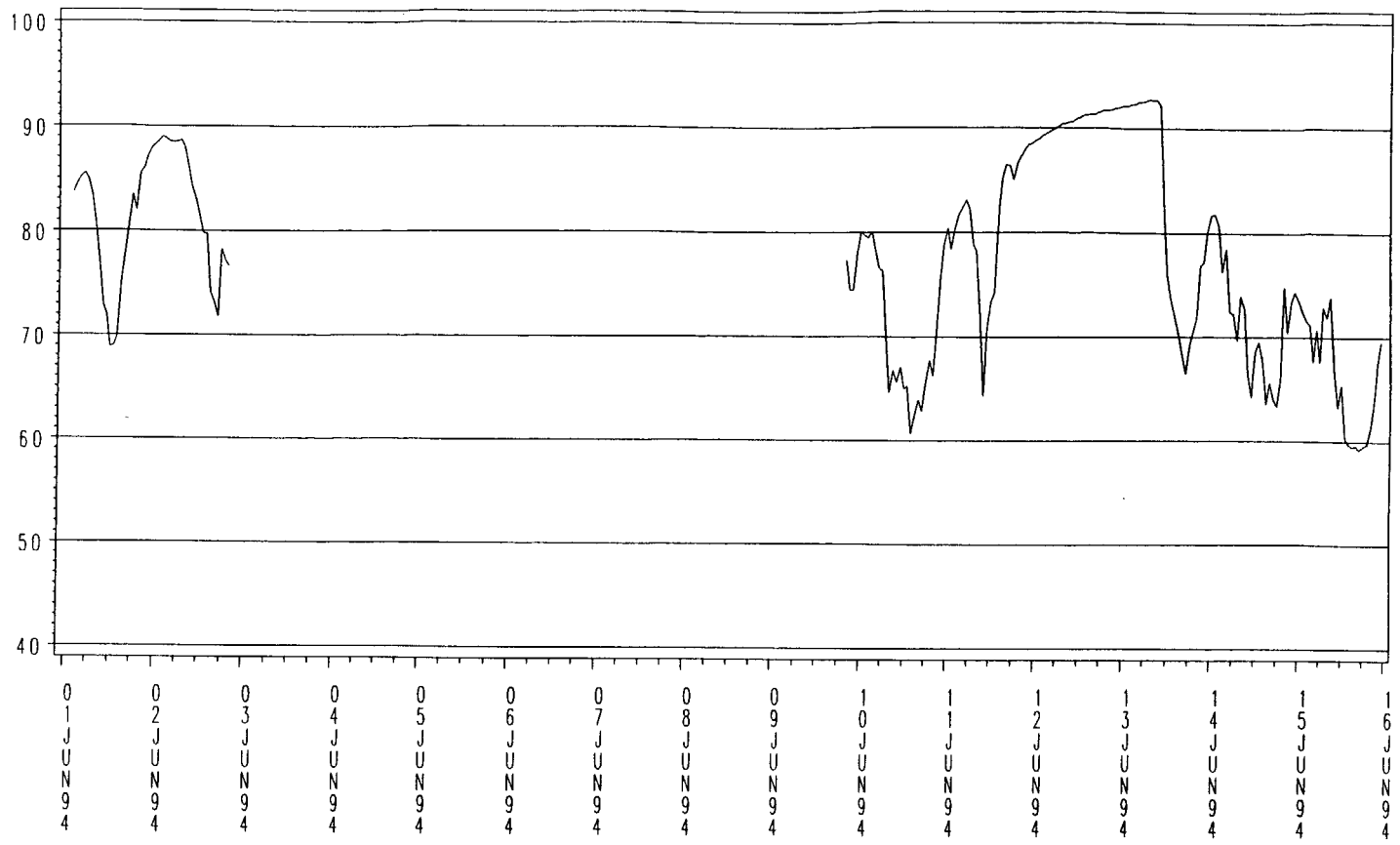
Air Temperature in degrees C (Hourly Means)



DAY

HANØYTANGEN 1994

Air Humidity in % (Hourly Means)

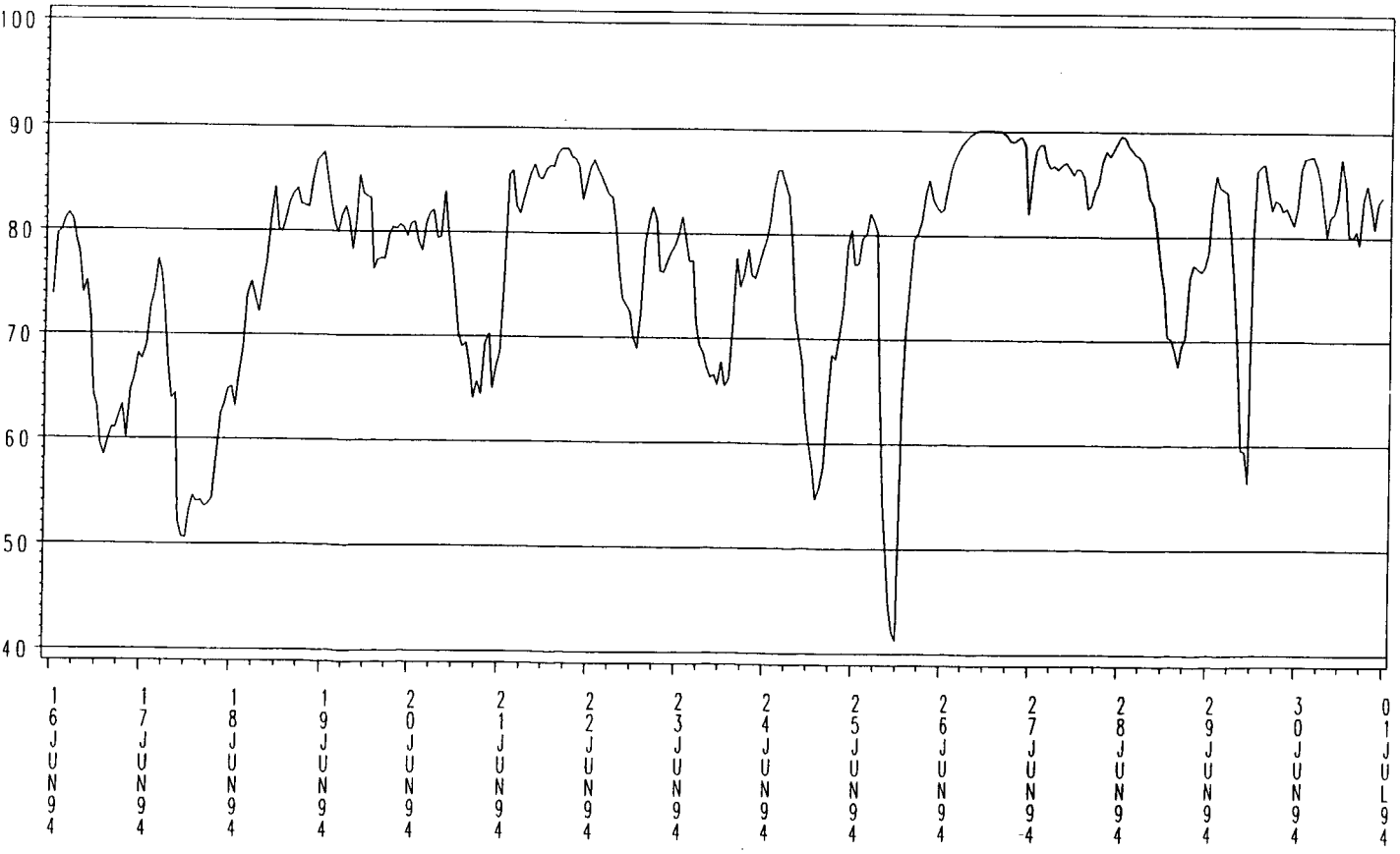


DAY

DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1994

Air Humidity in % (Hourly Means)

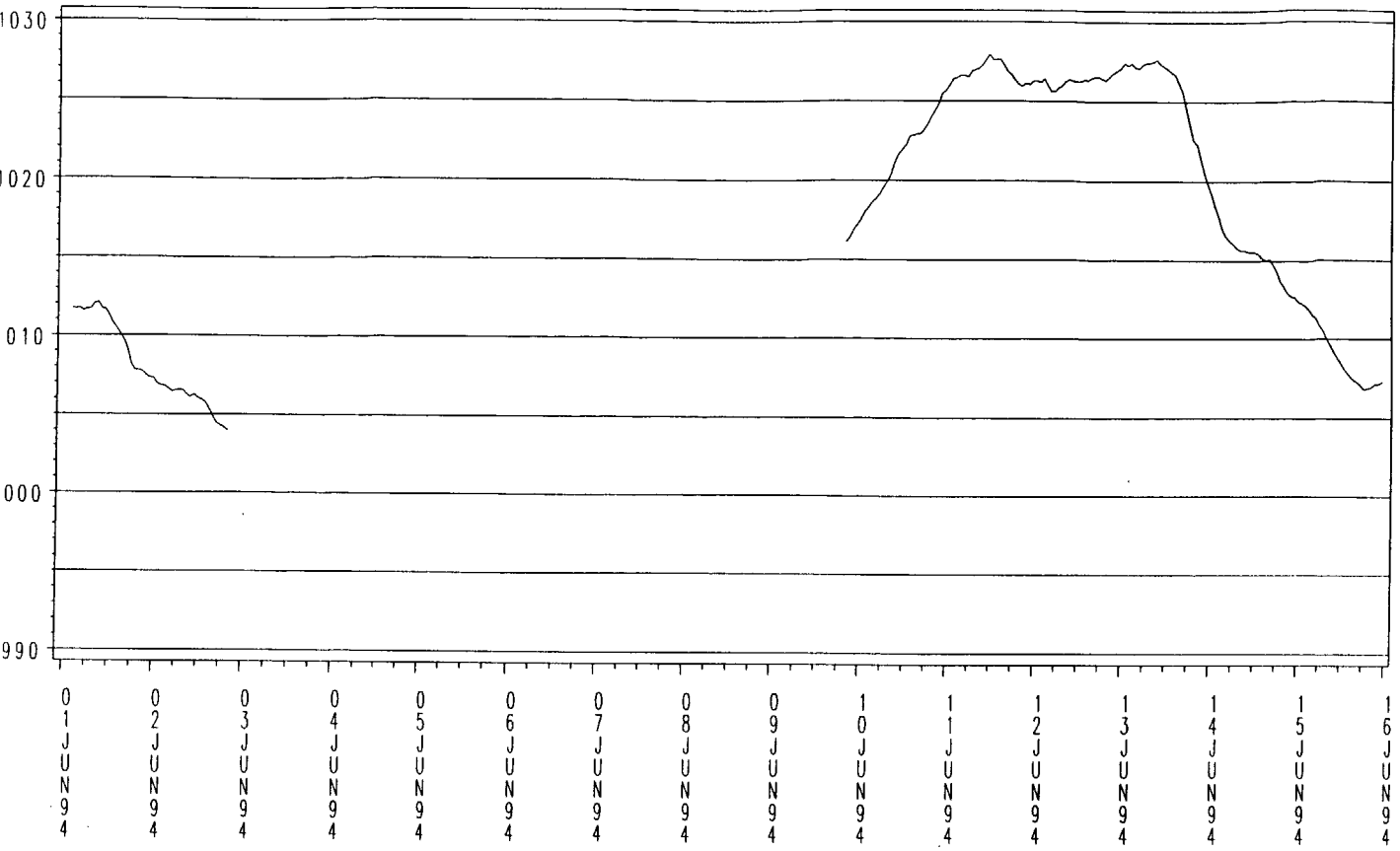


DAY

DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1994

Air Pressure (QFF) in hPa (Hourly Means)

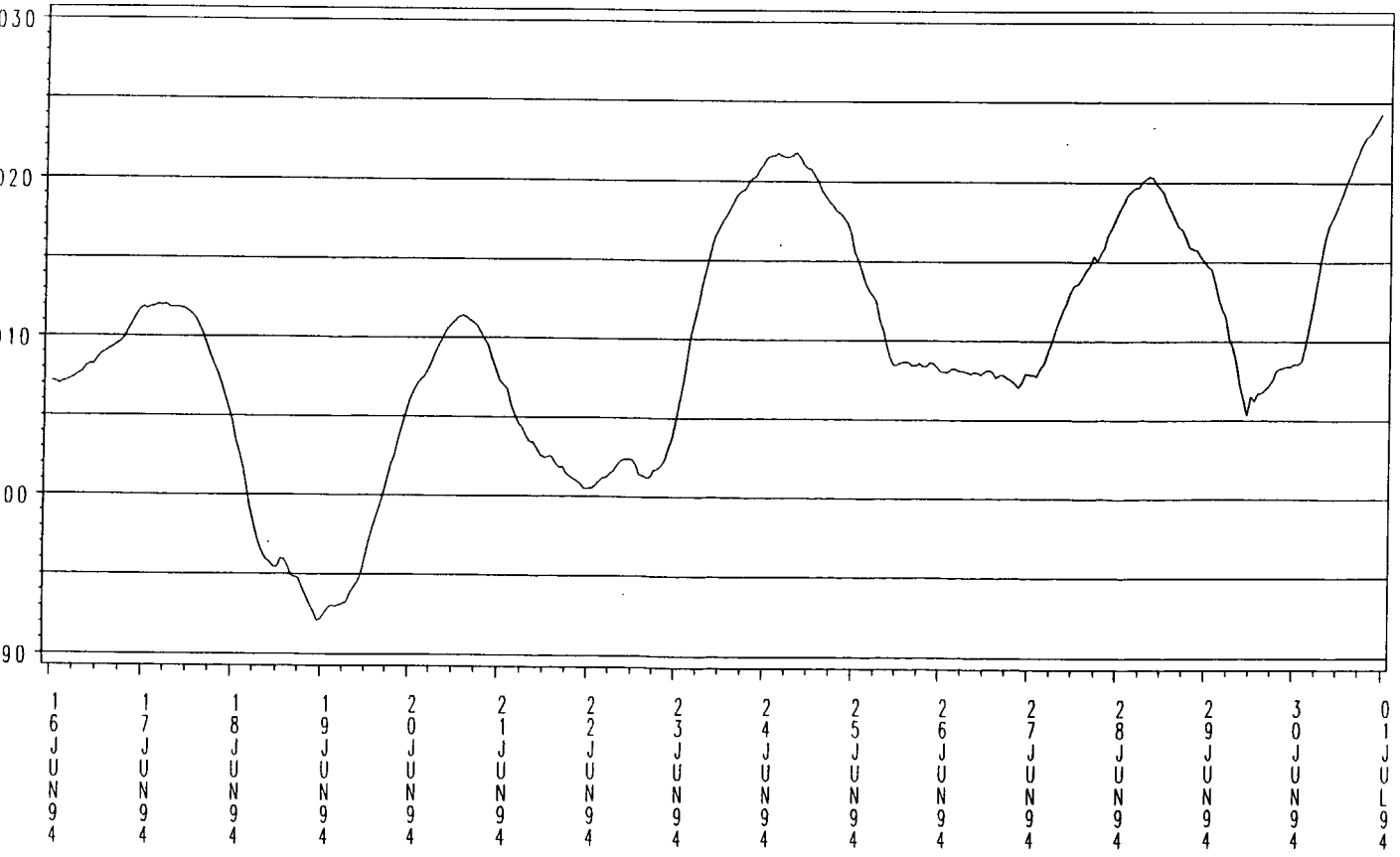


DAY

DNMI - KLIMAAVDELINGEN

HANØYTANGEN 1994

Air Pressure (QFF) in hPa (Hourly Means)



DAY

DNMI - KLIMAAVDELINGEN

DISTRIBUTION TABLES / WIND ROSES

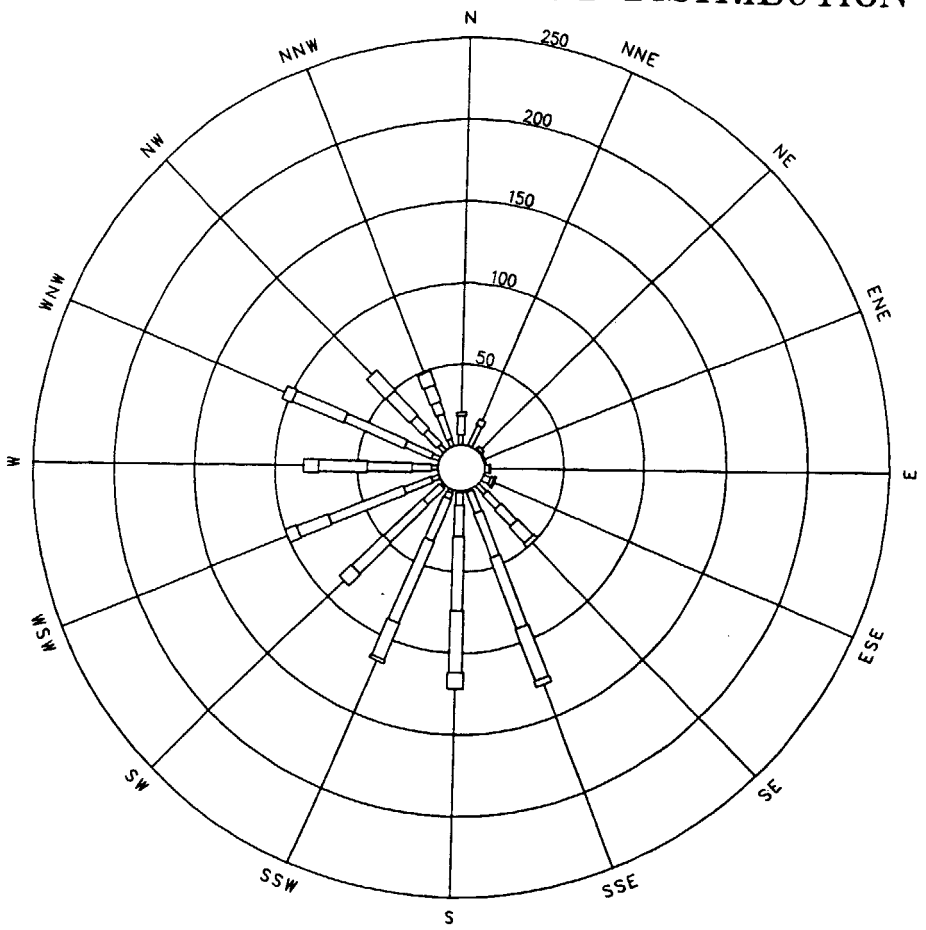
The distribution table gives details about the distribution of the wind speed for a certain wind direction or the distribution of the wind directions for a certain wind speed.

If for example, it is of interest to know the directions for which wind force 5 Beaufort have occurred this month, one has to look at the line for 5 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.

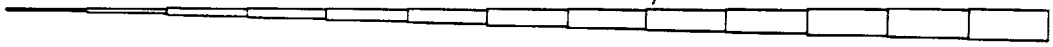
The frequencies in the table are given per thousand (Prm) of the data available this month.

The wind rose is a graphic representation of the information given in the distribution table. The same number of classes is applied. No Beaufort value is given to the centre of the wind rose. Thus, the first class outside the centre is 0 Beaufort (0-0.2 m/s). Due to the calibration of the wind sensors, this class will always be empty at Hanøytangen.

HANOYTANGEN JUNE 1994 WIND DISTRIBUTION 10 M



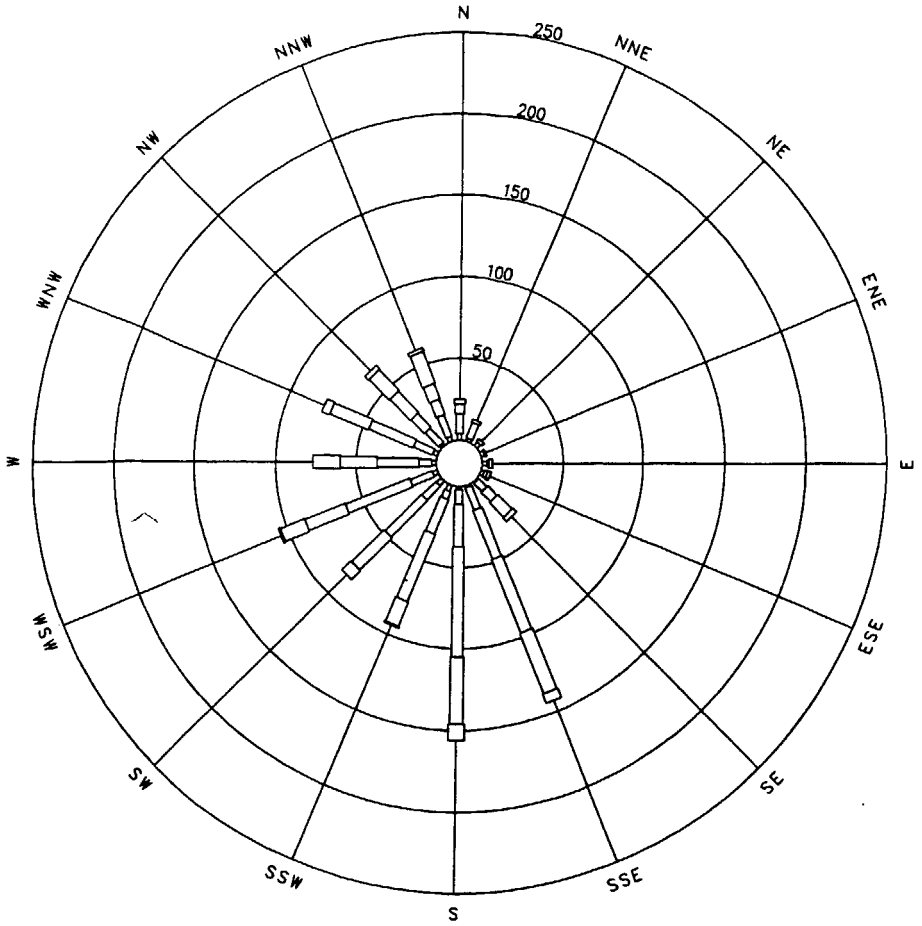
LENGTH : (NUMBER OF OBS/NUMBER OF DATA) * 1000
WIDTH = SPEED (M/S / BEAUFORT SCALE)



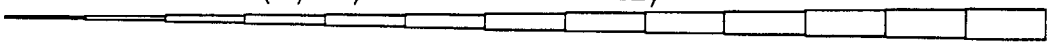
Wind direction (DD) / Wind speed (Beaufort and m/s) 10 m above the ground

	Beaufort	DD																
		N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	ALL
		Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm
.2	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.5	1	6	14	1	.	0	0	7	1	1	2	2	5	4	5	5	5	65
3.3	2	12	4	2	0	3	5	12	14	8	4	14	18	12	18	12	16	163
5.4	3	2	0	.	1	1	2	14	29	19	28	33	50	28	41	11	8	276
7.9	4	0	.	.	.	0	1	14	47	46	55	27	20	30	34	21	11	312
10.7	5	.	.	.	.	.	0	3	34	38	24	10	7	9	6	17	9	162
13.8	6	.	.	.	.	.	.	0	4	10	2	.	.	.	0	.	.	17
17.1	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20.7	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24.4	9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28.4	10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32.6	11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	12	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	ALL	22	19	3	2	6	10	54	131	125	118	88	102	86	106	67	51	1000

HANØYTANGEN JUNE 1994 WIND DISTRIBUTION 30 M



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

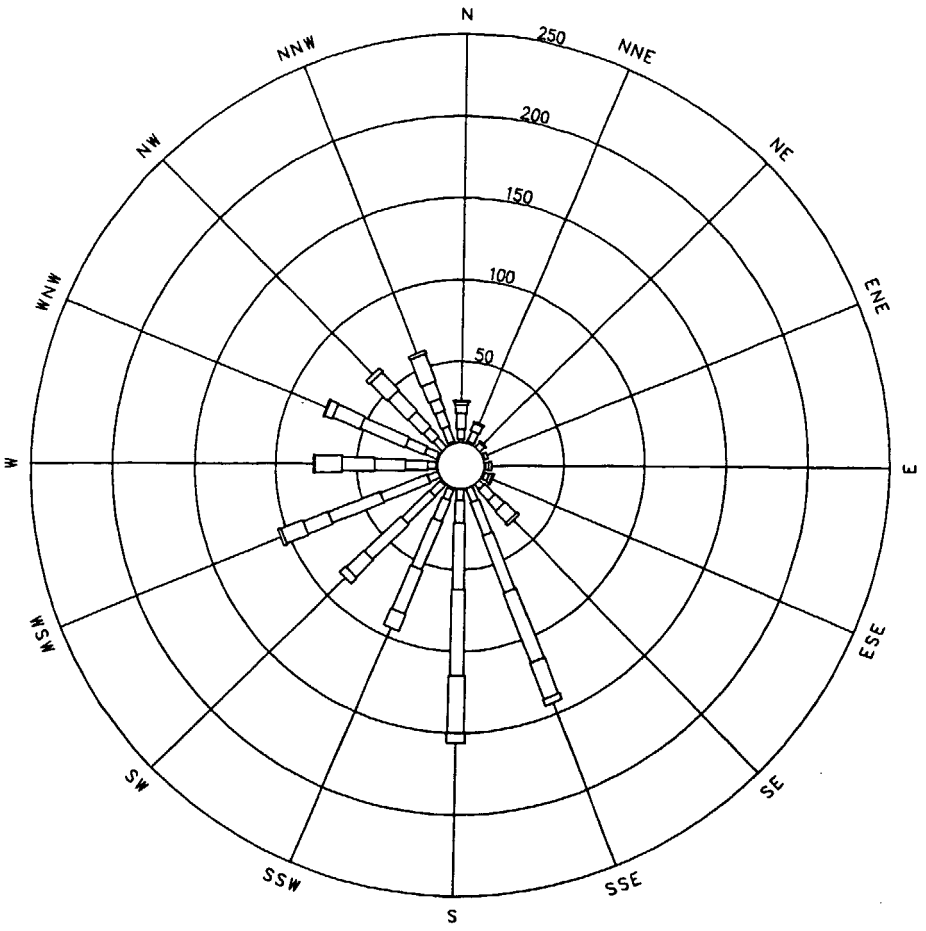


Wind direction (DD) / Wind speed (Beaufort and m/s) 30 m above the ground

	Beau-fort	DD																	
		N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	ALL
		Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm
.2	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.5	1	4	2	3	2	3	2	1	1	2	4	4	3	3	3	2	3	52
3.3	2	12	10	2	1	1	2	7	15	9	5	12	15	8	13	12	14	148
5.4	3	6	2	0	0	2	2	8	32	26	23	32	43	26	30	12	10	263
7.9	4	3	.	.	.	0	0	13	49	68	45	28	27	23	26	18	10	315
10.7	5	0	.	.	.	.	0	3	40	41	16	8	16	17	5	18	21	190
13.8	6	.	.	.	.	.	.	0	6	10	1	0	1	0	0	3	2	27
17.1	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20.7	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24.4	9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28.4	10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32.6	11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	12	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	ALL	28	16	7	4	7	8	35	147	157	97	88	107	80	80	67	63	1000

PAC 004 WEATHER ANALYSIS IN HANØYTANGEN
REPORT 8 : August 22 1994

HANOYTANGEN JUNE 1994 GUST WIND DISTR. 30 M



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

Wind direction (DD)/ Gust wind speed (m/s) 30 m above the ground.

m/s	DD																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	ALL
	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm	Prm
0-.2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0.3-1.5	2	1	0	1	1	1	0	0	.	1	1	0	1	1	0	1	18
1.6-3.3	6	7	4	2	2	3	4	9	7	7	9	7	5	8	8	10	105
3.4-5.4	10	5	1	0	2	2	9	22	14	14	24	31	14	13	8	10	184
5.5-7.9	5	1	0	.	0	1	8	38	41	32	31	34	19	30	13	8	269
8.0-10.7	2	0	.	.	.	0	10	46	53	29	15	17	20	18	17	11	243
10.8-13.8	1	.	.	.	.	.	2	24	35	11	5	14	17	5	15	18	151
13.9-17.1	.	.	.	.	.	.	0	4	6	0	0	2	1	1	3	2	23
17.2-20.7	.	.	.	.	.	.	.	.	0	.	.	.	.	.	0	0	0
20.8-24.5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24.5-28.4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28.5-32.6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
> 32.6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ALL	28	16	7	4	7	8	35	147	157	97	88	107	80	80	67	63	1000

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COEFFICIENT TRANSFERT TABLES

The tables are actually histograms of the quotient given in the heading of the tables, plotted horizontally. They give details about the distribution of the quotients.

The class interval is 0.5 and the frequencies for the actual class is plotted at the midpoint of the class. If the quotient is 1 the wind speed in the two heights considered have the same value.

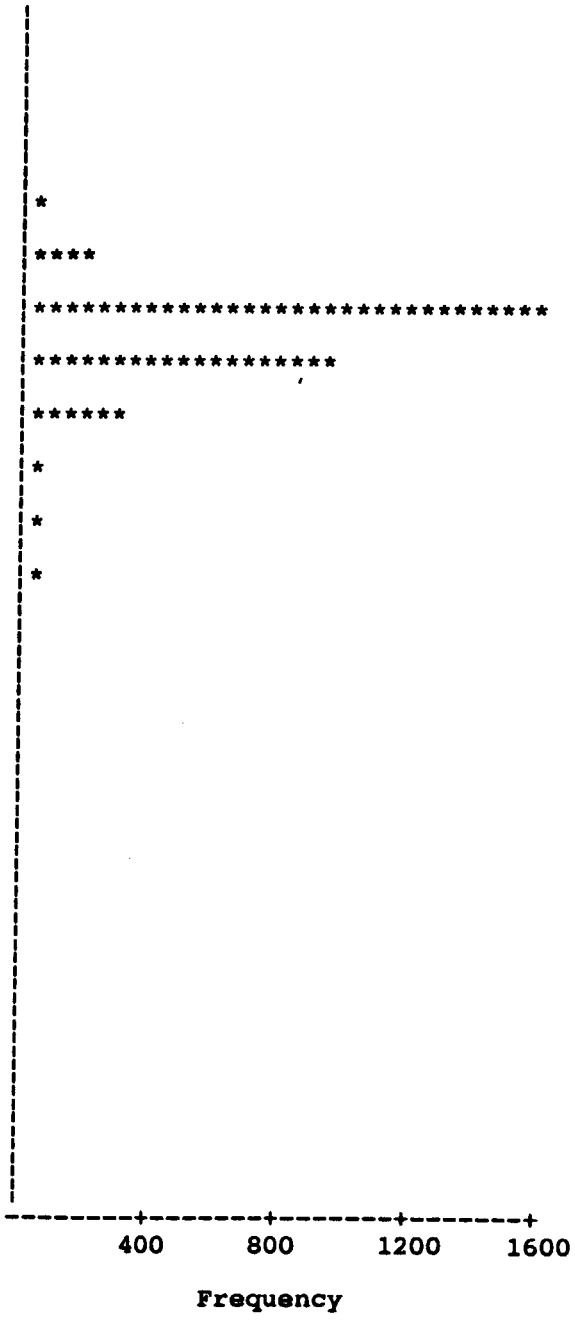
The classes start at 0.75 (.725-.774) and end at 1.80 (1.775-1.825). Quotients below or above these limits are counted in these classes respectively.

The tables are giving the frequencies in the actual classes in percent and also as cumulative frequencies in percent.

F30 = Wind speed 30 m above the ground
F18 = Wind speed 18 m above the ground
F10 = Wind speed 10 m above the ground

HANØYTANGEN JUNE 1994

QUOTIENT F30/F18



F30/F18 Midpoint	Freq	Cum. Freq	Percent	Cum. Percent
0.75	15	15	0.45	0.45
0.80	6	21	0.18	0.63
0.85	21	42	0.63	1.27
0.90	35	77	1.05	2.32
0.95	206	283	6.20	8.52
1.00	1597	1880	48.10	56.63
1.05	956	2836	28.80	85.42
1.10	290	3126	8.73	94.16
1.15	73	3199	2.20	96.36
1.20	34	3233	1.02	97.38
1.25	31	3264	0.93	98.31
1.30	24	3288	0.72	99.04
1.35	9	3297	0.27	99.31
1.40	7	3304	0.21	99.52
1.45	9	3313	0.27	99.79
1.50	2	3315	0.06	99.85
1.55	4	3319	0.12	99.97
1.60	1	3320	0.03	100.00
1.65	0	3320	0.00	100.00
1.70	0	3320	0.00	100.00
1.75	0	3320	0.00	100.00
1.80	0	3320	0.00	100.00

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QUOTIENT F30/F10

F30/F10 Midpoint		Freq	Cum. Freq	Percent	Cum. Percent
0.75	*	19	19	0.57	0.57
0.80	*	14	33	0.42	0.99
0.85	*	24	57	0.72	1.72
0.90	*	32	89	0.96	2.68
0.95	**********	345	434	10.39	13.07
1.00	**********	943	1377	28.40	41.48
1.05	**********	601	1978	18.10	59.58
1.10	**********	601	2579	18.10	77.68
1.15	**********	405	2984	12.20	89.88
1.20	******	141	3125	4.25	94.13
1.25	**	60	3185	1.81	95.93
1.30	*	33	3218	0.99	96.93
1.35	*	24	3242	0.72	97.65
1.40	*	19	3261	0.57	98.22
1.45	*	16	3277	0.48	98.70
1.50		9	3286	0.27	98.98
1.55		6	3292	0.18	99.16
1.60		7	3299	0.21	99.37
1.65		4	3303	0.12	99.49
1.70		6	3309	0.18	99.67
1.75		4	3313	0.12	99.79
1.80		7	3320	0.21	100.00

100 200 300 400 500 600 700 800 900

Frequency

HANØYTANGEN JUNE 1994

QUOTIENT F18/F10

F18/F10 Midpoint		Freq	Cum. Freq	Percent	Cum. Percent
0.75		3	3	0.09	0.09
0.80		5	8	0.15	0.24
0.85		4	12	0.12	0.36
0.90		16	28	0.48	0.84
0.95	****	187	215	5.63	6.47
1.00	**********	1524	1739	45.88	52.35
1.05	**********	970	2709	29.20	81.55
1.10	********	403	3112	12.13	93.68
1.15	***	129	3241	3.88	97.56
1.20	*	40	3281	1.20	98.77
1.25		19	3300	0.57	99.34
1.30		9	3309	0.27	99.61
1.35		8	3317	0.24	99.85
1.40		1	3318	0.03	99.88
1.45		0	3318	0.00	99.88
1.50		2	3320	0.06	99.94
1.55		0	3320	0.00	99.94
1.60		1	3321	0.03	99.97
1.65		1	3322	0.03	100.00
1.70		0	3322	0.00	100.00
1.75		0	3322	0.00	100.00
1.80		0	3322	0.00	100.00

400 800 1200

Frequency

OCCURRENCE TABLES

The content of the table is based on the hourly maxima (Fx) of the 10 min wind speed. First a period fulfilling the criterion Fx < Limit is sought. The lenght of this period is divided by the length of the windows specified and may result in multiples of the actual window or zero if the length of the period is less than the length of the actual window. This procedure is repeated through the month and the number of the different windows are accumulated.

Observation Period :										Location :
From :01/06/94		JUNE 1994								Level : 10 m a.gr.
To : 30/06/94										Coordinates:
Coverage : 76.9%		HANØYTANGEN								X = 71908
Number of data: 3322										Y = 47414
		OCCURRENCE TABLE								
		NUMBER OF WINDOWS FROM 6 TO 72 HOURS								
Wind Speed <= Beaufort		1	2	3	4	5	6	7	8	
Duration										
6 H		0	6	28	54	85	92	92	92	
12 H		0	0	10	23	40	46	46	46	
18 H		0	0	3	11	26	30	30	30	
24 H		0	0	2	8	17	23	23	23	
48 H		0	0	0	2	8	11	11	11	
72 H		0	0	0	0	5	7	7	7	
Remarks : Based on maximum 10mn wind speed within the interval period, in any direction, at 10 metres level										

CLIMATOLOGICAL SUMMARY

Observation Period :											Location:	
From : 01/06/94											Level:	2 m a.gr.
To : 30/06/94						HANØYTANGEN 1994						
Coverage : 76.3 - 76.9 %												
Number of data :3300 - 3322												
						CLIMATOLOGICAL SUMMARY						
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Air Temperature												
Mean Day min.	0.2	-2.1	0.8	3.7	6.1	8.4						
Abs min	-4	-6.3	-5.1	0.3	1.1	4						
Mean Day max.	3.8	3.3	5.3	8.4	13.2	12.3						
Abs max.	6.7	6.4	10.5	14.9	22.7	18.4						
Mean	2.1	0.1	3	5.9	9.5	10.2						
Relative Humidity												
Mean Day min.	61	44	59	57	44	64						
Abs min.	44	27	29	30	19	40						
Mean Day max.	81	73	84	84	80	86						
Abs max.	89	90	89	91	89	93						
Mean	70	60	73	72	63	78						
Air pressure												
Mean Day min.	991.6	1016.7	993.4	1004.4	1013.7	1008.3						
Abs min.	966.2	989.7	969.4	970.9	1004.7	991.9						
Mean Day max.	1003.5	1023.6	1004.7	1011.8	1018	1015.8						
Abs max.	1019.6	1045.2	1024.3	1028.8	1027.8	1028.1						
Mean	998	1020	999.1	1008.2	1016	1012.2						
Coeficient Transfert												
from level 10 to 18	1.051	1.046	1.024	1.022	1.049	1.035						
from level 10 to 30	1.117	1.088	1.055	1.053	1.119	1.067						
from level 18 to 30	1.059	1.036	1.029	1.032	1.063	1.03						
Remarks:												
The summary is based on air temperature, humidity and preasure measured each 10 minute.												

ESTIMATES OF WIND SPEED WITH 10/100 YEAR RETURN PERIODS

The method for the estimation is described in the report 43/92 KLIMA, Climatological statistics for Hanøytangen near Bergen. At the end of May 1994 the parallel series between Hellisøy and Hanøytangen which is of importance for the estimation is very short. It covers the period 3.2-30.6.1994 with some gaps due to missing data at Hanøytangen. At Hellisøy the automatic weather station was out of operation regarding all parameters by the end of 1993. The wind speed measurements were functioning again from 3.2.1994. It must be emphasized that when May 1994 was specified as the first month of which 10/100 years should be presented, the starting of the parallel series was assumed to be September 1993.

The parallel series available at the end of June 1994 is short and the results must therefore be regarded as an approximation. Compared to the estimates given in the report for May 1994, there are some small increases in the values for the sector 300-330°.

Detailed discussion of the results must be postponed to a longer parallel series is available. However, the transfer coefficient for the direction where the extreme most probably will occur, is of the same magnitude as that used for the 10 min mean in the report 43/92 KLIMA. This preliminary result gives no reason to change the 10/100 years estimates given in this report.

The transfer coefficients for the gust wind is lower than the estimates used in the report 43/92 KLIMA. Thus the estimates for the gust wind in this report may seem to high.

Estimates of transfer coefficients based on data from Hellisøy (He) and Hanøytangen (Ha) for the period 3.2-30.6.1994.

V(Han.,10 min)/V(He.,10 min) V(Han.,3 sec.)/V(He.,10 min)						
030-129°	130-159°	160-199°	200-229°	230-299°	300-339°	340-029°
0.60 0.86	0.72 0.98	0.71 1.00	0.81 1.12	0.65 1.00	0.69 1.03	0.58 0.86

The estimates for the wind speed at Hellisøy given below and these new transfer coefficients are applied to compute the wind speed estimates for Hanøytangen.

Estimates of extreme values for the 10 min mean of the wind speed (V_{10}) with return periods 10 and 100 years valid for Hellisøy Fyr.

	SUMMER		WINTER	
	May - August		September - April	
DIRECTION	$V_{10}10$	$V_{10}100$	$V_{10}10$	$V_{10}100$
030-060°	12.3	14.7	19.2	21.7
070-100°	13.0	15.5	16.6	18.8
110-120°	18.1	21.6	24.4	27.6
130-150°	20.6	24.6	28.3	32.0
160-190°	23.8	28.4	30.5	34.4
200-220°	23.8	28.4	30.5	34.4
230-290°	21.6	25.8	27.6	31.2
300-330°	21.1	25.2	28.6	32.3
340-020°	21.6	25.8	28.3	32.3

Estimates of values for the 10 min mean wind speed (V_{10}) with return periods 10 and 100 years valid for Hanøytangen. The estimates are based on computations made for Hellisøy Fyr and the parallel series between Hellisøy Fyr and Hanøytangen for the period 3.2-30.6.1994.

	SUMMER		WINTER	
	May - August		September - April	
DIRECTION	$V_{10}10$	$V_{10}100$	$V_{10}10$	$V_{10}100$
030-060°	7.4	8.8	11.5	13.0
070-100°	7.8	9.3	10.0	11.3
110-120°	10.9	13.0	14.6	16.6
130-150°	14.8	17.7	20.4	23.0
160-190°	16.9	20.2	21.7	24.4
200-220°	19.3	23.0	24.7	27.9
230-290°	14.0	16.8	17.9	20.3
300-330°	14.6	17.4	19.7	22.3
340-020°	12.5	15.0	16.4	18.7

Estimates of values for the 3 sec. gust wind speed (V_g) with return periods 10 and 100 years valid for Hanøytangen. The estimates are based on computations made for Hellisøy Fyr and the parallel series between Hellisøy Fyr and Hanøytangen for the period 3.2-30.6.1994.

	SUMMER		WINTER	
	May - August		September - April	
DIRECTION	V_g10	V_g100	V_g10	V_g100
030-060°	10.6	12.6	16.5	18.7
070-100°	11.2	13.3	14.3	16.2
110-120°	15.6	18.6	21.0	23.7
130-150°	20.2	24.1	27.7	31.4
160-190°	23.8	28.4	30.5	34.4
200-220°	26.7	31.8	34.2	38.5
230-290°	21.6	25.8	27.6	31.2
300-330°	21.7	26.0	29.5	33.3
340-020°	18.6	22.1	24.3	27.8

Appendix 1

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

Appendix 2

Records where at least one of the parameters is outside the criterions set in the automatic filter.

OBS	AAR	MND	DAG	TIME	MIN	REF	F30	G30	DD30	F18	G18	F10	G10	DD10	T	UU	P
16	1994	6	2	21	57	677	25.69	1.30	354.69	0.77	1.30	0.70	1.00	341.43	10.59	79.82	1002.00
17	1994	6	2	22	7	695	35.46	1.30	354.69	0.77	1.00	0.77	1.30	341.43	10.50	80.33	1002.00
18	1994	6	2	22	17	759	37.92	1.30	354.69	1.07	1.30	0.92	1.30	341.43	9.94	80.74	1002.00
19	1994	6	2	22	27	767	38.52	1.59	78.98	1.22	1.59	1.00	1.30	11.62	9.76	81.55	1001.83
20	1994	6	2	22	37	1023	76.72	1.59	80.72	1.22	1.59	0.62	1.00	11.62	9.48	82.36	1001.83
21	1994	6	2	22	47	1023	76.72	1.30	81.07	0.70	1.30	0.55	1.00	11.62	9.29	83.17	1001.66
22	1994	6	2	22	57	1023	76.72	1.30	56.64	0.92	1.30	0.62	1.00	11.62	9.29	83.57	1001.66
23	1994	6	2	23	7	1023	76.72	1.30	75.49	0.77	1.00	0.85	1.00	11.62	9.39	83.98	1001.50
24	1994	6	2	23	17	1023	76.72	1.89	78.28	1.15	1.59	0.77	1.00	11.62	9.39	84.38	1001.50
25	1994	6	2	23	27	1023	76.72	1.89	75.84	1.22	1.59	0.85	1.30	11.62	9.29	84.38	1001.33
26	1994	6	2	23	37	1023	76.72	1.59	71.30	0.85	1.30	0.70	1.00	11.62	9.57	85.09	1001.33
27	1994	6	2	23	47	1023	76.72	1.59	51.06	0.85	1.30	0.40	1.00	11.62	9.29	85.19	1001.33
28	1994	6	2	23	57	1023	76.72	40.09	68.86	0.92	1.59	0.55	1.00	11.62	9.20	85.19	1001.33
29	1994	6	3	0	7	1023	76.72	58.59	74.09	0.40	0.70	0.40	0.70	11.62	9.29	85.60	1001.16
30	1994	6	3	0	17	1023	76.72	72.31	74.44	0.40	1.30	0.70	1.30	358.53	9.11	85.90	1001.16
31	1994	6	3	0	27	1023	76.72	75.60	358.53	1.37	1.59	1.44	1.89	228.35	8.83	86.00	1001.33
32	1994	6	3	0	37	1023	76.72	75.60	293.61	1.44	1.89	1.15	1.59	288.38	8.65	86.41	1001.16
33	1994	6	3	0	47	1023	76.72	75.90	305.83	1.67	2.19	1.37	1.89	296.06	8.56	86.41	1001.16
34	1994	6	3	0	57	1023	76.72	76.34	323.63	2.12	2.49	1.89	2.49	326.42	8.65	86.81	1000.99
35	1994	6	3	1	7	1023	76.72	76.57	319.44	2.26	3.09	2.12	2.79	305.83	8.47	87.12	1001.16
36	1994	6	3	1	17	1023	76.72	76.64	342.47	2.34	2.79	2.26	3.09	308.62	8.01	87.02	1001.16
37	1994	6	3	1	27	1023	76.72	76.64	314.20	1.89	3.09	1.89	3.09	298.15	7.91	87.22	1001.16
38	1994	6	3	1	37	1023	76.72	76.72	313.16	2.26	3.09	2.19	2.79	297.80	8.01	87.52	1001.16
39	1994	6	3	1	47	1023	76.72	76.72	325.37	2.49	3.38	2.41	3.68	309.67	8.10	87.62	1001.16
40	1994	6	3	1	57	1023	76.72	76.72	328.86	2.86	3.68	2.64	3.98	309.67	8.10	87.83	1001.16
41	1994	6	3	2	7	1023	76.72	76.72	329.91	2.04	2.79	1.89	2.79	319.79	8.28	87.93	1000.65
42	1994	6	3	2	17	1023	76.72	76.72	343.87	2.41	3.09	2.34	3.38	330.96	8.47	87.83	1000.65
43	1994	6	3	2	27	1023	76.72	76.72	328.86	1.97	3.09	2.04	2.79	320.49	8.37	88.03	1000.48
44	1994	6	3	2	37	1023	76.72	76.72	329.91	2.04	3.09	2.04	3.09	335.49	8.37	88.33	1000.48
45	1994	6	3	2	47	1023	76.72	76.72	351.20	1.37	2.19	1.44	2.19	337.59	8.37	88.33	1000.48
46	1994	6	3	2	57	1023	76.72	76.72	328.86	1.37	1.89	1.37	1.89	321.53	8.37	88.43	1000.48
47	1994	6	3	3	7	1023	76.72	76.72	345.61	1.44	1.89	1.44	1.89	336.89	8.37	88.64	1000.14
48	1994	6	3	3	17	1023	76.72	76.72	351.20	1.44	1.89	1.37	1.89	338.28	8.37	88.64	1000.14
49	1994	6	3	3	27	1023	76.72	76.72	352.94	24.87	1.59	0.92	1.59	338.63	8.47	88.84	1000.14
50	1994	6	3	3	37	1023	76.72	76.72	357.13	24.72	1.89	0.85	1.59	347.01	8.47	88.64	1000.14

OBS	AAR	MND	DAG	TIME	MIN	REF	F30	G30	DD30	F18	G18	F10	G10	DD10	T	UU	P
51	1994	6	3	3	47	1023	76.72	76.72	120.51	25.09	1.89	1.00	1.59	10.57	8.47	88.84	999.97
52	1994	6	3	3	57	1023	76.72	76.72	351.20	25.02	1.59	1.00	1.59	10.92	8.56	88.84	999.97
53	1994	6	3	4	7	1023	76.72	76.72	120.51	25.09	1.89	1.07	1.59	10.92	8.47	89.04	999.97
54	1994	6	3	4	17	1023	76.72	76.72	120.51	25.91	1.59	0.92	1.59	341.43	8.56	89.14	999.97
55	1994	6	3	4	27	1023	76.72	76.72	355.04	26.29	2.79	1.07	2.49	298.15	8.47	89.14	999.97
56	1994	6	3	4	37	1023	76.72	76.72	355.04	26.29	21.59	1.15	2.49	336.54	8.37	89.24	999.97
57	1994	6	3	4	47	1023	76.72	76.72	358.53	25.84	26.44	0.70	1.00	338.63	8.47	89.14	999.97
58	1994	6	3	4	57	1023	76.72	76.72	358.53	26.21	25.47	0.85	1.30	274.07	8.47	89.24	999.97
59	1994	6	3	5	7	1023	76.72	76.72	358.53	26.29	25.84	1.30	1.89	277.91	8.37	89.24	999.97
60	1994	6	3	5	17	1023	76.72	76.72	358.53	25.84	26.44	1.74	2.49	287.68	8.28	89.24	999.97
61	1994	6	3	5	27	1023	76.72	76.72	358.53	25.84	26.21	1.89	2.19	261.16	8.37	89.45	999.97
62	1994	6	3	5	37	1023	76.72	76.72	358.53	26.58	25.84	20.24	1.89	284.54	8.56	89.55	999.97
63	1994	6	3	5	47	1023	76.72	76.72	358.53	25.84	26.44	19.87	1.30	328.16	8.47	89.24	999.97
64	1994	6	3	5	57	1023	76.72	76.72	358.53	26.58	25.84	25.09	1.59	178.44	8.28	89.65	999.97
65	1994	6	3	6	7	1023	76.72	76.72	358.53	26.58	25.84	25.02	1.59	185.07	8.28	89.55	999.97
66	1994	6	3	6	17	1023	76.72	76.72	358.53	26.58	27.41	25.99	3.09	82.47	8.28	89.65	999.97
67	1994	6	3	6	27	1023	76.72	76.72	358.53	76.72	27.41	26.44	3.09	74.09	8.28	89.65	999.80
68	1994	6	3	6	37	1023	76.72	76.72	358.53	76.72	26.58	26.58	26.21	75.84	8.28	89.65	999.80
69	1994	6	3	6	47	1023	76.72	76.72	358.53	76.72	26.58	25.84	26.44	90.84	8.37	89.65	999.80
70	1994	6	3	6	57	1023	76.72	76.72	358.53	76.72	76.72	25.99	25.84	113.18	8.56	89.95	999.80
71	1994	6	3	7	7	1023	76.72	76.72	358.53	76.72	76.72	25.84	25.47	113.18	8.74	89.95	999.80
72	1994	6	3	7	17	1023	76.72	76.72	358.53	76.72	76.72	25.99	26.44	118.76	8.56	89.95	999.80
73	1994	6	3	7	27	1023	76.72	76.72	358.53	76.72	26.58	25.99	26.44	74.09	8.83	89.95	999.80
74	1994	6	3	7	37	1023	76.72	76.72	358.53	26.58	25.84	25.24	1.89	74.79	8.65	89.95	999.80
75	1994	6	3	7	47	1023	76.72	76.72	358.53	26.58	25.84	1.22	1.59	74.79	8.74	89.95	999.80
76	1994	6	3	7	57	1023	76.72	76.72	120.51	26.21	25.47	0.85	1.30	74.79	8.83	90.05	999.80
77	1994	6	3	8	7	1023	76.72	76.72	120.51	25.84	1.30	0.55	1.00	74.79	8.83	90.05	999.80
78	1994	6	3	8	17	1023	76.72	76.72	120.51	25.99	1.30	0.77	1.30	74.79	9.11	90.05	999.80
79	1994	6	3	8	27	1023	76.72	76.34	120.51	0.85	1.89	0.70	1.59	74.79	9.57	90.05	999.80
80	1994	6	3	8	37	1023	76.72	76.34	120.51	0.47	1.00	0.55	1.30	74.79	9.39	90.05	999.80
81	1994	6	3	8	47	1023	76.72	64.41	117.02	1.15	1.89	0.85	1.89	74.79	9.29	90.05	999.80
82	1994	6	3	8	57	1023	76.72	26.21	114.92	0.70	1.89	0.77	1.59	74.79	9.48	90.05	999.80
83	1994	6	3	9	7	1023	76.72	26.44	127.14	1.74	2.19	1.52	2.19	74.79	9.57	90.05	999.64
84	1994	6	3	9	17	1023	76.72	26.44	143.19	1.89	2.19	1.59	2.19	78.28	9.48	90.36	999.64
85	1994	6	3	9	27	1023	76.72	21.88	138.66	1.97	2.49	1.82	2.19	104.80	9.48	90.36	999.64
86	1994	6	3	9	37	1023	76.72	21.88	156.11	1.89	2.79	1.67	2.49	109.69	9.57	90.26	999.64
87	1994	6	3	9	47	1023	76.72	26.21	167.97	1.74	2.19	1.67	1.89	110.04	9.48	90.26	999.64
88	1994	6	3	9	57	1023	76.72	27.55	252.08	1.82	2.79	1.82	2.79	244.05	9.85	90.36	999.64

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RECORDS WITH PARAMETERS OUTSIDE THE CRITERIONS

OBS	AAR	MND	DAG	TIME	MIN	REF	F30	G30	DD30	F18	G18	F10	G10	DD10	T	UU	P
101	1994	6	3	12	7	1023	73.28	3.09	313.16	1.82	3.68	1.82	3.09	300.59	12.44	77.80	998.96
102	1994	6	3	12	17	1023	69.03	3.09	324.32	2.34	3.09	2.49	3.09	324.67	12.72	78.10	998.79
103	1994	6	3	12	27	1023	68.58	2.79	308.27	1.89	2.79	1.97	2.79	313.51	13.28	77.39	998.79
104	1994	6	3	12	37	1023	58.44	2.19	245.80	1.22	2.19	1.22	2.19	281.40	14.40	75.47	998.79
105	1994	6	3	12	47	1023	39.42	1.89	267.79	1.22	2.19	1.22	1.89	282.79	14.86	70.20	998.62
106	1994	6	3	14	47	1023	73.36	7.86	173.91	6.59	7.86	6.59	7.86	180.89	14.68	63.72	998.28
107	1994	6	3	14	57	1023	76.49	8.16	171.81	6.37	8.16	6.37	8.16	170.76	14.58	64.53	998.28
108	1994	6	3	15	7	1023	76.72	8.46	166.93	7.26	8.76	7.34	8.76	167.62	14.40	65.54	997.94
109	1994	6	3	15	17	1023	76.72	9.05	155.76	7.64	9.05	7.56	9.05	158.20	13.74	68.17	998.28
110	1994	6	3	15	27	1023	76.72	28.23	157.50	7.71	8.76	7.79	8.76	159.95	13.56	69.79	998.45
111	1994	6	3	15	37	1023	76.72	28.23	154.01	7.49	8.76	7.56	8.76	153.66	13.65	71.01	998.45
112	1994	6	3	15	47	1023	76.72	76.72	150.17	26.29	7.56	5.92	7.56	148.43	13.37	73.04	998.45
113	1994	6	3	15	57	1023	76.72	76.72	150.17	25.84	27.41	6.37	7.56	148.43	13.28	74.25	998.45
114	1994	6	3	16	7	1023	76.72	76.72	358.53	26.58	27.41	26.29	8.16	150.17	13.19	75.47	998.45
115	1994	6	3	16	17	1023	76.72	76.72	358.53	27.78	26.21	8.31	30.61	230.44	22.77	47.31	940603.00
116	1994	6	3	16	37	1023	76.72	76.72	358.53	26.58	25.84	32.18	50.53	264.30	-2.18	940603.00	1647.00
117	1994	6	3	16	57	1023	76.72	76.72	358.53	76.72	76.72	37.77	51.28	301.99	-2.18	940603.00	1707.00
118	1994	6	3	17	17	1023	76.72	76.72	358.53	76.72	76.72	76.72	74.33	176.35	940603.00	1727.00	1023.00
119	1994	6	3	17	37	1023	76.72	76.72	358.53	76.72	76.72	76.72	76.72	358.53	940603.00	1747.00	1023.00
120	1994	6	3	17	57	1023	76.72	76.72	358.53	76.72	76.72	76.72	76.72	358.53	940603.00	1807.00	1023.00
121	1994	6	3	18	17	1023	76.72	76.72	358.53	76.72	76.72	76.72	76.72	358.53	940603.00	1827.00	1023.00
122	1994	6	3	18	37	1023	76.72	76.72	358.53	76.72	76.72	76.72	76.72	358.53	940603.00	1847.00	1023.00
123	1994	6	3	18	57	1023	76.72	76.72	358.53	76.72	76.72	76.72	76.72	358.53	940603.00	1907.00	1023.00
124	1994	6	3	19	17	1023	76.72	76.72	358.53	76.72	76.72	76.72	76.72	358.53	940603.00	1927.00	1023.00
125	1994	6	3	19	37	1023	76.72	76.72	358.53	76.72	76.72	76.72	76.72	358.53	940603.00	1947.00	1023.00
126	1994	6	3	19	57	1023	76.72	76.72	358.53	76.72	76.72	76.72	76.72	358.53	940603.00	2007.00	1023.00
127	1994	6	3	20	17	1023	76.72	76.72	358.53	76.72	76.72	76.72	76.72	358.53	940603.00	2027.00	1023.00
128	1994	6	3	20	37	1023	76.72	76.72	358.53	76.72	76.72	76.72	76.72	940603.00	2047.00	1023.00	76.72
129	1994	6	3	20	57	1023	76.72	76.72	358.53	76.72	76.72	76.72	940603.00	2107.00	1023.00	76.72	76.72
130	1994	6	3	21	17	1023	76.72	76.72	358.53	76.72	76.72	940603.00	2127.00	1023.00	76.72	76.72	358.53
131	1994	6	3	21	37	1023	76.72	76.72	358.53	76.72	940603.00	2147.00	1023.00	76.72	76.72	358.53	76.72
132	1994	6	3	21	57	1023	76.72	76.72	358.53	76.72	940603.00	2207.00	1023.00	76.72	76.72	358.53	940603.00
133	1994	6	3	22	27	1023	76.72	76.72	940603.00	2237.00	1023.00	76.72	940603.00	2247.00	1023.00	76.72	940603.00

RECORDS WITH PARAMETERS OUTSIDE THE CRITERIONS

OBS	AAR	MND	DAG	TIME	MIN	REF	F30	G30	DD30	F18	G18	F10	G10	DD10	T	UU	P
1	1994	6	21	7	44	645	3.38	35.01	169.72	11.07	13.53	11.07	13.53	171.81	11.24	85.60	1001.83
2	1994	6	30	3	44	645	3.16	12.34	234.28	9.58	12.63	8.53	11.14	245.10	10.77	87.22	1008.94