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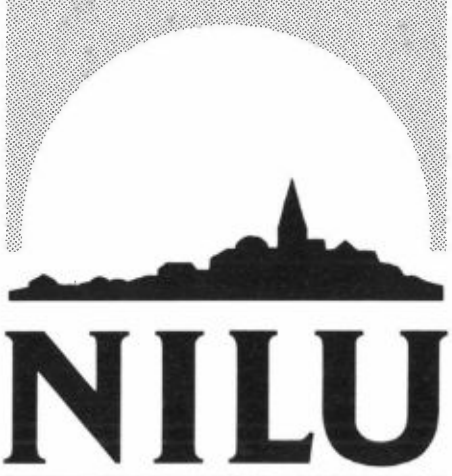
USERS GUIDE FOR STATISTICAL PROGRAMS

Trond Bøhler



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SUMMARY

This report consists of user guides for a set of programs for statistical evaluation of meteorological and air quality data. All the programs are interactive and the input are monthly data-files in standard NILU-format.

The programs perform standard statistics for meteorological- and air quality data, such as monthly maximum, minimum and average values, cumulative frequency distribution and diurnal distribution of a parameter. In addition, some general wind statistics are carried out, such as frequency distribution of wind speeds and wind directions.

One program calculates different stability parameters for further evaluation in stability classes. The information of winds, stability and air quality can be combined to perform an impact matrix, which relates air quality to meteorological conditions.

CONTENTS

USER GUIDE FOR STATISTICAL PROGRAMS

1 INTRODUCTION

NILU has developed several programs for statistical evaluation of meteorological and air quality data. This report consists of user guides for the following programs:

- DATCONV

  This program converts one hour average formatted data to binary coded data and store them for further statistical evaluation.

- TEMPHUM

  This program performs standard statistics for data regarding temperature and relative humidity.

- WINDROSE

  This program presents standard statistics for wind speed and direction for four wind speed classes and up to 36 wind sectors.

- CONFREC

  This program performs maximum, minimum and average values for a given scalar, i.e. concentrations. In addition, the program sorts the parameter into boxes of user given limits and calculates average diurnal distribution of the parameter.

- STABPAR

  This program calculates a stability parameter in four ways, either as temperature lapse rate or bulk Richardson numbers (3 methods).

- STABFREC

  This program presents diurnal distribution in four classes of stability for a stability parameter(Ri_b, DT/DZ)

- METFREC

  This program presents joint frequency distribution of wind speed, wind direction, stability and air quality for four wind classes, twelve wind sectors and four stability classes for a given period.

The user guide consists of a general description of the program and an example of a typical dialogue. In addition, a test-example for the program with the results are included in the user guide. All the programs are interactive with a dialogue to the user´s terminal. The program input is based on monthly data-files in standard NILU format.

2 PROGRAM DATCONV

2.1 GENERAL DESCRIPTION OF THE PROGRAM

The program DATCONV converts standard NILU-formatted ASCII data to binary coded data and store them on a file for further statistical evaluation.

2.2 FORMAT-DESCRIPTION OF THE INPUT-FILE

On the INPUT-file the following data-format must be used :

2.2.1 NSTA,IST,IDA(4),IDB(4),NDAG,NOBS,NPAR

NSTA - Station number
IST - Station name
IDA - Start date(day,month,year,hour)
IDB - Stop date(day,month,year,hour)
NDAG - Number of days in the period
NOBS - Number of observation per day
NPAR - Number of parameters on the file

Format: I4,A16,11I4

2.2.2 IHEAD(30)

Three lines containing information of the file

Format: 3(10A8,/)

2.2.3 JDES(I),I=1,NPAR

Number of decimals in the input-data

Format: 20I4

For each parameter, the following sequence are input:

2.2.4 JST,IDG,X(24)

JST - Station number
IDG - Date (the program checks if the date is correct)
X(24) - one-hour average data for one day
(two lines per day, two blank lines means end of the file)

Format: I3,2X,I2,13X,12F5.a,/,20X,12F5.a)
Where a is the number of decimals given in paragrph 2.2.3

2.3 THE PROGRAM DIALOGUE

The program DATCONV is an interactive program with a dialogue to the users terminal. The converted data are written on an user specified file. The program writes a description of the work out on an user specified logfile. A typical dialogue is given below:

```
@DATCONV

Output of the converted data:

   1) Output of only the heading
   2) Output of the five first and the five last days
   3) Output of all the data

   Enter 1,2 or 3 .....................      : 1,
Name of the log-file ....................      : DATCONV-LOG

Name of the input-fil (FORMATTED) .....      : 101JUL86:SYMB
Navn på the output-fil (UNFORMATTED) ....      : 101JUL86:BIN
EXIT from DATCONV? (Y/N).....................      : N
Name of the input-fil (FORMATTED) .....      : 101AUG86:SYMB
Navn på the output-fil (UNFORMATTED) ....      : 101AUG86:BIN
EXIT from DATCONV? (Y/N).....................      : Y

STOP PROGRAM DATCONV
```

2.4 TEST-EXAMLE OF THE PROGRAM

```
@DATCONV
1,
DATCONV-LOG
101JUL86:DATA
101JUL86:BIN
N
101AUG86:DATA
101AUG86:BIN
Y
```

2.5 THE RESULTS FROM THE TEST-EXAMPLE

The data are stored in binary code on the two files defined :BIN, and the following information are written on the logfile DATCONV-LOG :

```
 Following data are written on the file 101JUL86:BIN

 101NAUTICA            1   7  86   1  31   7  86  24  31  24   4
     PAR 1: FF      PAR 2: DD
     PAR 3: TEMP    PAR 4: SO2

 Following data are written on the file 101AUG86:BIN

 101NAUTICA            1   8  86   1  31   8  86  24  31  24   4
     PAR 1: FF      PAR 2: DD
     PAR 3: TEMP    PAR 4: SO2

 End program DATCONV
```

3 PROGRAM TEMPHUM

3.1 GENERAL DESCRIPTION OF THE PROGRAM

The program TEMPHUM deals with the following data:

- Temperature data
- Relative humidity data

The program TEMPHUM gives the following statistics for each month:

- Mean, maximum and minimum values
- Occurrence within selected classes
- Monthly averages for selected hours

3.2 THE PROGRAM DIALOGUE

The program TEMPHUM is an interactive program with a dialogue to the users terminal. The results are written on a user specified result-file. The example below is a typical input sequence of the program.

```
@TEMPHUM

Input/Output in English? (Y/N) ..............      : Y
Name of the result-file: .....................      : TEMPO-RES
Number of months  (max 60) ...................      : 3

The statistics are carried out for :
  1) Temperature data
  2) Relative humidity
  Enter data type ............................      :1

Output of one-hour averaged values? (Y/N).....      : N
Reading data for each I hour, enter I ........      : 1
Time of the day for the first observation ....      : 1
Print-out of each I hour, enter I ............      : 3
Time of the day for the first print-out ......      : 1
Enter scaling faktor for the data (Usually 1).      : 1
Number of bounds (max.6) .....................      : 3
```

```
Enter the values of the bounds ..............      : 10.,20.,30.
Testing for greater(G) or less(L) than the bounds   : G

Enter input-data of month number  1.
Write name of datafile (Max 16 chars) ........      : 104JUN79
Select parameter number:
(0=drop this file and select another.).........     : 3

Enter input-data of month number  2.
Write name of datafile (Max 16 chars) ........      : 104JUL79
Select parameter number:
(0=drop this file and select another.).........     : 3

Enter input-data of month number  3.
Write name of datafile (Max 16 chars) ........      : 104AUG79
Select parameter number:
(0=drop this file and select another.).........     : 3
EXIT from temphum? (Y/N) .....................      : Y

STOP  END OF PROGRAM TEMPHUM
```

3.3 TEST-EXAMPLE OF THE PROGRAM

```
@TEMPHUM
Y
TEMPO-RES
3
1
N
1
1
3
1
1
3
10.,20.,30.
G
```

```
104JUN79
3
104JUL79
3
104AUG79
3
Y
```

3.4 THE RESULTS FROM THE TEST-EXAMPLE

Station : FERIA
Period : 01.06.79 - 31.08.79
Parameter: TEMPERATURE
Unit : DEGREES C

MEAN, MAXIMUM AND MINIMUM VALUES

			Max			Min			Average	
Month	Nobs	Tmean	T	Day	Hr	T	Day	Hr	Tmax	Tmin
Jun 1979	27	17.7	27.4	9	15	11.2	17	05	21.0	14.3
Jul 1979	30	20.9	32.7	7	14	12.8	* 4	05	25.7	16.7
Aug 1979	25	20.8	30.1	*31	12	12.2	22	06	23.9	17.4

OCCURRENCE WITHIN SELECTED LIMITS

	T > 10.0		T > 20.0		T > 30.0	
Month	Days	Hours	Days	Hours	Days	Hours
Jun 1979	27	578	17	122	0	0
Jul 1979	30	684	28	352	5	19
Aug 1979	25	353	21	214	1	3

Station : FERIA
Period : 01.06.79 - 31.08.79
Parameter: TEMPERATURE
Unit : DEGREES C

MONTHLY AVERAGES FOR SELECTED HOURS

Month: Jun 1979

	Hours							
	01	04	07	10	13	16	19	22
Mean value	15.5	14.8	16.0	19.3	20.3	20.2	18.6	16.7
Stand.dev.	1.8	2.0	2.1	3.1	2.7	2.9	2.2	1.6
Nobs	(25)	(25)	(20)	(23)	(25)	(25)	(25)	(25)(578)

Month: Jul 1979

	Hours							
	01	04	07	10	13	16	19	22
Mean value	18.4	17.2	18.0	23.0	24.2	24.6	22.1	19.5
Stand.dev.	1.6	1.9	1.4	3.5	3.6	3.7	2.9	1.7
Nobs	(29)	(29)	(27)	(28)	(29)	(28)	(29)	(29) (684)

Month: Aug 1979

	Hours							
	01	04	07	10	13	16	19	22
Mean value	18.5	17.8	17.3	22.7	23.6	22.9	21.4	19.4
Stand.dev.	2.8	2.9	2.6	3.3	3.5	3.1	2.1	2.1
Nobs	(13)	(11)	(9)	(17)	(19)	(17)	(14)	(13) (353)

4 PROGRAM WINDROSE

4.1 GENERAL DESCRIPTION OF THE PROGRAM

The following data are input for the program :

- Wind speed
- Wind direction

The program WINDROSE gives the following results :

- Diurnal variation of wind directions
- Distribution of wind speed with wind directions
- Average wind speed for each wind sector
- Average wind speed for selected wind speed classes

4.2 THE PROGRAM DIALOGUE

The program WINDROSE is an interactive program with a dialogue to the users terminal. The results are written on an user specified result-file. The example below is a typical input sequence for the program. The numbers of parameters will vary dependent of the work to be carried out.

```
@WINDROSE

Input/Output in English? (Y/N).............      : Y
Name of the result file ...................      : WIND-RES
Number of months ..........................      : 3
Wind distribution for each I hour, enter I..     : 3
Time of the day for the first distribution..     : 1
```

If the number of months are more than 1, the following question are given :

```
Output for each month? (Y/N) ..............      : N

Maximum windspeed defined as calm .........      : 0.2
Number of bounds for windspeed distribution (Max6)  : 3
Enter 3 upper bounds for windspeed distribution     : 2.0,4.0,6.0
Number of wind sectors (12,16,36) .........      : 12
```

```
Data consist of values for each I hour, enter I     : 1
Time of the day for the first measurement ..        : 1

Wind direction equal zero might be interpreted
in three ways:
  1: Data not available
  2: Wind direction equal 360 degrees
  3: Calm conditions
  Enter 1,2 or 3  .........................         : 2

The analysis are carried out for  3 months.

Enter WINDSPEED-data for month number  1
Write name of datafile (Max 16 chars) ......        : 104JUN79
Select parameter number:
(0=drop this file and select another.).....         : 1

Enter WINDDIRECTION-data from the same file? (Y/N)  : Y
Select parameter number:
(0=drop this file and select another.).....         : 2
Enter WINDSPEED-data for month number  2
Write name of datafile (Max 16 chars) ......        : 104JUL79
Select parameter number:
(0=drop this file and select another.).....         : 1

Enter WINDDIRECTION-data from the same file? (Y/N)  : Y
Select parameter number:
(0=drop this file and select another.).....         : 2

Enter WINDSPEED-data for month number  3
Write name of datafile (Max 16 chars) ......        : 104AUG79
Select parameter number:
(0=drop this file and select another.).....         : 1

Enter WINDDIRECTION-data from the same file? (Y/N)  : Y
Select parameter number:
(0=drop this file and select another.).....         : 2
EXIT FROM WINDROSE? (Y/N) ........                  : Y

STOP  END OF PROGRAM WINDROSE
```

4.3 TEST-EXAMPLE FOR THE PROGRAM

```
@WINDROSE
Y
WIND-RES
3
3
1
N
0.2
3
2,4,6
12
1
1
2
104JUN79
1
Y
2
104JUL79
1
Y
2
104AUG79
1
Y
2
Y
```

4.4 THE RESULTS FROM THE TEST-EXAMPLE

Station : FERIA

Periode : 01.06.79 - 31.08.79

DIURNAL VARIATION OF WIND DIRECTIONS (%)

*) Wind-direction	Hours 01	04	07	10	13	16	19	22	Wind-rose
30	4.8	5.0	5.9	16.9	12.5	14.7	24.2	9.4	11.3
60	1.6	.0	3.9	7.7	5.6	10.3	7.6	.0	5.2
90	3.2	1.7	2.0	6.2	6.9	4.4	6.1	1.6	4.0
120	1.6	.0	.0	4.6	.0	.0	.0	4.7	1.7
150	4.8	10.0	31.4	7.7	1.4	1.5	1.5	1.6	6.3
180	30.2	36.7	13.7	4.6	1.4	.0	4.5	1.6	10.7
210	11.1	1.7	2.0	.0	.0	.0	.0	.0	2.1
240	1.6	8.3	.0	.0	.0	.0	.0	3.1	2.7
270	4.8	6.7	9.8	3.1	4.2	.0	.0	12.5	4.0
300	6.3	3.3	.0	3.1	2.8	1.5	3.0	20.3	6.1
330	17.5	11.7	11.8	26.2	16.7	11.8	21.2	23.4	17.0
360	6.3	10.0	5.9	16.9	48.6	55.9	30.3	14.1	24.3
Calm	6.3	5.0	13.7	3.1	.0	.0	1.5	7.8	4.7
Nobs	(63)	(60)	(51)	(65)	(72)	(68)	(66)	(64)	(1541)
Average wind m/s	1.1	1.3	1.1	1.8	3.6	4.0	3.0	1.4	2.2

DISTRIBUTION OF WINDSPEED WITH WIND DIRECTIONS (%)

Class I: Windspeed .3 - 2.0 m/s
Class II: Windspeed 2.1 - 4.0 m/s
Class III: Windspeed 4.1 - 6.0 m/s
Class IV: Windspeed > 6.0 m/s

*) Wind-direction	Classes I	II	III	IV	Total	Average Nobs	wind m/s
30	3.9	4.8	2.3	.3	11.3	(174)	2.8
60	2.1	2.6	.5	.0	5.2	(80)	2.4
90	2.4	1.2	.3	.0	4.0	(61)	1.8
120	1.7	.0	.0	.0	1.7	(26)	.9
150	5.8	.5	.0	.0	6.3	(97)	1.3
180	9.9	.8	.1	.0	10.7	(165)	1.3
210	2.1	.0	.0	.0	2.1	(33)	.6
240	2.5	.2	.0	.0	2.7	(41)	.9
270	3.3	.6	.0	.0	4.0	(61)	1.2
300	3.6	2.1	.5	.0	6.1	(94)	1.8
330	7.1	6.1	3.2	.5	17.0	(262)	2.7
360	5.3	11.8	6.4	.8	24.3	(375)	3.3
Calm					4.7	(72)	
Total	49.6	30.7	13.4	1.6	100.0	(1541)	
Average wind m/s	1.1	3.1	4.7	6.4			2.2

*) This number indicates central direction of sector.

5 PROGRAM CONFREC

5.1 GENERAL DESCRIPTION OF THE PROGRAM

The program CONFREC handle one-hour average air quality data, and gives the following statistics:

- Diurnal mean and maximum values
- Monthly mean values and standard deviation
- Average diurnal distribution of mean, maximum and standard deviation for the selected period
- Frequency distribution within selected intervals

5.2 THE PROGRAM DIALOGUE

The program CONFREC is an interactive program with a dialogue to the users terminal. The results are written on an user specified result-file. The example below is a typical input sequence for the program. The number of parameters and the sequence will vary with the work to be carried out.

```
@CONFREC

Input/Output in English? (Y/N).....          : Y
Name of the result-file .....                : CONFREC-RES
Number of months .....                       : 3
Number of observations pr.day .....          : 24
Enter hour of the day for the beginning
of the averaging period .....                : 1
Output of 24-hours average values? (Y/N) ...  : Y
Output of diurnal distribution? (Y/N) .....   : Y
```

If the number of months are more than 1, the following question are given :

```
Output for each month? (Y/N) .....           : N
Calculation of cumulative distribution (Y/N) : Y
Number of bounds ( 0: Automatic bounds ) ..  : 0
```

```
If  the  number of bounds differs from 0, i.e. 10, the following ques-
tion are given :
Enter 10 values for the upper bounds .......        :    ,
and the next question is omitted.

Enter scaling factor for the bounds ........        : 1
Enter scaling factor for the data ..........        : 1
Enter parameter string .....................        : SO2
Enter parameter unit .......................        : UG/M3

Testing for small negative values
and PEAK-values (neg.values)?  (Y/N)........        : N

The  analysis is carried out for  3 months. Enter input data for month
no  1.
Write name of datafile (Max 16 chars) ......        : 104JUN79
Select parameter number:
(0=drop this file and select another.).....         : 4

The  analysis is carried out for  3 months. Enter input data for month
no  2.
Write name of datafile (Max 16 chars) ......        : 104JUL79
Select parameter number:
(0=drop this file and select another.).....         : 4

The  analysis is carried out for  3 months. Enter input data for month
no  3.
Write name of datafile (Max 16 chars) ......        : 104AUG79
Select parameter number:
(0=drop this file and select another.).....         : 4

EXIT from CONFREC? (Y/N) ...................        : Y

STOP  END OF PROGRAM CONFREC
```

5.3 TEST-EXAMPLE OF THE PROGRAM

```
@CONFREC
Y
CONFREC-RES
3
24
1
Y
Y
N
Y
0
1
1
SO2
UG/M3
N
104JUN79
4
104JUL79
4
104AUG79
4
Y
```

5.4 THE RESULTS FROM THE TEST-EXAMPLE

Station : FERIA

Period : 01.06.79 - 30.06.79

Parameter: SO2

Unit : UG/M3

DIURNAL MEAN AND MAXIMUM VALUES

	*)Diurnal		N u m b e r		
Date	mean	Max	Nobs	99	Zero
010679	79.3	190.0	11	13	0
020679	.0	.0	0	24	0
030679	.0	.0	0	24	0
040679	79.0	120.0	10	14	0
050679	49.2	145.0	18	6	2
060679	81.9	265.0	20	4	0
070679	44.8	201.0	20	4	4
080679	265.2	620.0	19	5	0
090679	135.2	328.0	24	0	0
100679	97.6	241.0	24	0	0
110679	114.1	360.0	21	3	0
120679	144.6	267.0	23	1	0
130679	90.6	156.0	23	1	0
140679	65.1	126.0	24	0	0
150679	50.3	114.0	23	1	0
160679	39.2	109.0	24	0	1
170679	38.3	167.0	24	0	3
180679	97.4	253.0	22	2	0
190679	259.3	499.0	23	1	0
200679	194.7	484.0	23	1	0
210679	135.5	318.0	23	1	0
220679	42.8	146.0	21	3	0
230679	84.0	192.0	24	0	0
240679	46.3	174.0	24	0	0
250679	54.2	87.0	6	18	0
260679	.0	.0	0	24	0
270679	46.2	112.0	16	8	0
280679	53.3	156.0	20	4	0
290679	102.8	237.0	23	1	0
300679	27.2	139.0	24	0	3

Mean value for the month: 95.1 UG/M3
Stand.dev. for the month: 93.4 UG/M3

*) Averaging time is betweeen 01 - 24

Station : FERIA
Period : 01.07.79 - 31.07.79
Parameter: SO2
Unit : UG/M3

DIURNAL MEAN AND MAXIMUM VALUES

	*)Diurnal		Number		
Date	mean	Max	Nobs	99	Zero
010779	28.1	193.0	24	0	5
020779	31.7	135.0	22	2	0
030779	64.0	392.0	20	4	0
040779	108.5	262.0	21	3	0
050779	212.1	391.0	24	0	0
060779	113.0	313.0	23	1	0
070779	20.9	33.0	13	11	0
080779	18.5	31.0	24	0	0
090779	16.1	31.0	14	10	0
100779	92.7	154.0	7	17	0
110779	129.7	293.0	22	2	0
120779	64.6	150.0	23	1	0
130779	67.0	155.0	24	0	0
140779	41.7	103.0	24	0	1
150779	66.8	143.0	24	0	0
160779	131.8	226.0	21	3	0
170779	82.1	254.0	22	2	5
180779	211.1	675.0	23	1	0
190779	86.7	203.0	24	0	0
200779	67.5	139.0	22	2	0
210779	80.7	141.0	24	0	0
220779	36.3	137.0	24	0	6
230779	61.5	134.0	23	1	0
240779	139.8	203.0	5	19	0
250779	.0	.0	0	24	0
260779	108.9	179.0	12	12	0
270779	95.5	201.0	24	0	0
280779	50.2	190.0	24	0	0
290779	77.2	173.0	24	0	0
300779	61.1	145.0	23	1	0
310779	91.5	433.0	24	0	0

Mean value for the month: 81.1 UG/M3
Stand.dev. for the month: 79.2 UG/M3

*) Averaging time is betweeen 01 - 24

Station : FERIA

Period : 01.08.79 - 31.08.79

Parameter: SO2

Unit : UG/M3

DIURNAL MEAN AND MAXIMUM VALUES

	*)Diurnal		Number		
Date	mean	Max	Nobs	99	Zero
010879	77.5	279.0	24	0	0
020879	114.2	198.0	21	3	0
030879	83.3	276.0	15	9	0
040879	34.3	98.0	13	11	0
050879	109.9	242.0	15	9	0
060879	240.0	507.0	10	14	0
070879	130.9	368.0	17	7	0
080879	84.3	119.0	12	12	0
090879	132.5	230.0	11	13	0
100879	62.5	103.0	8	16	0
110879	91.2	192.0	12	12	0
120879	54.4	120.0	15	9	0
130879	.0	.0	0	24	0
140879	41.6	81.0	14	10	0
150879	55.1	141.0	24	0	0
160879	42.0	46.0	3	21	0
170879	.0	.0	0	24	0
180879	.0	.0	0	24	0
190879	.0	.0	0	24	0
200879	52.1	75.0	10	14	0
210879	26.0	63.0	7	17	0
220879	53.3	111.0	12	12	0
230879	.0	.0	0	24	0
240879	51.9	77.0	7	17	0
250879	120.5	296.0	13	11	0
260879	.0	.0	0	24	0
270879	25.9	87.0	14	10	3
280879	66.3	142.0	20	4	0
290879	123.5	576.0	22	2	0
300879	70.5	117.0	6	18	0
310879	117.4	351.0	21	3	0

Mean value for the month: 85.9 UG/M3
Stand.dev. for the month: 80.0 UG/M3

*) Averaging time is betweeen 01 - 24

Mean value for the whole period: 87.3 UG/M3
Stand.dev. for the whole period: 85.0 UG/M3

*) Averaging time is betweeen 01 - 24

Station : FERIA
Period : 01.06.79 - 31.08.79
Parameter: SO2
Unit : UG/M3

MEAN DIURNAL VARIATION

		Stand.		Number		
Hour	Mean	dev.	Max	Nobs	99	Zero
01	61.3	53.7	218.0	66	26	1
02	64.5	59.2	248.0	66	26	1
03	72.6	57.9	259.0	66	26	0
04	79.5	58.0	276.0	64	28	0
05	86.4	65.6	329.0	63	29	0
06	102.6	76.2	334.0	61	31	0
07	135.7	104.5	576.0	56	36	0
08	138.4	97.8	443.0	59	33	0
09	121.3	90.0	484.0	63	29	0
10	117.2	106.2	507.0	67	25	0
11	114.7	106.6	499.0	64	28	0
12	109.1	90.1	334.0	63	29	0
13	111.4	109.1	675.0	68	24	0
14	93.4	74.0	416.0	64	28	2
15	98.0	82.5	381.0	60	32	1
16	95.6	87.0	358.0	61	31	2
17	76.3	60.7	309.0	63	29	3
18	77.0	70.9	298.0	64	28	2
19	75.0	79.0	450.0	66	26	3
20	58.9	78.6	509.0	65	27	6
21	54.7	94.4	620.0	64	28	5
22	58.1	88.0	551.0	66	26	3
23	53.8	72.8	503.0	66	26	3
24	54.4	56.9	325.0	66	26	1

Station : FERIA
Period : 01.06.79 - 31.08.79
Parameter: SO2
Unit : UG/M3

FREQUENCY DISTRIBUTION (within given intervals)

Intervals L-H		Number of obs L-H	Number of obs <H	Percent occurrence L-H	Percent occurrence <H	Percent occurrence >L
0. -	5.	71	71	4.64	4.64	
5. -	10.	36	107	2.35	6.99	95.36
10. -	20.	187	294	12.21	19.20	93.01
20. -	30.	133	427	8.69	27.89	80.80
30. -	40.	109	536	7.12	35.01	72.11
40. -	50.	122	658	7.97	42.98	64.99
50. -	60.	96	754	6.27	49.25	57.02
60. -	70.	89	843	5.81	55.06	50.75
70. -	80.	82	925	5.36	60.42	44.94
80. -	90.	70	995	4.57	64.99	39.58
90. -	100.	44	1039	2.87	67.86	35.01
100. -	120.	112	1151	7.32	75.18	32.14
120. -	140.	87	1238	5.68	80.86	24.82
140. -	160.	55	1293	3.59	84.45	19.14
160. -	180.	52	1345	3.40	87.85	15.55
180. -	200.	50	1395	3.27	91.12	12.15
200. -	250.	63	1458	4.11	95.23	8.88
250. -	300.	28	1486	1.83	97.06	4.77
300. -	350.	19	1505	1.24	98.30	2.94
350. -	400.	10	1515	.65	98.95	1.70
400. -	500.	9	1524	.59	99.54	1.05
500. -	600.	5	1529	.33	99.87	.46
600. -	700.	2	1531	.13	100.00	.13
OVER	700.	0	1531	.00	100.00	.00

6 PROGRAM STABPAR

6.1 GENERAL DESCRIPTION OF THE PROGRAM

The program STABPAR needs the following input data:

- Temperature data at two levels or the temperature difference
- Wind speed data

Program STABFREC makes a binary-coded data-file containing a new stability parameter to be used in the programs STABFREC and METFREC. In addition, a print-out of the input data and the new stability parameter is given on a separate file.

The program consists of four options of stability parameter as follows:

1) DT/DZ

   Temperature stratification similar to already included in STABFREC.

2) Bulk Richardson number (NILU simplified method).

   $Ri_B = DT + 0.009DZ/Up$

   where:
   DT : temperature difference
   DZ : height difference
   Up : wind speed at upper level

   This method is a simplified method developed at NILU to be used on NILU 36 m tower.

3) Bulk Richardson number for tower measurements (Golder, 1972).

$$Ri_B = \frac{g}{T_m} \cdot \frac{(\Delta\theta/\Delta z) \cdot z_m^2}{u_2^2}$$

where $\frac{\Delta\theta}{\Delta z}$: potential temperature gradient ($\Delta\theta = \Delta T + \frac{g}{cp}\Delta z$)
$\Delta z = z_2 - z_1$, height difference above ground
z_m : geometric mean height ($\sqrt{z_1 \cdot z_2}$)
u_2 : wind speed at the upper level (z_2)
T_m : average temperature between the two levels (T_1 + 0.5DT).

This method is a general method used for tower measurements.

4) Bulk Richardson number (2 levels)

$$Ri_B = \frac{g}{T_m} \frac{(\Delta\theta/\Delta z) \cdot z^2}{u_L^2}$$

where: $\frac{\Delta\theta}{\Delta z}$: potential temperature gradient ($\Delta\theta = \Delta T + 0.008\Delta z$).
Δz : height difference above sea surface
z : measuring height above ground
u_L : wind speed at selected station (lower).

This method is a modified version of method 3 above to be used for two stations placed at the same height above ground at two different levels above the sea surface.

The troposphere is characterized by an average temperature gradient -6.5^0 C/km. The dry adiabatic lapse rate used in method 3 is -9.8^0 C/km. Method 4 takes into account moist air and that the height difference between the stations is on the order of 100 m or more. The temperature gradient (0.008) chosen in this formula is therefore a value between the dry adiabatic lapse rate and the average temperature gradient of the troposphere.

6.2 THE PROGRAM DIALOGUE

@STABPAR

```
Input/Output in English? (Y/N) ..............: Y
Name of result-file .........................: STABPAR:RES
Name of output-file (BINARY-file) ...........: RIB-MAR:BIN

The temperature difference can be represented in two ways:
   1)  Temperature difference directly from file
   2)  Temperature from two stations (Tupper-Tlower)

    Enter 1 or 2: ITEMP

The stability parameter can be calculated as follows:

   1)  Temperature difference only (DT/DZ)

   Bulk-Richardson number in three ways:
   2)  Simplified method from NILU tower data
   3)  From tower measurements (Golder, 1972)
   4)  From data collected at different levels above sea surface

   Enter 1, 2, 3 or 4: ISTAB

If ITEMP = 1, the following dialogues is given:

    Input of TEMPERATURE difference:
    Write name of datafile (max 16 chars.) ..........: 670MAR86
    Select parameter number:
    (0 = drop this file and select another) .........: 12

If ITEMP = 2, the following dialogue is given:

    Input of TEMPERATURE data from UPPER level:
    Write name of datafile (Max 16 chars) ....: 109MAR86
    Select parameter number:
    (0=drop this file and select another).....: 3
```

```
    Input of TEMPERATURE data from the LOWER level:
    From the same  input-file? (Y/N) .........: N
    Write name of datafile (Max 16 chars) ....: 108MAR86:BIN
    Select parameter number:
    (0=drop this file and select another).....: 3
```

If ITEMP = 1, and ISTAB = 3,4 the program asks for input of temperature at the lower level.

All the options, except for ISTAB = 1, then ask for wind speed data:

```
    Input of WIND SPEED:
    From the same input-file? (Y/N) ..........: Y
    Select parameter number:
    (0=drop this file and select another).....: 1
```

The four stability options continues with the following dialogues:

ISTAB = 1:

```
    Height difference between upper and lower station: 35
    EXIT from STABPAR? (Y/N)  ........................: Y
```

ISTAB = 2:

```
    Enter the lowest wind speed to be included ......: 0.2
    Height difference between upper and lower station: 35
    EXIT from STABPAR? (Y/N).........................: Y
```

ISTAB = 3:

```
    Enter the lowest wind speed to be included ......: 0.2
    Enter heights above ground for upper and lower
    station (Z2, Z1) ................................: 47, 12
    EXIT from STABPAR? (Y/N).........................: Y
```

ISTAB = 4:

```
    Enter the lowest wind speed to be included ......: 0.2
    Height differenc(masl) between UPPER and LOWER
    station .........................................: 180.
```

```
Height above ground for wind measurements .......: 10.
EXIT from STABPAR? (Y/N).........................: Y

STOP PROGRAM STABPAR
```

6.3 TEST-EXAMPLE OF THE PROGRAM

```
@STABPAR
Y
STABPAR-RES
RIB-MAR:BIN
2
4
109MAR86:BIN
3
N
108MAR86:BIN
3
Y
1
0.2
180.
10.
Y
&&
```

6.4 THE RESULTS FORM THE TEST-EXAMPLE

```
Temp. upper: BANDERAS
Temp. lower: SONDICA
Wind speed : SONDICA
Period     :  1   3   86   31   3   86

Stability from Bulk Richardson between two stations
```

Dataset with FF < .2 sets equal 99.0

DATE	HR	DZ	TEMP.UP	TEMP.LOW	FF	DTET	RIB
1 386	1	180.00	13.30	15.60	5.80	-.860E+00	-.484E-03
1 386	2	180.00	14.20	15.80	6.40	-.160E+00	-.739E-04
1 386	3	180.00	14.20	15.90	7.00	-.260E+00	-.100E-03
1 386	4	180.00	14.20	15.90	5.30	-.260E+00	-.175E-03
1 386	5	180.00	13.70	15.60	2.70	-.460E+00	-.119E-02
1 386	6	180.00	13.60	13.70	.30	.134E+01	.283E+00
1 386	7	180.00	13.80	12.30	.80	.294E+01	.875E-01
1 386	8	180.00	13.70	12.30	.70	.284E+01	.110E+00
1 386	9	180.00	11.40	12.70	2.40	.140E+00	.464E-03
1 386	10	180.00	11.10	12.40	2.40	.140E+00	.465E-03
1 386	11	180.00	11.40	13.00	2.80	-.160E+00	-.390E-03
1 386	12	180.00	11.50	13.50	3.80	-.560E+00	-.740E-03
1 386	13	180.00	11.50	13.70	3.00	-.760E+00	-.161E-02
.							
.							
.							
(continues)							
.							
.							
.							
31 386	3	180.00	11.30	7.30	.30	.544E+01	.117E+01
31 386	4	180.00	11.70	7.90	.60	-.524E+01	.280E+00
31 386	5	180.00	11.30	8.60	.50	-.414E+01	.319E+00
31 386	6	180.00	11.20	8.60	.40	-.404E+01	.486E+00
31 386	7	180.00	11.70	9.30	.40	-.384E+01	.461E+00
31 386	8	180.00	12.40	12.70	.30	.114E+01	.242E+00
31 386	9	180.00	13.90	16.10	2.20	-.760E+00	-.297E-02
31 386	10	180.00	15.50	16.90	3.10	.400E+01	.784E-04
31 386	11	180.00	16.30	18.80	2.60	-.106E+01	-.294E-02
31 386	12	180.00	17.30	20.30	3.40	-.156E+01	-.252E-02
31 386	13	180.00	17.50	21.10	4.70	-.216E+01	-.182E-02
31 386	14	180.00	18.30	22.20	3.90	-.246E+01	-.300E-02
31 386	15	180.00	16.80	20.40	6.60	-.216E+01	-.926E-03
31 386	16	180.00	99.00	17.90	6.40	.000E+00	.990E+02
31 386	17	180.00	99.00	15.30	5.20	.000E+00	.990E+02
31 386	18	180.00	99.00	13.90	5.00	.000E+00	.990E+02
31 386	19	180.00	99.00	13.30	4.40	.000E+00	.990E+02
31 386	20	180.00	99.00	13.00	3.80	.000E+00	.990E+02
31 386	21	180.00	99.00	11.90	1.80	.000E+00	.990E+02
31 386	22	180.00	99.00	12.00	.70	.000E+00	-.990E+02
31 386	23	180.00	99.00	11.50	.20	.000E+00	-.990E+02
31 386	24	180.00	99.00	10.70	.40	.000E+00	-.990E+02

7 PROGRAM STABFREC

7.1 GENERAL DESCRIPTION OF THE PROGRAM

The program STABFREC needs the following input-data:

- Stability parameter directly from STABPAR or
- Temperature data at two levels or the temperature difference
- Wind speed data (option)

Program STABFREC gives the following results:

- Diurnal distribution of four selected stability classes
- Distribution of the stability classes as a function of wind speed

7.2 THE PROGRAM DIALOGUE

The program STABFREC is an interactive program with a dialogue to the users terminal. The results are written on an user specified result-file. The following example presents a typical input sequence for the program. The number of parameters will vary with the work to be carried out.

```
@STABFREC Input/output in English? (Y/N) ..... : Y Name
Name of the result-file..... : STABFREC-RES
Number Number of months ..... : 3
```

If the number of months are more than 1, the following question are given:

```
Output for each month? (Y/N).....        : N
```

```
Stability distribution as function of:
   1) Time of the day
   2) Windspeed
   Enter 1 or 2 .....                    : 1
   Input datafile from STABPAR? (Y/N).....  : N
```

If the answer above is yes, the next sequence is omitted and the program continues by asking for the three upper bounds for the stability classes.

Stability can be represented in three ways:

1) Temperature difference directly from file
2) Temperature difference:100*(Tupper-Tlower)/Height difference
3) Temperature difference:(Tupper-Tlower)

Enter 1,2 or 3 ..... : 2

Height difference (m) between the upper and
lower level for the temperature measurements ..... : 180

Enter 3 upper bounds for the stability classes .... : -1.5,-0.5,1.5

Input of TEMPERATURE data for the UPPER level for period 1 of 3 :
Write name of datafile (Max 16 chars) ..... : 109JUN79
Select parameter number:
(0=drop this file and select another.)..... : 3

Input of TEMPERATURE data for the LOWER level:
From the same input-file? (Y/N) ..... : N
Write name of datafile (Max 16 chars) ..... : 108JUN79
Select parameter number:
(0=drop this file and select another.)..... : 3

If wind speed option is chosen, the program then asks for the wind speed station for each period:

Input of WIND SPEED data for period 1 of 3 :
Write name of datafile (Max 16 chars)..... : 108JUN79
Select parameter number:
(0=drop this file and select another)..... : 1

```
Input of TEMPERATURE data for the LOWER level:
From the same input-file?  (Y/N) ..................  : N
Write name of datafile (Max 16chars) ..............  : 108JUL79
Select parameter number:
(0=drop  this file and select another.).............  : 3

Input of TEMPERATURE data for the UPPER level for period  3 of    3  :
Write  name of datafile (Max 16 chars) .............  : 109AUG79
Select parameter number:
(0=drop  this  file  and  select another.).........  : 3

Input of TEMPERATURE data for the LOWER level:
From  the same input-file? (Y/N) ..................  : N
Write name datafile (Max 16 chars) .................  : 108AUG79
Select parameter number:
(0=drop this file and select another.)..............  : 3

EXIT from STABFREC? (Y/N) ..........................  : Y
```

7.3 TEST-EXAMPLE FOR THE PROGRAM

```
@STABFREC
Y
STABFREC-RES
3
N
1
N
2
180
-1.5,-0.5,1.5
109JUN79
3
N
108JUN79
3
109JUL79
3
N
108JUL79
3
109AUG79
3
N
108AUG79
3
Y
```

7.4 THE RESULTS FROM THE TEST-EXAMPLE

Station(upper): BANDERAS
Station(lower): SONDICA
Parameter: Temperature difference (DT)
Unit : Degrees C/100M
Period : 01.06.79 - 31.08.79

DIURNAL VARIATION OF STABILITY (%)

Class I: Unstable DT <-1.5E+00 Degrees C/100M
Class II: Neutral -1.5E+00 < DT <-5.0E-01 Degrees C/100M
Class III: Light stable -5.0E-01 < DT < 1.5E+00 Degrees C/100M
Class IV: Stable 1.5E+00 < DT Degrees C/100M

	Classes			
Hour	I	II	III	IV
01	1.4	39.2	58.1	1.4
02	2.7	40.0	54.7	2.7
03	1.3	45.3	50.7	2.7
04	5.4	41.9	51.4	1.4
05	1.4	44.6	50.0	4.1
06	1.4	47.9	49.3	1.4
07	1.4	56.5	42.0	.0
08	7.7	76.9	15.4	.0
09	10.4	85.1	4.5	.0
10	21.0	77.4	1.6	.0
11	39.7	60.3	.0	.0
12	47.1	52.9	.0	.0
13	48.5	51.5	.0	.0
14	48.5	50.0	1.5	.0
15	50.0	48.5	1.5	.0
16	50.0	48.5	1.5	.0
17	50.7	47.8	1.4	.0
18	41.7	58.3	.0	.0
19	28.8	69.9	1.4	.0
20	6.8	87.7	5.5	.0
21	2.8	80.6	16.7	.0
22	1.4	50.7	47.9	.0
23	.0	50.0	50.0	.0
24	.0	42.5	56.2	1.4
Total	19.0	56.1	24.2	.7

Number of obs.: 1685
Missing obs. : 523

8 PROGRAM METFREC

8.1 GENERAL DESCRIPTION OF THE PROGRAM

The program METFREC needs the following input-data :

- Wind speed
- Wind direction
- Stability parameter (DT, RIB)
- Air quality data (option)

Program METFREC is classifying observations into classes of wind speed, wind direction and stability. The results are given in two parts.

The first part represents a joint frequency distribution of four classes of wind speed and stability and 12 or 36 wind direction sectors. The values in the line "Total" gives the occurrence in percent of each stability class in each wind class for all wind directions. The values in the column "Rose" gives the occurrence in percent of winds blowing from this sector for all classes of wind speed and stability.

The second part of the program is sorting values of concentrations or other parameters into boxes of different meteorological conditions related to the wind/stability classification given in the first part. The values in this table represents arithmetic average values for all observations that occur in each class (box). The line "Average" gives the average values of concentrations for the observations in one stability and wind speed class for all wind directions. The column "Rose" gives the average concentrations for all observations that occur during each wind sector.

8.2 THE PROGRAM DIALOGUE

Program METFREC is an interactive program with a dialogue to the users terminal. The results are written to a user specified result-file. The

example below is a typical input sequence of the program. The numbers of parameters will vary with the work to be carried out.

```
@METFREC

Input/Output in English? (Y/N) ..................   : Y
Name of result-file .............................   : METFREC-RES

A separate file for multiple source modelling ....   :
Separate output-file for frequency distribution (Y/N): N

Number of months ................................  : 1

If the number of months are more than 1, the following question are
given :
Output for each month? ............................ :

Stability data from STABPAR? (Y/N)................. : ISTAB

IF ISTAB = Y, the following sequence is omitted and the program
   continues by asking: number of wind sectors (12 or 36).

Stability may be represented in three ways:
 1) Temperature difference directly from file
 2) Temperature difference:100*(Tupper-Tlower)/Height difference
 3) Temperature difference:(Tupper-Tlower)
 4) No input of stability data
    Enter 1,2,3 or 4 .....................       : 2
Height difference(M) between the upper and lower
level for the temperature measurements ............  :180

Number of wind sectors (12 or 36).................  : 12
Enter 3 upper bounds for the wind speed classes....  : 2.0,4.0,6.0
Enter 3 upper bounds for the stability classes(C/100M:-1.5,-0.5-1.5
Max.wind speed defined as calm .................: 0.2

The analysis are carried out for  1 months.
Enter data for month number  1
```

```
IF ISTAB = Y, the program continues by asking:
   Input of STABILITY data:
   Write name of datafile (max 16 chars) ..... : Ri_B-MAR:BIN
   Select parameter number:
   (0 = drop this file and select another) ..... :

ELSE ISTAB = N, the program continues by asking:

Input of TEMPERATURE data from the UPPER level:
Write name of datafile (Max 16 chars) ..... : 109JUN79
Select parameter number:
(0=drop this file and select another.)..... : 3

Input of TEMPERATURE data from the LOWER level:
From the same input-file? (Y/N) ..... : N
Write name of datafile (Max 16 chars) ..... : 104JUN79
Select parameter number:
(0=drop this file and select another.)..... : 1

Input  of  WIND  SPEED:
From the same input-file? (Y/N) ..... : N
Write name of datafile (Max 16 chars) ..... : 104JUN79
Select parameter number:
(0=drop this file and select another.)..... : 1
Input of WIND DIRECTION:
From the same input-file? (Y/N) ..... : Y
Select parameter number:
(0=drop this file and select another.)..... : 2
Wind data from "AWS"? (Y/N) ..... : N

Wind direction zero may be interpreted in three ways:
 1: Data not available
 2: Calm conditions
 3: Wind direction equal to 360 degrees
    Enter 1,2 or 3 .....  : 3
```

```
Input  of CONCENTRATION? (Y/N) ..................... : Y
From the same input-file? (Y/N) ..................  : N
Write name of datafile (Max 16 chars) ............  : 104JUN79
Select parameter number:
(0=drop this file and select another.)............  : 4

Enter consentration-string  ......................  : SO2
Enter concentration-unit ........................... : UG/M3
Number pf decimals in output of concentration ....  : 0
Scaling of the consentration data? (Y/N).........  : N
Test for  PEAK-values (negative values)? (Y/38....  : Y

EXIT from METFREC? (Y/N) ........................... : Y

STOP END OF PROGRAM METFREC
```

If the work shall be carried out for more periods, the answer to the last question should be N, and the sequence from input of temperature data to the end must be repeated.

8.3 TEST-EXAMPLE OF THE PROGRAM

```
@METFREC
Y
METFREC-RES
N
1
2
180
12
2.0,4.0,6.0
-1.5,-0.5,1.5
0.2
109JUN79
3
N
108JUN79
1
Y
2
N
3
Y
N
104JUN79
4
SO2
UG/M3
0
N
Y
Y
```

8.4 THE RESULTS FROM THE TEST-EXAMPLE

Temp.diff.: BANDERAS - SONDICA
Wind : FERIA
Period : 01.06.79. - 30.06.79.
Unit : Percent

JOINT FREQUENCY DISTRIBUTION OF STABILITY, WIND SPEED AND WIND DIRECTION

Class I: Unstable	DT < -1.5	Degrees C/100M
Class II: Neutral	-1.5 < DT < -.5	Degrees C/100M
Class III: Light stable	-.5 < DT < 1.5	Degrees C/100M
Class IV: Stable	1.5 < DT	Degrees C/100M

Calm: U less or equal .2 m/s

	.0- 2.0 m/s				2.0- 4.0 m/s				4.0- 6.0 m/s				over 6.0 m/s				
Wind-direction	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	Rose
30	.6	4.8	.0	.0	.0	3.9	.0	.0	.6	1.3	.0	.0	.0	.0	.0	.0	11.3
60	.3	.6	.3	.0	.0	2.9	.0	.0	.0	.6	.0	.0	.0	.0	.0	.0	4.8
90	.0	.3	.3	.0	.0	1.3	.0	.0	.0	.3	.0	.0	.0	.0	.0	.0	2.3
120	.0	.3	.6	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	1.0
150	.0	1.3	2.3	.0	.0	.3	.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	4.2
180	.0	1.6	10.3	1.0	.0	.0	.3	.0	.0	.3	.0	.0	.0	.0	.0	.0	13.5
210	.0	.6	1.6	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	2.3
240	.3	.6	3.9	.0	.0	.0	.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	5.1
270	.0	1.6	2.6	.0	.0	.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	4.5
300	.3	2.6	2.3	.0	1.0	1.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	7.4
330	1.0	5.5	1.6	.0	.6	3.2	.0	.0	.3	1.6	.0	.0	.0	.3	.0	.0	14.1
360	.6	6.8	1.3	.0	1.6	6.4	.6	.0	1.3	4.8	.0	.0	.0	.0	.0	.0	23.5
Calm	.0	4.5	1.6	.0													6.1
Total	3.2	31.2	28.6	1.0	3.2	19.6	1.6	.0	2.3	9.0	.0	.0	.0	.3	.0	.0	100.0
Occurrence	64.0 %				24.4 %				11.3 %				.3 %				100.0 %
Wind speed	1.0 m/s				3.0 m/s				4.6 m/s				7.0 m/s				1.9 m/s

Frequency of occurrence of the stability classes

	Class I	Class II	Class III	Class IV	
Occurrence	8.7 %	60.1 %	30.2 %	1.0 %	100.0 %

SO2 : FERIA
Period : 01.06.79. - 30.06.79.
Unit : UG/M3

JOINT FREQUENCY DISTRIBUTION OF STABILITY, WIND SPEED, WIND DIRECTIONS

Wind-direction	.0- 2.0 m/s				2.0- 4.0 m/s				4.0- 6.0 m/s				over 6.0 m/s				Rose
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	
30	39.	69.	-	-	-	73.	-	-	308.	234.	-	-	-	-	-	-	101.
60	16.	119.	88.	-	-	9.	-	-	-	16.	-	-	-	-	-	-	31.
90	-	8.	16.	-	-	6.	-	-	-	0.	-	-	-	-	-	-	7.
120	-	167.	161.	-	-	-	-	-	-	-	-	-	-	-	-	-	163.
150	-	189.	234.	-	-	12.	207.	-	-	-	-	-	-	-	-	-	201.
180	-	118.	123.	207.	-	-	176.	-	-	49.	-	-	-	-	-	-	128.
210	-	61.	83.	-	-	-	-	-	-	-	-	-	-	-	-	-	77.
240	69.	62.	24.	-	-	-	17.	-	-	-	-	-	-	-	-	-	31.
270	-	38.	28.	-	-	14.	-	-	-	-	-	-	-	-	-	-	31.
300	174.	77.	76.	-	69.	53.	-	-	-	-	-	-	-	-	-	-	76.
330	124.	101.	348.	-	178.	91.	-	-	39.	113.	-	-	-	49.	-	-	131.
360	8.	79.	100.	-	120.	192.	131.	-	191.	138.	-	-	-	-	-	-	132.
Calm	0.	92.	177.	0.													114.
Average	73.	88.	118.	207.	117.	98.	133.	-	203.	130.	-	-	-	49.	-	-	107.
Concentr.		102.				103.				145.				49.			

Average concentration in selected stability classes

	Class I	Class II	Class III	Class IV
Concentr.	123.	97.	119.	207.

Number of obs.: 311

Missing obs. : 409

NORSK INSTITUTT FOR LUFTFORSKNING (NILU)
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FORFATTER(E) T. Bøhler		TILGJENGELIGHET A	
		OPPDRAGSGIVERS REF.	

OPPDRAGSGIVER (NAVN OG ADRESSE)
LABEIN Avda. Montevideo S/N
Olakeaga, Bilbao 13
Spain

3 STIKKORD (à maks. 20 anslag)
Programmer | Statistikk | Brukerbeskrivelser

REFERAT (maks. 300 anslag, 7 linjer)
NILU har utarbeidet brukerbeskrivelser for syv statistiske programmer utviklet på NILU. De syv programmene er: DATCONV, TEMPHUM, WINDROSE, CONFREC, STABPAR, STABFREC OG METFREC. Brukerbeskrivelsene inneholder en generell beskrivelse og eksempler på dialog og kjøring av programmet.

TITLE

ABSTRACT (max. 300 characters, 7 lines)
NILU have performed user guides for seven statistical programs developed at NILU. The programs are: DATCONV, TEMPHUM, WINDROSE, CONFREC, STABPAR, STABFREC and METFREC. The user guides consist of a general description and a example of how to run the programs.

* Kategorier: Åpen - kan bestilles fra NILU A
Må bestilles gjennom oppdragsgiver B
Kan ikke utleveres C