

METEK

Graphic

User Manual

Version 2.9



sc 11/02

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System Requirements:

You will need an IBM compatible personal computer running Microsoft Windows NT 3.51 or higher. We recommend systems using a 200 MHz processor or faster.
The screenshots in this manual have been made on a Windows NT 4.0 system.

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1 Introduction

This program can be used to visualize almost all data measured by the different METEK measuring systems. The program provides several modes of representation. Some modes allow even the adjustment of further options.

The time period, the definition of heights and the scaling are freely adjustable. Plottable are not only the scalar values but as well the wind vectors (horizontal wind speed and direction). The selection includes all known measuring values, also those which cannot be measured because your device may be lacking some options.

Up to 9 single plots of the same period and the same height steps can be shown together on the screen. The screen contents can also be printed or exported to a graphic file, which may be used by other programs. If you copy the screen to the clipboard, it may be directly inserted into other documents e.g. into word processing files. For further processing of the data, which are interpreted and checked by this graphic program, an additional data output as a text file is available. These text files can be imported by spreadsheet programs which can perform further calculations.

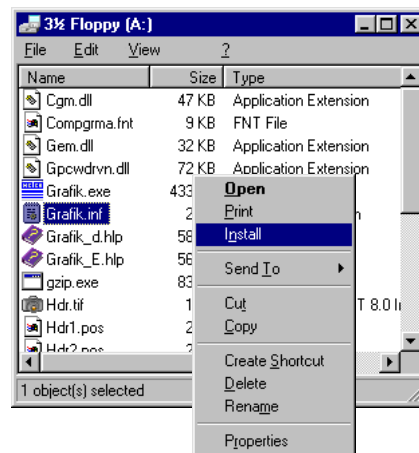
2 Installation of the Software

The graphic program is shipped on a 3½" disk. The following files belong to the distribution:

CGM.DLL	GRAFIK_E.HLP	POSTSCR.DLL
COMPGRMA.FNT	HDR.TIF	SCODL.DLL
GEM.DLL	HDR1.POS	SWISS.FNT
GPCWDRVN.DLL	HDR2.POS	SWISSBLD.FNT
GRAFIK.EXE	MESSAGES.DAT	TIFF.DLL
GRAFIK.INF	MESSAGES.TAB	
GRAFIK_D.HLP	PIC.DLL	

2.1 Installation on a Windows NT 4.0 / Windows 2000 System

To install the program place the disk into the disk drive (A:), login as administrator and open the window "My Computer" (icon on the desktop). Now open the window for the disk drive, and select the GRAFIK.INF file with the right mouse button. When the context menu appears select "install". The files from the distribution disk will now be copied to the hard disk.



2.2 Deinstallation on a Windows NT 4.0 / Windows 2000 System

For Deinstallation on a Windows NT 4.0 / Windows 2000 system you need to be logged in as administrator. Select now from the "Control Panel" the "Software" folder. Here you will find an entry for the "METEK Graphic Software". Select it press the "Add/Remove" button. If not longer needed after successful deinstallation the METEK directory (C:\METEK) and possibly created subdirectories (should be empty now) must be removed manually.

2.3 Installation on a Windows NT 3.51 System

The installation procedure for the old Windows NT Version 3.51 is little more complicate cause everything has to be done manually. First you should logon as administrator and create the target directory on the hard disk whose name should be C:\METEK. Copy now the following files to the just created directory:

CGM.DLL	GRAFIK_D.HLP	SCODL.DLL
GEM.DLL	GRAFIK_E.HLP	TIFF.DLL
GPCWDRVN.DLL	PIC.DLL	
GRAFIK.EXE	POSTSCR.DLL	

Next you have to create the subdirectories C:\METEK\GPCNT and C:\METEK\TEMP. The remaining files

COMPGRMA.FNT	HDR2.POS	SWISS.FNT
HDR.TIF	MESSAGES.DAT	SWISSBLD.FNT
HDR1.POS	MESSAGES.TAB	

have to be copied to the C:\METEK\GPCNT directory. The GRAFIK.INF file is not used for the installation on a Windows NT 3.51 system.

To enable the automatic save function for all settings made within the Graphic program individually for each user, you have to add some keys to the Windows Registry. Use REGEDIT.EXE to add the following entries for the key HKEY_LOCAL_MACHINE\Software\Microsoft\Windows NT\CurrentVersion:

```
IniFileMapping
  Grafik.ini Default      REG_SZ      #USR:Software\METEK\Grafik\Default
              Plot        REG_SZ      #USR:Software\METEK\Grafik\Plot
              Plot 1      REG_SZ      #USR:Software\METEK\Grafik\Plot\1
              Plot 2      REG_SZ      #USR:Software\METEK\Grafik\Plot\2
              Plot 3      REG_SZ      #USR:Software\METEK\Grafik\Plot\3
              Plot 4      REG_SZ      #USR:Software\METEK\Grafik\Plot\4
              Plot 5      REG_SZ      #USR:Software\METEK\Grafik\Plot\5
              Plot 6      REG_SZ      #USR:Software\METEK\Grafik\Plot\6
              Plot 7      REG_SZ      #USR:Software\METEK\Grafik\Plot\7
              Plot 8      REG_SZ      #USR:Software\METEK\Grafik\Plot\8
              Plot 9      REG_SZ      #USR:Software\METEK\Grafik\Plot\9
```

After adding this values/keys to the Windows Registry the PC has to be rebooted.

The program can be used as well without this manipulation of the Registry. In this case all settings (for all users) will be saved to file (GRAFIK.INI).

2.4 Deinstallation on a Windows NT 3.51 System

For Deinstallation on a Windows NT 3.51 system you have to login as administrator. Now just delete all the files and directories listed in section 2.3. If you have changed the Registry while installing the program you may now remove this entries by use of REGEDIT.EXE.

3 Start of the Program

The program can be started with a double-click on the corresponding icon or with an explicit call of the program `GRAFIK.EXE` at the DOS prompt. When starting the program by use of the DOS prompt or from within a batch file the following command line parameters (options) are allowed:

```
GRAFIK.EXE [ /ddigit | /wdigit | /mdigit ] [ /p ] [ file ]
```

The dialog box “Show Data” (refer to chapter 4.1.1) will be displayed and wait for user input if `GRAFIK.EXE` has been called without any of this options. The dialog box will show the settings that were used by the previous session.

If a *file* is given as option. The settings will be loaded from this file. The file must have been created by `GRAFIK.EXE` (refer to chapter 4.1.3).

The option `/p` will suppress the “Show Data” dialog box. Instead the plots defined by the actual settings (setting from the previous session) will be printed to the default printer. After finishing the print job the program will terminate automatically.

The options `/d`, `/w` and `/m` will change the time range for the actual settings (given by the *file* or by the previous session) to one day (`/d`), one week (`/w`) or one month (`/m`). Each of the options requires that one decimal digit (0–9) follows immediately the option letter (`d`, `w` or `m`). The digit defines the starting point for the time interval (0 for the actual day, the actual week or the actual month, 1 for the last day, the last week or the last month etc.)

4 The User Interface

The user interface consists of a Windows conform menu system with the following structure:

File

<i>Show Data</i>	Modify representation style and period and draw data
<i>Defaults</i>	Dialog for basic settings
<i>Load Settings</i>	Load the settings from a previously stored file
<i>Save Settings</i>	Save settings to a file
<i>Load Invalidation List</i>	Load and append or replace the actual invalidation list with the content of a previously saved file
<i>Save Invalidation List</i>	Save the actual invalidation list to a file
<i>Delete Invalidation List</i>	Clear the contents of the actual invalidation list
<i>Export</i>	Export graphs or data to files
<i>Printer Setup</i>	Windows standard dialog for printer setup
<i>Print</i>	Print the actual picture
<i>Exit</i>	Close the program and save the settings

Edit

<i>Copy</i>	Copy drawing to the clipboard
<i>man. Invalidation</i>	Enter/leave manual invalidation mode

View

<i>Refresh</i>	Refresh the actual drawing
<i>Previous Interval</i>	Draw the previous time interval
<i>Next Interval</i>	Draw the next time interval
<i>Zoom In/Out</i>	Change the magnification of the drawing window

Help

<i>Contents</i>	Help to the program
<i>Use Help</i>	An entry to the Windows help system
<i>About</i>	Program manufacturer and version number

+ direct access to menu item *View / Next Interval*

– direct access to menu item *View / Previous Interval*

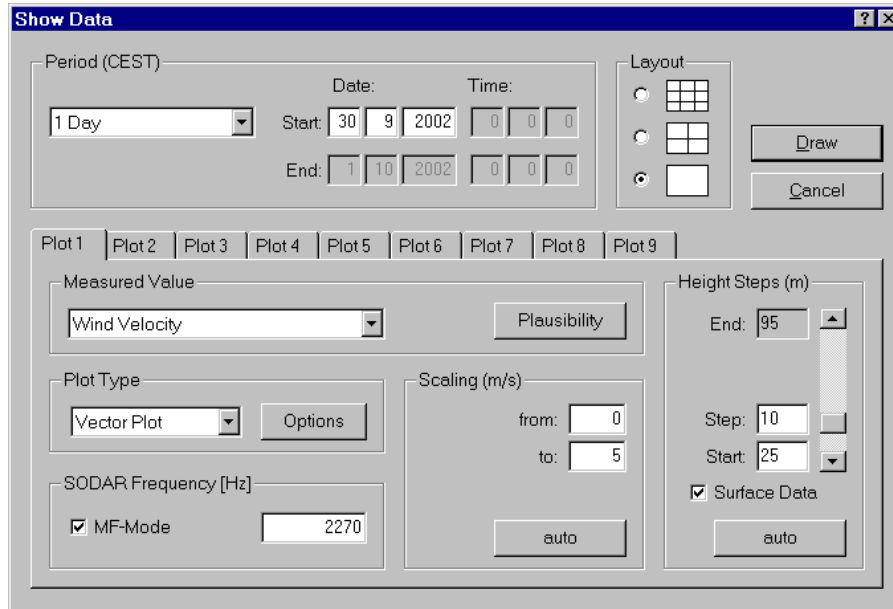
The Submenu *File* → *Show Data* is automatically activated when starting the program without options.

4.1 Menu *File*

This menu is containing the most important functions of the graphic software. Here the basic settings like pathnames and printers can be done.

4.1.1 Submenu Show Data

Selecting this menu item, the following dialog window appears :



In this entry mask the settings for the several plot types are done. Some elements of this dialog can also be reached by use of the context menu which can be displayed by clicking the right mouse key on an already drawn plot.

Period

The selection of the data is generally made by the exact date and time. The user must enter the start time and the end time of the period for which data shall be shown. At the standard settings *1 Hour*, *6 Hours*, *1 Day*, *1 Week*, *1 Month* only the start time must be set, the end time is calculated automatically.

The setting *next value* requires only a start time. Use this setting to draw single spectra or single profiles.

Layout

It is possible to define 9 different graphic pictures at one time, which are called *Plot 1* to *Plot 9* and are activated by clicking the according tab key in the dialog window. If the needed tab number is invisible, click to the corresponding arrow at the right of the tabs. For each plot the settings of *Measurement Type*, *Plot Type*, *Scale* and *Height Steps* can be adjusted separately. If only plot is selected, that plot is shown, which is actually activated by its tab ('*Plot 1*' to '*Plot 9*'). Otherwise *Plot 1* to *4 / 9* are shown.

Measured Value

The following measured values are available:

Availability	%
Averaged Drop Spectrum N(d)	$\text{m}^{-3} \text{mm}^{-1}$
Averaged Drop Spectrum N(v)	$\text{m}^{-3} \text{s/m}$
Averaged Spectrum	dB ¹⁾

Characteristic Temperature	K	
Diffusion class		
Drag Coefficient		
Fall Velocity	m/s	
Friction Velocity	m/s	
Gain		¹⁾
Heat flux	W/m ²	
Liquid water contents	g/m ³	
Momentum Flux	kg/ms ²	
Normalized Averaged Spectrum	dB	¹⁾
Plausibility Codes		
Potential RASS Temperature	°C	
Potential Temperature	°C	
Power	dB	¹⁾
Pressure	hPa	
Radar Reflectivity	dBZ	
Radial velocity	m/s	¹⁾
Rain rate	mm/h	
RASS Temperature	°C	
Reflectivity	dB	¹⁾
Relative Humidity	%	
Sigma of Horiz. Wind Velocity	m/s	
Sigma of the Inclination Angel	degree	
Sigma of the Radial Velocity	m/s	¹⁾
Sigma of the Temperature	°C	
Sigma of the Wind Direction	degree	
Sigma of Vertical Wind	degree	
Sigma of Wind Component	m/s	²⁾
Signal Noise Ratio	dB	
Stability Parameter (Monin Obukhov)	m ⁻¹	
Temperature	°C	
Vectorial Wind Component	m/s	²⁾
Wind Direction (clustered)	degree	
Wind Direction	degree	
Wind Velocity (clustered)	m/s	
Wind Velocity (scalar)	m/s	
Wind Velocity	m/s	

¹⁾ Additionally to these values the number of the antenna must be given.

²⁾ Additionally to this value the Vector component must be given. Available components: U, V, W for SODARs and X, Y, Z, P, Q, R for SONICs
An according select field automatically appears when selecting one of these items.

The list of measured values changes dynamically with the definition of devices (refer to chapter 4.1.2) and the selected plot type (see below).

Plausibility

With this button another dialog can be opened. It defines, which plausibility checks of the SODAR shall be applied. Data which don't comply with the selected criteria are treated as invalid data and are not shown. The definition is done for each antenna separately¹. Select the different antennas by clicking on the tab on top of the dialog window. This is the list of plausibility codes to be considered :

- Saturation of the receiver for one or several samples. The affected instantaneous spectra are rejected and not used in the averaging process.
- High level of white noise for one or several samples. The affected instantaneous spectra are rejected and not used in the averaging process.
- Local maximum in the spectra too strong as compared to the main maximum.
- Signal/Noise ratio too low.
- Low statistical significance of the measured backscattered acoustic signal. Most of the instantaneous signal spectra have been rejected.
- Low statistical significance of the measured ambient noise. Most of the instantaneous noise spectra have been rejected.
- The maximum of the spectrum is too slim.
- The maximum of the spectrum is too wide.
- The maximum of the signal spectrum is smaller than the maximum of the noise spectrum.

Each plausibility code has a check box in the dialog window. If you click on it, this test function will become enabled (showing a check mark) or disabled again. With the *Standard* button you restore the standard settings for the specified antenna.

The plausibility for the signal/noise ratio may be checked in an alternative manner: Instead of interpreting the coded value (one bit of the plausibility code) the lowest limit may be entered directly. This feature requires, that the signal/noise ration has been recorded within the measured data.

For the statistical plot of plausibility codes the selected criteria is used to define the class of „serious error codes“.

Measured values from times/heights included in the invalidation list are always invalid regardless of the plausibility codes (refer to chapter 4.1.5-4.1.7 und 4.2.2)

Plot Type

The plot types

Time Series
Spectrum
Profile Series
Vector Plot
Sodargram
Statistics
Wind Rose
Correlation and

¹ Antennas whose plausibility codes are not relevant for the selected measured value will not be displayed for the selection of codes. Therefore plausibility codes can be only defined for measured values which dependent at least from one antenna.

Availability

are described in chapter 5 (Plot Representations). For all plot types you may enter further *options*:

- **Time Series and Spectrum / Options**

For *Time Series* you can choose

1. if you would like to have an additional horizontal reference line marking the value 0 („*null line*“) or
2. if you want to mark positive and negative values by *different colors* (the colors can be selected by use of menu file / defaults / colors) or
3. if the interpolation algorithm should be applied to the data. The number for *smoothings* specifies the number of iterations of this algorithm.

- **Profile Series / Options**

For *Profile Series* you can choose

1. if all profiles should be shown (for the selected time interval),
2. or if the number of profiles should be reduced to every second, every third, etc. profile

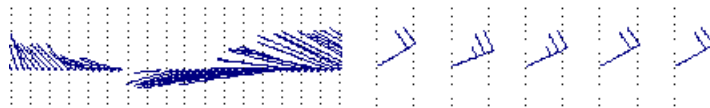
For single profiles the x-axis refers to the size of the measured value. If there more than one profile to be plotted the x-axis is used as time axis. In this case the plotted profiles do not show absolute values but values relative to the measured value in the lowest height.

Additional the parameter *smoothings* can be used to select the number of iterations for the integrated interpolation algorithm. The value of zero disables all interpolations and smoothing.

- **Vector Plot / Options**

For *Vector Plots* you can decide, whether the wind vectors are to be drawn as vectors or as wind barbs. Additional the vectors / barbs can be colored to indicate the wind speed although it is already coded in the form of the barbs / the length of the vectors.

Examples: left: vector plot with arrows, right: vector plot with *wind barbs*



The parameter *smoothings* can be used to select the number of iterations for the integrated interpolation algorithm. For interpolation the vectors are internally converted to their components. The interpolated components build the vectors drawn. The value zero disables all interpolations and smoothing.

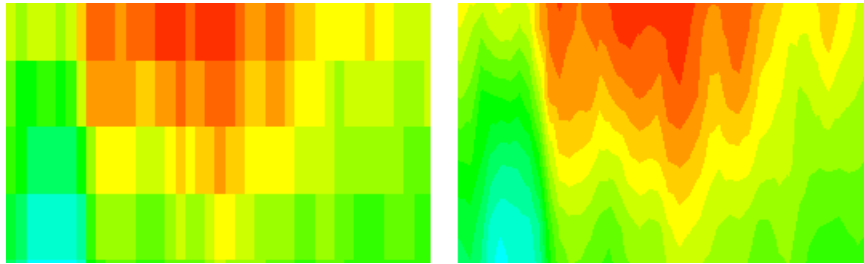
- **Sodargram / Options**

For a *Sodargram* you can select between a grayscale and a *colored* representation of the sodargrams. Additionally it is possible to activate the representation as a *contour plot*. In this case the plot lines between the measured values are interpolated to obtain a smooth distribution of coloring. Otherwise only single colored or grayed squares are calculated

and drawn for each measured value, where the grid is defined by the height- and time resolution. The number of *smoothings* specifies the number of iterations the implied interpolation algorithm will be applied to the data before constructing the sodagram. Generally a number of 2 to 5 iterations is recommended. For contour plots a number of 3 to 5 iterations is adequate to keep the calculation time in a tolerable range.

Examples: left: sodagram,

right: sodagram *contour plot*

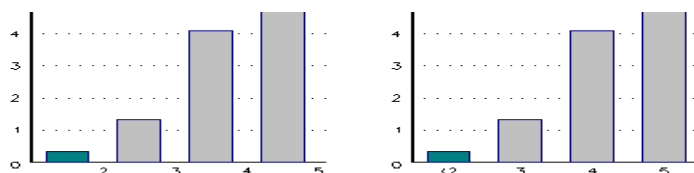


- **Statistics / Options**

For *Statistics* you can choose between the *relative* and *absolute* count of incidences. When activating the option *show open classes*, two additional bars (classes) represent the values ranging out of the selected scale range.

The scale divisions of the x-axis can be drawn in two ways: If the option *mark class borders* is activated, the x-axis ticks mark the borders between two bars (class limits), if the alternate option *mark mid of classes* is activated, the x-axis ticks mark the center of each bar (class center).

Examples: left: *mark class borders*, right: *mark mid of classes*,
both: *show open classes*, *scale* = from 2 m/s, *class width* = 1 m/s



For statistics over several days the analyzed time period can be restricted to certain times of day (*restrict to time of day*). This enables for example statistical analyzes for night/day periods. The time limits may be entered as full hours since midnight (0 to 24).

- **Wind Rose / Options**

For a *Wind Rose* you can select between a *grayscale* and a *colored* representation. Each segment of the Wind Rose will be filled with a color according to the distribution of wind speed and the selected *Measured Value* (typical would be the wind speed). The number of radial *segments* can be adjusted within the range from 3 to 36 (→ width of wind direction classes: 10 to 120 degree). As option you may select the accumulated representation. If this option is selected each class (circular) counts all the events where the measured value is higher than the lower class border.

For statistics over several days the analyzed time period can be restricted to certain times of day (*restrict to time of day*). This enables for example statistical analyzes for night/day periods. The time limits may be entered as full hours since midnight (0 to 24).

You can select between a relative or an absolute distribution of measurements. This has no influence on the graphical representation, only the shown and the exported numbers are in percent when showing a relative distribution.

- **Correlation / Options**

For a *Correlation* plot you choose whether lines for the calculated regression and averages should be drawn or not. The lines will be labeled with formulas, showing the average values, their standard deviations and the regression coefficients (offset and factor).

The analyzed data can be restricted to certain times of day (*restrict to time of day*). The time limits may be entered as full hours since midnight (0 to 24). Additional calm situations can be rejected, where the velocity limit for the definition of a calm situation can be adjusted.

A smoothing (interpolation) of the input data is also available. If the interpolation algorithm should be applied to the data. The number for *smoothings* specifies the number of iterations of this algorithm. If interpolation is enabled all output data (calculations of regression etc.) will be based on the smoothed / interpolated input data.

- **Availability / Options**

The analyzed data can be restricted to certain times of day (*restrict to time of day*). The time limits may be entered as full hours since midnight (0 to 24). The availability will be displayed as 100% when all data is available during the restricted time.

SODAR Frequency

In this field you may enter one of the transmit frequencies used in the SODAR multi frequency (MF) mode. If other data is to be viewed, the MF mode checkbox should be unchecked!

In the multi frequency mode the SODAR generates for each averaging interval and each transmit frequency a separate data set. Up to now there are no plot types, which support a visualization of multi frequency data. So for plotting a selection of one frequency is essential. Selecting a certain frequency will force the input routine to skip all other data based on other frequencies.

Scale

In the field *Scale* a manual scale can be entered. The entry fields *Axis scale* and *Class width* become visible and editable only if the plot type *Statistics* or *Wind Rose* (→ *Class width*) was chosen or if only one height step was selected for the plot type *Time series* (→ *Axis scale*).

Scale / auto

If this button is pressed, the program scans the entire data of the selected time period and searches for minimum and maximum values to find a useful scaling.

Height Steps

The data of several height steps can be shown simultaneously in a single plot one above the other. The lowest height you want to show must be entered into the field *Start*. The difference between the height steps must be entered into the field *Step*. The upper height results from the total count of height steps given by the vertical slider.

Height Steps / auto

Possible is as well the *automatic* recognition of height steps. If the *auto* button is pressed the graphic program scans all the recorded data within the selected time *period*.

Height Steps / Surface Data

If the option *Show Surface Data* in the dialog area *Height Steps* is activated, the continuous height steps region which is defined by the values of *Start*, *Step*, and *Count* will be extended by a special height step. This height step contains the surface data which are either separately recorded or included in the profile data set as height 0. While the *Show Surface Data* option is selected you may adjust the number of height steps from the profiler to zero to allow just surface data to be plotted. The surface data is always plotted as lowest height step. The value used to label this height step is defined by the dialog box *Defaults* (see chapter 4.1.2).

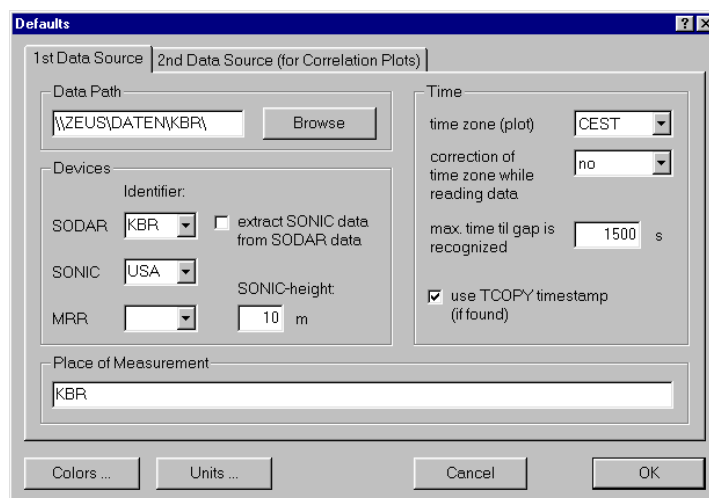
If the surface data are recorded in separate files, remember that the display modes *Profile series* and *Sodargram* are only possible if equal synchronous averaging intervals were used. In the other way the surface data are rejected.

To show the selected plot(s) you must click on the *Draw* button.

The input forms for the settings of *Options*, *Plausibility*, *Scale*, and *Height Steps* are available through a popup menu when clicking with the right mouse button on the graphics screen.

4.1.2 Submenu *Defaults*

If this menu item is activated, the following dialog appears :



There are two pages with controls, which can be selected by use of the according tabs. Each page holds the information for one *data source* (location of data, place of measurement, etc.). The second data source is just used for correlation plots. All other plot types use just the first

data source. The settings for *time zone* used for plotting, the *color* definitions and the physical *units* will be the same for both data sources.

Data Path

In this submenu the path name of the stored data can be entered into the field *path*. The measured data are stored by the data acquisition program in one file each day. The file names are created from the month number (2 digits) and the day (2 digits), e.g. 1101.SDR for SODAR data of 1-november.

All measured data of one month are stored in one directory, the directory name is created from the year (4 digits) and the month number (2 digits), e.g. 199711.

All subdirectories in the given path which are matching this style will be recognized automatically. The file name extensions (usually SDR for SODAR data, SNC for SONIC data and MRR for MRR data) can be set in the field *Devices / Identifier*.

Devices

At least one of the *Identifier* fields must be set. Clear identifier fields will reduce the list of available measured values in the *Show Data* dialog (see chapter 4.1.1). The identifiers are used to search for the correct file extensions. If the option *extract SONIC data from SODAR data* is selected the SONIC identifier is blanked and the program searches within the SODAR data for the SONIC values, which are expected in the special height 0 (look for the *sncprtcl* in the SODAR manual). The real measuring height for the SONIC data can be applied as well (*SONIC-height*). This value is used for display and for calculation of the potential temperature.

Place of Measurement

The *Place of Measurement* is any text with a maximum of 60 characters, which is printed below the automatically created subscript of the plots. This text should be used to indicate the measuring site or certain measuring conditions.

Time

All measured data can be displayed for different time zones. Selectable are as well the European time zones **GMT**, **CET** and **CEST** as all international time zones, which are represented by $UTC \pm hhmm^2$. Additional the user may choose how time stamps have to be interpreted within the recorded data. Beside of the recognition of different time stamp formats of different sources (i.e. time stamps generated by the TCOPY program) it is possible to force the graphic program to ignore any time zones noted in the recorded data and to replace this information by a user selected time zone. This option should be used only in case of erroneous data recording (using a wrong time zone)!

Colors

This button opens another dialog box which offers a selection of different colors and line widths for specific graphical elements used in the plots:

<i>Background</i>	background color („paper color“); the same color is used for the first (lowest) class of distribution within wind rose and statistical plots.
<i>Axis</i>	color of the axis, their tick marks and their labels.

² positive offsets for time zones east of Greenwich, negative offsets for time zones west of Greenwich

<i>Vectors/Lines</i>	color of monochrome lines for the plot types <i>time series</i> and <i>profile series</i> and color of monochrome vectors and barbs for the plot type <i>vector plot</i> .
<i>Axis Title</i>	text color of the vertical axis title.
<i>Title/Place</i>	text color for the automatic generated plot title, the optional figure number and the user defined text for the place of measurement..
<i>add. Info</i>	text color for additional information as number of averaged spectra, statistical analyzed values, time range for statistics, etc.
<i>Bars</i>	color of bars for the plot type <i>statistics</i> .
<i>Open Classes</i>	color of bars (open classes) for the plot type <i>statistics</i> .
<i>Reference Line</i>	color of the optional reference line within plots of the type <i>time series</i> .
<i>< Reference</i>	color of lines used for measured values smaller than the reference within plots of the type <i>time series</i> .
<i>> Reference</i>	color of lines used for measured values greater than the reference within plots of the type <i>time series</i> .
<i>Line Width</i>	Line width for <i>time series</i> , <i>profile series</i> and <i>vector plots</i> .

The colors recommended by METEK can be restored by clicking on the *Standard* button.

Units

This button opens a dialog box which defines the physical units used for displaying temperatur and velocity. Available units are m/s and kn for velocity, °C, °F and K for temperature and m and ft for the height. The program assumes that all height, speed and temperature data has been recorded as values based on m, m/s or °C. The values will be transformed for display if the user selects different units by use of this dialog box.

4.1.3 Submenu *Save Settings*

By use of this menu item it is possible to save all the settings made in the dialog boxes *Defaults* and *Show Data* to a file. A standard windows dialog box for saving of files will appear. Path and file name can be selected freely the file extension (file type) is fixed to .MGR. The invalidation list will not be saved with this action. Use the separate menu item *Save Invalidation List* (chapter 4.1.5) to do this.

Use the menu item *Load Settings* to restore the previous saved settings.

4.1.4 Submenu *Load Settings*

This menu item will restore all settings which were previously saved to a file (see chapter 4.1.3).

Further it is possible to load specific settings on start of the program. For this purpose you can start the program (GRAFIK.EXE) from a command prompt or from a batch file giving the name of the desired .MGR file as a parameter (refer to chapter 3).

Example: GRAFIK.EXE Example.MGR

Additional on the programs exit all settings will be saved for the next session of use. But existing .MGR files will not be updated.

Note: The settings for the printer (for example paper orientation) can not be saved. Use instead the windows control panel to setup the default settings for your standard printer.

4.1.5 Submenu *Save Invalidation List*

By use of this menu item it is possible to save the actual invalidation list to a file. A standard windows dialog box for saving of files will appear. Path and file name can be selected freely the file extension (file type) is fixed to .TXT. The generated file will contain human readable ASCII text, which can be viewed and edited by use of an external text editor. The format is defined in the following way: Each line starts with a time/date identifier of the form *YYMMDDhhmmss ZZZ*. The next field (separated by space one or more characters) holds a height information (height in meters or 0 for ground values). All values specified by this list of times/heights will be interpreted as invalid regardless of the settings for the plausibility codes.

Use the submenu item *Load Invalidation List* to restore or to add time/height pairs to the actual list.

4.1.6 Submenu *Load Invalidation List*

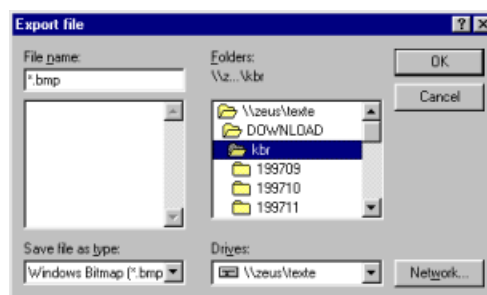
This menu item can be used to restore an invalidation list previously saved by the function Save Invalidation List. Additional to the „restore“ function the saved data can be appended to the actual list. The system will ask for the desired option after selection of the saved text file (description of file format refer to chapter 4.1.5). The maximum length of the invalidation list is actually limited to 4096 elements.

4.1.7 Submenu *Delete Invalidation List*

This menu item offers the possibility to delete the entire contents of the actual invalidation list. When the actual invalidation list has been deleted, values will be interpreted as valid/invalid just by evaluation of the corresponding plausibility codes (refer to description for *Plausibility* in chapter 4.1.2).

4.1.8 Submenu *Export*

If this menu is activated, the following dialog appears :



You can export the actual plot either as a graphic file or as a text file including the data which are underlying the plot. Choose one of the following file formats :

- Windows Bitmap (* .BMP)
- Windows Metafile (* .WMF)
- Agfa SCODL (* .SCD)
- Computer Graphics Metafile (* .CGM)
- GEM File (* .GEM)
- HPGL Plotter File (* .PLT)
- Lotus 1-2-3 PIC (* .PIC)
- Encapsulated Postscript (* .EPS)
- TIFF Bitmap (* .TIF)
- Textfile (* .TXT)

The export of the data into a text file is done by one or several tables with fixed column width. The first column is containing the date and time of the data set. The following columns include the measured data from the different heights. Non plausible values are replaced by spaces. The number of tables in the file depends on the number of single plots on the screen.

When using the plot type *Vector Plot*, two columns for each height are created, which include the wind velocity and its matching directory.

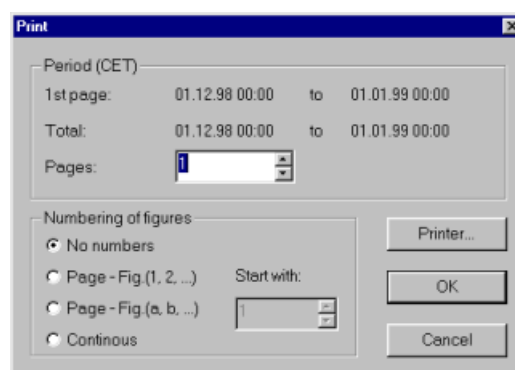
When exporting spectral data the first column is replaced by the number of the filter. For *Wind Rose* and *Statistic Plots* the first column identifies the class as defined by the scale and class width.

4.1.9 Submenu *Printer Setup*

If this menu is activated, the standard Windows dialog appears, which is to use analogously to other Windows applications and needs no further explanation.

4.1.10 Submenu *Print*

If this menu is activated, the following dialog appears:



Period

You either can print only the actual screen on one page or an entire series of pages containing this and the following periods with the same length. Enter the total number of pages here.

Numbering

In the dialog area *Numbering* the automatic numbering of the different plots can be activated. There are 3 types of numbering :

- Page numbers plus picture numbers consecutively per page (1 .. 4 resp. 1 .. 9)
The number of the first page is selectable
- Page number plus letter consecutively per page (a .. d resp. a .. i)
The number of the first page is selectable
- Consecutive numbering of all pictures
The number of the first picture is selectable

4.1.11 Submenu *Exit*

When this menu item is activated, the program settings are stored and the program is closed.

4.2 Menu *Edit*

4.2.1 Submenu *Copy*

If this function is selected, the actual plot on the screen is copied to the clipboard as a Windows metafile. The user now can change to another application e.g. to a word processing program and insert the drawing into his text.

4.2.2 Submenu *man. Invalidation*

Clicking on this menu item enables/disables the manual invalidation mode. The actual mode is indicated by a mark on the menu item.

The manual invalidation mode can be entered for single time series, vector plots, and sodargrams. If this mode is active, this cursor changes to a cross hair sight and clicks with left mouse key will rubout the corresponding values. If you keep the shift key pressed while clicking the mouse button, additionally all values of the upper height steps are invalidated. All values marked in this manner will be added to the actual invalidation list which consists of time/height pairs. Each value found in this specific height at the given time will be interpreted in the following as invalid. With the *Actualize* function (F5) you can redraw the entire graphic without the invalidated values.

The Invalidation list can be saved as/loaded from a text file (refer to chapter 4.1.5 - 4.1.7).

4.3 Menu *View*

This menu supports functions to continue the plots with the next or previous time interval and to magnify the plot on the screen.

4.3.1 Submenu *Previous Interval (PgUp)*

The function *Previous Interval* is used to draw a new graph on the screen, showing the data from a time interval which is immediately preceding that one which is actually shown. The length of the interval remains constant. If e.g. the Nov 11, 1997 is shown as a one-day-plot, it will be the Nov 10, 1997 after the execution of this function. This is also callable by the shortcutkey *Page Up*.

This function is not available for plot of single profiles or single spectra!

4.3.2 Submenu *Next Interval (PgDn)*

The function *Next Interval* is used to draw a new graph on the screen, showing the data from a time interval which is immediately following that one which is actually shown. The length of the interval remains constant. If e.g. the Nov 11, 1997 is shown as a one-day-plot, it will be the Nov 12, 1997 after the execution of this function. This is also callable by the shortcutkey *Page Down*.

4.3.3 Submenu *Zoom In/Out (Alt+Z)*

The *Zoom In* command magnifies a portion of the plot window. When you activate this function, the mouse cursor changes to a cross hair. Press and hold the left mouse button and drag the pointer diagonally across the region to be enlarged. A rectangle follows the pointer, indicating the extent of the region. Release the mouse button and the region within the zoom rectangle is magnified to fill the entire window.

When you activate this function next time, the graph is redrawn in the unzoomed size again. The zoomed part of the plot can be printed or exported to a graphic file as well.

4.4 Menu *Help*

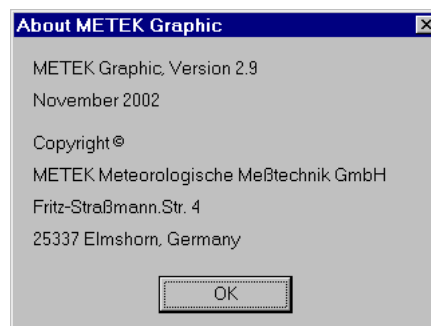
This menu activates the help system.

4.4.1 Submenu *Registration*

This function can be used to enter a license key. Without license key the menu items for export and printing of data will be disabled.

4.4.2 Submenu *About*

If this function is selected, a window will open where you can check the program version number:



4.5 Menu –

This menu item is identical with the menu *View*, submenu *Previous interval*.

When clicking with the mouse on this item, a new graph is drawn on the screen, showing the data from a time interval which is immediately preceding that one which is actually shown. The length of the interval remains constant. If e.g. the Nov 11, 1997 is shown as a one-day-plot, it will be the Nov 10, 1997 after the execution of this function. This is also callable by the shortcut *Page Up*.

This function is not available for plot of single profiles or single spectra!

4.6 Menu +

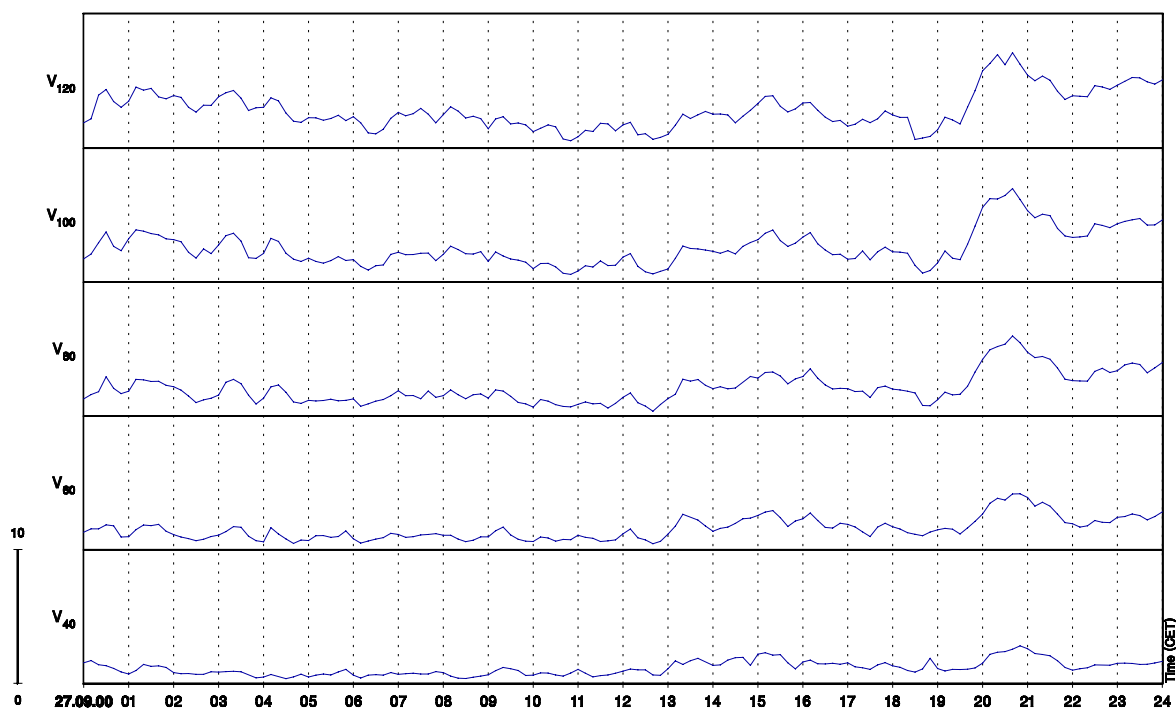
This menu item is identical with the menu *View*, submenu *Next interval*.

When clicking with the mouse on this item, a new graph is drawn on the screen, showing the data from a time interval which is immediately following that one which is actually shown. The length of the interval remains constant. If e.g. the Nov 11, 1997 is shown as a one-day-plot, it will be the Nov 12, 1997 after the execution of this function. This is also callable by the shortcutkey *Page Down*.

5 Plot Representations

5.1 Time Series / Spectrum

The plot type *time series* displays the selected measurement type for one or several height steps. The measured data are plotted in a chronological order from left to right. The data points are connected by a straight line. If you select data from different measuring heights, they are displayed with separate pairs of axes on the top of each other. The following picture shows a one-day-plot of the wind velocity from 5 measuring heights (40, 60, 80, 100 and 120 m height). At the left border of the plot you find a separate scaled axis matching for all height steps.



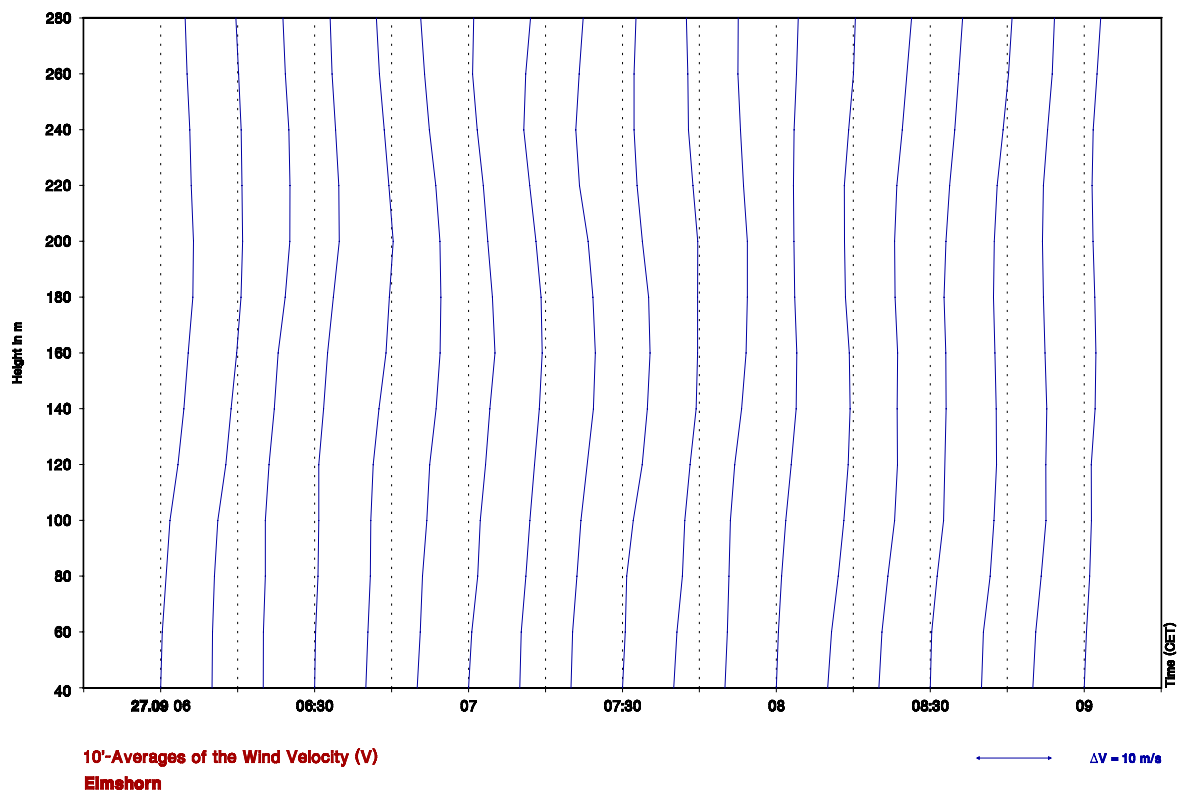
10'-Averages of the Wind Velocity (V_x) in m/s for Selected Heights (x)
Elmsborn

If only one height step is selected, the reference axis at the left border is omitted. Instead of this the main y-axis is equipped with scaling marks. The scale division (ticks) and the entire scale range can be entered manually.

When plotting spectral data the time axis is replaced by a frequency axis. This axis will display the spectral line numbers of the SODAR or the falling velocities / drop sizes of the MRR. The shown spectra, one for every height step, are created by averaging the single spectra in the selected period.

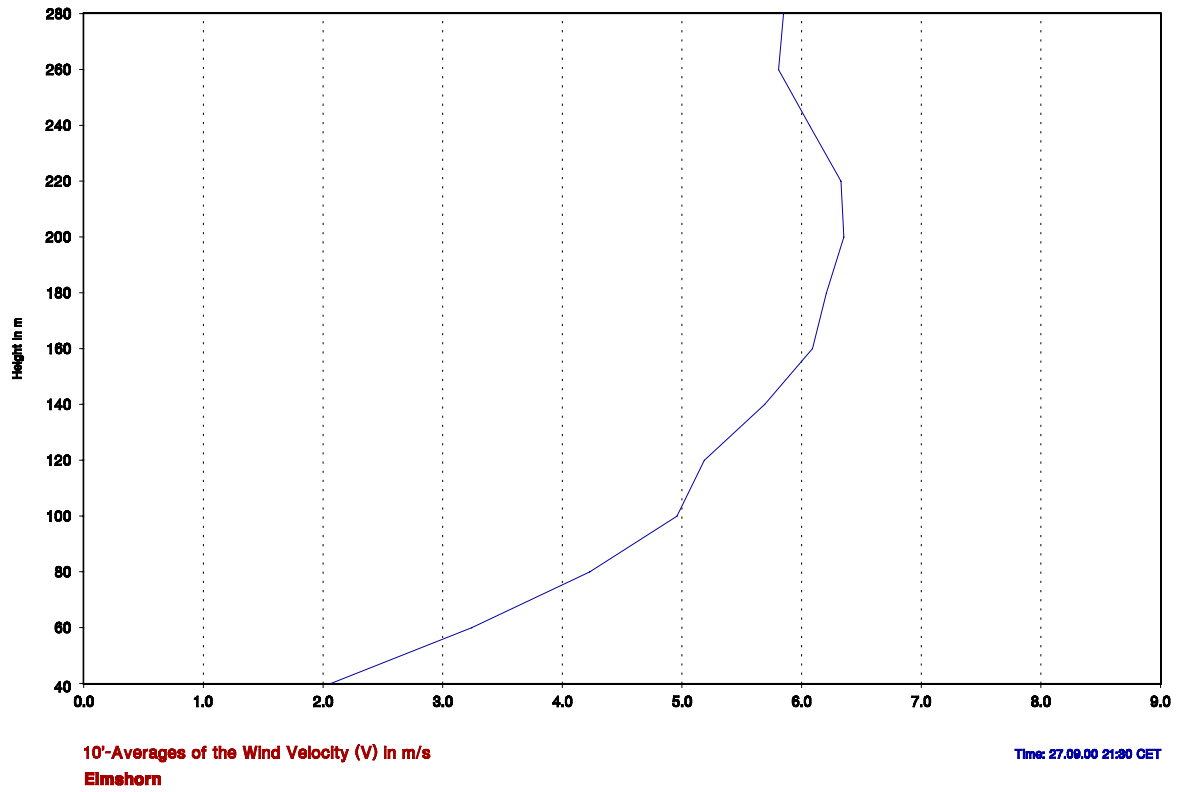
5.2 Profile Series

The plot type *Profile series* displays the selected measurement type for several height steps. The measured data are drawn as a relative course of the values against the different measuring heights, resulting in a vertical profile. The values of the lowest valid height define the zero on the x-axis of the relative profile. The data points are connected by a straight line. The following picture shows a 3-hour-plot of the wind velocity in a height of 40 to 280 m. At the right bottom side of the plot you find a scaled x-axis for the single profiles.



When plotting spectral data the time axis is replaced by a frequency axis. This axis will display the spectral line numbers of the SODAR or the falling velocities / drop sizes of the MRR. The shown spectra, one for every height step, are created by averaging the single spectra in the selected period.

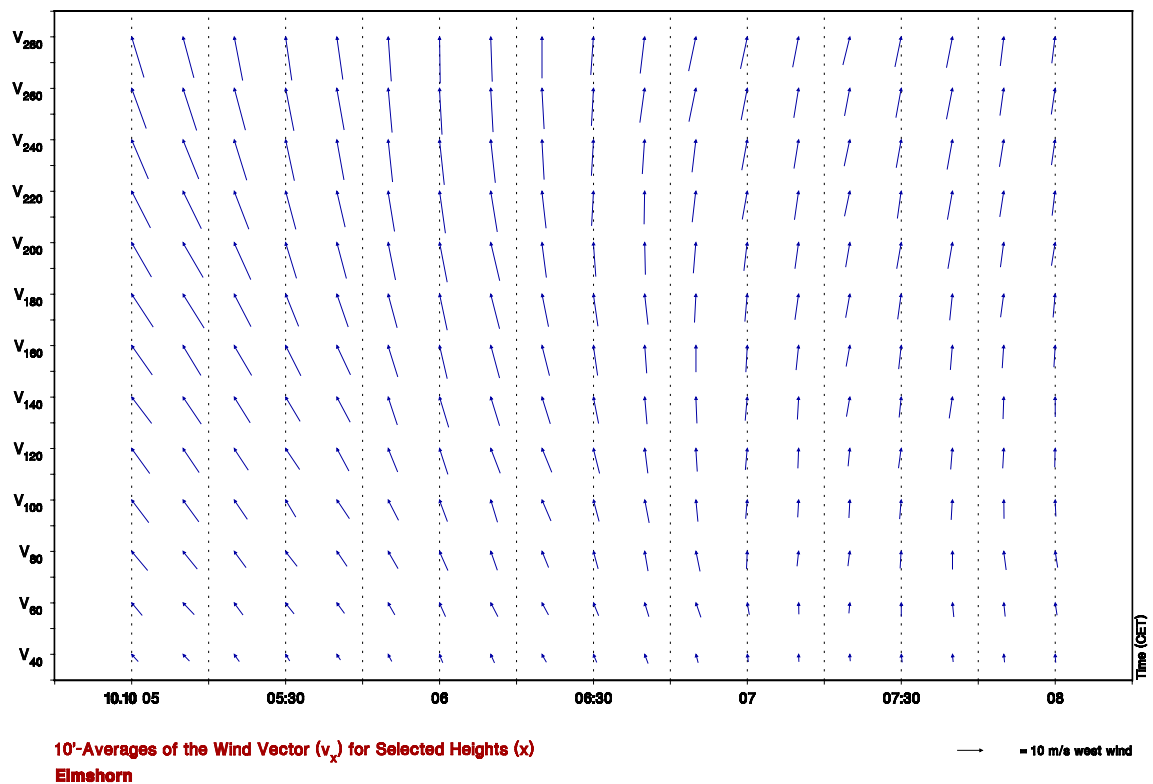
For plots showing non spectral single profiles the x-axis will be divided in physical units of the measured value. In this case the profile shows the absolute values rather than values relative to the first valid value in one of the lowest heights:



5.3 Vector Plot

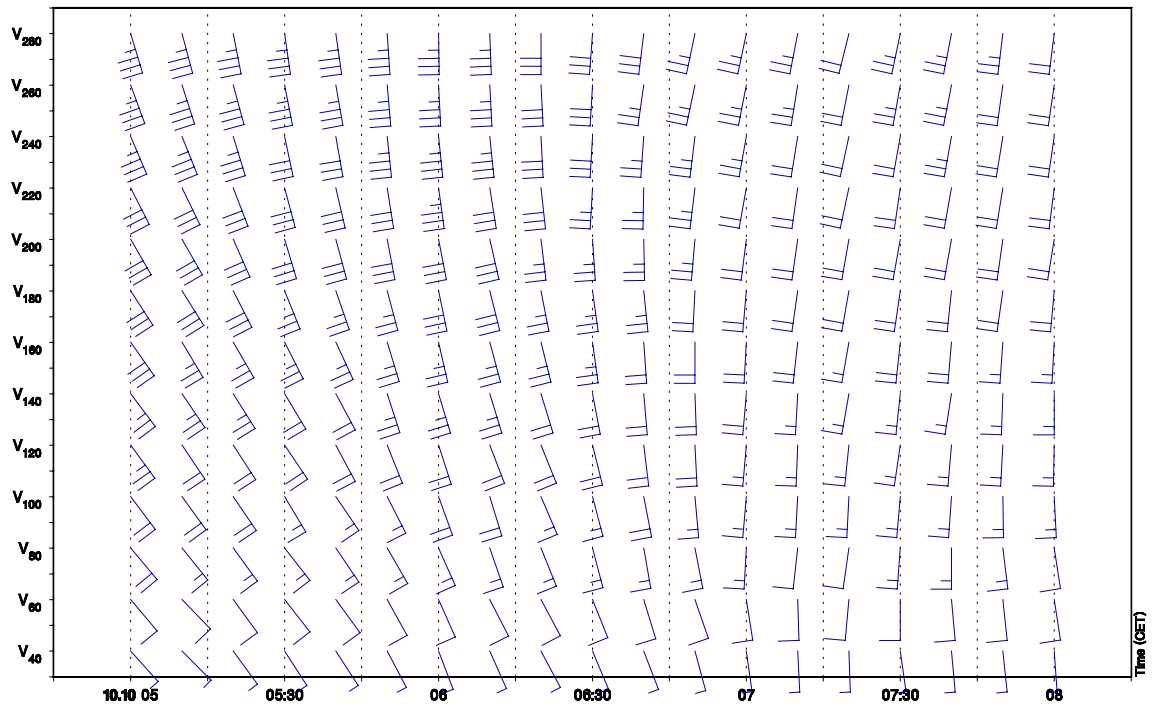
The plot type *vector plot* displays the selected measurement type for one or several height steps. The measured data are plotted in a chronological order from left to right as a combined representation of the wind velocity and the direction as vectors. The arrowheads define the time and the height of the data pair. The direction of the vector represents the wind direction, the length of the arrow is a measure of the velocity.

The following picture shows a 3-hour-plot of the wind velocity in a height of 40 to 280 m. At the right bottom side of the plot you find a scaled vector.



This plot type can also show wind barbs instead of the vectors (refer to *Vector Plot / Options* in chapter 4.1.1).

The figure below shows the same data as above but using wind barbs instead of vectors:

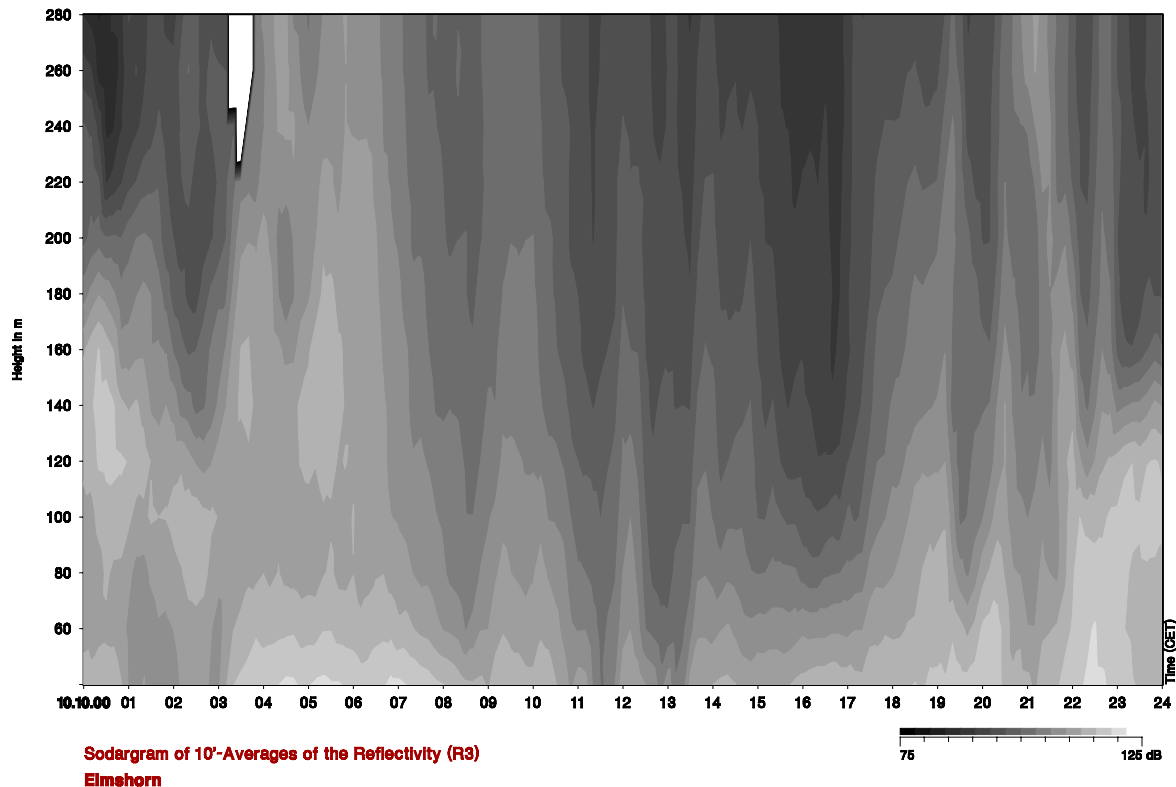


10'-Averages of the Wind Vector (v_x) for Selected Heights (x)
Elmshorn

5.4 Sodargram

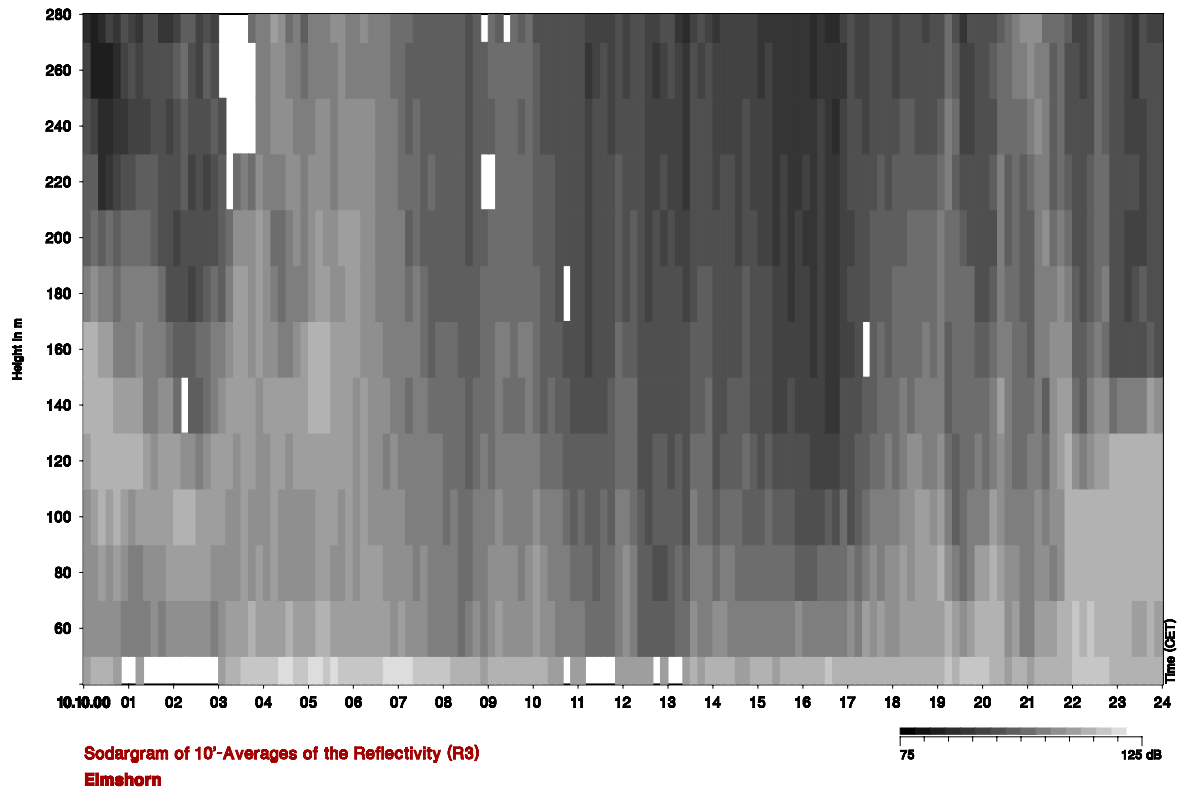
The plot type *Sodargram* displays the selected measurement type for several height steps. In a height-time-grid the corresponding measured data are represented by grayscale values or a special coloring. At the right bottom side of the plot you find a scaled color table.

The following picture shows a one-day-plot of the reflectivity of the antenna A3 in a height of 40 to 280 m.



The options dialog box for this plot type allows the selection between colored and grayscale plots. Additionally it is possible to choose between contour plots (see above) and simple square plots (see next page) where each square (sides are defined by measuring time interval length and height resolution) is grayed or colored according to the measured value.

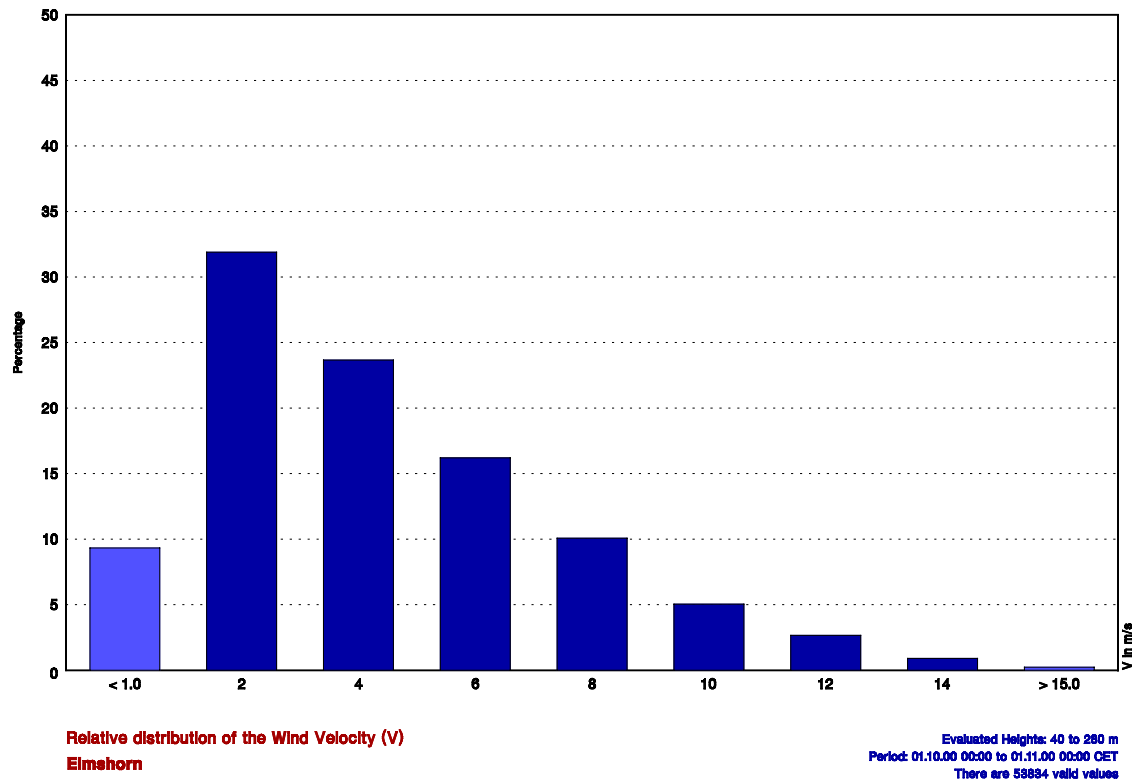
While the figure on the previous page is a smoothed contour plot, this plot does not use any smoothing:



When plotting spectral data the time axis is replaced by a frequency axis. This axis will display the spectral line numbers of the SODAR or the falling velocities / drop sizes of the MRR. The shown spectra, one for every height step, are created by averaging the single spectra in the selected period.

5.5 Statistics

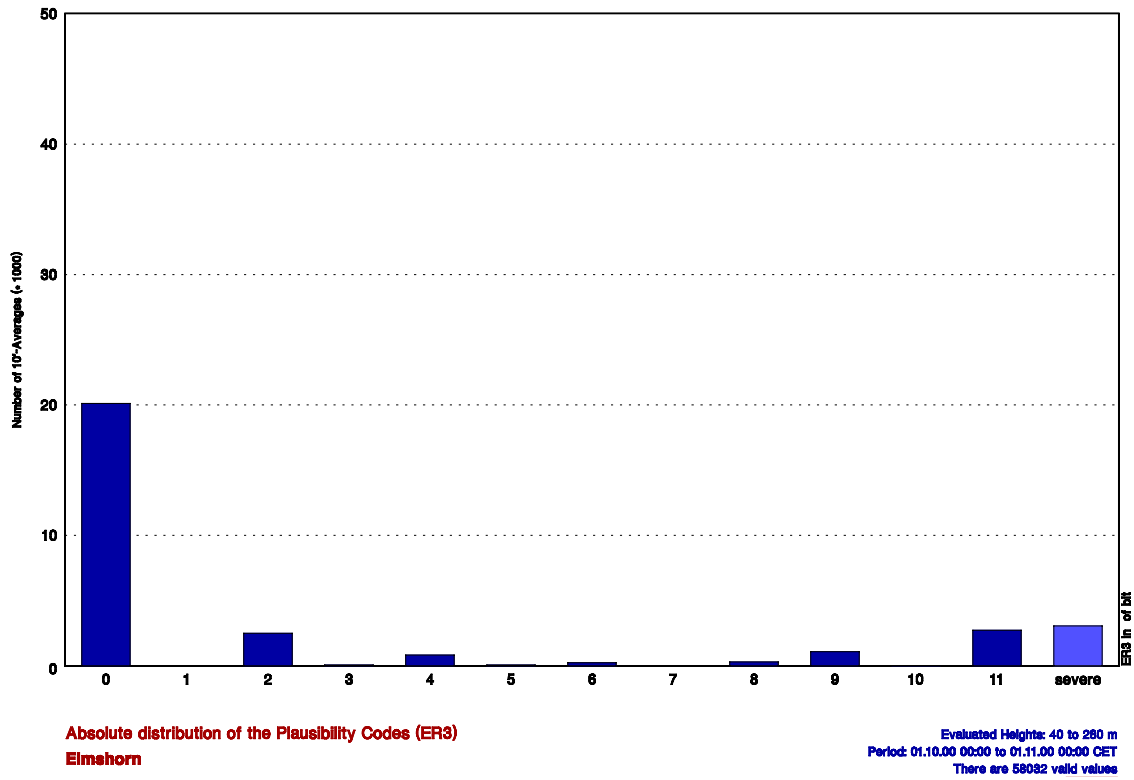
The plot type Statistics computes statistics with the selected measurement type for one or several height steps. The following picture shows the statistics for the wind velocities of one month from the heights of 40 to 280 m covering the range from 1 m/s to 15 m/s in classes of 2 m/s. The values outside of this range are shown as open classes for all values < 1/m/s resp. > 15 m/s.



There are several options for this plot type (refer to chapter 4.1.1):

For example the use can change between the representation of the relative and absolute count of incidences and whether open classes representing the values ranging out of the selected scale (as shown in the figure above) should be displayed. Additionally it is possible to select between two types of labeling. The plot above uses labels on the mid of each class. Alternatively the class borders may be marked with a label.

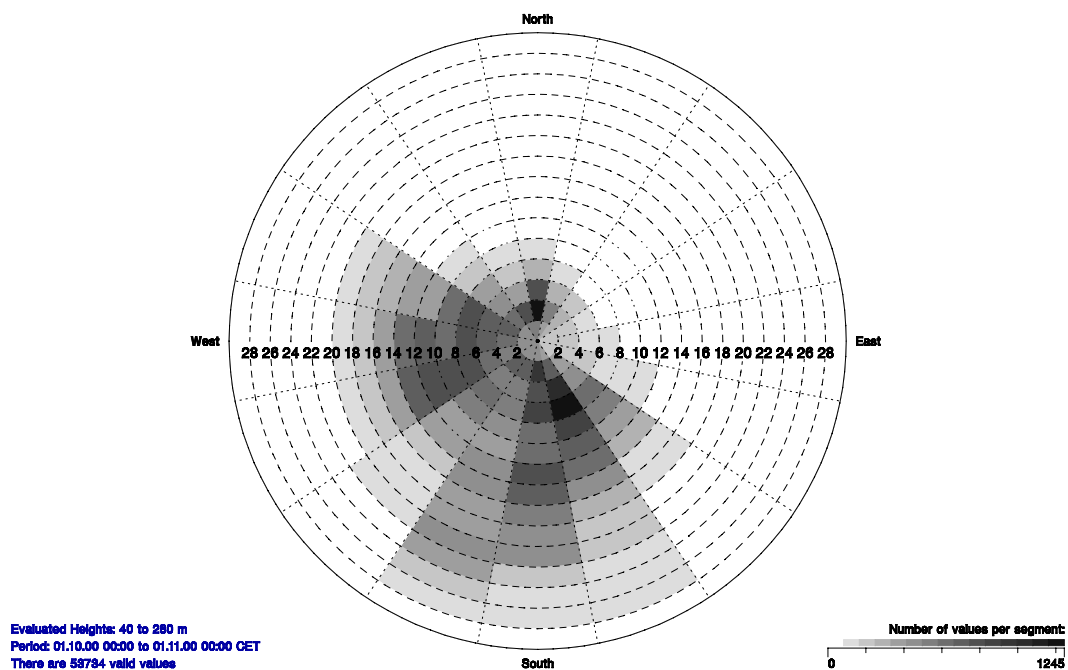
If the SODAR plausibility codes have been selected for statistical analysis they will be divided into the bit-coded categories and a special class for those values, which are interpreted as serious errors due to the settings in the *Plausibility* dialog within chapter 4.1.1. Refer to the SODAR manual for the meaning of each individual bit of the plausibility code.



5.6 Wind Rose

Similar as for the statistic this plot type shows the distribution of a measured value (typical: wind speed). Additional to the classification on the value itself the count of incidence is done separately for the corresponding wind directions within the selected heights and time period. The number of segments and the representation mode (colored or black and white) can be selected with the options dialog.

The plot below shows the distribution of wind speed for one month where the wind speed is divided into 15 classes (width: 2 knots) and the wind direction is divided into 16 classes (width: 22.5 degrees). The plot shows that most of the time the wind blows from the south and from the west with low to middle velocities.

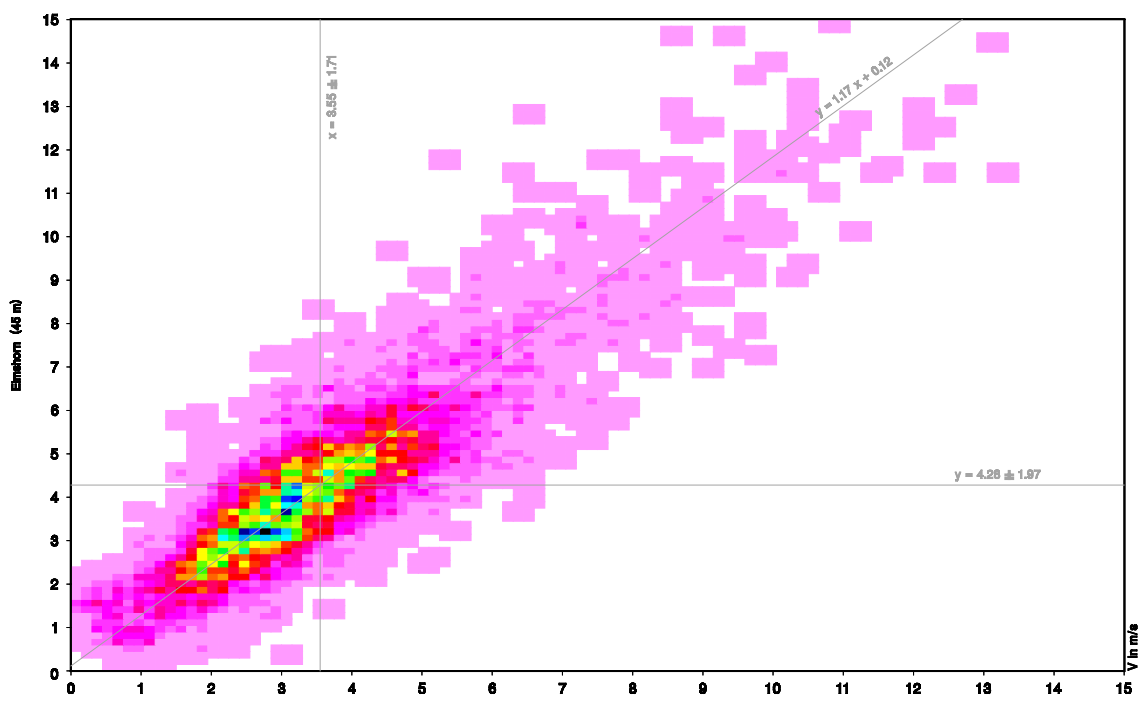


**Absolute distribution of the Wind Velocity (V) depending on the Wind Direction (D)
 Elmshorn**

5.7 Correlation

This plot type shows the correlation of a measured value on two different sites and/or two different heights where data from different heights may even be delivered from different devices (i.e.: SONIC/SODAR). The different colors show different densities of counts of incidence. The horizontal and vertical gray lines mark the average values for each data source. The other gray line shows the regression. The correlation factor and the standard deviations are displayed numerical.

The plot below shows the correlation of wind speed for one month where the wind speed is measured by a SODAR on 35 and 45 m above ground.

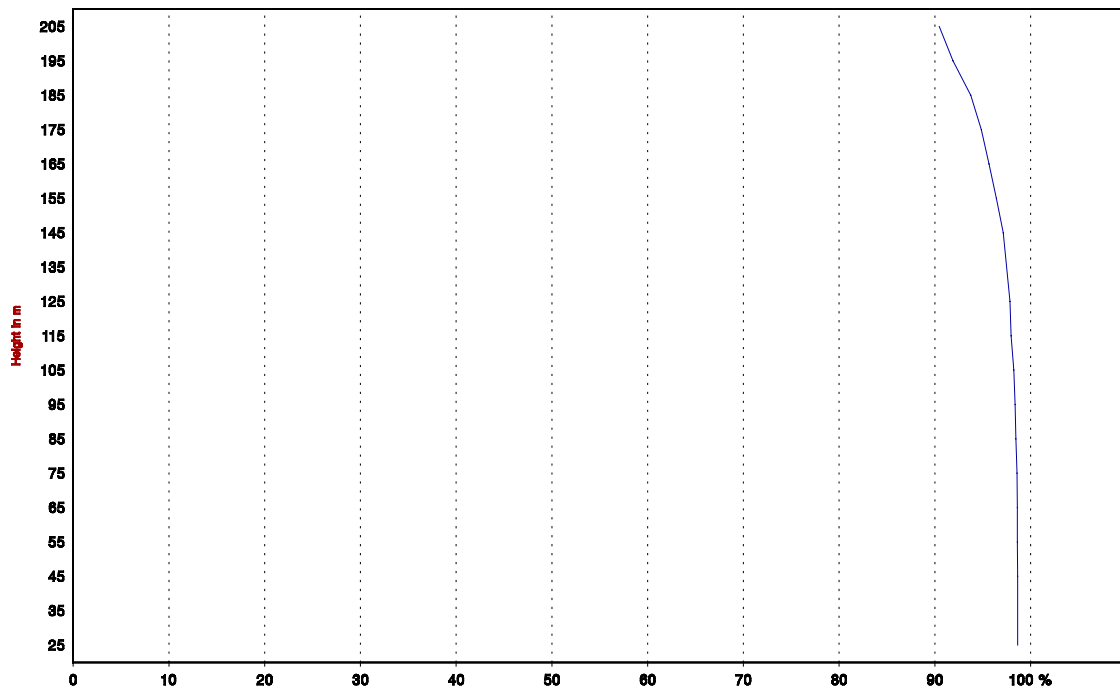


Correlation of the Wind Velocity (V)
Elmshorn (35 m)

The Correlation is 0.879
There are 4256 valid values
Period: 30.09.02 00:00 to 30.10.02 00:00 CEST
METEK

5.8 Availability

This plot type shows the availability of valid data for different measuring heights. The calculation of availability is based on the length of averaging intervals for valid data and the theoretical measuring time in the selected time range. Optionally excluded times of the actual day (for time range selections covering multiple days) are taking into account.



Availability of the 10'-Averages of the Sigma of the Radial Wind Velocity ($S3_x$) for selected Heights (x)
Elmshorn

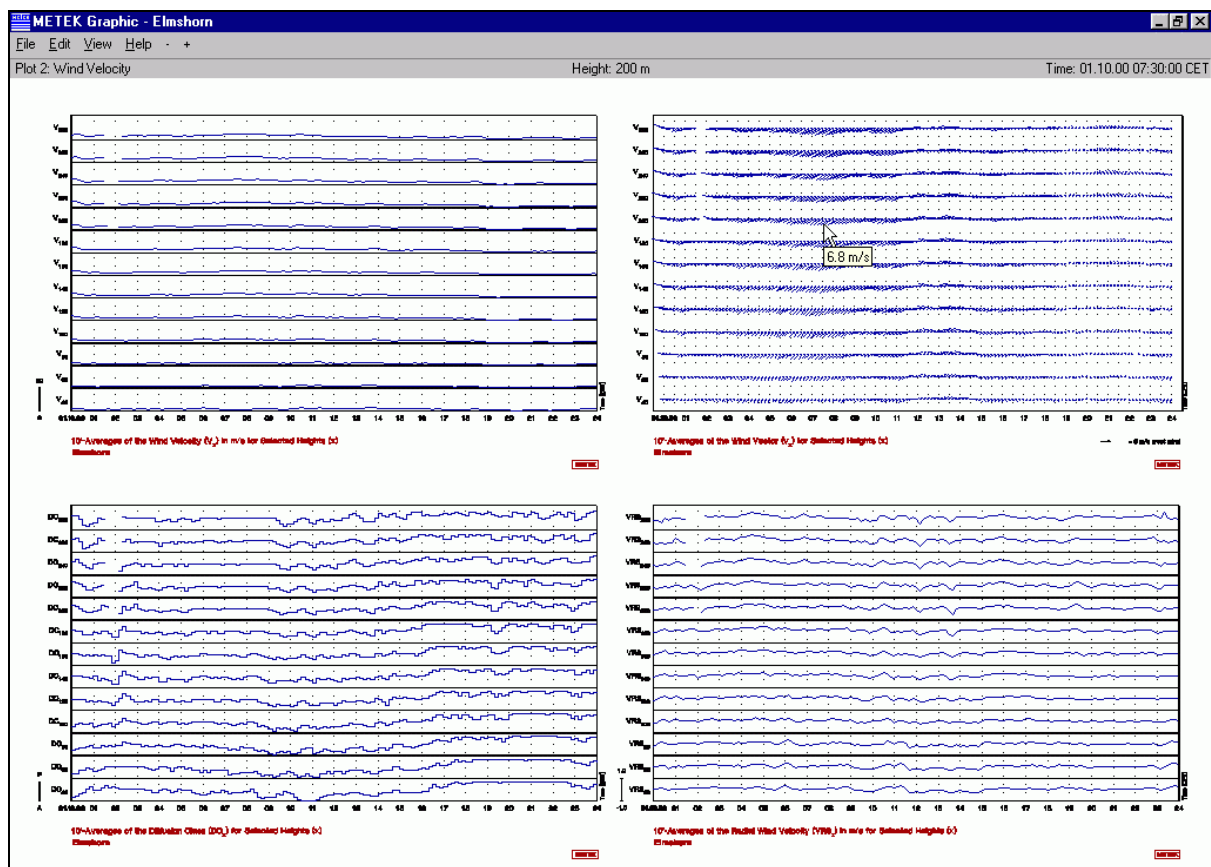
Period: 30.09.02 00:00 to 30.10.02 00:00 CEST
METEK

5.9 Display of Single Measured Values

For all plot types the program displays a status line to show information about the actual position of the mouse pointer within the actual plots on the screen. This information include the current plot number, the type of measured data, the measuring height (for plots showing a height axis) and the date/time based on the time axis (if displayed).

The measured value itself is displayed as a numeric value in a small window near the actual position of the mouse pointer. This window disappears after about 4 seconds since the last mouse movement.

Example for 4 plots on one screen:



6 Trouble Shooting

The most common reasons for errors of the form „no data“:

- The program can not find the data files.

Ensure that you have entered the **correct (and complete) path name** in *File* → *Defaults*, input field *Data Path*.

The name of the directory (folder) of the last level should not be entered here. Each of this directories holds the data files for one month. The name of these directories is derived from the year (4 digits) and the month (2 digits). So the program will add this parts to the entered path name to locate the data files required for the desired plot.

Example:

SODAR data measured on the first of April 1999 are expected in a file named 0401 . SDR.

The file will be searched in the directory

D:\MESSUNG\DATEN\199904

if the entered path name is

D:\MESSUNG\DATEN\

- The path name is correct, but there is still no data..

Check the file extensions (= device identifier) in

File → *Defaults*, input field *Device Identifier*.

The extensions of the data files depend on the individual device identifiers (3 character label at the beginning of each date/time stamp within the recorded data). This labels/identifier may be entered in the data fields described above. For each device type (SONIC-Anemometer, SODAR, Micro Rain Radar) there may be entered one identifier. The program uses this identifier to build the file names for a selected time range.

Usually the extensions should be

SNC for SONIC data, SDR for SODAR data and MRR for data from the Micro Rain Radar.

Take a look at the files (windows explorer) if you are not sure which extension has been used while the data was recorded.

- All names (files and directories) are correct, but there is still no data.

Check if there has been recorded any data for the selected time range.

The time range may be adjusted in the dialog

File → *Show data*, input field *Period*.

Note: The usage of different time zones may be the reason for further problems. Take a look at the recorded data (i.e. open one file with WordPad). The header lines of the recorded data contain the device identifier (should be the same as the file extension³), the date/time and the time zone. Example:

SDR 991013000900 UTC AVE 600 ...

³ Use the file extension for the defaults setup of this program if this identifier is not the same as the file extension. Under normal circumstances the data recording service program will ensure that both strings are equal, cause it builds up the file name from the actual date/time and the identifier/label found within the data to record.

The device identifier is SDR. The data was recorded on the 13th of October 1999 at 00:09:00 UTC.

The time zone for the graphical output (and for the selection of the time range) can be entered in

File → *Defaults*, input field *Time* → *Time Zone (Plot)*.

This time zone can be different to the time zone in the recorded data (the program takes the time shift into account) but usually you should use the same zone for the plots.

- There are measured values for the given time, but the program does not find any value.

Ensure that the **selected height resolution** fits to the recorded data.

Use the dialog *File* → *Show Data*, input field *Height Steps (m)* to adjust the height steps

If you press the *auto* button from this dialog box, the program tries to guess the height steps found in the recorded data. Have a look at the recorded data files (i.e. by use of WordPad) if the program is not able not guess this setting.

Note: The height steps have to be adjusted for each of the 9 plots individually!

- Date/Time range and the height step setting fit to the data, but the program does not find the desired values.

Ensure that the selected **type of measured data** has been recorded at all.

Use the dialog box *File* → *Show Data*, input field *Measured Value* to select a different type of measured value.

For the first try select one plot of the type time series per page

File → *Show Data*, input fields *Layout* and *Plot Type*

- The axis and the labels are shown but there are no measured values visible.

Ensure that the value has the **correct scaling**.

The scaling can be adjusted from

File → *Show Data*, input fields *Scaling*.

The program tries to find some reasonable scaling by itself if you use the *auto* button from the scaling section. The automatic scaling is based on the minimum/maximum value found in the recorded data for the selected time and height range.