

## WUFI® Tutorial

# Meteonorm 6.1: Generate climate data for WUFI®

## Meteonorm: Climate data for WUFI®

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The software Meteonorm from the Swiss company Meteotest ([www.meteonorm.com](http://www.meteonorm.com)) offers the possibility to create climate data for any location worldwide. For this purpose the program includes long term monthly mean values for a large number of weather stations. Based on this, an interpolation could generate site-specific hourly values. In addition, Meteotest offers the possibility to purchase individual climate data sets, created for any specific location.

Concerning the driving rain, it's important to note that the correlation between wind and precipitation events is not sufficient. This could lead to an incorrect modelling of the amount and direction of the driving rain. If the accurate amount of driving rain is essential for the evaluation of a construction the climate data from Meteonorm may not be sufficient.

The handling of Meteonorm 7 should be the same as in Meteonorm 6. The essential part is the selection of the right output format („WUFI / wac“ ).

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# Meteonorm: Climate data for WUFI®

The screenshot displays the METEONORM Version 6.1 software interface. The top section is a configuration panel with four main columns: Site, Data, Format, and Calculations. The Site column includes fields for Name of site, Type of site (set to 'Cities'), Altitude [m], Longitude [°], Latitude [°], Situation, Time zone, and Time ref. [mins]. The Data column includes Radiation model, Temperature model, Tilt radiation model, Time period (Temperature: 1951-1990, Radiation: 1981-2000), and 10 y. extreme monthly values. The Format column includes Output format, Azimuth, Inclination, and Horizon file. The Calculations column includes Results saved, Units temperature (°C, °F), and Units radiation (W/m², kWh/m², kWh/m²d, kWh/m²d). Navigation buttons 'Back' and 'Continue' are present.

The bottom section is the 'Site' selection screen, which is currently active. It features a 'Help' section on the left, a 'Choose site' section with radio buttons for 'Cities', 'Stations', 'Stations (Gh interpol.)', 'Userdefined site', 'User (month)', 'User (hour)', and 'Design Reference Years'. A 'part of the world' section lists regions like Europe, Switzerland, North America, Central / South America, Africa, Asia, and Australia / Oceania. A 'Search site' section has a text input field with 'st\*' and a 'Search site' button. A list of sites is displayed, including St. Albans UK, St. Helens UK, Stafford UK, Stara Zagora BU, Stavanger NO, STOCKHOLM SW, Stockport UK, Stockton-on-Tees UK, Stoke on Trent UK, Strasbourg FR, Stratford-on-Avon UK, Stroud UK, and Stuttgart GM. A 'Select by' section offers 'None' and 'Latitude' options. A 'Map' button and a 'Time system' section (legal, solar) are also visible.

Preferred order of data sources:

1. Stations, if present at the desired location
2. Stations (Gh interpolated by Near stations)
3. Interpolation based on the surrounding stations (so called "Cities" are predefined locations for which data can be interpolated)

# Meteonorm: Climate data for WUFI®

The screenshot displays the METEONORM Version 6.1 software interface. The top section is a configuration panel with four main columns: Site, Data, Format, and Calculations. The Site column includes fields for Name of site (Schallhausen), Type of site (Stations), Altitude (m) (437), Longitude (°) (8.6201), Latitude (°) (47.6898), Situation (open), Time zone (1.00), and Time ref. (min) (-30). The Data column includes Radiation model, Temperature model, T/H radiation model, Time period (Temperature: 1961-1990, Radiation: 1981-2000), and 10 y. extreme monthly values. The Format column includes Output format, Azimuth, Inclination, and Horizon file. The Calculations column includes a Results saved checkbox, Units temperature (°C, °F), and Units radiation (kWh/m2, kWh/m2d, kWh/m2m). A Back button is on the left and a Continue button is on the right.

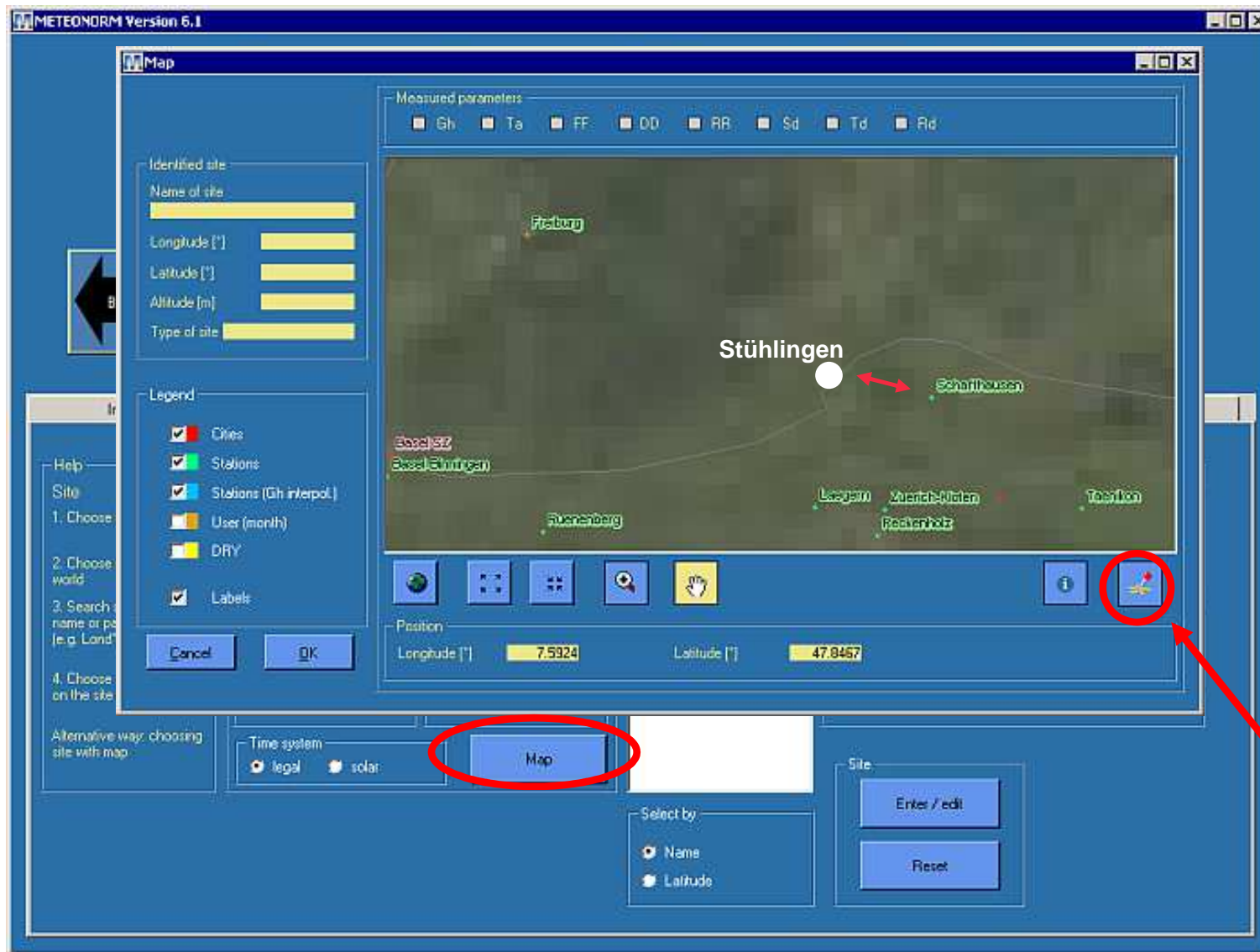
The bottom section is a search interface with a navigation bar (Intro, Site, Data, Format, Calculations, Exit) and a Help section. The Search site section includes a search box, a Search site button, and a list of sites with 'Schallhausen' highlighted. The Measured parameters section (highlighted with a red box) includes checkboxes for 'Old period' (Ta, Gh, FF, Td, RR, Rd) and 'New period' (Ta, Gh, FF, Td, RR) and corresponding time period selection fields. The Old period fields are Temperature: 1961-1990 and Radiation: 1983-1992. The New period fields are Temperature: 1996-2005 and Radiation: 1981-2000. There are also buttons for Enter / edit and Reset.

For each station it is possible to choose between two periods:

Old period:  
30 years standard – period for meteorological purposes.

New period:  
recent observations

# Meteonorm: Climate data for WUFI®



Maybe the desired location can also be represented by a nearby station:

e.g. Stühlingen through the station Schaffhausen

Otherwise:  
choose a „user defined“ position by a click in the map

# Meteonorm: Climate data for WUFI®

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**Edit site**

Choose site

Name of site:

Altitude [m]:

Latitude [°]:

Longitude [°]:

Time zone:

Situation:

Type of site:

Time ref. [min.]:

Coordinates

Transform to Swiss coordinates:

Coord. X [m]:

Coord. Y [m]:

For a „user defined“ location the following parameters have to be provided:

- Time Zone (Germany: 1)
- Exposition  
(open terrain, valley, peak...)
- Time Ref: -30  
(representative within the hour position of the sun )

# Meteonorm: Climate data for WUFI®

The screenshot shows the METEONORM Version 6.1 software interface. The top section contains input fields for Site, Data, Format, and Calculations. The bottom section contains a detailed view of the Data settings, including Radiation model, Temperature model, Tilt radiation model, Time period, and Additional settings. The '10 y. extreme monthly values' option is highlighted with a red box.

Section	Field	Value	
Site	Name of site	Stuehlingen	
	Type of site	Userdefined site	
	Altitude [m]	972	
	Longitude [°]	8.2369	
	Latitude [°]	47.8139	
	Situation	open	
	Time zone	1.00	
	Time ref. [min.]	-30	
	Data	Radiation model	Default (hour)
		Temperature model	Default (hour)
Tilt radiation model		Perez	
Time period		Temperature 1961-1990 Radiation 1991-2000	
10 y. extreme monthly values		<input checked="" type="checkbox"/>	
Format	Output format	WUFI / WAC	
	Azimuth		
	Inclination		
Calculations	Results saved	<input checked="" type="checkbox"/>	
	Units temperature	<input checked="" type="radio"/> [C] <input type="radio"/> [F]	
	Units radiation	<input checked="" type="radio"/> [W/m2] <input type="radio"/> [kWh/m2] <input type="radio"/> [kWh/m2.d]	
	Buttons	Back, Continue	

Section	Field	Value
Data	Radiation model	<input checked="" type="radio"/> Default (hour) <input type="radio"/> Version 5 (hour) <input type="radio"/> Minute <input type="radio"/> Clear sky radiation
	Temperature model	<input checked="" type="radio"/> Default (hour) <input type="radio"/> 10 year extreme (hour) <input type="radio"/> Clear sky temperature
	Tilt radiation model	<input checked="" type="radio"/> Perez <input type="radio"/> Hay <input type="radio"/> Gueymard <input type="radio"/> Skartveit/Olseth
	Time period	Temperature: <input checked="" type="radio"/> 1961-1990 <input type="radio"/> 1996-2005 Radiation: <input type="radio"/> 1961-1990 <input type="radio"/> 1961-2000 <input type="radio"/> Imported data
	Additional settings	Atmosph. turbidity 1. random seed <b>10 y. extreme monthly values</b>
	Import	Import monthly values Import hourly values
	Buttons	Default values

Output settings:

- Radiation: Default
- Tilt Modell is to be ignored, WUFI does this calculation
- Temperature: Default or 10-year-extreme

# Meteonorm: Climate data for WUFI®

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Selection screen for the option „10-year extreme“ climate.

**10 y. extreme monthly values**

**Temperature**

Monthly values

Months: Nov - Apr

10 y minimum    Mean val.    10 y maximum

Months: May - Oct

10 y minimum    Mean val.    10 y maximum

All months

10 y minimum    Mean val.    10 y maximum

Yearly values

10 y minimum    Mean val.    10 y maximum

**Global radiation horizontal**

Monthly values

Months: Nov - Apr

10 y minimum    Mean val.    10 y maximum

Months: May - Oct

10 y minimum    Mean val.    10 y maximum

All months

10 y minimum    Mean val.    10 y maximum

Yearly values

10 y minimum    Mean val.    10 y maximum

Cancel   OK



# Meteonorm: Climate data for WUFI®

The screenshot shows the METEONORM Version 6.1 software interface. The top section contains input fields for Site, Data, Format, and Calculations. The bottom section contains a navigation bar and a detailed view of the Data settings.

Intro	Site	Data	Format	Calculations	Exit
Help Data Here different models, time periods, and additional settings can be chosen and own data can imported.	Radiation model <input checked="" type="radio"/> Default (hour) <input type="radio"/> Version 5 (hour) <input type="radio"/> Minute <input type="radio"/> Clear sky radiation	Temperature model <input checked="" type="radio"/> Default (hour) <input type="radio"/> 10 year extreme (hour) <input type="radio"/> Clear sky temperature	Tilt radiation model <input checked="" type="radio"/> Perez <input type="radio"/> Hay <input type="radio"/> Gueymard <input type="radio"/> Skartveit/Olseth	Time period Temperature <input checked="" type="radio"/> 1961-1990 <input type="radio"/> 1996-2005 Radiation <input type="radio"/> 1961-1990 <input type="radio"/> 1981-2000 <input type="radio"/> Imported data Additional settings Atmosph. turbidity 1. random seed 10 y. extreme monthly values Import Import monthly values Import hourly values	

Output settings:

- Radiation: Default
- Tilt Modell is to be ignored, WUFI does this calculation
- Temperature: Default or 10-year-extreme
- Choose the time period

# Meteonorm: Climate data for WUFI®

METEONORM Version 6.1

**Site**  
Name of site: Stuehlingen  
Type of site: Userdefined site  
Altitude [m]: 972  
Longitude [°]: 8.2369  
Latitude [°]: 47.8139  
Situation: open  
Time zone: 1.00  
Time ref. [min]: -30

**Data**  
Radiation model: Default (hour)  
Temperature model: Default (hour)  
T/H radiation model: Perez  
Time period: Temperature 1961-1990, Radiation 1991-2000  
10 y. extreme monthly values

**Format**  
Output format: WUFI / WAC  
Azimuth: 0, Inclination: 0  
Horizon file:

**Calculations**  
Results saved:   
Units temperature: [C], [F]  
Units radiation: [W/m2], [kWh/m2], [kWh/m2d]

Back Continue

Intro Site Data Format Calculations Exit

Help  
Format  
The output format can be chosen according your needs.  
Depending on the format, the plane orientation and the elevation can be set or are disabled.

Output formats

- Meteonorm
  - Standard
  - User defined
  - Meteo
  - Standard mixture
  - Humidity
  - Science
  - Spectral / LV
  - Standard opt.
  - Climate change
- Building simulation
  - TRNSYS
  - CH Meteo
  - HELIOS-PC
  - DOE
  - Suncode
  - Match
  - via 380/1
  - LESOSAI
  - EnergyPlus
  - DYNBIL
  - PHPP/WAVE
  - Plelades/Comfie
  - no save
  - WUFI / WAC**
  - Prisma
  - IDA ICE
- PV
  - PVSOL
  - PVSyst
  - PVS
  - Meteo matrix (TISO)
  - PVScout
- Solar thermal
  - Polysun
  - TSOL
  - Solar-Ripp
- General use
  - TMY2
  - TRY (DWD)
  - TMY3

Plane orientation  
Azimuth: 0  
Inclination: 0  
Azimuth (DWS - U.D):  
 automatic  user defined  
Horizon

Output format:

WUFI / WAC

# Meteonorm: Climate data for WUFI®

The screenshot shows the METEONORM Version 6.1 software interface. The top section contains input fields for site data (Name of site: Stuehlingen, Type of site: Userdefined site, Altitude: 972, Longitude: 8.2369, Latitude: 47.8139, Situation: open, Time zone: 1.00, Time ref.: -30), calculation parameters (Radiation model: Default (hour), Temperature model: Default (hour), T/H radiation model: Perez, Time period: Temperature 1961-1990, Radiation 1991-2000, 10 y. extreme monthly values: Gh: Mean val., Ta: Mean val.), and output format (Output format: WUFI / WAC, Azimuth: 0, Inclination: 0, Horizon file). The 'Calculations' section shows a progress bar and options for saving results (Results saved: [S], [F]), units for temperature ([C], [F]) and radiation ([W/m2], [kWh/m2], [kWh/m2.d]). A 'Back' button is on the left and a 'Continue' button is on the right.

The bottom section shows a navigation bar with tabs: Intro, Site, Data, Format, Calculations, Exit. The 'Calculations' tab is active, displaying a bar chart of monthly radiation values and a table of monthly data. The 'View results' and 'Save' buttons are highlighted with red boxes.

Month	Ta	H_Gh	H_Dh
Jan	-1.5	31	17
Feb	-0.4	48	23
Mar	2.5	66	50
Apr	5.9	117	61
May	10.2	153	79
Jun	13.4	160	68
Jul	15.7	167	64
Aug	15.1	147	70
Sep	12.5	100	53
Oct	8.1	58	29
Nov	3.0	31	19
Dec	-0.6	23	15
Year	7.0	1119	548

Calculation Window  
(Calculation starts automatically)

To save the generated climate dataset click the „Save“ button.

To view a statistical summary of the results, click the “View results” button.

# Meteonorm: Climate data for WUFI®

Name of site = Stuehlingen

Latitude [°] = 47.814, Longitude [°] = 8.237, Altitude [m] = 972, Climatic zone = III, 3

Radiation model = Default (hour); Temperature model = Default (hour)

Tilt radiation model = Perez

Temperature: Old period = 1961-1990

Radiation: New period = 1981-2000

Ta: Only 4 station(s) for interpolation

Rh: Only 4 station(s) for interpolation

SD: Only 4 station(s) for interpolation

Nearest 3 stations: Gh: Laegem (39 km), Ruenenberg (50 km), Schaffhausen (32 km)

Nearest 3 stations: Ta: St. Gallen (97 km), Engelberg (111 km), Ruenenberg (50 km)

Month	H_Gh	H_Dh	N	Ta	RH	FF	DD	RR	G_Lin
	[W/m2]	[W/m2]	[Octas]	[C]	[%]	[m/s]	[grad]	[mm]	[W/m2]
Jan	42	22	6.3	-1.5	78	2.5	214	64	260
Feb	71	34	5.5	-0.4	77	2.5	183	64	261
Mar	116	68	6.0	2.5	73	2.6	223	66	273
Apr	163	85	5.7	5.9	72	2.5	217	84	287
May	205	106	5.7	10.2	73	2.2	191	105	310
Jun	223	95	4.8	13.4	74	2.2	237	118	325
Jul	225	86	4.2	15.7	72	2.0	259	111	336
Aug	197	94	5.0	15.1	73	1.9	234	120	335
Sep	138	73	5.9	12.5	77	2.0	240	87	328
Oct	78	39	5.9	8.1	79	2.1	225	70	309
Nov	44	27	6.6	3.0	79	2.2	224	79	283
Dec	31	20	6.6	-0.6	79	2.3	200	72	265
Year	128	63	5.7	7.0	75	2.3	219	1040	1040

Legend:

Ta: Air temperature

H\_Gh: Mean irradiance of global radiation horizontal

H\_Dh: Mean irradiance of diffuse radiation horizontal

N: Cloud cover fraction

RH: Relative humidity

FF: Wind speed

DD: Wind direction

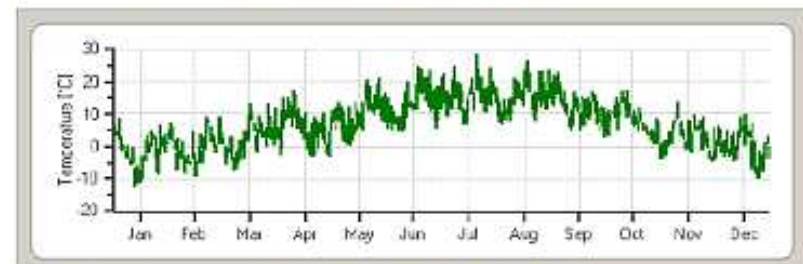
RR: Precipitation



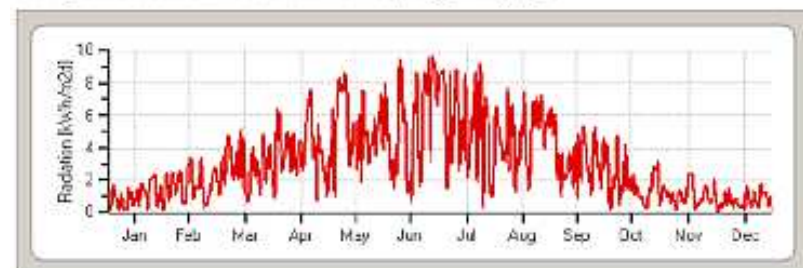
C:\Programme\Gemeinsame Dateien\mn61\output\Fig\_ghdh1.png



C:\Programme\Gemeinsame Dateien\mn61\output\fig\_tamina1.png

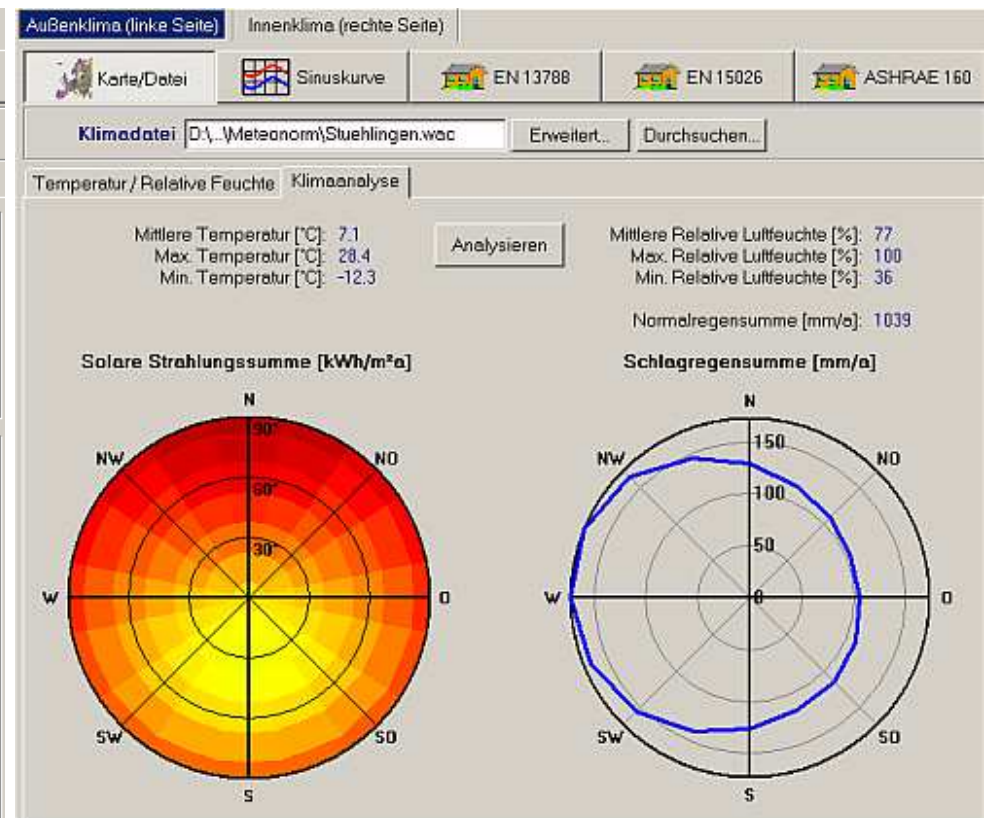
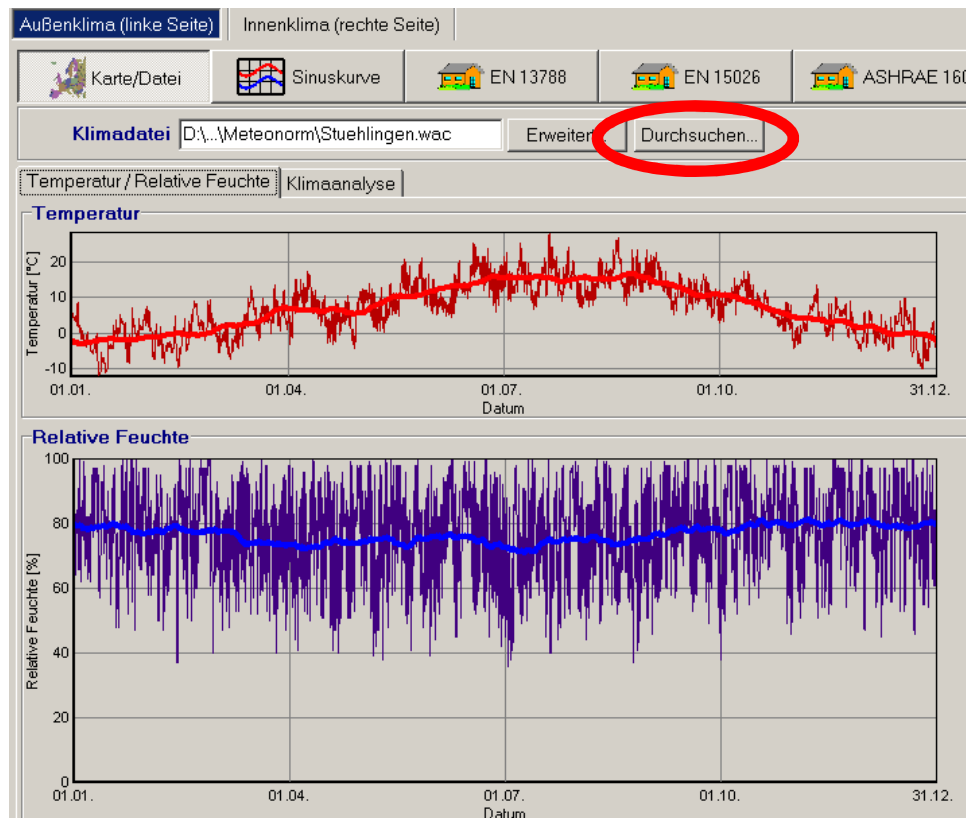


C:\Programme\Gemeinsame Dateien\mn61\output\fig\_tadaily1.png



# Meteonorm: Climate data for WUFI®

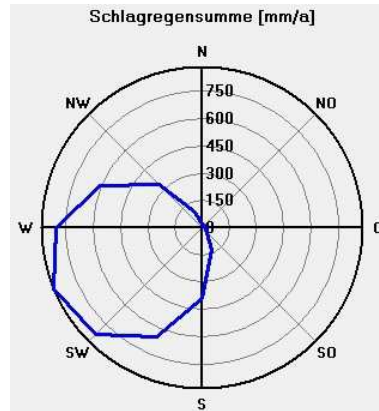
The generated climate data can be directly imported into WUFI.



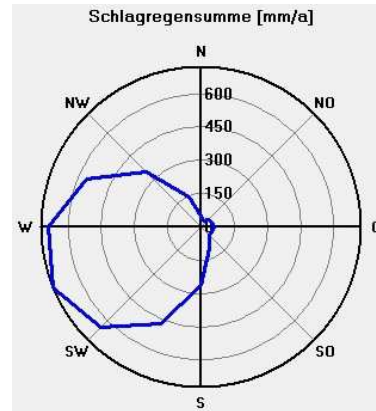
# Meteonorm: Distribution of driving rain

## Driving rain measurement for Holzkirchen

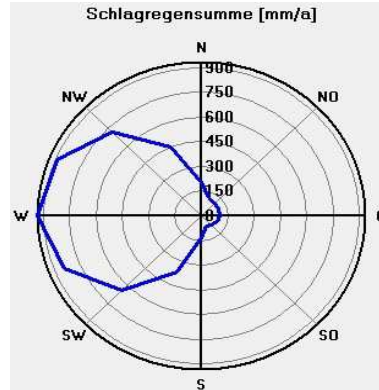
1991



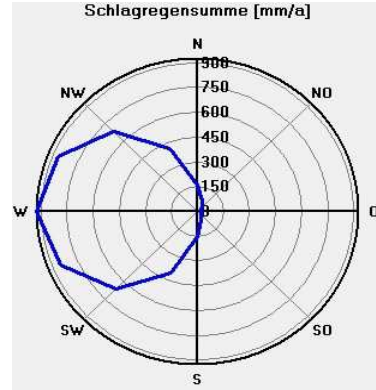
1992



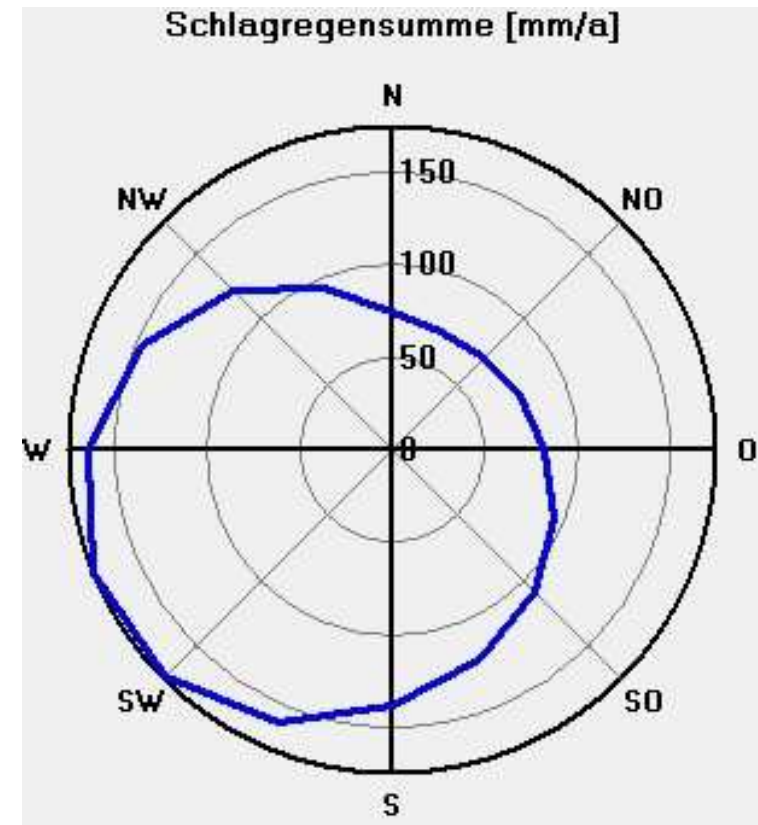
1993



1994



## Driving rain from Meteonorm 6 for Holzkirchen



Note: The distribution of the driving rain from Meteonorm is more uniform than the measured data. Furthermore the yearly sum is less than the measurement.