

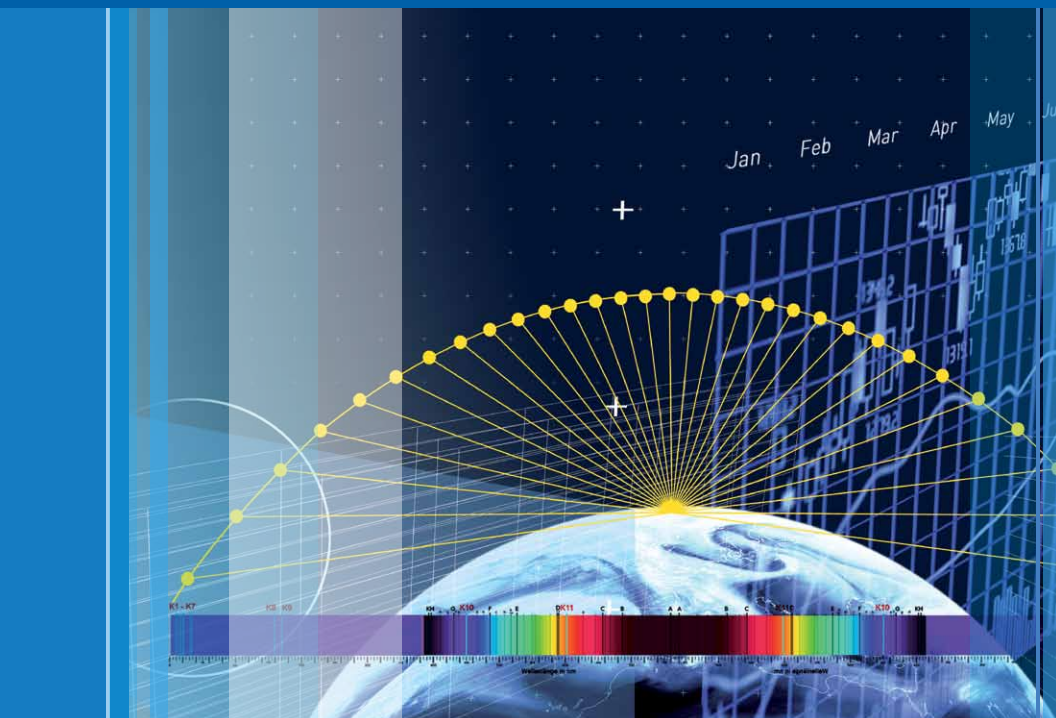
meteonorm

Global Meteorological Database

Version 7

Software and Data for Engineers, Planners and Education

The Meteorological Reference for Solar Energy Applications, Building Design, Heating & Cooling Systems, Education Renewable Energy System Design, Agriculture and Forestry, Environmental Research



meteonorm – What is it?

meteonorm 7 is a comprehensive meteorological reference. **meteonorm** gives you access to a catalogue of meteorological data for solar applications and system design at any desired location in the world. It is based on more than 25 years of experience in the development of meteorological databases for energy applications.

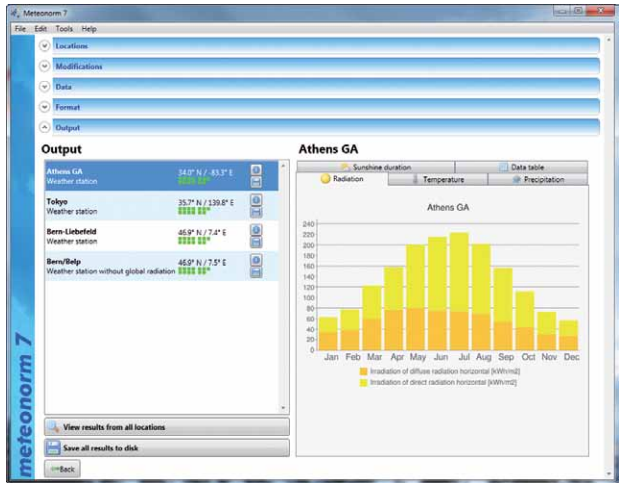
meteonorm addresses engineers, architects, teachers, planners and anyone interested in solar energy and climatology.

Database:

- > Climatological data of 8'300 weather stations. *Updated*
- > Measured parameters: monthly means of global radiation, temperature, humidity, precipitation, days with precipitation, wind speed and direction, sunshine duration.
- > Selection between the time periods 1961–90 and 2000–2009 for temperature, humidity, precipitation and wind speed. *Updated*
- > Updated global radiation database for period 1986–2005. *Updated*
- > Use of satellite data for areas with low density of weather stations. *Updated*
- > Access to climate change forecasts (3 IPCC scenarios). *New*
- > Uncertainty of yearly values of radiation and temperature for any site *New*
- > Wind load zones for Germany and Switzerland and snow load zones for Germany, Switzerland, Austria and France *New*
- > Swiss Design Reference Years (DRY, sia "Merkblatt 2028") included.

Result screen

4 steps are needed to obtain the results. The new GUI will guide securely.



Models:

- > Interpolation models to calculate mean values for any site in the world. *Updated*
- > Minute and hourly data for radiation parameters.
- > Calculation of direct radiation and inclined planes with additional models. *Updated*
- > Generation of temperature and humidity time series for building simulation.

Software:

- > Total redesign of software, more intuitive handling. *Updated*
- > Processing of **horicatcher** panorama pictures inside **meteornorm**. *New*
- > New map tool for site selection. *Updated*
- > Import interface for user defined data (including current data by internet). *Updated*
- > Effects of high horizon considered in radiation calculations. High horizon calculated automatically for all regions worldwide. *Updated*
- > Calculation of panel reflexions. *Updated*
- > Batch mode to process 100 sites at once. *New*
- > English manual, maps and illustrations included. *Updated*
- > 5 languages supported: English, French, German, Italian and Spanish.
- > Low price: The whole world in one software for the price of a few working hours..



Available parameters	global radiation and temperature	temperature, additional parameters	only temperature or radiation	total
Europe	385	1'413	58	1'856
North America	281	2'466	39	2'786
South/Central America	95	594	66	755
Asia (with Russia)	265	1'246	39	1'550
Australia / Pacific	68	679	21	768
Africa	123	434	36	593
World	1'217	6'832	259	8'308

Distribution and number of available stations.

8'300 meteorological stations worldwide

Numerous global and regional databases have been combined and checked for their reliability. In the present version, most of the data is taken from the GEBA (Global Energy Balance Archive), from the World Meteorological Organization (WMO/OMM) Climatological Normals 1961–1990 and from the Swiss database compiled by MeteoSwiss.

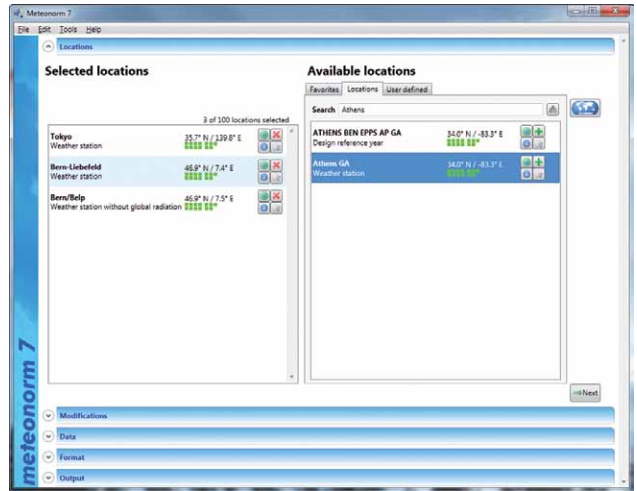
The periods 1961–1990 and 2000–2009 are available for temperature, humidity, wind speed and precipitation; the periods 1981–1990 and 1986–2005 for solar radiation.

Monthly climatological (long term) means are available for the following 8 parameters:

- > global radiation
- > ambient air temperature
- > humidity
- > precipitation
- > days with precipitation
- > wind speed
- > wind direction
- > sunshine duration



Example: Choosing Athens (Greece) in the respective menu.



Interpolation – data for any site worldwide

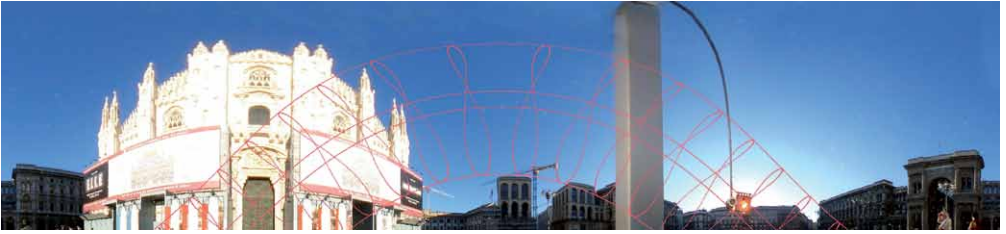
Usually, measurement data can only be used in the vicinity of a weather station. Elsewhere, the data has to be interpolated between different stations. The sophisticated interpolation models inside **meteonorm** allow a reliable calculation of solar radiation, temperature and additional parameters at any site in the world. The new intuitive GUI in **meteonorm 7** allows you to easily manage and select your weather stations and sites.

Data import

meteonorm offers dynamic web downloads of current monthly temperature and radiation data (for Europe available data from 2007 onwards). With one mouseclick, current data is imported from the internet and displayed. This allows solar energy calculations and performance checks of energy systems based on actual data sets.

You can import your own monthly or hourly radiation and temperature data into **meteonorm** with a specific import interface. Subsequently, you can apply the **meteonorm** models and procedures to this data to generate random time series.

Horizon image with solar paths, taken with **horicatcher**.



Calculation of hourly and minute values

From the monthly values (station data, interpolated data or imported data), **meteonorm** calculates hourly values of all parameters using a stochastic model. The resulting time series correspond to “typical years” used for system design. Additionally, the following parameters are derived:

- > solar azimuth and elevation
- > global, diffuse and beam (direct normal) radiation as well as radiation on inclined planes
- > longwave radiation
- > luminance
- > spectral UVA/UVB, erythemal radiation
- > precipitation, driving rain
- > humidity parameters (dewpoint, relative humidity, mixing ratio, psychrometric temperature)

The generation of humidity values is optimized to fit building and climate system simulations (including extreme hourly values).

Additionally a stochastic generation model for minute values of radiation parameters is available.

Effects of high horizon considered

meteonorm calculates reduced global radiation caused by a high horizon. The horizon line can easily be entered either graphically (drag line) or numerically. For most regions of the world, the horizon line is calculated automatically, based on a digital terrain mode (accessible over the internet).

Any rectified picture of the horizon can be imported and used as a background for digitizing the horizon. As a new feature in **meteonorm 7**, images taken with the **horicatcher** can be imported and processed directly inside **meteonorm**. The additional horicatcher software is not needed anymore.

horicatcher

horicatcher is an add-on for meteonorm. It is an accurate and fast tool to determine the real horizon line at your specific site. **horicatcher** allows you to take into account the reduced solar energy input, the sunshine duration and sun exposure by obstacles like trees, houses or mountains at your site.



Data export

36 different predefined export formats are available. They cover most of the established simulation software in solar energy applications and building design, including TMY2 and 3, EPW, TRNSYS as well as output formats for TRY (German test reference years), POLYSUN, TSOL/PVSOL, PVSyst and PHPP. All export formats are available for hourly as well as monthly values. Data is written to ASCII files.

Alternatively, the parameters and the desired units can be defined in a user-defined export format.

Support

meteonorm includes free and personal customer support by e-mail or by phone.

Profit from our regular free training courses and get in touch with the **meteonorm** team.



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System requirements

800 MB of free space on harddisk
512 MB RAM
screen resolution 1024 x 800
.NET 4.0 framework installed

For more information ask your authorized meteonorm dealer or visit www.meteonorm.com



The Swiss Federal Office
of Energy supports the
development of meteonorm.