Data sources and quality

Meteonorm is a superior global climate data base

Ground stations

Meteonorm offers unique access to the Global Energy Balance Archive Data (GEBA). The GEBA data is provided from national weather services and fulfills the quality criteria of the World Meteorological Organisation WMO.

The database also includes high quality measurement networks such as the Baseline Surface Radiation Network BSRN or the networks of MeteoSwiss and the German Weather Service.

Aerosols

The aerosol climatology in Meteonorm is provided by Solar Consulting Services / Chris Gueymard. It is currently the most accurate data set available.

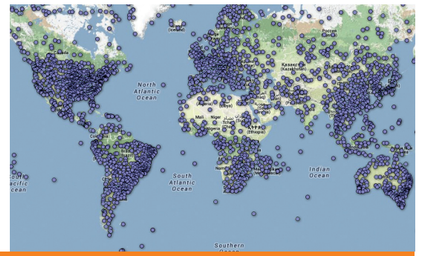
Satellite and Reanalysis data

The database of ground stations is extended with data from five geostationary satellites to enable global coverage. The satellite data is available on a global grid. It was correlated with long term ground measurements to obtain homogenous long term averages.

Historical hourly time series are derived from MSG, IODC, Himawari and GOES-E satellite and ERA5 reanalysis data.

Validation

All data is quality checked by Meteotest. The uncertainty of the data base and the generated typical years are transparently shown directly in the software and in the documentation.



Weather stations or satellites?

Weather stations with well-maintained good quality instruments still provide the most accurate data for solar irradiation. They represent the ground truth, which is the relevant parameter for solar energy applications.

But weather stations are not always located in the vicinity of the project site and time series may be incomplete. In this context, satellites have become a valuable source for solar irradiation data, in particular in areas with sparse distribution of stations. However, this approach also has disadvantages such as lack of other meteorological parameters, uncertainties in aerosol values, detection of multiple cloud layers and inaccuracies in areas with snow or no data north of 62°.

We recommend combining multiple data sources of ground and satellite data to achieve the lowest uncertainty for resource assessments.

Meteonorm a product with a long history

The first version of Meteonorm was published as a paperback handbook in 1985.

Ten years later, Meteotest transferred the handbook to a desktop software. In 1998, the coverage of the climate data was extended from Switzerland to the whole world. The global breakthrough was reached with version 6 – back in 2007.

Today Meteonorm has more than 2000 active users and is included in almost every PV, solar thermal or building simulation software on the market.

Jan Remund
jan.remund@meteotest.ch

Head of Business Unit Energy & Climate
Product Manager of Meteonorm
Operating Agent of IEA PVPS Task 16

meteonorm.com

Meteotest

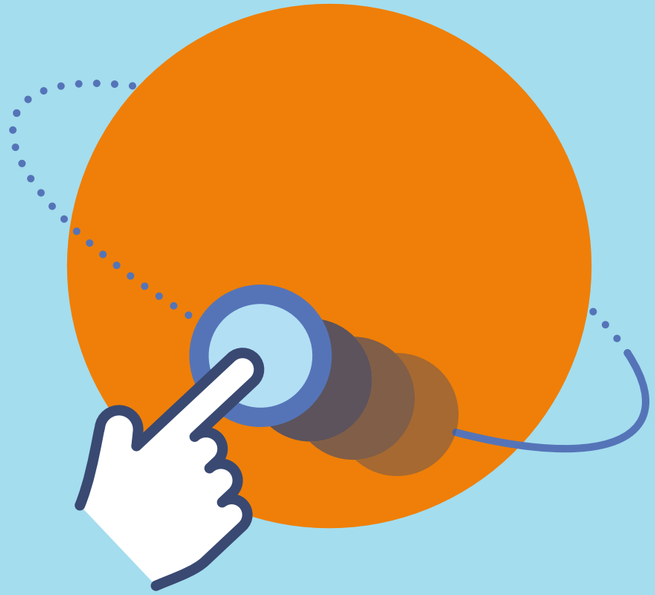
Meteotest AG
Fabrikstrasse 14
3012 Bern
Switzerland

Web: meteonorm.com
E-Mail: sales@meteonorm.com
Phone: ++ 41 31 307 26 12

Meteotest is a private, independent Swiss company, founded 1981. By today, Meteotest is one of the oldest service providers for weather, climate and environmental data in Europe. We provide high quality irradiation data and forecasts to project developers, utilities, investors, building planning and automation as well as for service providers.

Apart from Meteonorm, we offer the solar forecast services CloudMove and SolarForecast, the horizon measurement tool HoriCatcher and the solar satellite service SolarSat.

Meteotest



Meteonorm 8

Irradiation data for every place on Earth

About Meteonorm

A unique combination of reliable data sources and sophisticated calculation tools

The global climate database
Meteonorm generates accurate and representative typical years for any place on earth. You can choose from more than 30 different weather parameters. In addition you have access to a global archive of hourly time series of irradiation and temperature.

The database consists of more than 8000 weather stations, five geostationary satellites and a globally calibrated aerosol climatology. On this basis, sophisticated interpolation models, based on more than 30 years of experience, provide results with a high accuracy worldwide.

More than a simple data provider
Meteonorm includes two of the best minute models on the market for reliable simulations of large PV plants or energy management & battery systems. It can model urban heat effects to support the development of green cities. It contains algorithms to calculate extreme years, for example to test design limits.

An open system
You can import any third party data, be it from satellites or from measurement stations and still profit from all tools inside Meteonorm.

The intuitive desktop software lets you easily manage your sites and retrieve the required results in a convenient and fast way. More than 40 different output formats offer maximum flexibility.

Platform independent
Meteonorm is not only a desktop software: Our web service API and our Dynamic Link Library DLL ensure platform independent access to all data and models of Meteonorm, from everywhere.

This allows an easy integration of Meteonorm data in your software or web application.

The global standard
All this makes Meteonorm the global standard for solar energy applications, building design, heating & cooling systems, education, agriculture, forestry and many more.
The powerful tool offers an excellent cost/benefit ratio.

Meteonorm is integrated in almost every PV, solar thermal or building simulation software on the market.

Updates of Version 8:
New data periods (2009–2019 / 1996–2015)
Updated current data / time series for Americas and Asia

Download trial version: meteonorm.com

Meteonorm Features

Global coverage
Data from more than 8000 weather stations worldwide and five geostationary satellites.

Data period
The standard periods are 1996–2015 for irradiation data and 2000–2019 for other parameters.

Historical data
Access to historical hourly time series and monthly values. Import of third party data.

Time intervals
Meteonorm generates monthly, daily, hourly and minute values.

Interpolation
Interpolation models calculate typical years for any location worldwide.

Uncertainty
Transparent information on data sources and uncertainty provided for each data set. Validation papers available on the website.

Climate Change
Meteonorm includes three newly updated IPCC scenarios for 2030–2100.

Extreme years
P10 and P90 values available for simulating extreme years. Urban heat effects can be represented.

Topography
Global 90x90m terrain model. Digitising tool for user-defined horizon lines.

Data formats
42 output formats: CSV, TMY2, TMY3, EPW, PVSol, PVSyst, Polysun, SAM and many more.

API and DLL
Meteonorm core is also available as a Dynamic Link Library or web service.

Aerosol climatology
Globally calibrated gridded dataset by Chris Gueymard. Time period 2000 - 2015, spatial resolution 0.5°.

Meteonorm includes over 30 meteorological parameters

Global, direct and diffuse irradiation on horizontal and inclined surface, temperature, relative humidity, wind speed, cloud cover, illuminance, UVA/UV radiation, mixing ratio, snow depth, atmospheric pressure, precipitation, days with precipitation, sunshine duration, dew point temperature, wet bulb temperature, surface temperature, Linke turbidity factor and many more.

Meteonorm time series

The new Meteonorm 8 includes historical hourly time series of irradiation and temperature anywhere on Earth!

Meteonorm 8 allows access to our Meteonorm time series archive. The archive contains hourly data since 2009 and is constantly updated. You can download historical hourly time series directly from the Meteonorm software.

Thanks to this feature, Meteonorm offers access to all relevant meteorological information required for planning of solar applications through the same software platform:

- Typical years
- Monthly averages
- Hourly time series

In addition you can still benefit from all additional models integrated in Meteonorm such as minute models, urban heat algorithms or the calculation of extreme years (P90 and P10). All this makes Meteonorm the most complete meteorological data base available on the market.

To get access to the data archive, you need a registered license of Meteonorm 8. From there you can buy the following add-on packages:

- Single requests
- Package of 10 requests
- Unlimited requests during one year.

Irradiation data for Europe, Middle East and Africa is derived from Meteosat Second Generation (MSG) satellite data. For Asia IODC and Himawari satellites are used. The Americas are covered by GOES-E satellite. Irradiation data outside covered areas is taken from ERA5 reanalysis data. Temperature profiles are modelled with measured Tmin and Tmax daily data. The irradiation dataset was compiled combining the Heliosat method with a snow cover detection retrieval. A statistical regression approach integrating ground measurements is adopted for bias correction and uncertainty reduction.