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Deutscher Wetterdienst
Wetter und Klima aus einer Hand

DATASET DESCRIPTION

Hourly station observations of solar incoming (total/diffuse) and longwave downward radiation for Germany

Version: v24.03

Publication date: 2024-03-29

Cite data set as:	Hourly station observations of solar incoming (total/diffuse) and longwave downward radiation for Germany, Version v24.03
Dataset-ID:	urn:x-wmo:md:de.dwd.cdc::obsgermany-climate-hourly-solar
Dataset-URL:	https://opendata.dwd.de/climate_environment/CDC/observations_germany/climate/hourly/solar/
Dataset-URL:	https://opendata.dwd.de/climate_environment/CDC/observations_germany/climate/hourly/solar/ST_Stundenwerte_Beschreibung_Stationen.txt

ABSTRACT

These data originate from the stations of the DWD and legally as well as qualitatively equal partner network stations. Extensive station metadata, such as station relocations, instrument changes, reference time changes, algorithm changes or operator information are included.
The quality check for these data has been completed.

POINT OF CONTACT

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DATASET DESCRIPTION

Parameter	diffuse radiation, global radiation, , sunshine duration
Unit(s)	degree, J/cm², minutes
Statistical processing	hourly sum, time series
Temporal coverage	1945-12-31 -- ...
Spatial coverage	stations in Germany
Projection	WGS 84 (EPSG:4326)
Format description	In the folder for each station a zip-archive is provided. The zip-archive contains the data and meta information about the station, instruments and algorithms. The naming schema of the zip-archives is: *_{product_code}_{station_id}_row.zip
Format description	The file Datei ST_Stundenwerte_Beschreibung_Stationen.txt contains information on the recent geographical position and the temporal data coverage per station.

application schema

csv dialect description

delimiter	line terminator	header	quote char
;	\\r\\n	true	\"

csv content description

column name	description	uom	type	format
STATIONS_ID	Station ID		VARCHAR2	
MESS_DATUM	reference date		VARCHAR2	YYYYMMDDHH24:mm
QN_592	quality level	numerical code	NUMBER	990
ATMO_LBERG	[\longwave downward radiation\,\missing value = -999 \]	J/cm^2	NUMBER	99999999.0
FD_LBERG	[\hourly sum of diffuse solar radiation\,\missing value = -999 \]	J/cm^2	NUMBER	99999999.0
FG_LBERG	[\The solar incoming radiation includes the direct and the diffuse part of the solar radiation with respect to the horizontal plane. It is sometimes also referred to as shortwave, including the solar spectrum up to 2.8 micron, as opposed to longwave , which refers to the thermal radiation of the atmosphere.\,\missing value = -999\]	J/cm^2	NUMBER	99999999.0
SD_LBERG	[\hourly sum of sunshine duration\,\missing value = -999 \]	min	NUMBER	9990
ZENIT	[\solar zenith angle at mid of interval\,\The solar zenith angle is between 0-180 and is defined as: ZENIT= 90 - solar_height\,\missing value = -999 \]	°	NUMBER	999.90
MESS_DATUM_WOZ	local true solar time		VARCHAR2	YYYYMMDDHH24:mm

Quality Information

The QUALITAETS_NIVEAU (QN) shows the quality control procedure applied for a data report (of several parameters) for a certain reporting time.

Data before and including 1980 can reach as best quality check level QN=5. Data after 1980 can reach QN=10 as best quality check level.

QN = 1 : only formal control;
QN = 2 : controlled with individually defined criteria;
QN = 3 : automatic control and correction;
QN = 5 : historic, subjective procedures;
QN = 7 : second control done, before correction;
QN = 8 : quality control outside ROUTINE;
QN = 9 : not all parameters corrected;
QN = 10 : quality control finished, all corrections finished.

The QUALITAETS_BYTE (QB) denotes whether the value was objected to and/or corrected.

QB = 0 : denotes not flagged,
QB = 1 : had no objections (either checked and not objected, or not checked and not objected, this can be interpreted only when considering QN);
QB = 2 : corrected;
QB = 3 : confirmed with objection rejected;
QB = 4 : added or calculated;
QB = 5 : objected;
QB = 6 : only formally checked;
QB = 7 : formal objection;
QB = -999 : quality flag does not exist.

DATA ORIGIN

The data are taken from the station measuring networks of Deutscher Wetterdienst as well as its predecessor organisations.
The dataset is regularly updated with recent as well as with recovered historical data.
From 1997 onwards, the data have been imported operationally into the central specialist database and archived, see Behrendt et al., 2011, and Kaspar et al., 2013. Note that when going back to historical times, guidelines on observation procedure, instruments and observation times were issued by the authority in charge (see, e.g., Freydank, 2014), and might be incompletely recorded in the metadata of the stations.
As explained in Kaspar et al., 2013 in the early years numerous meteorological agencies were active in the area of todays Germany. After establishment of the der International Meteorological Organization (IMO) in 1873, the various standards were gradually harmonized, resulting in a single standard 1936. After 1945, the standards in East and West Germany developed differently, and were harmonized again after re-unification in 1990.
Between the end of the nineties and 2009 many stations were changed from manual to automated.

RESOURCE MAINTENANCE

Data provision takes place monthly in the middle of the following month.

VALIDATION AND UNCERTAINTY ESTIMATE

Considerations of quality assurance are explained in Becker and Behrens, 2012, see also Long und Dutton, 2002: several steps of quality control, including automatic tests for completeness, temporal and internal consistency, and against statistical thresholds based on the software QualiMet (see Spengler, 2002) and manual inspection had been applied.
Data are provided “as observed”, no homogenization has been carried out. The history of instrumental design, observation practice, and possibly changing representativity has to be considered for the individual stations when interpreting changes in the statistical properties of the time series. It is strongly suggested to investigate the records of the station history which are provided together with the data. Note that in the 1990s many stations had the transition from manual to automated stations, entailing possible changes in certain statistical properties.

UNCERTAINTIES

The stations are nowadays selected and operated according to WMO guidelines. Though these guidelines aim at minimizing possible local effects, still some applications of certain parameters may require the consideration of local and regional effects. Note that when going back to historical times, such guidelines might not have been in place. Depending on the application, local, regional and influences changing with time should be considered, which can be location- and parameter specific. Sources of long-term uncertainty are (1) changes in station height when station was re-located, information on this is within the station's zip-files in Metadaten_Geographie*.
Uncertainties are also expected from (2) changes in instrumentation, see Metadaten_Geraete* and possibly also from (3) varying quality control procedures (Behrendt et al., 2011).
Further, uncertainties are known to come from (4) errors during data transfer or errors in the software, (5) change of observing personnel, and (6) others, see Freydank, 2014.

CONSIDERATIONS FOR APPLICATIONS

When investigating long term changes or trends, consider the information in section Uncertainties.

ADDITIONAL INFORMATION

There are still issues to be discovered in the historical data. We welcome any hints to improve the data basis (see contact).

LITERATURE

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REVISION HISTORY

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