Deutscher Wetterdienst
Wetter und Klima aus einer Hand

DWD

DATASET DESCRIPTION

Gridded hourly near-realtime data of surface irradiance and sunshine duration based on surface measurements and satellite observations - DUETT Project

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Dataset-ID:	2586457f-ffd1-4998-960d-3064beea1e34
Dataset-URL:	https://opendata.dwd.de/climate_environment/CDC/grids_germany/hourly/duett/DUETT_ListOfStations.csv
Dataset-URL:	https://opendata.dwd.de/climate_environment/CDC/grids_germany/hourly/duett/radiation_global/recent
Dataset-URL:	https://opendata.dwd.de/climate_environment/CDC/grids_germany/hourly/duett/sunshine_duration/recent

ABSTRACT

These data are generated by combining satellite-based and surface-measured data of the surface irradiance (global radiation) and the sunshine duration. The associated algorithms has been developed within the DUETT-project and are continuously adjusted and improved. Gridded data (EPSG-3034 projection, Germany) of the surface irradiance and the sunshine duration are generated with a spatial resolution of 2 km and a temporal resolution of 1 hour (average / sum for synoptic hours, ending in minute 50). The data set is separated into two parts: the directory ./{parameter}/recent/ contains the latest data; in the directory ./{parameter}/historical/ older data are archived.

POINT OF CONTACT

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DATASET DESCRIPTION

Parameter	sunshine duration, global radiation
Temporal coverage	2024-01-01 -- ...
Spatial coverage	stations in Germany
Projection	ETRS89 / LCC Europe
Format description	Liste der Stationen mit Insitu-Messungen, welche zur Erzeugung des Rasterproduktes verwendet werden.
Format description	The folder .radiation_global/recent/ contains recent hourly gridded data files in netcdf-format. The naming of the files follows: {parameter}_duett_2km_DE_60min_{YYYYmmddHHMM}_{version}.nc
Format description	The folder .sunshine_duration/recent/ contains hourly gridded data of the current year in netcdf format. The namng convention of the netcdf-files is: {parameter}_duett_2km_DE_60min_{YYYYmmddHHMM}_{version}.nc

DATA ORIGIN

The gridded data are based on satellite observations and surface measurements. The used satellite data are generated by DWD in near-realtime every 15-min as instantaneous data of the suface radiation based on data from the geostationary Meteosat satellite. The surface measurements (10-min) are collected at 42 locations from the DWD netowork (mainly pyranometer instruments). Both data sets are prepared to represent the synoptic hour. A geostatistical algorithm is used to generate from those two data sources the gridded data of surface irradiance and sunshine duration.

RESOURCE MAINTENANCE

In the directory ./recent/ the data files are updated hourly.

In the directories ./{parameter}/historical/ the data files are updated annually.
The hourly data files are merged into monthly files.

VALIDATION AND UNCERTAINTY ESTIMATE

The grid data are regularly compared with direct measurements of sunshine duration and global radiation at independent stations. This resulting systematic differenes have been found to be small (approx. 1 min for the sunshine duration, approx. 15 W/m2 for the global radiation, each approx. 5%); the mean absolute deviations were in the range of approx. 8 min and 50 W/m2, respectively. In specific situations / stations, the deviations, of course, can be lower or higher than the average.
Since Version 006 the data contain also information on the uncertainty of the surface irradiance and the sunshine duration. These are based on the differences of the satellite data to the surface measurements and their spatial extrapolation as well as on assumptions of the small-scale variabiliy that reduce the representativity of the gridded data.

UNCERTAINTIES

Snow-covered surfaces often result in an underestimation of the surface irradiance and the sunshine duration, especially in clear sky situations. The uncertainty in the data is enhanced in these cases.
Due to scientific developments in the estimation of the surface radiation from the satellite data and in the algorithm to combine the surface data and the satellite measurements these data do not always fulfil the stability requirements for climate data records. Changes in the generation of the data are documented in the versioning of the data.

CONSIDERATIONS FOR APPLICATIONS

The data represent the spatially averaged value for the specified grid area.

ADDITIONAL INFORMATION

These gridded data are obtained from ground measurements and satellite data using a numerical method. The method used is subject to continuous further development; a temporal homogeneity of the data cannot be guaranteed. Changes in the method used are indicated in the file name.
A complete check of the raster data does not take place; we are grateful for information on problematic data points in the raster data (see Contact).

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REVISION HISTORY

This document is maintained by Deutscher Wetterdienst, Satellitengestütztes Klimamonitoring - DUETT, last edited at 2024-02-05.