

DATA SET DESCRIPTION

Hourly grids of downwelling longwave radiation for Germany (project TRY Advancement)

Version V001

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INTENT OF THE DATASET

This document describes freely available data of the DWD Climate Data Centre which are the raw data set used for input to generate the German Test Reference Years (2017). The commissioned research project "TRY Advancement" was supported with funding from the Research Initiative Future Building through BBSR.

POINT OF CONTACT

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DATA DESCRIPTION

Spatial coverage	Germany
Temporal coverage	01.01.1995 - 31.12.2012
Spatial resolution	1 km x 1 km
Temporal resolution	monthly
Projection	ETRS89 / ETRS-LCC, ellipsoid GRS80, EPSG: 3034, see http://spatialreference.org/ref/epsg/3034/ .
Format(s)	NetCDF
Parameters	longwave downwelling radiation [Wh/m ²] in the data SDL_*.nc
Uncertainties	Uncertainties result from the gridding procedure and from errors in the model and the satellite data. When comparing grids of different years, changes of the satellite instruments over the time have to be taken into account.

DATA ORIGIN

Input data for the gridding are model data (COSMO-CLM) and satellite observations (CM-SAF). To generate surface downwelling longwave (SDL) radiation fields an algorithm proposed by Karlsson et al. (2013) is used. The algorithm applies a cloud dependent radiation forcing (all sky minus clear sky SDL) derived from model data and satellite-derived cloud cover. Firstly, a model-based cloud

correction factor (CCF) is calculated as the ratio of the radiative forcing per cloud fraction. Downscaling of SDL involves application of CCF to the cloud cover grids at 1 km² resolution. To account for the elevation effect on SDL, a surcharge of 2.8 Wm⁻² per 100 m (Wild et al., 1995) is added to the previously derived SDL dataset, which amounts to the elevation difference between the model grid and the 1 km² grid.

VALIDATION AND UNCERTAINTY ESTIMATE

The 1 km² grid resolution matches the resolution of the digital elevation model. Representativity of the longwave radiation data is limited by the coarse resolution (~ 25 km²) of the satellite data. Surface emissivity and lapse rate of the surface temperature are kept constant over the day and the year. In addition, no station data are used for bias correction.

CONSIDERATIONS FOR APPLICATIONS

Due to degradation and change of satellites, climatological analysis (e.g. identification of long-term trends) is not possible. These grids represent a first pragmatic estimation and should therefore be used with caution. Application of the dataset requires thorough validation before any application. The dataset has proven to be excellently suited for its original application (test reference years).

REFERENCES

Cloud cover: https://opendata.dwd.de/climate_environment/CDC/grids_germany/hourly/Project_TRY/cloud_cover/BESCHREIBUNG_gridsgermany_hourly_Project_TRY_cloud_cover_en.pdf

Karlsson GK, Riihelä A, Müller R, Meirink JF, Sedlar J, Stengel M, Lockhoff M, Trentmann J, Kaspar F, Hollmann R, Wolters E (2013) CLARA-A1: a cloud, albedo, and radiation dataset from 28yr of global AVHRR data. Atmos Chem Phys 13:5351-5367. doi:10.5194/acp-13-5351-2013

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REVISION HISTORY

The data are output of a project and not subject to change. This document is maintained by the Climate and Environmental Consultancy Department (KU11), DWD, last edited 19.12.2018.