

## DATA SET DESCRIPTION

### *Grids of multi-annual means of annual sunshine duration over Germany 1961-1990*

#### Version v1.0

**Cite data set as:** DWD Climate Data Center (CDC): Grids of multi-annual means of annual sunshine duration over Germany 1961-1990, version v1.0, 2018.

#### INTENT OF THE DATASET

The grids are derived from DWD stations and legally and qualitatively equivalent partner stations in Germany run for climatological and climate related applications.

#### POINT OF CONTACT

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#### DATA DESCRIPTION

<b>Spatial coverage</b>	Germany
<b>Temporal coverage</b>	01.01.1961 - 31.12.1990
<b>Spatial resolution</b>	1 km x 1 km
<b>Temporal resolution</b>	30 years, for each calendar month and season, and for the whole year
<b>Projection</b>	3-degree Gauss-Kruger zone 3, Ellipsoid Bessel, Datum Potsdam (central point Rauenberg), EPSG:31467, see <a href="http://spatialreference.org/ref/epsg/31467/">http://spatialreference.org/ref/epsg/31467/</a> . To define the spatial projection in GIS, the file <a href="https://opendata.dwd.de/climate_environment/CDC/help/gk3.prj">https://opendata.dwd.de/climate_environment/CDC/help/gk3.prj</a> can be used. Help is given on importing into ESRI ArcGIS in <a href="https://opendata.dwd.de/climate_environment/CDC/help/Hilfe_Gauss-Krueger-Raster2GIS.pdf">https://opendata.dwd.de/climate_environment/CDC/help/Hilfe_Gauss-Krueger-Raster2GIS.pdf</a> .
<b>Format(s)</b>	There are files for each calendar month (*01.asc.gz bis *12.asc.gz), for each season, i.e., spring (March, April, May): *13.asc.gz, summer (June, July, August): *14.asc.gz, autumn (September, October, November): *15.asc.gz, winter (December, January, February): *16.asc.gz, and for the whole year (*17.asc.gz). The winter value contains the December of the previous year. The file in ESRI-ascii-grid-format has in the header the coordinates for the lower left grid cell, including the definition of its center [XLLCENTER],[YLLCENTER] or its corner [XLLCORNER],[YLLCORNER]. It contains a table of 654 x 866 numbers. Each row goes from West to East. The first row is the northernmost one (654 values with 4 digits). Missing values are marked with -999.
<b>Parameters</b>	Multi-annual mean of sunshine duration in h
<b>Uncertainties</b>	Uncertainties are caused by the interpolation method, and erroneous or missing observations. When comparing grid fields for different periods, it should be considered that the measurement network has changed over time.

## DATA ORIGIN

The grids for 1961-1990 are based on homogenized station data [Herzog und Müller-Westermeier, 1998]. The 30 year averages were calculated for each calendar month of the year before the spatial interpolation. The seasonal grids (spring -13, summer-14, autumn-15, winter-16) and the grid for the whole year (-17) are the sum of the respective grids for the calendar months. The gridding method is based on height regression and Inverse Distance Weight (IDW), see Müller-Westermeier, 1995: The station density allows for a linear regression between topographic height and climatological parameters within a region, and varies somewhat between the regions in Germany [Maier und Müller-Westermeier, 2010]. The regression coefficients were determined separately for each month, based on the monthly means recorded 1951-1980. Using these interpolated regression coefficients, in a first step, the station values are reduced to the reference height and attributed to the grid cells. In case several stations refer to a grid cell, the mean was taken. In a second step, the values at reference height were interpolated horizontally to cover the grid (weighted with the inverse square distance). Finally, in a third step, the values at reference height are transformed to values corresponding to the topographic elevation using again the spatially variable regression function. This is done with the DWD digital topographic height model. When grid cells contain a station, the value of the latter is simply interpolated vertically to the height of the grid cell.

## VALIDATION AND UNCERTAINTY ESTIMATE

The given resolution of 1 km x 1 km is the resolution of the employed digital height model. The gridded data miss processes relevant for local climate which are not covered by observations of the station network or cannot be reproduced by the gridding method explained above. The actual information density depends on the station network.

## REFERENCES

Kaspar et al.: Monitoring of climate change in Germany – data, products and services of Germany's National Climate Data Centre. Adv. Sci. Res., 10, 99–106, 2013.

Maier, U. und Müller-Westermeier, G.: Verifikation klimatologischer Rasterfelder, Berichte des Deutschen Wetterdienstes 235, Selbstverlag des Deutschen Wetterdienstes, Offenbach am Main, 2010.

Müller-Westermeier, G., Walter, A., Dittmann, E.: Klimaatlas Bundesrepublik Deutschland, Teil 1-4, Selbstverlag des Deutschen Wetterdienstes, Offenbach am Main, 2005.

Müller-Westermeier, G.: Numerische Verfahren zur Erstellung klimatologischer Karten, Berichte des Deutschen Wetterdienstes 193, Selbstverlag des Deutschen Wetterdienstes, Offenbach am Main, 1995.

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## REVISION HISTORY

This document is maintained by DWD division National Climate Monitoring, last edited 18.12.2018.