DATA SET DESCRIPTION

Grids of monthly averaged daily minimum air temperature (2m) over Germany

Version v1.0

Cite data set as: DWD Climate Data Center (CDC): Grids of monthly averaged daily minimum air temperature (2m) over Germany, version v1.0.

INTENT OF THE DATASET

This describes the freely available data of the DWD Climate Data Center. Grids are derived from DWD stations and legally and qualitatively equivalent partner stations in Germany run for climatological and climate related applications, considering the height dependencies.

POINT OF CONTACT

Deutscher Wetterdienst
CDC - Vertrieb Klima und Umwelt
Frankfurter Straße 135
63067 Offenbach
Tel.: + 49 (0) 69 8062-4400
Fax.: + 49 (0) 69 8062-4499
Mail: klima.vertrieb@dwd.de

DATA DESCRIPTION

Spatial coverage	Germany
Temporal coverage	01.01.1901 - current
Spatial resolution	1 km x 1 km
Temporal resolution	monthly
Projection	3-degree Gauss-Kruger zone 3, Ellipsoid Bessel, Datum Potsdam (central point Rauenberg), EPSG:31467, see http://spatialreference.org/ref/epsg/31467/. o define the spatial projection in GIS, the file https://opendata.dwd.de/climate_environment/CDC/help/gk3.prj can be used. Help is given on importing into ESRI ArcGIS in https://opendata.dwd.de/climate_environment/CDC/help/Hilfe_Gauss-Krueger-Raster2GIS.pdf.
Format(s)	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.
Parameters	Mean of the monthly averaged minimum daily air temperature in 2 m height above ground, given in 1/10 °C.
Uncertainties	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 are based on the DWD station data [Kaspar et al., 2013], which are interpolated in space with the gridding method described below. For each month, the gridding routines were applied to the monthly means. The monthly means were derived from the respective daily min of the stations. In 2008, the grids were calculated back to 1881 with quality controlled station data which were digitized by 2008. Since 2008, the grids are extended monthly. 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 seperately for each month, based on the monthly means recorded 1961-1990. Using these interpolated regression coefficients, 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 (like urban heat island or cold air pools) 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. 1881 the monthly means of 150 stations were used in the gridding routines. The number of used stations grew steadily to 200 stations at the begin of the 20th century, and 400 before World War II. After the war, the number of stations decreased a short time, growing again to above 500 since 1951. Changes in station height caused by station relocations are accounted for with the interpolation to the reference height.

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.

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

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REVISION HISTORY

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