

DATA SET DESCRIPTION

Historical monthly precipitation observations for Germany

Version v21.3

Cite data set as: DWD Climate Data Center (CDC): Historical monthly precipitation observations for Germany, version v21.3, 2021.

Dataset-ID: urn:x-wmo:md:de.dwd.cdc::obsgermany-climate-monthly-more_precip-historical

INTENT OF THE DATASET

These historical data are quality controlled measurements and observations derived from DWD stations and legally and qualitatively equivalent partner stations operated for climatological and climate related applications. Comprehensive station metadata (station relocation, instrument change, time zones, change of algorithms) are included.

POINT OF CONTACT

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DATA DESCRIPTION

Spatial coverage stations in Germany

Temporal coverage 1781-01-01 until - 2020-12-31

Temporal resolution monthly

Format(s) The station observations (produkt_*.txt) are zipped together with the station metadata. The latter are given in *.txt as well as *.html. The file Metadaten_Parameter* contains a listing of the parameters measured at the station (the parameter portfolio) with begin, end, units, measurement procedures, averaging formulas, measurement times and applied time units (e.g., MOZ or UTC) which are all related to the Station Id and the station name valid now. The instrument history is sorted according to the parameters (see file Metadaten_Geraete*). There the history of sensor height, type of instrument and measurement procedure is given, together with the historical station names. The station ID is unique and does not change over time. For a convenient documentation of station name change, see Metadaten_Stationsname*. The geographical metadata of the station (longitude, latitude, height) is listed in Metadaten_Geographie*.txt together with the Stations_id and the current station name.
All these information is combined into a single zip-file for each station: *_[Stations_id]_[from]_[to]_hist.zip. An overview over all stations with start and end dates is given in the station list: [Stationsliste](#). Note that for convenience, the list comprises not only stations given here, but also stations with more complicated copyright regulations which may be obtained for certain applications, requiring discussion with the point of contact.

Units The file produkt*.txt comprises following parameters:

STATIONS_ID	station id	
MESS_DATUM	date	yyyymmdd

QN_6	quality level of next columns	coding see paragraph "Quality information"
MO_NSH	monthly sum of daily fresh snow	cm
MO_RR	monthly sum of daily precipitation height	mm
MO_SH_S	monthly sum of daily height of snow pack	cm
MX_RS	monthly max of daily precipitation height	mm
eor	end of record	can be ignored

Missing values are -999.

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. 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*; (2) changes in the observation times and (3) changes in the averaging interval. Details on (2) and (3) can be found in the stationwise zipped Metadaten_Parameter*. Uncertainties are also expected from (4) changes in instrumentation, see Metadaten_Geraete* and possibly also from (5) varying quality control procedures (Behrendt et al., 2011). Further, uncertainties are known to come from (6) errors during data transfer or errors in the software, (7) change of observing personnel, and (8) others, see Freydank, 2014 .

Quality information

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

Explanation for QB:

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.

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

Explanation for QN:

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.

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.

DATA ORIGIN

These precipitation data are from the precipitation observation networks of Deutscher Wetterdienst and its predecessor organisations, and are regularly updated with recent data as well as recovered historical data. From 1997 onwards, the data are operationally collected in the central MIRAKEL data base and archived, see Behrendt et al., 2011, and Kaspar et al., 2013. For details on current measurement and observation procedures see VuB 3 Beobachterhandbuch (DWD, 2014a), VuB 3 Technikerhandbuch (DWD, 2014b) and VuB 2 Wetterschlüsselhandbuch (DWD, 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.

As explained in Kaspar et al., 2013 in the early years numerous meteorological agencies were active in the area of today's Germany. After establishment of the 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 automatised.

The monthly means are calculated for each month from the respective daily values (of the same version), and only in the case the daily values are complete. If some daily values are missing, no monthly mean is given. For some stations monthly values exist and no daily values are available (e.g., burned in the wars, or not yet digitized). For these cases, the monthly values are included here.

VALIDATION AND UNCERTAINTY ESTIMATE

The precipitation data are only checked with respect to spatial consistency. With the automatic quality control, random gross errors are identified and eliminated. No systematic corrections (like "Richter correction") are applied. The data provided here have not been subjected to homogenization procedures. The data in the directory /kl/ are, when present there, in general of superior quality than in the directory /more_precip/ (where more stations are provided).

CONSIDERATIONS FOR APPLICATIONS

For long-term effects in precipitation note that the height of the instrument changed systematically over time: in earlier years, and at mountain stations, was the precipitation measurement 1.5 m above ground, afterwards at lower heights at an increasing number of stations (details are not included in the metadata yet). Missing precipitation observation during 1940-1950 were derived from neighbouring stations. Before 1969, in East Germany, and before 1971 in West Germany, the integrated precipitation recordings were stored for the day on which the morning reading was performed. Here, all values are converted and related to the day contributing the largest part of the measurement interval.

The procedures for observations can change over time. Therefore, for investigation of trends, the station specific metadata as given in Metadaten* have to be taken into account. From the early nineties onwards, metadata were collected electronically, and provided here. The most relevant metadata recorded on paper before the early nineties are in the process of being digitized at DWD. For detailed studies, you can apply for access to the paper archive.

ADDITIONAL INFORMATION

For extending the time series with recent data (where quality control is not completed yet), see subdirectories ../recent/. When data from both directories "historical" and "recent" are used together, the difference in the quality control procedure should be considered. There are still issues to be discovered in the historical data. We welcome any hints to improve the data basis (see contact).

REFERENCES

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Freydank, E.: 150 Jahre staatliche Wetter- und Klimabeobachtungen in Sachsen. Tharandter Klimaprotokolle Band 21, 2014.

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COPYRIGHT

The instructions in https://opendata.dwd.de/climate_environment/CDC/Terms_of_use.pdf should be followed. The DWD website provides comprehensive copyright information.

REVISION HISTORY

This version is a result of a research project. It is possible that errors in the metadata or the data itself are detected and corrected. That will be documented in the file Change_log_REA_OD.txt, however, no versions of the COSMO-REA6 dataset will be saved.

This document is maintained by the Climate Data Center (CDC) of DWD, last edited on 2021-04-27.