

DATA SET DESCRIPTION

Calculated monthly values for different characteristic elements of soil and crops

Version v19.3

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INTENT OF THE DATASET

For different locations in Germany, values for soil moisture, soil temperatures and evaporation of crops were calculated. Such values are very useful for issues concerning water and heat balance in the soil. Measurements of such elements are rarely available.

POINT OF CONTACT

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DATA DESCRIPTION

Spatial coverage	Germany		
Temporal coverage	1991-01-01 until - 2018-12-31		
Spatial resolution	locations in Germany		
Temporal resolution	monthly		
Format(s)	Every gzip compressed ascii file contains a time series for one location. The parameters are given in columns separated by the delimiter ' '; '. The first row is the header.		
Units	The elements (parameters) are as follows:		
	name	abbreviation	unit
	real evapotranspiration over gras and sandy loam (AMBAV)	VGSL	mm
	potential evapotranspiration over gras (AMBAV)	VPGB	mm
	potential evaporation over gras (Haude)	VPGH	mm

mean daily soil temperature in 5 cm depth for uncovered typical soil	TS05	°C
mean daily soil temperature in 10 cm depth for uncovered typical soil	TS10	°C
mean daily soil temperature in 20 cm depth for uncovered typical soil	TS20	°C
mean daily soil temperature in 50 cm depth for uncovered typical soil	TS50	°C
mean daily soil temperature in 1 m depth for uncovered typical soil	TS100	°C
frost depth at midday for uncovered soil	ZFUMI	cm
soil moisture under grass and sandy loam between 0 and 10 cm depth in % plant useable water	BF10	%nFK
soil moisture under grass and sandy loam between 10 and 20 cm depth in % plant useable water	BF20	%nFK
soil moisture under grass and sandy loam between 20 and 30 cm depth in % plant useable water	BF30	%nFK
soil moisture under grass and sandy loam between 30 and 40 cm depth in % plant useable water	BF40	%nFK
soil moisture under grass and sandy loam between 40 and 50 cm depth in % plant useable water	BF50	%nFK
soil moisture under grass and sandy loam between 50 and 60 cm depth in % plant useable water	BF60	%nFK

soil moisture under grass and sandy loam up to 60 cm depth (AMBAV)	BFGSL	%nFK
soil moisture under grass and loamy sand up to 60 cm depth (AMBAV)	BFGLS	%nFK
mean daily soil temperature in 5 cm depth for uncovered loamy sand	TSLS05	°C
mean daily soil temperature in 5 cm depth for uncovered sandy loam	TSSL05	°C
depth of thaw layer at midday for covered soil	ZTKMI	cm
depth of thaw layer at midday for uncovered soil	ZTUMI	cm
potential evapotranspiration over grass (Penman Monteith, FAO formula)	VPGPM	mm
potential evapotranspiration over maize (AMBAV)	VPMB	mm
potential evapotranspiration over winter wheat (AMBAV)	VPWB	mm
potential evapotranspiration over sugar beet (AMBAV)	VPZB	mm
real evapotranspiration over grass and loamy sand (AMBAV)	VGLS	mm
real evapotranspiration over winter wheat and loamy sand (AMBAV)	VWLS	mm
real evapotranspiration over winter wheat and sandy loam (AMBAV)	VWSL	mm
soil moisture under winter wheat and loamy sand up to 60 cm depth (AMBAV)	BFWLS	%nFK

soil moisture under
winter wheat and sandy
loam up to 60 cm depth
(AMBAV)

BFWSL

%nFK

Uncertainties

The accuracy of values depends from quality of the models but also from quality of model input. Most necessary hourly input values from temperature, wind velocity, relative humidity and precipitation are measured but global radiation and longwave radiation is often substituted by sunshine duration and cloud cover and therefore not always exact.

Quality information

No quality flags are given.

DATA ORIGIN

All values concerning to soil moisture and some evapotranspirations are computed by the agrometeorological model AMBAV. The soil sandy loam has a wilting point of 13 volumic% and a field capacity of 37 volumic% and the used loamy sand a wilting point of 3 volumic% and a field capacity of 17 volumic%. The potential evaporation after Haude is calculated by a simple formula and is often used but not as correct as other evapotranspirations. All soil temperatures and frost depths are calculated by the model AMBETI, which was also developed at the agrometeorological research center in Braunschweig.

VALIDATION AND UNCERTAINTY ESTIMATE

Measurements of soil moisture are complex and expensive, so only temporal validations at different locations, soil types and canopies were made in the past and showed good results after calibration. The calculated soil temperatures can be validated against measured values in same depth and show really good results even with snow cover in winter times.

REFERENCES

Löpmeier, F.-J. (1994): Berechnung der Bodenfeuchte und Verdunstung mittels agrarmeteorologischer Modelle. Zeitschrift f. Bewässerungswirtschaft, 29, 157–167.

Braden, H., 1995: The model AMBETI. - A detailed description of a soil-plant-atmosphere model, Berichte des Deutschen Wetterdienstes, Nr. 195.

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REVISION HISTORY

All calculated values are used in daily advisory work and therefore passed plausibility checks by advisors and customers. Internal balance checks for water and heat are implemented in the models. This document was last edited 2019-11-13.