

## Summary AMBAV

### (Agrarmeteorologisches Modell zur Berechnung der aktuellen Verdunstung)

#### General description

The model AMBAV, part of a complex agrometeorological model toolbox of the German Weather Service, calculates the potential and real evapotranspiration and the soil water balance under different crop covers. The model is dedicated to produce recommendations for irrigation amounts and scheduling which are disseminated by the Deutscher Wetterdienst (German Weather Service) by Fax service for different soil types using hourly data from the meteorological station network of the weather service including weather forecast up to 5 days. The model is designed to be used by local meteorological advisory services. A detailed model description is given by **Löpmeier (1994)** or **Braden (1995)**.

#### Fundamentals

AMBAV simulates the water balance in the crop-soil-system using the Penman-Monteith formula on an hourly basis. The model calculates separately soil evaporation, transpiration and interception for up to 13 different crop covers considering the relevant processes of heat, water and vapour transport in the soil-crop-atmosphere interface including water losses during irrigation.

Soil water dynamics are simulated using a mechanistic model based on the Richards-equation. Soil water characteristics and hydraulic conductivity functions were described by pedo-transfer functions (**Vereecken et al. 1989, 1990**). Parameters are calculated externally within the toolbox environment and are defined for the main soil types within the external parameter files (see below).

Actually the model considers 13 different crops: winter wheat, spring wheat, winter barley, rye, oats, maize, sugar beets, potatoes, oilseed rape, grassland, fruit trees, coniferous and deciduous forest.

#### Software and system requirements

The model is programmed in FORTRAN 77 and runs on a PC platform (at least 386) under a DOS environment. A minimum of 4 MB RAM and of 8 MB disc space is required to operate the model.

#### Input files

All input data files and parameter files required by the model have to be given in ASCII format. A detailed description of the file format is given in the manual. 3 groups of files are required:

**Model run definition** (starting and batch driving file)

**AMBAV.STA** defines the batch of different model runs containing input and output path, simulation period, crop, soil type, irrigation settings.

#### **Parameter files**

**AMBAV.DAT** defines crop parameters for all 13 crops (height, LAI, ...)

**soiltype.PAR** contains parameters for soil-hydraulic properties for specific *soiltype*

**KOORD.DAT** list of station coordinates

#### **Input data files:**

**PHAAM.DAT** 5 phenological development stages during the season for each crop  
**BODsoiltypecrop.station** crop and soil specific initial / boundary conditions for a given location (ref. to station). (*only for first run of a crop/soiltype combination*)

**ZWI soiltypecrop.station** contains intermediate results of soil water budget and rooting which is automatically generated after model run to be used for subsequent model runs instead of **BODsoiltypecrop.station** from any date which has already been simulated.

**METD\_year.station** daily data (only column for rain used)

**NG\_year.stationb** hourly cloud cover (in octas)

**RF\_year.stationb** hourly relative humidity (2m)

**RG\_year.stationb** hourly global radiation

**RR\_year.stationb** hourly precipitation amount

**TL\_year.stationb** hourly air temperature (2m)

**VV\_year.stationb** hourly windspeed (in m/s)

**REGEN\_year.stationb** daily rain amounts (can be used as an alternative for METD\_...)

## Output data files

<b>AMBAV.LS1</b>	list 1: control data of each run
<b>AMBAV.LS2</b>	detailed result list
<b>AMBAV.ERG</b>	data for tables for irrigation recommendation
<b>AMBERERG.station</b>	crop-specific soil data (if S12 (sand) or Ls2 (loam) taken)
<b>ERGLAUF.DAT</b>	model run control (last column: -99 = failure, 1 = o.k.)
<b>AMB_year.station</b>	output concerning ISTEU chosen (see AMBAV.STA)
<b>BEREG_year.station</b>	date and amount of irrigations done or recommended
<b>ETA_year.station</b>	real evapotranspiration
<b>ETP_year.station</b>	potential evapotranspiration
<b>NFK_year.station</b>	available soil water (in %, 0-60cm depth!)
<b>WURZ_cult.station</b>	calculated daily crop variables (LAI, height, root density) only for crops 1 to 6
<b>ZWI soiltypecrop.station</b>	soil water budget and rooting percentage in layers (see above, used again as input for next run)

An overview of the file structure is given in Fig. 1.

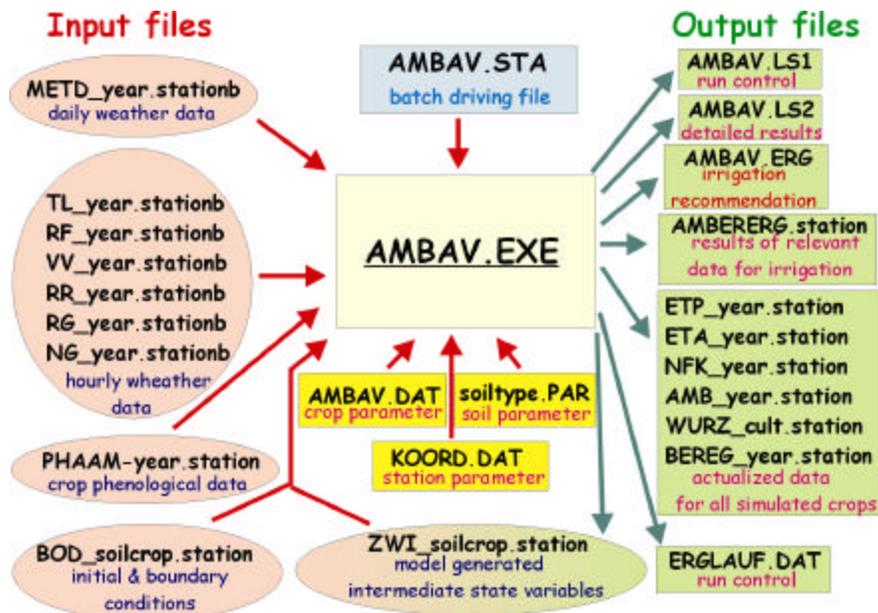


Fig 1: Overview of the input and output file structure of AMBAV.

## Contacts

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## References

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