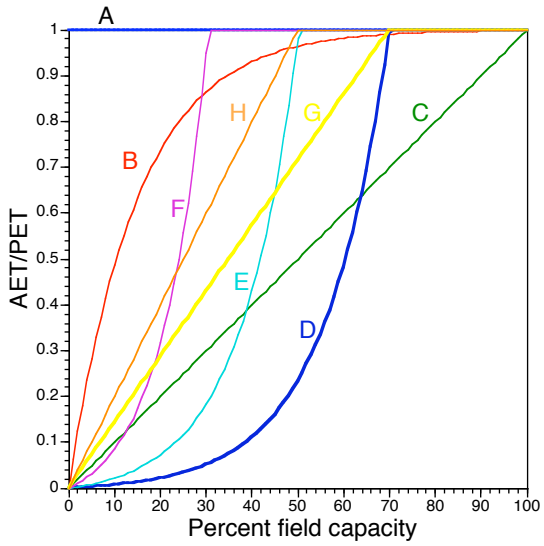
AET Calculator 1.0 (revision March 2007)

A program for calculating the annual climatic water balance using the modified Thornthwaite method. See Willmott et al. (1985) for how the method is calculated. Day length, needed to compute potential evapotranspiration, is calculated from the latitude using methods by Forsythe et al. 1995. This program was written by Daniel Gavin. Comments to dgavin@uoregon.edu

How to run the program:
Input data consist of monthly mean temperature and monthly precipitation. Two input files are accepted: The HCN (historical climate network) or a tab-delimited text file. Examples of these files are included on the author's web page. Note that for the HCN format, temperature units are deg C*10 and precipitation units are mm*10. For the tabbed-delimited format, temperature units are deg C and precipitation units are mm. The first line in each input file is a header line. For the HCN file type, the first three letters on the first line must be HCN.

Once the field capacity is chosen, a declining availability function must be chosen. This describes the proportion of evaporative demand on soil moisture that is met for a given soil wetness (percent field capacity). Generally, as soils dry, it is harder to remove the remaining water. Curve B is presented in Willmott et al. (1985). The remaining curves were taken from the Web WIMP program (http://climate.geog.udel.edu/~wimp/) to make these programs compatible and comparable.



Once pressing 'Run', the user is prompted to select the folder where the input files are located, and then select the folder where the output file should be saved.

It may be run many times, saving to different output files.

The output file lists monthly potential evapotranspiration (PET), actual evapotranspiration (AET), and surplus (precipitation while soil water is at capacity. The last three columns contain annual PET, AET, and SURPLUS.

Notes:
1. Unless the box “carryover soil water from Dec to Jan” is checked, the water balance is computed for each row of input data (a year or site) independently. Each year is run in a loop until the soil water at the end of the year equals the water at the start of the year. This usually occurs at the end of the second time the model loops through the year.
2. Data in each row may represent sites or years. The second column in each row (for the tab-delimited text files) should be the site latitude. If each row represents a year (i.e., it is not a list of sites), this column should be the same value for all rows. See example data file.
3. If any month in a row of data is missing data, that row will be skipped.

References:

Forsythe, W.C., Rykiel, E.J., Jr, Stahl, R.S., Wu, H., & Schoolfield, R.M. (1995) A model comparison for daylength as a function of latitude and day of year. Ecological Modelling, 80, 87-95.

Willmott, C.J., C.M. Rowe and Y. Mintz, 1985. Climatology of the terrestrial seasonal water cycle. Journal of Climatology, 5, 589-606.