Data sources for FAO worldmaps of Koeppen climatologies and climatic net primary production

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August 2006

The Koeppen climatologies and the climatic net primary production maps of FAO are based on different periods and precipitation datasets. Here we provide the datasets in different formats. Furthermore some derived information like temperature of the coldest and warmest months, Martonnes aridity index and Gorczynskis continentality index are provided.

The original data are brought to a common grid based on USGS gtopo30 and provided as tables in csv format (.5° resolution). For the users convenience the derived data are also provided as georeferenced data in IDA/Windisp format (5' resolution, resampled).

The table provides the links to the datasets used to derive the Koeppen climatologies and npp maps. Each of the files consists of 13 columns. The first column contains the gridpoint number, the remaining 12 columns contain the mean annual cycle of the variable at that grid point. In the case of temperature, it is the mean monthly temperature in °C or the standard deviation of temperature over the respective period. Precipitation is provided in mm per month. The meta data file consists of 4 columns with gridpoint number, longitude (in .01°), latitude (in .01°) and land fraction (in %).

All data are provided as comma separated value (csv) in .5°x.5° resolution. The temporal standard deviation of the variable at the grid cell within the period is provided too. This allows a wide range of investigations. For example, it can be used to compare the average with the variability by estimating the coefficient of variability (standard deviation / average) in the case of precipitation. Furthermore it can be used to estimate uncertainty intervals for the average of each grid cell.

Comma Separated Value (csv)				
	Full Period 1951 – 2000	**Norm Period 1961 – 1990**	**Early Period 1951 – 1975**	**Late Period 1976 - 2000**
CRU Temperature	Average (2Mb)	Average	Average	Average
	Standard Deviation	Standard Deviation	Standard Deviation	Standard Deviation
CRU Precipitation	Average	Average	Average	Average
	Standard Deviation	Standard Deviation	Standard Deviation	Standard Deviation
GPCC Fulldata Precipitation	Average	Average	Average	Average
	Standard Deviation	Standard Deviation	Standard Deviation	Standard Deviation
GPCC VASClimO Precipitation	Average	Average	Average	Average
	Standard Deviation	Standard Deviation	Standard Deviation	Standard Deviation

The meta-data file with grid point coordinates is here.

For the annual mean temperature und the annual precipitation sum we also provide resampled georeferenced data in 5’x5’ resolution as Windisp/IDA images.

Georeferenced annual Data				
	Full Period 1951 – 2000	**Norm Period 1961 – 1990**	**Early Period 1951 – 1975**	**Late Period 1976 - 2000**
CRU Temperature	IDA	IDA	IDA	IDA
CRU Precipitation	IDA	IDA	IDA	IDA
GPCC Fulldata Precipitation	IDA	IDA	IDA	IDA
GPCC VASClimO Precipitation	IDA	IDA	IDA	IDA

Download colour tables for IDA images of temperature, precipitation, number of months with temperature exceeding 10°C, and annual temperature amplitudes here.

Derived Temperature products				
	Full Period 1951 – 2000	Norm Period 1961 – 1990	Early Period 1951 – 1975	Late Period 1976 - 2000
Mean monthly temperature of coldest month	IDA	IDA	IDA	IDA
Mean monthly temperature of warmest month	IDA	IDA	IDA	IDA
Mean annual temperature amplitude	IDA	IDA	IDA	IDA
Number of months with temperature exceeding 10°C	IDA	IDA	IDA	IDA
All as csv (700kb)	csv	csv	csv	csv

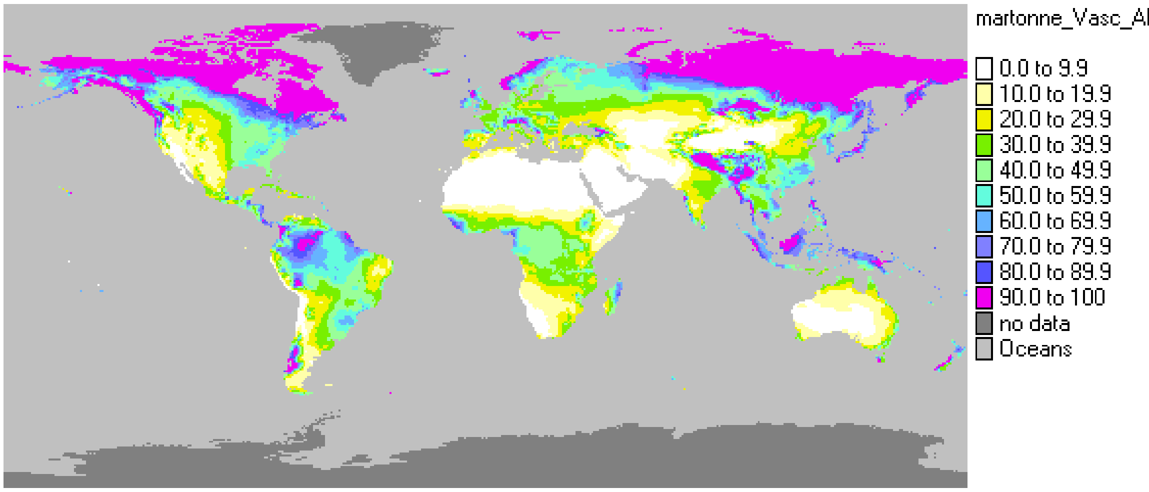
Aridity and Continentality

From the variety of existing indices to quantify aridity and continentality we only provide the aridity index of De Martonne (1926) and the continentality index of Gorczynski (1920).

Aridity indices provide a simple way to express the ratio of precipitation to evaporation. Since evaporation is rarely observed it is a common tradition to approximate it. In the approximation by De Martonne evaporation is set to mean annual temperature T_A in °C +10. The aridity index of De Martonne A_M is therefore defined as the ratio of the annual precipitation sum P_A in mm and the annual mean Temperature in °C +10. It is obvious that one disadvantage of this definition is that the equation has a pole at –10°C where the index is undefined. Lower temperatures lead automatically to negative indices. One may argue that the whole concept of aridity/humidity may not make much sense in cold regions. However, since we draw global maps we have to deal with this problem. In order to use the index world wide we define

$$A_M = \begin{cases} 100 & \text{if } T_A < -9.9°C \\ P_A / (T_A + 10) & \text{else} \end{cases}$$

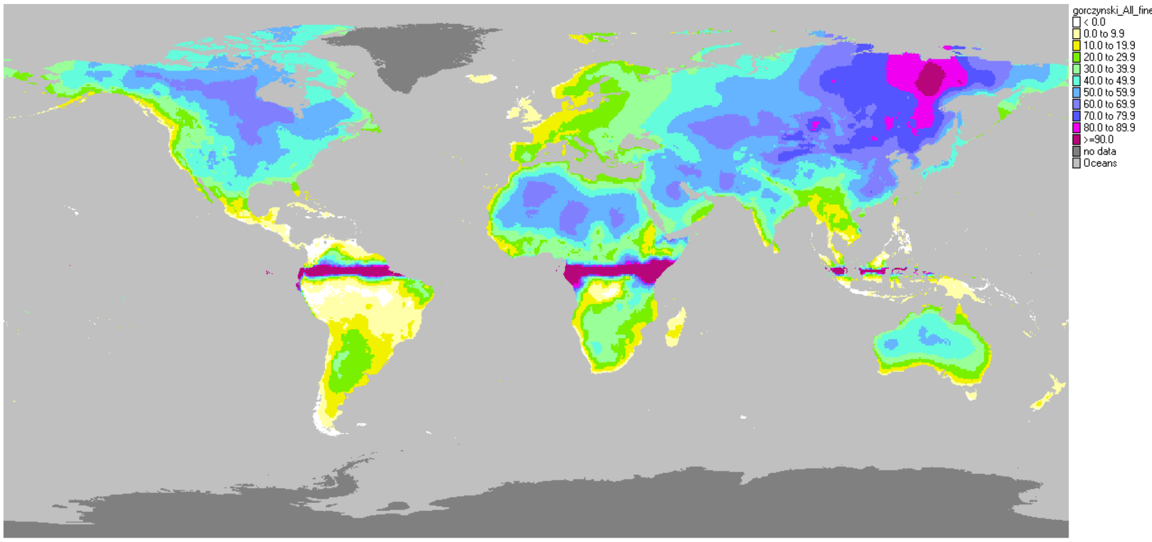
Note that the higher this coefficient is, the higher is the precipitation compared to evaporation and thus the less arid is the climate. This means that by definition a high aridity index means a humid climate while a low aridity index means an arid climate. The following map shows the aridity index for the 50 year period from 1951 to 2000 based on temperature data of the CRU and precipitation data from GPCC VASClimO. It can be downloaded as a bitmap here.



The continentality index of Gorczynski K_G is a simple but efficient way to estimate the influence of the ocean on the local climate. The index depends linearly on the annual temperature amplitude A (difference of monthly mean temperature of warmest and coldest month). However, A not only depends on the strength of the influence of the ocean but also on the annual cycle of incoming solar radiation. Since the amplitude of the annual cycle of incoming solar radiation depends on latitude, with a maximum in the polar regions, the inverse of the sine of the latitude φ gets in as well. The definition in the version of Gorczynski is

$$K_G = 1.7 \frac{A}{\sin \varphi} - 20.4$$

This original equation comes with some drawbacks. Since the sine approaches zero as the latitude approaches the equator, the values close to the equator tend to infinity. At the equator the definition breaks down. We therefore suggest not using the index values within a latitude range of plus/minus 10 degrees. In order to apply the definition also to the southern hemisphere we use the absolute of the latitude instead of the latitude itself. The following map shows the continentality index for the 50 year period from 1951 to 2000 based on temperature data of the CRU. It can be downloaded as a bitmap here.



Download colour tables for IDA images of De Martonne aridity index and of Gorczynski continentality index here.

De Martonne aridity index and Gorczynski continentality index				
Index	Full Period 1951 – 2000	Norm Period 1961 – 1990	Early Period 1951 – 1975	Late Period 1976 - 2000
Gorczynski (CRU)	csv IDA	csv IDA	csv IDA	csv IDA
De Martonne CRU	csv IDA	csv IDA	csv IDA	csv IDA
De Martonne GPCC Fulldata	csv IDA	csv IDA	csv IDA	csv IDA
De Martonne GPCC VASClimO	csv IDA	csv IDA	csv IDA	csv IDA

Download this file as pdf.

References

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De Martonne, E. (1941) : Nouvelle carte mondiale de l'indice s'aridité. Météorol. 1941, 3-26.

Gorczynski, W. (1920) : Sur le calcul du degré de continentalisme et son application dans la climatologie. Geogr. Annaler 2, 324-331.

Mitchell, T., and P. Jones, 2005: An improved method of constructing a database of monthly climate observations and associated high-resolution grids. Int. J. Climatol., 25, 693-712. http://www.cru.uea.ac.uk/

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