New gridded maps of Koeppen's climate classification

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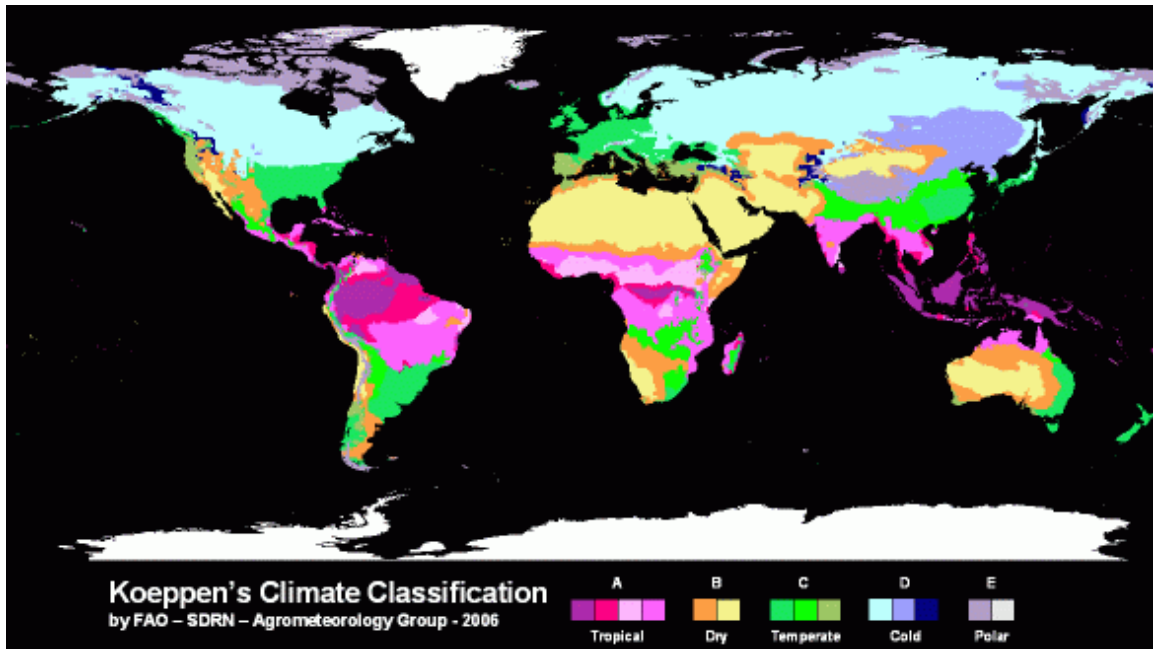
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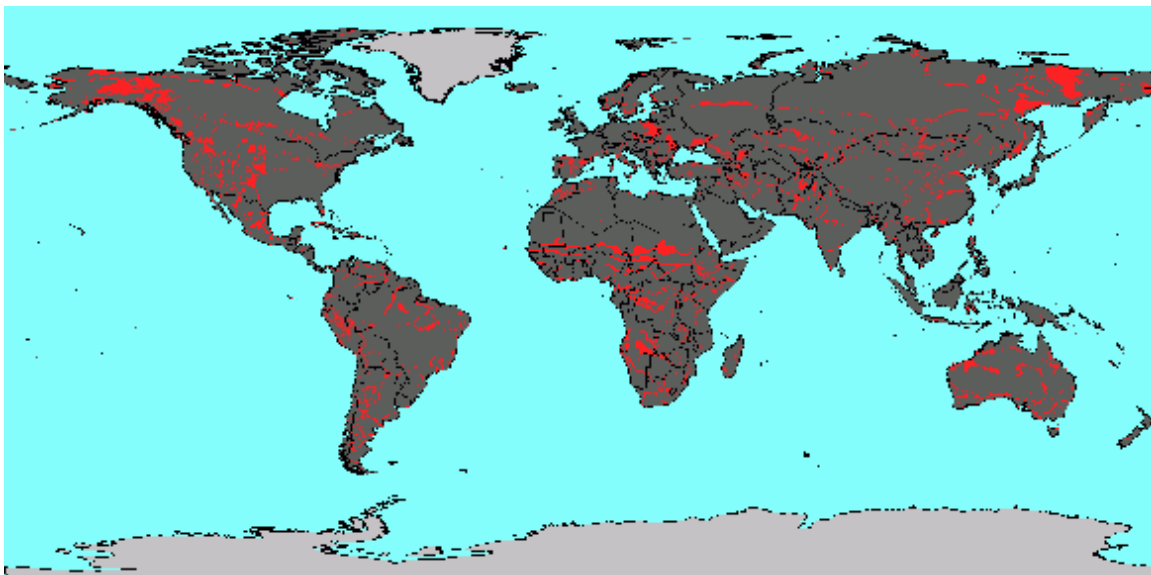
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Introduction

In 1999, the FAO Environment and Natural Resources Service published some global climate grids, a map showing the Koeppen climate classification next to various derived products such as the agroclimatic production potential according to Lieth (click here for details). Regardless of several inconsistencies which users soon discovered, the maps turned out to be very popular and were widely copied, pasted into other web pages as well as linked to.

We are presenting below some updated maps based on improved recent global climate grids (click here for the source of the original data) and a more consistent methodology (click here [pdf] for an overview of the definition of Koeppen classes). Results of a recent recalculation of climatic net primary production can be found here. The image below shows average Koeppen climate for the period 1951-2000 based on the CRU and VASClimO datasets. Click here to download a larger version of the map. A very nice map can also be downloaded here from the Department of Natural Sciences at the University of Veterinary Medicine, Vienna.

Koeppen's Climate Classification
by FAO – SDRN – Agrometeorology Group - 2006

A	B	C	D	E
Tropical	Dry	Temperate	Cold	Polar

The new maps are presented for two time periods, to allow users to assess changes that have taken place recently. For instance, the map below shows in red all the areas where the climate has changed (3rd level of Koeppen classification) between the two reference periods from 1951 to 1975 and 1976 to 2000.

A larger version as well as a georeferenced variant of the image in IDA/WinDisp format can be downloaded by clicking here.

Methodology

The new globally gridded Koeppen climatologies are based on climatological observations rasterized to grids of 0.5°x0.5° degrees. They cover 4 different periods and are based on 3 different precipitation datasets. This leads to a total number of 12 rasterized Koeppen climatologies.

Mean annual cycles of temperature are always taken from the Climatic Research Unit (CRU, Mitchell and Jones, 2005). Precipitation is taken from 3 different sources:

1. Precipitation data set of CRU based on about 10,000 station records (Mitchel and Jones, 2005),
2. GPCC Full data, based on all time series fragments available to GPCC (>40,000 stations, Rudolf et al., 2005),
3. GPCC VASClimO data, based on 9,343 stations that provide at least 90% coverage within 1951-2000 (Beck, Grieser and Rudolf, 2005).

The 4 different periods are
　　1951 – 2000 (all),
　　1961 – 1990 (norm),
　　1951 – 1975 (early),
　　1976 – 2000 (late).

All different datasets are converted to the same 0.5°x0.5° grid, which results from USGS gtopo30. Antarctica and Greenland are left out due to lack of data.

For the users convenience data are provided in two formats: comma separated values and IDA/Windisp geo-referenced grids. For IDA/WinDisp format the Koeppen classes, that are identified as strings of letters (e.g. E, or Af, or Cfa) have to be recoded as numbers. The following coding system ("byte representation") was adopted:

TROPICAL		COLD	
Af	13	Dfa	162
Am	23	Dfb	165
As	33	Dfc	168
Aw	43	Dfd	170
		Dwa	172
DRY		Dwb	175
BSk	63	Dwc	178
BSh	73	Dwd	180
BWk	83	Dsa	182
BWh	93	Dsb	185
		Dsc	188
TEMPERATE		Dsd	190
Cfa	112		
Cfb	115		

Cfc	118	POLAR	
Cwa	122	ET	213
Cwb	125	EF	223
Cwc	128		
Csa	132	Other	
Csb	135	Sea	254
Csc	138	Missing	255

The coding is such that A climates cover the range from 13 to 43, Cf ranges from 112 to 118 etc. Oceans and large freshwater bodies are coded as 254, while land areas that were assigned no climate values (for instance very small islands) are indicated with a value of 255. The table can be downloaded here.

Downloads as comma separated values (csv):

For each data source, the file contains a list of comma separated values (csv) ready for the use with Microsoft Excel. There are of 63,660 lines, each corresponding to a grid point over land. The five columns (data items on a line) are the gridpoint number, the longitude (in 0.01°), the latitude (in 0.01°), the fraction (in %) of the area of the 0.5°x0.5° pixel covered by land, and the Koeppen class using the standard 3-letter codes.

Comma Separated Value Files				
	All **1951 – 2000**	**Norm** **1961 – 1990**	**Early** **1951 – 1975**	**Late** **1976 - 2000**
CRU	zip (350 kb)	zip (350 kb)	zip (350 kb)	zip (350 kb)
GPCC Fulldata	zip (350 kb)	zip (350 kb)	zip (350 kb)	zip (350 kb)
GPCC VASClimO	zip (350 kb)	zip (350 kb)	zip (350 kb)	zip (350 kb)

Downloads as IDA (Windisp):

IDA stands for **I**mage **D**isplay and **A**nalysis format. These files can be easily displayed and rescaled with Windisp. Windisp also allows further processing of the data including the easy manipulation of colour scales.

We provide the Koeppen maps in their original 0.5°x0.5° resolution. Each pixel that covers a fraction of land is drawn as a whole pixel. We furthermore resampled these maps on a 5'x5' grid. The resulting fine-scale images still contain the classes on a .5°x.5° grid but the coastlines are represented more precisely.

Windisp can display the Koeppen classes up to the first, second or third letter. This allows the maps to be displayed in full (3 letters) or medium (2 letters) accuracy or to concentrate on the 5 major classes (1 letter). The colour scales come in two flavors, with and without an explicit byte representation. The resulting 6 colour scales are available here.

Colour tables, **all colour tables**		
1-letter representation (only major climates A – E)	with byte representation	without byte representation
2-letter representation (intermediate level of detail)	with byte representation	without byte representation
3-letter representation (full accuracy)	with byte representation	without byte representation

A list of the byte representations is here.

IDA Images				
	All 1951 – 2000	**Norm 1961 – 1990**	**Early 1951 – 1975**	**Late 1976 - 2000**
CRU	Coarse (15kb)	Coarse (15kb)	Coarse (15kb)	Coarse (15kb)
	Fine (140kb)	Fine (140kb)	Fine (140kb)	Fine (140kb)
GPCC Fulldata	Coarse (15kb)	Coarse (15kb)	Coarse (15kb)	Coarse (15kb)
	Fine (140kb)	Fine (140kb)	Fine (140kb)	Fine (140kb)
GPCC VASClimO	Coarse (15kb)	Coarse (15kb)	Coarse (15kb)	Coarse (15kb)
	Fine (140kb)	Fine (140kb)	Fine (140kb)	Fine (140kb)

Additional information

For further information on the area size covered by different Koeppen climate classes click here.

Download this file as pdf.

For any questions or to report problems please contact agromet@fao.org

References

Beck, C., J. Grieser and B. Rudolf, 2005: A New Monthly Precipitation Climatology for the Global Land Areas for the Period 1951 to 2000. *Klimastatusbericht 2004*, 181-190, DWD. [pdf]

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/

Rudolf, B., C. Beck, J. Grieser, U. Schneider, 2005: Global Precipitation Analysis Products of the GPCC. Internet publication at http://gpcc.dwd.de/ [pdf]