Short Tabular Presentation of Koeppen Classes

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August 9, 2006

The following table gives a definition of the Koeppen classes (Köppen, 1900, see e.g. Kraus, 2004, Kottek et al., 2006). In later studies the letter H was introduced to represent high altitude climates for which very little was known. Often all regions with an altitude higher than a certain threshold (say $1000m$) were automatically called H climates. However, if data of high quality are available (either from observations or from models) we suggest using the original Koeppen classification as defined by Koeppen himself.

The Koeppen classification becomes unique if the climate is first tested with respect to an E climate. If the location does not fall under E then it is tested for B. This means that a climate can only be a dry climate if it is warm enough. If the highest monthly mean temperature is below 10° the climate is polar, no matter how dry it is. If the climate is neither polar nor dry it can be either of the remaining 3 climate classes (A, C, D). Minimum temperature is the criteria used to decide to which of these classes the climate belongs.

BW and BS climates are further subdivided and assigned into cold and hot, k and h as a third letter. If the annual mean temperature of a desert/steppe is below $+18°C$ it is called cold. Otherwise it is hot.

C and D climates are further distinguished with respect to their summer temperatures, where a third letter a means hot summer, b warm summer, c cool summer, d cool summer and extreme continental climate. The third letter is a (hot summer) if the warmest month has an average temperature above $22°C$. If it is not a but 4 months exceed the threshold of $10°C$ the summer is called warm and the third letter is b. If it is neither a nor b the minimum temperature is used to further distinguish between c and d . If it is above $-38°C$ (which is always the case with C climates) the third letter is c, otherwise d.

The precipitation threshold for aridity P_{th} is defined as

$$P_{th} = \begin{cases} 2\{T_{ann}\} & \text{if } P_W \geq 2P_S \\ 2\{T_{ann}\} + 28 & \text{if } P_S \geq 2P_W \\ 2\{T_{ann}\} + 14 & \text{else} \end{cases} \quad (1)$$

where $\{T_{ann}\}$ is the unitless annual mean temperature as observed in $°C$.

Table 1: Type, description and criteria for the Koeppen classification. T stands for long term monthly mean temperature in $°C$, P means long term mean monthly precipitation sum in mm. The subscript ann stands for the annual sum, while min and max represent the lowest and highest monthly values of the mean annual cycle. Subscript S and W indicate summer and winter halfyear. P_{th} refers to a threshold precipitation to define aridity with respect to temperature and precipitation. It is defined in eq. (1)

Type	**Description**	**Criterion**
A	**Equatorial climates**	$T_{min} \geq 18°C$
Af	Equatorial full humid rainforest	$P_{min} > 60mm$
Am	Equatorial monsoon	$P_{ann} \geq 25(100mm - P_{min})$
As	Equatorial savannah with dry summer	$P_{min} < 60mm$ in summer
Aw	Equatorial savannah with dry winter	$P_{min} < 60mm$ in winter
B	**Arid climates**	$P_{ann} < 10P_{th}$
BS	Steppe climate	$P_{ann} > 5P_{th}$
BW	Desert climate	$P_{ann} \leq 5P_{th}$
C	**Warm temperate climates**	$-3°C < T_{min} < 18°C$
Cs	Warm temperate climate with dry summer	$P_{Smin} < P_{Wmin}$, $P_{Wmax} > 3P_{Smin}$ and $P_{Smin} < 40mm$
Cw	Warm temperate climate with dry winter	$P_{Wmin} < P_{Smin}$ and $P_{Smax} > 10P_{Wmin}$
Cf	Warm temperate fully humid climate	neither Cs nor Cw
D	**Snow climates**	$T_{min} \leq -3°C$
Ds	Snow Climate with dry summer	$P_{Smin} < P_{Wmin}$, $P_{Wmax} > 3P_{Smin}$ and $P_{Smin} < 40mm$
Dw	Snow Climate with dry winter	$P_{Wmin} < P_{Smin}$ and $P_{Smax} > 10P_{Wmin}$
Df	Snow climate, fully humid	neither Ds nor Dw
E	**Polar climates**	$T_{max} \leq 10°C$
EF	Tundra climate	$0°C \leq T_{max} < 10°C$
ET	Frost climate	$T_{max} \leq 0°C$

References

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