Hydrol. Earth Syst. Sci. Discuss., 8, C1920–C1922, 2011
www.hydrol-earth-syst-sci-discuss.net/8/C1920/2011/

Hydrology and Earth System Sciences Discussions

Interactive comment on "Köppen versus the computer: an objective comparison between the Köppen-Geiger climate classification and a multivariate regression tree" *by* A. J. Cannon

Anonymous Referee #3

Received and published: 2 June 2011

This is a very well written paper that deals with an interesting and scientifically relevant study. Figures and Tables are well organized to present the main results of the study. I strongly support publication, but do have some questions/ remarks that require clarification:

Title

First of all, the use of the word objective in the title might be reconsidered, because the objectiveness of the parameter chosen for the comparison between the two methods of climate classification is arguable. Objectiveness results from the fact that the same

parameter was used to judge the outcome but the parameter itself was not chosen objectively from the wealth of parameters one could think of... But I agree that it is very catchy.

Abstract:

A main advantage as stated in the abstract is that the practitioner is no longer asked to "manually define classes" – however I doubt that practitioners nowadays manually define classes, as this was already done by Köppen...

"MRT generally outperforms Köppen" – the analysis presented here is far from allowing a generalisation; the outperformance depends on the aim/ and usage of the classification. Aim and usage seem to be different in nature between Köppen and MRT. MRT aims at partitioning points into homogeneous classes, while Köppen aimed at a differentiation of climate classes based on vegetation groups. The homogeneity of vegetation groups within the MRT classes is not considered at all, hence performance is not objectively judged.

"...and it is rule-based, which allows climate classes to be unambiguously defined and easily interpreted." I am actually missing that interpretation: how are the classes interpreted – why is a new classification required after all – which additional gain do these classes bring – what can be said about the areas that differ?

And more generally, how does this algorithm perform in the light of climate change – would predictor variables change and areas remain constant? Or would areas change? Or both? (This question might, however, be outside the scope of this study, but maybe the author has some ideas on this)

How sensitive is the algorithm to the length of time series from which climatologies are calculated? How does it perform if only 30 years are used / or the 50 years are split into two parts of 25 yrs and evaluated separately?

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"For sake of simplicity and for consistency with the Köppen Geiger rules, the same variables are chosen as predictor variables. . ." I find this a weak argumentation, I am afraid that simplicity and consistency are not adequate reasons for the choice of predictor variables. I understand the need to compare the algorithm to the Köppen classification and therefore support this choice for a first test of the method. But especially in times of "rapid improvement of computer power" as the author states, the study set-up offers a unique opportunity to test other predictor variables, which were not considered by Köppen – such as AET, PET, deviation from climatology, soil moisture, vegetation pattern and many more. Then I would find the comparison more relevant with regards to newly gained knowledge. The study as it is now, does not really offer much new knowledge and its application in current studies is doubtful. It shows, that a similar classification as the Köppen classification can be achieved if similar predictor variables are chosen, although absolute threshold values of the predictors differ.

Figure 5

I would like to see the same two Figures for the 30 classes, with similar colours for subclasses. I think a visual comparison of the end-result of the study would be interesting, and helpful to understand the differences between the two classifications.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 2345, 2011.