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Climate of the Past Discussions

Interactive comment on "CREST: Climate REconstruction SofTware" *by* M. Chevalier et al.

Anonymous Referee #1

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In their paper submitted to Climate of the Past, the authors present an interesting study on climate reconstructions. The statistical relation between a taxon and a climate variable is obtained by the pdf-method. In the second step a pollen-type pdf is created out of the single species pdfs. The reconstructed climate variables are verified e.g. with the RMSE and its normalized version. With their software CREST it is possible to analyze climate reconstructions for the southern African continent. The analyzed 20 variables are split in the categories temperature and moisture. One presented result is that those parameters which have direct impacts on the plants are better for reconstructions.

The assumption was being made that the taxon/pollen-type depends only on one climate variable. The pdf is expressed as an univariate function. This is a big restriction as the plant growth needs at best a measure for temperature (e.g. the coldest and warmest quarter) and a measure for moisture (e.g. annual precipitation) at the same time. I suggest that the authors should think about including two or three dimensional

pdfs to their software to get the relation between a taxon/pollen-type and a certain climate state.

The formula for weighting climate values could be useful in the text. If the authors follow the definition after Kühl et al. (2002) the expectation value and standard deviation (Eqt. 1 and 2) are not correct. Is the weighting also valid for non normally distributed variables?

Climate variables (with positive values only) which do not follow a normal distribution can be transformed before fitting a pdf. The precipitation distributions e.g. in Fig. 1A are close to zero which makes it difficult to fit the log-normal distribution, as this is only valid for values larger than zero. There are several ways to do transformations, e.g. explained in Gentle (2003). It would be worthwhile to mention this option as the results could be improved for the precipitation measures.

It did not become clear to me how to calculate the weighting and the pollen percentage in the third step (Eqt. 7). What exactly is t? This should be shown more explicitly.

Which time period is taken for the analyses in CREST?

A formula for the Moran's Index should be given to get a better understanding.

In section 3 the software CREST is briefly described. I like the approach of building a tool like this with an output consisting of figures and texts. As this manuscript should present the major characteristics of CREST the authors could go more in detail what can be changed by the users. What does it mean to change the shape of the pdf of the species? Is it or will it be possible to use own botanical and meteorological data sets in CREST?

The following points should be corrected:

- adding the missing 1/2 in exponential function (Eqt. 3)

- adding the missing literature references (e.g. lines 32, 368)

- checking abbreviations and indices (e.g. lines 116, 171, 304)

The manuscript may become acceptable for publication in Climate of the Past after the major points raised above have been satisfactorily addressed by the authors.

Kühl, N., Gebhardt, C., Litt, T., and Hense, A. (2002) Probability density functions as botanical-climatological transfer functions for climate reconstruction, Quaternary Res., 58, 381–392.

J.E. Gentle (2003) Random Number Generation and Monte Carlo Methods. Statistics and Computing. Springer Verlag, New York.

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