

## ***Interactive comment on “Analysing the sensitivity of pollen based land-cover maps to different auxiliary variables” by Behnaz Pirzamanbein et al.***

### **Anonymous Referee #1**

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Pirzamanbein et al. present a statistical method for producing past land cover reconstructions from pollen and model data. More specifically, they explore present and test a statistical model that can be used for linking pollen-based land cover data with different auxiliary variables, such as the past vegetation simulated with dynamic vegetation modeling and anthropogenic land cover change modeling. The idea of combining pollen-based land cover data with auxiliary data derived from various simulation approaches is interesting. The paper has a clear focus and it is for most parts clearly presented and well illustrated, deserving a publication.

My main comment is, however, that the authors should reconsider whether Climate of the Past is the right and best forum for this paper. It is certainly true that past land cover patterns are important for understanding past climates, but this paper is really not

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presented from the palaeoclimatological perspective. Its emphasis is in the use of the statistical model for land-cover compositions, and the mathematical basis of this model is presented and tested in detail on pages 4-8. As a consequence, the paper is mostly a methodological description of the model, including its testing. There is barely any description or discussion why this model might be important in palaeoclimatology and I fear that the number of palaeoclimatologists interested in the details of this particular statistical model is very limited. My view is that there are other journals, which would be more suitable for this paper, for example *Environmetrics*, *Biometrics*, *Computers and Geosciences* or possibly *Journal of Applied Ecology*.

More detailed remarks.

-page 1 line 2: "However, observation based reconstructions of past land cover are rare". This paper deals mostly with land covers before human-made observations, so a better term instead of "observations" would be "proxy-based reconstructions" - it is stated in the abstract that five different auxiliary datasets were considered in the study. However, on page 3 the authors write that "Four different model derived datasets. . .were considered as potential auxiliary datasets". This seems contradictory. I believe that the fifth auxiliary dataset is the elevation dataset? In any case, it would be best to amend the wording either in the abstract or in the method description. -I agree with the authors when they write that "The final land-cover reconstructions achieved by fitting the models to the observed PbLCC are very similar. . .". This is demonstrated by maps in Figs. 4-6. But I find this outcome surprising because earlier in the paper (page 8 lines 15-20 and Fig. 1) it is stated that the available auxiliary datasets exhibit large variation in the extent of coniferous and broadleaved forests, and un-forested areas for all of the studied time periods. It is hard to understand how it is possible that when these different auxiliary datasets, showing such large variation, are combined with one and the same pollen-based dataset, the resulting land-cover reconstructions are nearly identical. This can lead to a skeptical view about the performance of the statistical model presented in the paper. -page 15 line 11: "The performance of the statistical

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model. . .to reconstruct the pollen based observations was tested. . .” The model is not used “to reconstruct the pollen based observations”. It would be more correct to write that the statistical model was used to test the sensitivity of the pollen-based land cover reconstructions to the use of different auxiliary datasets”. -the possible palaeoclimatic importance of the results presented is totally lacking from the Discussion from the Conclusions. -figures and captions should be made more user-friendly. The caption of Fig. 1 is very tedious to read with many abbreviations and Fig. 2 is hard to understand given the short and uninformative caption. Figure 9 is only briefly mentioned in the text and the caption is uninformative.

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