**Climate
of the Past
Discussions**

Interactive comment on "Identification of climatic state with limited proxy data" *by* J. D. Annan and J. C. Hargreaves

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The paper investigates several issues related to model based reconstructions of past climate. The approach is based on pseudo-proxies generated by adding noise to local modelled temperatures. I find the paper interesting and the topic important. The following is not a full review but only a few points I think need to be considered.

1) In the real-world, proxies are not just the temperatures polluted with noise. The proxies do not have the units of temperature. At best they are related to temperatures through a scaling. Finding the right scaling coefficient is not easy and how to do it to avoid underestimation of variability has been discussed a lot in the literature recently. As I understand it this important step is not considered in the present paper. This limitation should be discussed in some detail or at least stated more explicitly.

2) Figure 2 shows the potential predictability. It is included - as Fig. 1 - to show that the model is realistic. However, I find the potential predictability very hard to interpret. Even white noise will have variance distributed over many time-scales. The only thing I learn from the figure is that the time-sales are shorter over land than over sea. It is true that it looks like the plots in Boer and Lambert 2008 (they use 25 years and not 20 years), but it is very difficult to say what is a good match and what is not. I would prefer to see some of the leading patterns of variability instead. It could be the NAO and the ENSO.

3) The method is described as a "particle based assimilation method" using "likelihood-based weighting". However, to me the method seems to be a kind of analogues technique, in particular the version used in the first part of the paper (the non-sequential version). Perhaps the authors could clarify this.

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