

***Interactive comment on “Statistical framework for evaluation of climate model simulations by use of climate proxy data from the last millennium – Part 3: Practical considerations, relaxed assumptions, and using tree-ring data to address the amplitude of solar forcing” by A. Moberg et al.***

**Anonymous Referee #1**

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This paper is an extension of the statistical framework formulated by Sundberg et al. (CP 2012). As the third in a series of papers it considers experiences gained with this method (e.g. Hind and Moberg, 2013) and attempts to give a thorough account of real-world considerations when applying the framework in practice. The framework basically consists of two metrics combining correlation and proximity to the observed value in the sense of a quadratic distance measure. The main new ingredients are to allow autocorrelation in the statistical model and to allow evaluating directly simulations

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with different forcing characteristics. The first addition is very useful, because in the previous study by Hind and Moberg (2013), the time unit for comparing simulated and proxy data had to be chosen pretty long (30 years). The authors demonstrate the effect of autocorrelation and come up with recommendations which time unit to choose. The second addition is also very useful and leads to illustrative results, as given in figure 7. The authors give clear arguments for their choices and the reasoning behind the addition to the statistical models is well founded. The combination of the statistical framework with practical application gives insight into many practical considerations, such as the weighting of certain regions/indices etc. The presentation is clear and the figures are suited to demonstrate the merits of the method. At some places, the text could be a bit more concise and the punctuation could be improved. In summary, this paper is a very useful addition to the previous publications. It clearly demonstrates the value of the Sunberg et al. 2012 framework, and makes a valuable contribution to the field. I am looking forward to more application, e.g. using the newly available PMIP3 model and PAGES2K reconstruction data. I recommend publication in *Climate of the Past*, with only very minor revisions.

Minor comments:

Abstract: The first third of the abstracts reads more like an introduction. Could be reformulated more concisely.

Ln 2 (and at other places). Not so clear what “alternative” means. Maybe better something like “forced climate models under equally valid assumptions for boundary conditions”

Page 2633, ln 21ff (and §5). It would be interesting to include also individual members of the ensemble. Sure, the ensemble mean will filter out better the forced signal, but maybe the method can also be used to define the actual “best” simulation (e.g. for data assimilation purposes).

Ln 2642, §4.2: a relatively long paragraph coming to a very simplistic conclusion could

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be summarized in two sentences or so.

Page 2653, ln 1: maybe worth mentioning that Servonnat also point to relatively long lead times the climate system needs to show response to forcing. This could be realized differently in models and the real climate.

Appendix B, page 2660, ln 21ff: “In the situation that a particular forcing effect is present . . . both with and without forcing. . .”: this sounds a bit strange, how can there be a forcing effect without forcing?

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Interactive comment on Clim. Past Discuss., 10, 2627, 2014.

**CPD**

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