

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 #3

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This manuscript presents an application of a statistical framework for evaluating proxy climate reconstructions and simulations from general circulation models. It builds on previous description and evaluation of the methods (e.g. Part 1 and 2), discussing here in particular practical considerations for such an approach, objective criteria, as well as necessary subjective decisions. The particular case examined here involves 15 temperature sensitive tree-ring or tree-ring composite reconstructions and climate model results from a MPI-ESM set of last millennium simulations.

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This is a solid manuscript and I have relatively few comments. The authors do a fine job of describing the method, the particular considerations for applying the framework in a more 'real world' situation, and discussing frankly the subjective choices that must be made. The approach they take is transparent and their discussion of the results appropriately measured. My comments are relatively minor, and I think this is a valuable contribution to the literature regarding how we might usefully perform model-data intercomparisons.

Minor comments:

Page 2633, Line 16-20: It would be useful to provide a bit more detail on the weights (the text notes this is discussed in SUN12, but a short summary would be appropriate here)

Page 2636, Line 18-20: Likewise, some additional description of the U_R statistic would be welcome here.

Page 2638, Line 9-10 and throughout: For clarity, would it be possible to refer to these E1, E2 in the rest of the manuscript as high and low solar ensembles? This would make for a more streamlined reading of the results and discussion

Page 2648, Line 25-: The discussion here is too informal, and tries to parse 'closer' and 'significantly closer' in a way that I don't think is helpful. It would be sufficient to note the former ('closer') but to state they are not significantly so. If such a test isn't available, perhaps noting that any differences are minor would be sufficient.

Page 2649, Line 8: As above, I don't think this informal discussion of 'better' aids the clarity of the section here. The authors are welcome to make informal (non-statistical) observations, but parsing these too closely becomes merely confusing.

Page 2649, Line 25: As might be expected for a non-RCS chronology, although I think the authors make clear that it would be difficult to make any grand conclusions from this observation. The position of the GOA reconstruction in, for example Figure 8 is

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quite interesting.

Page 2651, Line 2: Perhaps draw in as well the recent paper by Schurer et al. 2013 (Small influence of solar variability on climate over the past millennium, *Nature Geoscience*). As well, how do these findings (and the preceding) compare to Schurer et al. 2013 (*Journal of Climate*)?

Page 2651, Line 8-10: It would be interesting to know how much of this might be due to the inclusion of GHG, since I suspect most of the proxy data show warming since the ~1850s concurrent with the rise in GHG. Is there any way to weight the importance of orbital forcing (related to long term cooling seen in the, for example, *PAGES2k* results as well as the Scandinavian reconstruction by Esper) vs. GHG vs. the (statistical) benefits of the ensemble average?

Page 2652, Line 10: But this (Esper et al. 2012) is tied to orbital forcing, correct?

Page 2652, Line 19: Perhaps, although this appears to be substantially more pronounced for precipitation proxies.

Page 2652, Line 21-22: Perhaps also cite D'Arrigo et al. 2013 here, which makes the comparison explicitly.

Figure 1: It would be useful to indicate the location of the single-series proxies in plots.

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