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Climate of the Past Discussions

Interactive comment on "Continental-scale temperature variability in PMIP3 simulations and PAGES 2k regional temperature reconstructions over the past millennium" *by* PAGES2k-PMIP3 group

Anonymous Referee #2

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This manuscript presents an analysis of the performance of climate model simulations of the last millennium. I don't really have much to say in the way of suggestions and recommend it for publication in CP. The analysis is extensive and seems appropriate, the paper is not earth-shattering in conclusions, but it is certainly a useful analysis of the current state of climate model performance (as far as can be deduced from recent proxy-based reconstructions). It is a lengthy paper but as the model-data comparison is extensive, this is not entirely avoidable. However, the English in some places is a little hard work, and it could do with some editing and rewriting in parts.

One area that particularly stands out is the description of volcanic response in 6.1, where it is not always clear which two quantities are being compared for many instances of "larger" and "smaller" etc. In addition to the overall magnitude of forcing, I would expect that the regional distribution of the forcing could be somewhat uncertain here (and thus lead to regional discrepancies between models and reconstructions) but this does not seem to be mentioned in the text.

I'd also prefer more direct language that does not skate around the issue of model-data disagreements where they exist. Throughout the paper, discrepancies are often attributed to "uncertainties" when in fact uncertainty, if correctly accounted for (which the methods used can potentially do), should not in itself give rise to significant discrepancies. The problem is surely with errors that lie outside the range of estimated (or tested) uncertainties. The authors could do worse than globally search for "uncertain" and ask themselves whether it would not be clearer to talk frankly about errors.

The paper also seems to take a rather rosy view of the reconstructions. I realise that the authors did not set out to assess the reconstructions, but taking them as a ground truth (albeit with their stated uncertainties) seems potentially misleading. Given the wide range of results reported for NH temperatures e.g. in the IPCC AR4 "spaghetti plot" of Fig 6.10 (which shows persistent disagreements of order 0.5C even after heavy smoothing), it seems optimistic to expect reconstruction accuracy to be reliable on regional scales. Where models agree reasonably with each other (but not with the reconstruction) and forcing uncertainties are not considered to be large, gross errors in reconstructions cannot be excluded.

Interactive comment on Clim. Past Discuss., 11, 2483, 2015.