**Climate
of the Past**

Discussions

EGU

Interactive comment on "Application and evaluation of the dendroclimatic process-based model MAIDEN during the last century in Canada and Europe" *by* Jeanne Rezsöhazy et al.

Anonymous Referee #2

Received and published: 30 March 2020

Review of CP-2019-140

This manuscript presents a useful analysis of the use of the model MAIDEN as a PSM for potential paleoclimatic reconstructions. I have some minor comments, corrections, and requests for clarification.

I think it would be important to state more prominently that the results here come with the caveat that they are done over a limited range of climate regimes. In my experience using VS-lite, I have found large differences for Eastern North America vs. Western North America, where Eastern North America (the primary region used here) did clearly worse than Western North America. It's therefore possible that MAIDEN will be

less clearly the winner in certain climate regimes.

All of the validations are done with only the correlation metric. Correlation will miss potentially important differences like a variance bias. Is this not a concern here because the time series being compared are all standardized to have no mean and unit variance?

I'm confused about the use of NRCAN data in the VS-lite model. If I've understood the manuscript correctly, the NRCAN data provides daily max-min temperature and precip data. But I believe that VS-lite is designed for monthly mean data. Is NRCAN (and daily max/min values) the right data to be using for VS-lite? I'm wondering if this might contribute to the reduced skill of VS-lite.

Can the authors comment on the computation cost of running MAIDEN vs VS-lite? This is particularly relevant for paleoclimate DA where an expensive PSM might be justification enough for not using it if something else is much faster.

p2.l51-53 This isn't actually true. Several reconstructions have assimilated proxy values directly using linear statistical "PSMs" (e.g., Hakim et al. 2016, Steiger et al. 2018, Tardif et al. 2018). While these are not physically-based, they still are a kind of PSM and the proxy values are not converted to temperature and then assimilated. Additionally there are reconstructions methods that have tested the direct assimilation of real isotope data using isotope GCMs (Steiger et al. 2017, Okazaki and Yoshimura 2019), and thus employed fully physically-based PSMs.

p3.l62-64 Is the inclusion of CO_2 influences needed for Common Era paleoclimate though? Over most of the Common Era CO_2 changes very little. Then when CO_2 does start to matter, we have plentiful observations? Maybe there's some other aspect of the MAIDEN model that would be more beneficial to highlight for paleoclimatic applications? It just seems like the use of MAIDEN might not be sufficiently motivated here.

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