

Interactive comment on “Sampling density and date influence spatial representation of tree ring reconstructions” by Justin T. Maxwell et al.

Anonymous Referee #1

Received and published: 6 April 2020

Review for Maxwell et al 2020

“Sampling density and date influence spatial representation of tree ring reconstructions” uses an updated, multi-species, tree-ring network in the Ohio River Valley to demonstrate the influence of increased predictor density and record length on spatial drought reconstructions. This paper presents well-supported findings that increasing predictor density in a gridded hydroclimate reconstruction can identify more localized patterns and emphasizes that the hydrologic sensitivity of some of the species is changing. The authors discuss the influence of recent dampening of extreme droughts and pluvials compared to the 1900-1980 time period, and how incorporating non-traditional dendroclimatology species can strengthen the reconstructions.

The clearly laid out discussion showed the power and limitations of increasing the

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predictor density in a spatial reconstruction. The authors' conclusions regarding the "fading drought signal" of trees is important for future hydroclimate reconstructions – particularly in this region.

This manuscript should be published, with a few minor edits. A multi species approach to climate reconstructions, comparing the NADA to a denser predictor network in data-scare areas (most recently in Pearl et al., 2019), and adjusting the calibration/verification time period for reconstructions have all been done previously in other regions of the U.S. . Thus, the main novelty of this study is the site geography. The discussion, therefore, would benefit from the inclusion of the author's thoughts on a climatological explanation for the higher number of flips at a local scale compared to large scale. That is, why does the Ohio River Valley experience these flips, how is this distinct from the large scale regional dynamics that "smooth" out these flips in the lower resolution reconstruction?

Minor comments:

Be careful when hyphenating "tree ring". It should be "tree-ring" when used as an adjective or modifier, and "tree ring" when use as a noun or direct object. E.g. "tree-ring reconstruction"

Title: The title is a bit convoluted for me. . . the paper also looks at species not just sample density and length of the record. Perhaps "Sampling characteristics" or "Predictor characteristics influence climate patterns/phenomena in tree-ring reconstructions:

Line 45: add "of climate" after reconstructions so that readers know you are not reconstructing the mechanisms mentioned at the beginnings of the sentence.

Line 47: delete "historical" – tree rings provide context in the prehistory too.

Line 48: "instrumentally -recorded" is awkward. "Droughts and pluvials captured in the instrumental record. . . "or similar

Line 77: Pearl et al., 2019 did this in New England

Line 274: Again, I think either “historical” or “past” should be here, both are redundant

Line 295: I would also cite Pearl et al, 2019

Line 319: Alexander et al 2019 also saw this in a temperature reconstruction

Line 275: replace “but” with “be”

Figure 1: Suggestion to move the USA map and species symbols to the top of the figure. Its odd that its in between panel “A” and “B”

Figure 3: I would choose either contour lines or un-smoothed squares. Since the maps are not “filled” or “smoothed” the contours are unnecessary and distracting. Reference the color bar in the caption. I also suggest having white (not green or yellow) as 0 PMDI, and then hatch out the grid cells with no data.

Figure 4: same comment as 3

Figure 6: suggestion to have all color bars go from white to color and then hatch out the insignificant/no data values. Solid blocks of color are more difficult with color blindness.

Figure 8: Mention what calibration time period is represented in this figure.

Figure 9: Again, suggestion to NOT have green has the zero value, have white.

Figures in general, increase the size of the text

Suggested citations:

Alexander, M. R., J.K. Pearl, D. A. Bishop, E.R Cook, K.J. Anchukaitis, N. Pederson, The potential to strengthen temperature reconstructions in ecoregions with limited tree line using a multi species approach, Quaternary Research, 1-15, doi: 10.1017/qua.2019.33, 2019

Pearl, J.K., K.J. Anchukaitis, N. Pederson, J. Donnelly, Multivariate climate field reconstructions using tree-rings for the northeastern United States, Journal of Geophysical Research – Atmospheres, doi:10.1029/2019JD031619, 2019

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Interactive comment on Clim. Past Discuss., <https://doi.org/10.5194/cp-2020-31>, 2020.

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