Climate
of the Past
Discussions

CPD

Interactive
comment

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

Justin T. Maxwell et al.

maxweljt@indiana.edu

Received and published: 9 June 2020

We would like to thank the Referee for the constructive review. The feedback provided will help us to improve the manuscript. Written below are our point by point responses to the Referee's comments. Our responses are below each comment and are the changes we propose to the manuscript based on the Referee's comments. The revised version of the manuscript will be prepared based on the decision of the Editor.

Anonymous Referee #1

COMMENT: "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 or increasing the 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?

RESPONSE: Thank you for the positive comments on the manuscript. In the revision, we will include work from Pearl et al., 2019 and agree that expanding the discussion on the number of flips. The ORV reconstruction has a higher number due to better capturing the local extremes compared to the LBDA. We are picking up small but extreme droughts and pluvials as well as higher local extremes in broad scale drought and pluvial conditions. In the resubmission, we will look into the large-scale regional dynamics and see if we are picking up anything new compared to the LBDA but the likely differences are localized extremes.

Minor comments: COMMENT: 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"

RESPONSE: Thank you, we will check all uses and ensure we only use a hyphen when grammatically correct.

COMMENT:. . 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:

RESPONSE: Great suggestion, we will change the title accordingly.

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

RESPONSE: We will make this change

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

RESPONSE: We will make this change

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

RESPONSE: Good suggestion, we will make this change.

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

RESPONSE: We will add Pearl et al. 2019 in the paper and add discussion where needed.

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

RESPONSE: We will make this change.

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

RESPONSE: We will make this change.

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

RESPONSE: We will add this citation and discuss where needed.

COMMENT: Line 275: replace "but" with "be"

RESPONSE: We will make this change.

COMMENT: 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"

RESPONSE: We will make this change.

COMMENT: 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.

RESPONSE: We will change white color to represent 0 PMDI and then hatch the no data cells as suggested. We will explore a better way to illustrate the map based on the comment. As of now, we think we will just remove the contours.

COMMENT: Figure 4: same comment as 3

RESPONSE: See response for figure 3.

COMMENT: 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.

RESPONSE: We will make this change

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

RESPONSE: We will make this change.

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

RESPONSE: We will change the figure to have a color closer to white. We cannot assign white for 0 as it falls in between two groups. But we get the Referee's point and will improve the figure based on the feedback.

COMMENT: Figures in general, increase the size of the text

RESPONSE: We will increase the font size.

COMMENT: 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

RESPONSE: We will include these citations.

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