Climate of the Past Discussions

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Reply on RC2

Jacinda A. O'Connor et al.

Author comment on "Ring-width and blue-light chronologies of *Podocarpus lawrencei* from southeastern mainland Australia reveal a regional climate signal" by Jacinda A. O'Connor et al., Clim. Past Discuss., https://doi.org/10.5194/cp-2022-13-AC2, 2022

Referee #2 Response

Title: I don't find the title particularly illuminating; it feels rather vague and not wholly accurate, in my opinion. I think more keywords from the abstract could be woven into the title. At the very least, I suggest making clear in the title that this is a dendro-based study on a new conifer species. Furthermore, this particular study does not report a "multicentennial record".

Thank you for the suggestion - upon re-evaluating the title we agree that whilst the paper is "piloting" multi-centennial scale records, the use of this term could be misleading. We will change the title to the following to be more clear about the content of the paper: "Ring width and blue light chronologies of *Podocarpus lawrencei* from southeastern mainland Australia reveal a regional climate signal".

Line 21: could you state in this sentence how far back in time the observations and gridded data extend?

Both the observation station and gridded data extended back further in time than our final chronology length (1929 - 1998) and so we calculated the climate correlations across this entire 70 year period. We will clarify this in the sentence.

Lines 51-53: I suggest expanding on this key point around limited progress in Australian dendroclimatology as this is critical justification for your research and will better accommodate the broad audience of the journal.

Thank you for the suggestion, we agree and shall develop this point further in the introduction.

Lines 57-58 and 65-71: The paucity of long-term reconstructions and the benefits of high elevation areas are emphasised but some commentary on the representativeness of alpine climate reconstructions for the wider region would

be useful.

We agree that this would be useful additional information and will expand upon this also.

Line 112-119: I have modest experience of dendroclimatology but, with that caveat in mind, nine specimens feels rather limited. I suggest some justification (how does this compare to similar case studies like McDougall et al. 2012 and Brookhouse & Graham 2016?) and critical reflection on the appropriateness of this sampling strategy and any limitations this may introduce would be useful at this stage.

We agree that more specimens would certainly be ideal. As this study was undertaken as an undergraduate thesis, time was quite restricted, and we acknowledge the low sample size as a key limitation in L312-317. Whilst our chronology is comprised of less individual specimens than McDougall et al. (2012) (48 samples) and Brookhouse and Graham (2016) (13 samples), we believe that our study still holds the novelty of consisting of a new *P. lawrencei* site in which we explored the spatial signature of climate sensitivity, as well as the application of a simpler and cheaper resin extraction technique. Additionally, our chronology exceeded the commonly used EPS threshold of 0.85 for the 1929-1998 period, and this was hence the portion of the chronologies that we used for climate analysis. We agree with the need to further justify the viability of the sample size and will emphasise this information in the discussion.

Second, could the authors clarify the method(s) used to physically obtain the crosssections? Were these sliced out of the trunk or did they study stumps? Or did they repeat the approach outlined on Lines 76-77 from McDougall et al. 2012? I'm guessing the latter but this should be made clear in the Methods section.

The latter is correct and we will add this information to the methods.

Lines 140, 151, and elsewhere: The authors repeatedly highlight the highly lobate radial growth of P. lawrencei. I – and I suspect other readers – would find a photo of one of the cross-sections very useful.

We agree that an image would be helpful, and will include a scan of one of the cross-sections to illustrate the lobate growth behaviour.

Lines 182 – 185: I suggest providing a bit more technical detail on the gridded climate data, especially the temporal and spatial scale of those datasets.

We agree with this suggestion. The AGCD extends from 1900-2020 with a grid averaged resolution of 0.05 degrees (approximately 5km): we will include this information.

Lines 195-196: I'm a little surprised that these two dendrochronological studies (McDougall et al. 2012 and Brookhouse & Graham 2016) are not cited in the

introduction. Given the important claims made in this paper about novelty, being more transparent about what research has already been conducted and how your study builds upon existing work is important. The point about developing a strong network (Lines 199-200) is valid but this secondary aim could be stated earlier in the paper.

Whilst we mentioned Brookhouse and Graham (2016) in L89-93 in the introduction when discussing the previous application of the BI technique on *P. lawrencei,* we agree that the importance of these two studies is understated in the introduction as a whole, and we will further emphasise how our study builds on these earlier works. We also agree that the aim of developing a future dendroclimatological network ought to be mentioned earlier, and will include this in the introduction also.

Results and Discussion: Whilst I appreciate the focus of this paper is testing for climate signals, I'm surprised more detailed reporting of the cross-dating and chronological development is not presented. The full chronology is shown on Figure 5 but minimal corresponding text is presented in Section 3. The authors state on Line 94 that specimen ages range from 67 to 327 years – this could be elaborated upon, especially to provide deeper justification for your decision to start the analysis from 1929 due to "low sample resolution" Line 169.

Thank you for the suggestion, we agree that in an effort to be concise we have omitted some helpful information detailing the chronology development, and will expand on this in the methods. Regarding our justification for conducting correlation analysis of climate variables on the 1929-1998 portion of the full chronology, the running mean of the EPS statistic in figure 5 gives an indication of our chronology reliability. The sample depth panel in this figure shows that at least 11 radii were required to meet the EPS threshold of 0.85, and this occurs from 1929-1998.

Similarly, given the analysis is on 20th-century reconstructions, a refined Figure 5 focusing on only that time window would be useful, perhaps as a second panel. In its current form, statements like Lines 206-207 "particularly narrow rings observed in the 1905s and 60s" are tricky to pick out by eye.

Whilst figure 5 shows the full RW chronology, figure 6 shows the RW and BI chronologies, focusing on just the 1929-1998 period. We will include a figure reference to this plot in the sentence at L206-207 so that readers are directed to the close up of that time window.

Lines 228-244: I found this analysis to be fascinating! I know little about this species but Te justification for a strong relationship between winter temperature and RW presented in this segment is convincing.

The dominant effect of winter temperature and snow cover on *P. lawrencei* RW is certainly a key result! Exploring the spatial extent of this relationship with the AGCD was interesting also - very encouraging, particularly given the sample size.

Figure 1 appears rather blurry on my screen. This can be easily rectified but I felt worth flagging with the authors.

Thank you for making note of this, we will check this.

Figure 5: In addition to the comments above about the data plotted in this figure and the figure itself, it's not clear how the standard errors have been visualised on the top panel? I'm also unclear what the y-axis label on the bottom panel refers to – what is "sample depth"?

Thank you for pointing this out. The standard errors were previously included in the graph but were removed, and the caption was not updated - this will be rectified. The bottom panel refers to the sample resolution: as the series are of different lengths we included this information to illustrate the number of tree-ring series used throughout the chronology above.

Figure 7: could you clarify in the caption which parameter is represented by the green and grey bars?

This error will be rectified also to include information about what each panel represents, apologies!