

Manuscript Evaluation : A millennial summer temperature reconstruction for north eastern Canada using oxygen isotopes in subfossil trees

Scientific Significance:

Does the manuscript represent a substantial contribution to scientific progress within the scope of Climate of the Past (substantial new concepts, ideas, methods, or data)? YES- new and novel data carefully compiled. A large amount of effort has been invested to produce this record which represents an important step in understanding the isotope and climate variability of this region.

Scientific Quality:

Are the scientific approach and applied methods valid? Are the results discussed in an appropriate and balanced way (consideration of related work, including appropriate references)? Yes, the methods are appropriate for the dataset and significant background work has been conducted prior to completion of the long timeseries. Some detail on the signal strength during the calibration period might be helpful to gauge the suitability of the levels of replication. The join point plus off-set pooling approach used has been demonstrated to work, but without doubt sampling more longer-lived trees which cross cohorts would strengthen the lower frequency signal further still. Is there any evidence of a juvenile effect in the oxygen isotopes?

The interpretation of the record as temperature provides a general interpretation based upon the calibration period, however, and as the authors correctly state, oxygen isotopes are not a single instrumental temperature variable, but relate instead to circulation, hydroclimate, temperature etc. Interpretation as temperature may be more “accessible” but may only tell a part of the story. In this respect, I would personally be cautious in reporting differences in “temperature” during the past without a more detailed discussion of the isotope climate of the region, particularly when the recent past (last 5 years) do not closely calibrate (the decision not to calibrate with this truncated period could be misinterpreted so perhaps the full-period calibration could also be presented and reconstructed). However, that said, reporting this as a “divergence” in the dendroclimatological-sense may equally be misunderstood by some dendrochronologists/climatologists less familiar with the approach, since there is no evidence that the relationship in isotope fractionation has changed, just that the relationship between the isotopes sampled by the trees and summer temperature has changed. It may be possible to draw support for this hypothesis using local GNIP data. Alternatively, if the species is suitable for densitometry then there may be scope for a detrended reconstruction of temperature against which to compare the oxygen isotopes through time. Interpretation against solar variability is appropriately cautious.

Presentation Quality:

Are the scientific results and conclusions presented in a clear, concise, and well-structured way (number and quality of figures/tables, appropriate use of English language)? YES – the paper is clearly written and well written. Some axis labels require attention (maximale etc.) otherwise the figures are of good quality.

Access Review, Peer-Review & Interactive Public Discussion (CPD)

In the full review and interactive discussion the referees and other interested members of the scientific community are asked to take into account all of the following aspects:

1. Does the paper address relevant scientific questions within the scope of CP?

YES

2. Does the paper present novel concepts, ideas, tools, or data?

YES – new data for the region; a terrestrial isotope record.

3. Are substantial conclusions reached?

Isotope climatology is at an early-stage, but appropriate conclusions are drawn.

4. Are the scientific methods and assumptions valid and clearly outlined?

This work has been VERY carefully conducted and thoughtfully compiled. Important background work has been conducted over many years.

The join-point approach seems to work well here, but additional replication at both join-points and within the body of the reconstruction would undoubtedly strengthen the record, as would incorporation of longer-lived trees.

Interpretation as temperature is only part of the “isotope story”.

The truncated calibration should be addressed in more detail here.

5. Are the results sufficient to support the interpretations and conclusions?

Yes, within the limits of the calibration as presented.

6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)?

Although some elements of the methods are brief. The cited papers identify the many elements of this work have been evaluated by the team elsewhere, so this information is available I believe. I could not see/access supplementary data (see note below) so it was not possible to attempt to recalculate.

7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution?

Yes

8. Does the title clearly reflect the contents of the paper?

Yes

9. Does the abstract provide a concise and complete summary?

Yes

10. Is the overall presentation well structured and clear?

Yes

11. Is the language fluent and precise?

Yes

12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used?

Yes

13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated?

See review notes

14. Are the number and quality of references appropriate?

Yes

15. Is the amount and quality of supplementary material appropriate?

I was not able to access/see a link to any supplementary data – but as a minimum the raw and join point corrected data should be presented versus calendar age in addition to the final reconstruction.