

Interactive comment on “The potential of tree-ring cellulose content as a novel supplementary proxy in dendroclimatology” by Malin M. Ziehmer et al.

Anonymous Referee #1

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The authors have investigated if the cellulose content (CC) of tree-rings could be used as an additional palaeo-climatic proxy. The idea is indeed novel and the presented results are interesting. On the other hand, I have concerns regarding the reliability of the method.

- In my opinion and from my experience, I would expect the CC-values to be “operator-dependent”, meaning that different laboratories would get to different results from the same tree-ring material. Various cellulose extraction protocols are used in different labs, see Boettger et al. 2007. An inter-lab comparison would therefore be crucial, in particular as there are no standards for verification. Further interfering methodological factors are also the preparation of the wood, e.g. milling (loss of powder during cellulose extraction) versus no milling (using slivers) and the recovery from filter/containers (also different methods are in use in different labs).

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- Climate correlations with temperature may not be reliable as it seems to me that unrealistic significance levels have been used. The mean chronologies (Fig. 3) display a very high autocorrelation mainly because of the use of 5-yr blocked data. Therefore it is absolutely essential to correct the degree of freedom for autocorrelation, which seems not to have been done. This would increase the correlation coefficients needed to be significant. Obviously, increasing trends in the data will correlate with increasing temperature trends. Accordingly, even winter months appear to correlate significantly with CC, but I cannot believe that all months of the year influence CC as suggested by results in Fig. 5. Trends could be related to ageing, for instance, rather than climate.

- There are strong differences in the mean chronologies between Larix and Pinus for the same site (VEE), while chronologies from the same species but rather distant sites are similar. This points to the importance of biological factors rather than climate.

- The mechanisms resulting in varying CC are rather unclear. Some link to NSC and sink activity was proposed, but was not very understandable for me. The relationship between CC and wood density might be rather interesting to explore. Late-wood density is known as strong temperature indicator and it would be plausible to expect a relationship between CC-content and density.

- Due to the degradation of cellulose in old wood, the reliability of the subfossil CC series seems not so clear to me.

Overall, I find it worthwhile to investigate these data, but it seems premature to me to propose them as a palaeo-climate proxy.

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