

Interactive comment on “Tree-ring based June–July mean temperature variations since the Little Ice Age in the Adamello-Presanella Group (Italian Central Alps)” by A. Coppola et al.

Anonymous Referee #2

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General comments:

The authors present an early summer temperature reconstruction for the Italian central Alps derived from larch tree ring width. It is a valuable study as it contributes important information on climate variability in a mountainous region which climatically is quite heterogeneous and patchy. I fully agree with the comments brought up by referee 1, but want to highlight a few (additional) points:

The major problem I see with this study is the detrending method used, which results in an almost complete loss of low frequency climate changes (see figure 7 of the manuscript). It might be that the authors chose an inappropriate detrending method

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(they don't describe it well enough in the text, so it is hard to judge at this stage). It may also be that it is the result of selecting “dominant trees” which are less sensitive to climatic changes compared to the average reaction of an entire stand. Even age classes might be biased by that approach, rendering the application of an RCS detrending impossible. Since the presented reconstruction is so flat, I think it is ambitious to tackle the “divergence problem” (one may still mention it though).

The set of data used for this study is largely the same as the one used for the study in Quaternary Research (2012) by the same team of authors, so I think it would be important to improve the reconstruction by applying a more appropriate detrending model and with that, retaining more low frequency climatic variability. Otherwise I am not entirely sure if there is enough novelty deserving publication. An additional aspect is that potential processes leading to the observed correlations should be described in greater detail. If June-July temperatures account for 35 % of the variability in ring width – what other parameters are there which may control tree growth? The climate data used for calibration and validation require a much more detailed description. Even though the data used are gridded, their quality still depends on observed data from climate stations, the number (and sometimes quality) of which may change over time. The horizontal and altitudinal distances and local effects are relevant, too.

In general, the language could be improved. I only point out some major things below. I also think that the number of references cited is far too large given the overall length of the manuscript, especially as they often appear as long lists with unclear relation to the statements made.

I recommend publishing the manuscript after major revisions if the authors can a) improve the reconstruction and b) highlight the novelty of the study compared to the QR 2012 publication.

Specific comments:

Page 3872, Line 8: glaciated instead of glacierized L. 11: ...and temperature variance

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accounts for about 35 % of the ring width variability. . . L. 15: needs rewording. E.g. “. . .with reconstructed temperatures being too low.” L. 15: “The” instead of “An”. L. 16: . . .years reveals a decrease of this parameter. . . L. 18: complex instead of complacent L. 20: Reword, e.g. “Mountain environments are valuable study areas as they react sensitively to climatic changes.” L. 21-26: Reword! Split his up into two sentences. You want to emphasize that quite a few studies were done in the Alps and that it is important to have long-term reconstructions to understand recent changes. P. 3873, L.4: such climate-sensitive environments L. 5-6: Reword. “Tree rings are an excellent source of paleoclimate information, as proven by numerous studies (Fritts, 1976). L. 7: delete “actually” L. 9: . . .parameters and both local and regional climate reconstructions were developed (select 2-3 important references, the list here is way too long and is not really helpful for the current study) L. 12-23: I suggest deleting this section as it is unrelated to the presented study. L. 24-29: merge the two reference lists and try to shorten it. Even better than just listing the studies: can you give us a very brief summary, e.g. which time span was reconstructed, which climate parameter(s)? P. 3874, L. 1: specific instead of peculiar L. 3-4: over the central-western Alpine region, is largely controlled by the specific topographic characteristics and environmental features . . . L. 7: has influenced; remove “at high resolution” L. 8: maybe you can explain (briefly) in why these areas are climate sensitive. What concretely do you think will happen if climate changes? What are the consequences of climate warming? L. 8-11: word order is somewhat odd here. L. 18: change order: response to summer temperatures over time. L. 22: glacial systems L. 25: can you briefly describe what “strategic issue” means here? P. 3875, L. 13: “overdeepened” L. 18: delete forest L. 20: Vegetation cover at the four sampling sites is quite similar and mainly consists of Norway Spruce. . . L. 22: give way to open European Larch (. . .) – Norway Spruce (. . .) mixed stands. P. 3876, L. 4: affecting instead of involving L. 6: Therefore, sampling was conducted . . . L. 8: biasing instead of fading L. 10: how many cores per tree and how many trees per site? L. 20: It would be helpful for the reader if you described the two detrendings here. RCS, exponential or polynomial splines? What order? L. 27: Can you show

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the development of SSS (or RBAR) over time in a figure? P. 3877, L. 1: . . .have then been averaged. . . L. 4-8: This section should be extended! Comment on pixel size, the “altitude problem” (i.e. real temperature variability within one pixel) and on the closest climate stations contributing data to the HISTALP dataset near the study sites. In other words: How representative do you think your climate data are for your study sites? L. 14: Did you also analyze other seasonal combinations? Why just June-July? L. 19-20: Remove sentence “The resulting time series. . .” as it is obvious. P. 3878, L. 6: Low MS values are indicative for a complex response of trees. . . L. 7: remove “the formula” Equation 2: Define/explain the parameter X L. 9: statistics L. 10: . . .progressively shifting the window by one year and . . . P. 3879, L. 15: into two subsets P. 3880, L. 16: remove comma L. 18: “complex” instead of “complacent” L. 20: “related to” instead of “involved” L. 21: “In spite of” instead of “Although” P. 3881, L. 11: I assume the authors mean increase (not increment)? L. 20: “Holocene” instead of “Holocenic” L. 28: The year 1816, . . . L. 29: does not reach. . . P. 3883, L. 8: “very well” does not apply here, in my opinion. See my general remarks.

P. 3894, Figure caption 2: . . . Graphs to the right show the differences between ring width- and temperature z-scores. P. 3895, Figure 3: y-axis label? P. 3896, Figure 4: This figure needs explanation. Either in the caption or in the text (or both). Is this the high-frequency climate signal we are seeing here? Also indicate the R2 value in the figure. P. 3899, Figure 7(b): To me, this figure shows that the detrending method used here is inappropriate. The long term climate change got almost entirely lost as the red curve is too flat compared to the observed data. Because of that, it is hard to tackle the “divergence problem” with this data set.

Interactive comment on Clim. Past Discuss., 8, 3871, 2012.

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