

## ***Interactive comment on “Tree growth and its climate signal along latitudinal and altitudinal gradients: comparison of tree rings between Finland and Tibetan Plateau” by Lixin Lyu et al.***

**Anonymous Referee #1**

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General comments: In this manuscript, Lyu et al. showed that tree ring width has a pattern in both the growth (width) and its response to climate (majorly temperature) along with the latitude/altitude gradient. The creative way of using daily-step climate data implies the potential improvement in analyzing such type of time series data, e.g. tree ring analysis. It is interesting to compare/combine the latitude with altitude gradient, and would be very useful in understanding/predicting the change of tree growth in the future “warming” scenario. However, I think more efforts are needed in structuring and surmising of the paper. And I found a bit difficult to follow the results part.

Specific comments:

1 In terms of the climate data used in this paper, “local” meteorological station data  
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was used in this paper, where temperature was adjusted using lapse rates in altitude gradients. Is this adjustment linearly correction? If so, this correction should have little effect on the correlation analysis. So what’s the point to do this adjustment, if no absolute value of the temperature, e.g. GDD, is considered.

2 Multiple climate factors control on tree growth was mentioned in the ms. And a number of (different) temperature signals were explained from the effect of precipitation or soil moisture, which is either non-altitude-corrected or not analyzed. Is it possible to add some analysis or information about this? In the current ms, the mentioned potential drought limitation need more evidence to support.

3 Both the climate signal and the timing for the max signal are changing along with the two gradients. And in the ms, latitude and altitude gradients are both using (July) temperature to distinguish, which implies the changing temperature is one of the major reason for the change of these pattern. If that’s the case, the increase of temperature during the record period should also have influence. Does this mean either the timing or the strength of the temperature signal would change with time? Would the warming have any effect on this analysis? Would this weaken the application of using daily climate data? Because it could be always changing year-by-year.

4 There are lots of places mentioned “growing season”, e.g. in the abstract, page 5 line 25, page line4 and line17, page 9 line3. However, there is no clear definition about it. If we treat the growing season as May-Aug, which was mentioned in page8 line4, it has both very strong negative and positive correlation between ring width and temperature. However, only positive correlation was mentioned in the ms. Definition and what value was used need to be cleared.

5 Results, especially in page 5, are difficult to follow. It is hard to get consistent described results via reading the figures (Fig. 5 and 6). And the climate signals of “growing season”/“summer” made it more confusing. Does this mean a period of several months, or only one month/peak?

Other comments:

1 Page 3 line 27: Why the special sampling method was applied in these altitude gradient sites.

2 Page 4 line 16: the altitude of these meteorological station should be supplied, especially for the altitude gradient sites. This would be helpful for understanding the process of altitude adjustment, and could be helpful to evaluate the consistence between the local precipitation and met record.

3 Page 5 line 2: what is the difference between plot-wise mean increment chronologies and RWI.

4 Not sure whether Fig. 4 is necessary. The results show more location/site dependent, which is more obvious that these gradients. And this makes sense, because RWI of similar locations should have similar pattern. And in fact, no composite cluster result is used in the following analysis.

5 More caption is needed to describe what is the gray horizontal line in fig.5. If this is the significance test level, why all of the site has the same test level, considering the different length of climate record for different sites.

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