Climate of the Past Discussions

Clim. Past Discuss., author comment AC3
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Reply on RC2

Maierdang Keyimu et al.

Author comment on "A 406-year non-growing-season precipitation reconstruction in the southeastern Tibetan Plateau" by Maierdang Keyimu et al., Clim. Past Discuss., https://doi.org/10.5194/cp-2021-13-AC3, 2021

Dear editor, Dear referee 2,

We would like to thank referee 2 for his/her participation in the discussion and evaluating our work, as well as providing important comments and suggestions. Particularly, the suggestion of adding some isotope analysis-based investigations in the discussion section is indeed quite beneficial for us to further illustrate the eco-physiological importance of NGS precipitation on radial tree growth. Such discussion strongly supports our findings about the association between radial tree growth and NGS precipitation.

Below is our one-by-one reply to the concerns and suggestion of the referee 2. The author replies were illustrated in *ITALIC*. Some of our replies included updated figures, and they were attached as supplementary file to our response.

Thanks again.

Best regards

on behalf of all the authors

Zongshan Li and Maierdang Keyimu

Referee 2 comments:

Using tree-ring width data, Keyimu et al. (2021) presented a non-growing season precipitation reconstruction from 1475 to 2005 on the southeastern Tibetan Plateau. Given that there are lot of summer precipitation or temperature reconstructions in this region, it is very interesting to obtain non-growing seasonal precipitation reconstruction. Overall, this study is well designed with reasonable data analysis, producing a robust result and conclusion. I suggest to accept this manuscript after minor revision. Detailed comments and suggestions are as follows:

- Line 1, "non-growth" or "non-growing", which is suitable? Please check

Author reply:

Thanks for the comment. After checking many literatures, we have considered to use as "non-growing". We will replace as "non-growing" through the whole manuscript.

- Line 1, Add "A" before "531-year"

Author reply:

Thanks. The title of the MS will be changed because according to the EPS value of the TRW chronology, the updated length of the reconstruction will be 406 years (A.D. 1600-2005). Therefore, we will change the title as "A 406-year non-growing season precipitation reconstruction in the southeastern Tibetan Plateau".

- Lines 79-83. It is better that only "Figure 1" should be in bold, other text should be normal. Same for other tables and figures

Author reply:

Thanks. We will do so.

- Lines 192-193, it is a little difficult to see green and yellow bars, maybe it's better to change to other color combinations.

Author reply:

Thanks for the suggestion. We will replace the upgraded the Fig. 6 (it will be Fig. 7 in the revised manuscript) combining the comments of referee 1 and referee 2. Please refer to the attachment for the updated Fig. 6.

- Line 206-233. More detailed discussions are needed. It appeared the underlying mechanisms about the non-growing season precipitation signals of tree-ring widths were lacking. The non-growing season precipitation signals of tree-ring widths seemed to imply the non-monsoon (e.g., winter) precipitation was used for tree growth. Maybe tree-ring oxygen isotopes could provide some evidence to support non-monsoon precipitation usage of tree growth.

Author reply:

Thanks a lot for the valuable suggestion about the isotope analysis which was indeed important to improve the discussion over the underlying mechanism between NGS precipitation and radial growth of forest hemlock in current study.

In the revised manuscript, we will add detailed discussion about the importance of NGS precipitation on radial tree growth combining some isotope-based findings, below is the content which we are going to add:

"*This is because tree growth is often water stressed in the early stages of its growth in each year on the SETP when the monsoon precipitation does not arrive (Bräuning and Mantwill, 2004; Zhang et al., 2015), and the earlywood of tree rings mainly use spring melt water (Zhu et al., 2021). The eco-physiological importance of NGS precipitation on tree growth and tree water usage was also revealed by isotope ratios method-based investigations. Brinkmann et al's (2018) study showed that nearly 40% of the uptaken water by Fagus sylvatica and Picea abies trees in a temperate forest of middle Europe are sourced from NGS precipitation. Tree-ring oxygen isotope ratios (δ18O) are demonstrated to contain NGS precipitation signals in the Himalayan region (Huang et al., 2019; Zhu et al., 2021). Huang et al's (2019) study revealed that NGS precipitation (snowfall) increased the snow-depth and the later snowmelt compensated soil moisture in the spring and early*

summer, which was a crucially important water source for the Juniper growth in the southwestern Tibetan Plateau. Zhu et al's (2021) investigation in the western Himalaya revealed that formation of earlywood in tree rings of Pinus wallachina depended on the snowmelt originated from NGS precipitation".

Please also note the supplement to this comment:
https://cp.copernicus.org/preprints/cp-2021-13/cp-2021-13-AC3-supplement.pdf