Clim. Past Discuss.,
https://doi.org/10.5194/cp-2020-93-AC2, 2020

Climate of the Past Discussions

Interactive comment on "The response of annual minimum temperature on the eastern central Tibetan Plateau to large volcanic eruptions for the period 1380–2014 AD" *by* Yajun Wang et al.

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Received and published: 22 October 2020

1. In this study, the extreme years was defined using the threshold of the mean plus/minus 0.5 SD of the reconstruction series. Under this criterion, it seems that there are too many years are identified as extreme events. I hope the authors can give a consideration that whether it is plausible if the extreme years was defined based on the threshold of the mean plus/minus 1 SD/1.5 SD?

Reply: Following your suggestion, we modified the threshold and the relevant sentences. Please see line 173-174 Page 6: "Tmin87 values below the mean 1.5ïĄşare defined here as 'extreme cold', and values above the mean 1.5ïĄş are 'extreme warm'.

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There are 39 extreme cold years; the five coldest are 1488, 1490, 1824, 1862, and 1872. There are 47 extreme warm years; the five warmest are 1418, 1996, 1999, 2009, and 2010."

2. The statistics of calibration and verification show a relatively good skill for the regression model. However, Rbar values of the tree-ring width indices show a relatively large fluctuation over the whole period of 1380-2014. It is interesting that the highest Rbar values appear in two special intervals (i.e., the cold interval of 1800-1820 and the warmest period of 1980-2014). The cold period of 1800-1820 was driven by both the weak solar activity (Dalton Minimum) and a few very strong tropical eruptions (e.g., the Tambora eruption in 1815 and the other in 1809), while the warmest interval of 1980-2014 is likely a result of human activity. The cold period of 1800-1820 and the warmest interval since the 1980s were also found in the previous studies (both tree ring- based temperature reconstructions and instrumental temperature data) on the Tibetan Plateau. I hope the authors can give a discussion on these two special periods based on the previous references.

Reply: We have added a discussion about these two periods. Please see line 253-261, Page 9-10: "It is interesting that higher Rbar values appear in some special intervals, i.e., the cold intervals of the 1460s-1500s and 1800s-1820s and the warmest period of 1980-2014. These higher Rbar values indicate a good consistency among tree-ring series during these periods; in fact, these three intervals are evident in tree-ring-based studies from elsewhere on the Tibetan Plateau (Huang et al. 2019; Liang et al. 2016; Shi et al. 2019). The two cold periods identified in our series correspond to period of weaker solar activity (the Spörer Minimum and the Dalton Minimum), and to a few very strong tropical eruptions (e.g., the Tambora eruption in 1815 and another stratospheric eruption in 1809) (Cole-Dai et al., 2009). Similarly, the warming in 1980-2014 is closely related to the influence of human activities. These responses are indicative of the consistent response of tree growth to strong external forcing factors and of the reliability of our reconstruction."

3. The sentences in the paragraph 245 are need to be improved.

Reply: Thank you; we have modified this sentence in the revision. Please see line 268-273 Page 10. “On the southeastern TP, the cold period from 1816 to 1822 may have also been related to the Tambora eruption (Liang et al., 2008). Other research in the northeastern TP has shown that cold years can be matched with known tropical volcanic events in 15 of 21 cases (Zhang et al., 2014). We compared years of cooling we identified in this study with those identified by Zhang et al. (2014), the cooling years identified by the two studies are either the same or within a year of each other. On the southeastern TP, Liang et al. (2016) showed that the 15 coldest years of the past 304 years occurred mostly within 1-2 years of a major volcanic eruption, nine of these 15 cooling years are also seen in our study.”

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