Clim. Past Discuss.,
doi:10.5194/cp-2016-132-RC1, 2017

Climate of the Past
Discussions

Interactive comment on "Decreasing Indian summer monsoon in northern Indian sub-continent during the last 180 years: evidence from five tree cellulose oxygen isotope chronologies" *by* Chenxi Xu et al.

Anonymous Referee #1

Received and published: 4 March 2017

The authors attempted to reconstruct long-term Indian monsoon rainfall or intensity variations based on tree-ring oxygen isotope chronologies produced from northern part of the Indian subcontinent. They developed two new isotope chronologies spanning the past two centuries or more. Combined with existing tree-ring oxygen isotope records, they produced a so-called regional composite chronology which is regarded as an indicator of the Indian summer monsoon intensity. Further, the authors explored variation characteristics of the regional composite and potential driving mechanism by the way of statistical comparison. One main conclusion is that the intensity of the Indian summer monsoon exhibits a decreasing trend since the early nineteenth century. However,

this conclusion is difficult to assess, and it might be subject to large uncertainties since they did not show the comparison of all available five tree-ring oxygen records. Furthermore, observed all Indian rainfall record does not show a decreasing trend according to much longer observational data. It needs much more evidence to validate. At any rate, given that the high-resolution proxy records are still sparse in this region, their effort is expected to add new contribution to the knowledge of regional climate variability. In general the methodology used here is simple and routine in dendrochronological study. This work is worthy of publication in the Climate of the Past. However, there are some questions should be clarified or explained before it is ready to go.

Specific comments:

1) The main conclusion in this manuscript is that the Indian summer monsoon strength decreased during the last 180 years. To confirm the robustness of this conclusion, much more evidence and discussion are needed to compliment using all available proxy records together with some statistical approach. Furthermore, it is necessary to show a comparison of five isotope chronologies from all five sites. In so soing, one can see how different they are on low-frequency variations, particularly for the time span from 1820 AD till at present. Another concern is why the authors do not use any ring width chronologies into discussion since a large number of chronologies have been published in the study region. It is no problem for ring width to retain century-scale climatic signals due to long-lived species used in producing the chronologies. 2) The overall length of the record is approximately 300 yr or so, so it is impossible to locate a cycle of 350 yr in the composite record. 3) ENSO has the strongest power in wave length or cycles 2-7 yr, so 31-yr moving correlations are not suitable in this case. 4) Shi et al. (2015) temperature reconstruction represents a 10-year moving average rather than a yearly time resolution. It is suggested that the authors also use other summer season temperature reconstructions (see Cook et al., 2013, CD; Wang et al., 2015, JC). In so doing, it can be regarded as a sensitivity experiment. 5) It is strange why the best spatial correlations between the regional tree ring δ18O record with May-

September SST during 1871-2008 CE (Fig. 8) center around the central tropical ocean rather than in the eastern tropical ocean due to a close association between the ENSO and the Indian monsoon. 6) Fig. 10 is not helpful due to poor agreement between the two curves.

Interactive comment on Clim. Past Discuss., doi:10.5194/cp-2016-132, 2017.