Reviewer#1:

The authors developed a floating tree-ring width chronology covering ca. 300 years in Middle Age and ca.200 years in modern time, using living trees and carbonized logs in Changbai Mountain, northeast Asia and then reconstructed air temperatures based on these tree-ring materials in this region. The work with the materials of tree rings from carbonized logs is important to the studies of climate, but the shortcomings of this manuscript are also clear, especially in quality control and the standardization of the data. Here, some main points need to be addressed:

[Response]: We are very grateful to you for the approval of the significance of this work. Most importantly, we would like to thank you for pointing out the shortcomings including the lack of the information on the quality statistics of the chronologies, missing reliable information for the species identification, reconstructing temperature using the RES chronology, and some confused statements when referring the previous study. According to your comments and suggestions, we have added all the relevant information and clarified the relationship between our study and the study by Zhu et al., (2009).

Again, thank you very much for these valuable and insightful comments and suggestions, which helped us to improve the MS quality significantly. Below you will find our point-to-point response.

1. ***Dendroclimatology is based on the high quality cross-dating tree-ring data and reliable fidelity of growth-climate response. The cross-dating, especially the process and results, is the most crucial step in the dendrochronological study. However, the authors seemed deliberately evading the question, and did not give sufficient details on their samples, for example:***

1) line128-129, authors did not show the clear information that "these trees" were 18 Korean pines or the total of 55 trees.

2) line 148-157, authors presented that they did cross-dating, tree-ring width measurements and chronology development, however, they did not illustrate the quality control criteria of the cross-dating, measuring process, measurement accuracy and instruments, quality statistics of the chronologies (e.g., the correlation between cores and correlation between trees and so on) and the main statistics of chronologies.

Without the information on the quality statistics, the readers and the referees, cannot give an objective evaluation for your manuscript, and the subsequent results, analyses, discussions, and conclusions in this manuscript become doubtful.

[Response]: We apologize to the confusing information of carbonized trees used to reconstruct temperature in the previous version. Korean pine was the most species (18 trees) identified from the 55 carbonized trees. To ensure the quality of temperature reconstruction, we decided to use the same species, Korean pine, to build the chronologies for both the pre-Millennium and modern periods. However, some small Korean pine was excluded from the chronology development, and only 19 cores from ten Korean pines after the quality control of the cross-dating were finally used for developing chronology. The exact information is that: "*We used 19 cores from ten carbonized Korean pine trees to reconstruct the climate before the Millennium Eruption (946 AD).*" We also supplemented the information of these cores/trees in Table 2 in the revised manuscript.

We also added the information on the quality control of the cross-dating, measuring process, measurement accuracy and instruments, and quality statistics of the chronologies in the revised manuscript. The updated information is showed below (Lines 142-165): "*Tree-ring width measurements and chronology development of carbonized and living samples were conducted using standard dendrochronological techniques (Cook and Kairiukstis, 2013). The carbonized and living samples were naturally air-dried. The surface of the stem cross section of carbonized trees and the core of living trees was polished with a sandpaper polishing machine, and thick and thin brushes. Then, the tree ring width was identified and recorded by a LINTAB 6 measuring system with an accuracy of 0.001 mm. For each carbonized tree, two cores along one line crossing the pith were measured. Quality control of measurements and cross-dating was assessed using the COFECHA software (Holmes, 1983). Core segments having low correlation with the master chronology were excluded from the analysis. Tree ring width series were detrended using polynomial functions (splines with a period of 67% of series length). However, results may be sensitive to the detrending method (Peters et al. 2015). Therefore, to ensure robustness of our results to method choice, age detrending of the ring-width series was also performed by fitting negative exponential curves. Standardized (STD) growth chronologies for carbonized and living samples were developed by calculating robust biweight means using the ARSTAN program version 49 (Cook et al., 2017; Cook, 1985). Then, subsample signal strength (SSS) was used to evaluate the suitability and reliability of chronology data for climate reconstructions (Buras, 2017; Wigley et al., 1984). The SSS > 0.85 was used to determine the robust and maximum chronology length and to ensure the reliability of the reconstructions (Figure S2). This threshold corresponded to a minimum sample depth of 11 samples for the carbonized tree chronology (from 745 AD) and 13 samples for the living tree chronology (from 1883 AD onwards) (Table 2). The dendrochronological characteristics of the STD ring-width chronologies of carbonized and living trees were showed in Table 2.*"

For tree species identification of carbonized logs:

2. ***Line126-128, the authors did not give a reliable information for the species identification. Authors should present the main anatomical features of their samples matching Korean pine wood attributes briefly and professionally in the manuscript because some readers may not have sufficient wood anatomy knowledge. The presentation in sentence like line126-128, and the three planes (cross-sectional, radial, and tangential) in Fig S1 are insufficient to show the species being Korean pine.***

[Response]: We thank you for this suggestion. In the revised manuscript, we presented the main anatomical features of the tree planes of carbonized samples, which were used to match Korean pine wood attributes. This information was showed in the section "**Identifying Korean pine tree species from carbonized trees**" in the Supplement file. We also showed the anatomical features of the three planes for all the 18 identified Korean pine trees (Figure S1) in the Supplement file.

We also enclosed the content of "**Identifying Korean pine tree species from carbonized trees**" below:

Identifying Korean pine tree species from carbonized trees

In this study, the tree species of carbonized trees was identified by analyzing the microscopic anatomical features of wood on three planes (cross-, radial-, and tangential-section). For the identified Korean pine (*Pinus koraiensis* Siebold & Zucc.) in this study, the microscopic anatomical features were showed below:

Cross-section features. The boundary of growth ring is slightly obvious, and the early wood gradually changes to late wood within the ring. The growth of early wood is uniform, and the early wood accounts for most of the ring width. The axial parenchyma tissue is absent. The resin channels are divided into axial and radial types. The axial channels are mostly single and usually distributed in the late wood or located at 2/3 of the ring width. The lipid cells are thin-walled and often contain quasi-invasion bodies. There are 3~6 lipid cells around the maximum axial resin channel. The transverse section of early wood tracheid is square, rectangular and polygon, and the axial parenchyma tissue is absent.

Radial-section features. Radiative tracheids are located in 1~2 columns of the upper and lower edges, and are occasionally seen in the middle of the rays. The xylem low rays are sometimes made up entirely of radial tracheids. The inner wall is smooth and the outer edge is wavy. The cross field pattern between ray parenchyma cells and early wood tracheids was pane-like, or pine type was occasionally seen in late wood, with number of 1~4, 1 (rare 2) in horizontal line. Axial parenchyma cell horizontal wall perforation and end wall nodular thickening are usually absent or few, not obvious, no indentation.

Tangential-section features. There are 4-8 wood rays per mm, including two types: single column and spindle-shaped. The single column of rays is 2~13 cells or more in height, most of them are 3~8 cells; the spindle rays have radial resin canals, 2~3 columns of ray cells above and below the approach; The upper and lower ends gradually sharpen into a single column, the height of which is 3-10 cells or more. The ray cells are usually oval in shape. The radial resin tract is much smaller, with 3-5 adipocytes around the tract.

Conclusions. According to the microscopic anatomical characteristics of the above three planes, the carbonized logs, No. CBSXA-01, CBSXA-12, CBSXA-21, CBSXA-24, CBSXA-27, CBSXB-01, CBSXB-02, CBSXB-03, CBSXB-05, CBSXB-07, CBSXB-08, CBSXB-10, CBSXB-11, CBSXB-14, CBSXB-15, CBSXB-17, CBSXB-21, and CBSXB-26, were identified as Korean pine (*Pinus koraiensis*) of the family *Pinaceae* and the genus *Pinus*. The anatomical features of the tree planes of the 18 samples were separately showed in the large Figure S1.

For the reconstruction:

3. ***RES chronology emphasizes high-frequency variations using autoregressive prewhitening that removes autocorrelation from the series, but temperature usually contains multi-band signals, especially low frequency information, with high autocorrelation. Thus, reconstruction of temperature variables using RES chronology with only the statistical correlation sounds unscientific, and lack of biophysical basis.***

[Response]: We sincerely thank you for this comment. And, we agree with you that RES chronology emphasizes high-frequency variations in temperatures. Therefore, we reconstructed temperature using STD chronology in the revised manuscript, and this revision did not affect the main findings of this study. Thank you again!

4. ***In addition, authors used the documented growth-climate response with the current climate response of Korean pine by Zhu et al., (2009) as a current climate response of the pine in this manuscript. Do you and Zhu et al., (2009) use the same samples in the manuscript? If not, it is unscientific and unacceptable to use the assessed and verified data to match or as the using base of your unassessed new data.***

[Response]: We apologize for the confusing expression in the previous version. We used the growth-climate response of Korean pine by our samples **rather than** by Zhu et al. (2009) as the current climate response of the pine in our study. For example, we presented that "**Prior to performing the climate response analyses, we also sampled modern living Korean pines. Core samples from 27 living Korean pine trees located near site A (see Figure 1a) were collected in 2013**" (Lines 135-137). We wanted to express that Korean pine was previously successfully used to reconstruct temperature in Changbai Mountain (Zhu et al., 2009). Therefore, Korean pine is suitable for temperature reconstruction in this region. To avoid the previous confusion, we deleted the citation in this sentence, and moved this sentence to the position following the sentence which mentioned the samples of living Korean pines (Lines 138-140). Thank you for your comments!