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Climate of the Past Discussions

Interactive comment on "Winter temperature variations over middle and lower reaches of the Yangtze River during the past three centuries" *by* Z.-X. Hao et al.

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General comments: The paper has a potential to be published in Climate of the Past, but it has to be significantly revised. I see as particularly important following comments: a) Page 104: Introduction should be completed by paragraph giving some overview about reconstructions based on documentary data, i.e. put this article more into international context what is done in historical climatology. For example, many such papers exist also outside of China. Great reconstruction effort concerns, for example, of Europe and some important papers should be mentioned here.

A: We have put international reconstructions using historical documents to this part.

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b) Page 108: Description of reconstruction method is very short with hints on some published papers, i.e. reader is not able to understand how it was really done. More detail description of homogenisation methods is necessary. Moreover, there is not clear, if calibration and verification periods to find corresponding transfer function have been used. If yes, there should be mentioned some standard verification statistics used which should show the quality of reconstruction. Generally, the reconstruction methodology has to be described much better than it is.

A: We agree. A new table on verification and predict statistics has been added in appendix. And the method of combination with different subperiod has been added at the end of P108. In addition, the numbers of snowfall days from 24 stations are extracted from the same historical sources– memos-to-emperor, and a systematic and consistent archive in Qing dynasty (1644-1911) using fixed report format and fixed location, so this is a homogenization dataset. In order to understand the documents by the readers, we add the related text on Page106

c) Discussion of results: it should be broader, please concentrate also on possible reasons of the fluctuations you found. See e.g. point 16 below.

A:For the fluctuations, we did not analyze the possible reasons. Because these possible reasons should be detected by paleo-climate models simulations, if the reviewer requests this, we will do in the next step. However, I guess the reviewer pays more attention to the data homogenization, like point 16. Although our original data source-Yu-Xue-Fen-Cun is homogenous dataset, we selected different number of stations for different periods, which could bring the inhomogeneous subseries. Thus, we calibrate mean value and variance of subseries to the same level of 1736-1852, and these decadal-centennial fluctuations still existed, please see point 16 for detail.

d) Page 111, Conclusions: it needs to be re-worked. On lines 20-26 you only repeat what you have mentioned in the second paragraph on page 109.

A:We have rewrote this section.

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e) For some clarification of the text, the manuscript should be checked by native speaker.

A:It is difficult to find native speaker to help us to correct English, so we have to try our best to do this, also based on the reviewers' kindly corrections. We hope journal of climate of the past could help us to do this, we would be very grateful of this.

Other comments: 1) Title: You mention three centuries, but your reconstruction covers shorter period (1736–2007). Change it as "in AD 1736" instead of "during the past three centuries".

A:We changed it with since AD 1736.

2) Page 104, lines 3-4, 24: please express more exactly longitude, not only "east of".

A:For the longitude, the boundary line is not constant value (in another word, it is not vertical line), so we use east of 108E, but if the reviewer asks for express more exactly, we will put within China mainland after east of 108E, please see P104.

3) Page 104, line 5: I recommend "days from historical documents of Yu-Xue-Fen-Cun archive in Qing . . . "

A:Changed.

4) Page 104, line 11: not clear formulation: "is 0.25oC higher than that of climatology" – what climatology?

A:P104, line 9: With respect to the 1951–2007 climatology. Climatology is the mean value of winter temperature during the period of 1951 – 2007.

5) Page 104, lines 12-13: What causes?

A:The region of MLRYR is in phase with Northern Hemisphere, also in Europe.

6) Page 106, line 4: I do not like expression "daily weather type" in this context.

A:We changed this expression.

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7) Page 106, lines 15-16: Did you homogenise temperature series? What you mean "by quality insurance check"?

A:This dataset was prepared by Chinese Academy of Sciences and Carbon Dioxide Information Analysis Center (CDIAC), before contribute this dataset, the homogenous procedure has been conducted, the Criteria for choosing station is: the station should be representative of a particular climate region of China; the station's data should be of relatively high quality. CDIAC conducts extensive quality assurance reviews, which involve examining the data for completeness, reasonableness, and accuracy. This information can be available on http://dss.ucar.edu/datasets/ds578.5/. In order to better understanding for readers, we put the explanation what is quality assurance on page 106.

8) Page 106, line 17-18: how did you find that five stations "catch 50–90% variance of regional . . . " – what method was used?

A:We did linear regression analysis between the individual station and the regional winter temperature, 50%-90% variance is correlation coefficient square. The note has been added at the end of this sentence on P106.

9) Page 106, line 20-22: did you limit the use of linear regression by any value of correlation coefficients (between given station and its neighbour)?

A:We choose the linear regression model which has highest correlation coefficient to interpolate the missing values. The note has been added in P106, line 21.

10) Page 106, line 26: What is "rain infiltration depth"?

A:Usually, we use the shovel to dig into the soil after the rainfall event, the rain infiltration depth is distance measurement from dry-wet soil boundary layer to the ground surface. This has been added in P106.

11) Page 107, line 3: What kind of "quantitative and qualitative" information you have in mind?

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A:We move the example of “quantitative and qualitative” record to this paragraph from appendix section in order to understand easily. The quantitative information is that the original memos-to-emperor told us what date and what time the snowfall occurred; the qualitative information is that the records only show us this month or this period got snowfall, but did not tell us how many snow days it has. The qualitative record can provide cross-check for quantitative record accuracy.

12) Page 108, lines 20-21: There is not clear, how you came to values of the explained variance.

A:The values are based on PLS, and in order to see clearly by the readers, we attached the statistics tables for the subperiod in the appendix section.

13) Section 4, title: Results and discussion has to be clearly separated into two sections.

A:Separated now

14) Page 109, line 11: The winter 1865 is those of 1864/1865? The same concerns of 1809 – please clarify (see also line 16).

A:The winter 1865 is from November of 1865 to February of 1866. In order to understand easily, we insert a note in P105, line 15.

15) Page 109, line 20: 30-year or decadal trends?

A:We analyzed the changing trend at two time scales, the one is 30-years, another one is centennial (100-years) time scale.

16) Page 109, lines 26-27: May you discuss why the trend in 1862–1961 is much stronger than in the 20th century? Non-homogeneous data or other reasons?

A:This difference is not from non-homogeneous data. We adjusted variance and mean value for the period of 1853-1905 and 1906-1950 to the same level of 1736-1852, and found that the warming trend in 1862-1961 is 2.6°C/100yr, which is even greater

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than 1.9°C/100yr in our manuscript, and for the 20th century, the warming trend is 0.76°C/100yr. The possible reason is that the 1860s is located at coldest decade during the Little Ice Age, and in 1940s, the temperature reached to a warm level before 1950, in another word, the 100 years from 1862 to 1961 covered three temperature changing procedures, coldest decadeâĂŤincreasing periodâĂŤwarming period, so this slope from cold valley to warm peak is greater than that of 20th century Necessary related text has been added in P109.

17) Page 112, line 2: Please add any quotations of related Chinese papers (behind this first sentence).

A:Yes, we added.

18) Page 112, Appendix A: Information explaining time or days has to be in square brackets, e.g. [12–21 Dec. 1739]. Please do not use numbers 1, ..., 12 for identification of months. What do you mean by "Solar calendar" – is this in any relation to Julian or Gregorian calendar? Expression in the Gregorian style would be the best.

A:Yes, we changed the expression. The solar calendar is also Gregorian calendar.

19) Pages 113-114: References were not checked for completeness and correctness. But they should be extended for quotations of some papers working with documentary-based reconstructions, e.g. in Europe.

A:Yes, we added references based on the first general comment.

20) Table 2A: Columns K, b0 and p are not necessary, I recommend to skip them. Note: "explained variation" or "explained variance"? Instead "Observation" I recommend "Period".

A:Changed.

21) Fig. 1: Graphical scale is missing to have an idea about the size of the territory studied. Please give a better formulation of the first sentence in the figure caption. Not

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fully clear is distinguishing between “total records and quantitative records” – see also my comments to page 107.

A:The scale has been added in the figure. The first sentence has been reformulated. The explanation about “total records and quantitative records” has been added in P107.

22) Fig. 2: please use “10-yr running mean” in the figure caption. You have to indicate reference period if you use “anomalies”.

A:We rewrote the figure caption, and followed the first reviewer’s comment, we use fft filter method rather than 10-year running mean to express the variation on decade time scale. The reference period is 1951-2007, and it was shown on the figure caption.

23) Fig. 3: How is calculated “Temperature standardised index”? r is a correlation coefficient? – if yes, only two places behind comma are enough (i.e. 0.56 instead of 0.5623). r is correlation between corresponding series and “our reconstruction”? WT, ..., CC has to be explained not only in section 4 (page 110), but also in figure captions. The six reconstructions are standardized by subtracting the mean value and divided by the standard deviation with their common stage from 1730s to 1960s.

A:Yes, r is correlation coefficient. We deleted as suggestion. And r is correlation between corresponding series and “our reconstruction”, we added this information and what is WT, CC. . .... in the caption of figure 3.

24) Other corrections I put directly into the manuscript and sent to the editor.

A:Thank you for these kind comments, and we have made correction as the corrected manuscript.

The new table will be inserted in the manuscript. Table A3. The selected PLS regression models for the winter temperatures between region and individual stations and verifications for 1736-1852, 1853-1905 and 1906-1950 based on leave-one-out cross validation method

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1736-1852 Component Variance SE R2 PRESS Predicted R2 1 0.51 20.68 0.60 23.20 0.5472 2* 0.67 17.00 0.67 21.85 0.5735 3 13.68 0.73 22.40 0.5628 4 10.89 0.79 25.40 0.5042 5 9.51 0.81 25.07 0.5107 1853-1905 1 0.65 27.36 0.47 30.51 0.4045 2* 0.77 23.75 0.54 30.08 0.4128 3 23.57 0.54 31.27 0.3897 4 23.57 0.54 31.40 0.3871 5 23.57 0.54 31.48 0.3856 1906-1950 1 0.88 1.80 0.97 1.91 0.9675 2 0.96 1.55 0.97 1.73 0.9706 3* 0.99 1.39 0.98 1.69 0.9713 4 1.38 0.98 1.79 0.9696 5 1.37 0.98 1.79 0.9695 *the selected model used to reconstruct temperatures; SE indicates standard error; PRESS indicates prediction sum of squares

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Interactive comment on Clim. Past Discuss., 8, 103, 2012.