**Climate
of the Past
Discussions**

Interactive comment on "Temperature changes of the past 2000 yr in China and comparison with Northern Hemisphere" *by* Q. Ge et al.

Q. Ge et al.

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Dear editor and reviewers,

We have answered each comment carefully. Based on the coauthors and the third reviewer's suggestions, we changed and updated three new temperature proxies (including Liu et al.,2006 Chu et al.,2012 and Zhang et al., 2013, please see reference in our manuscript for details), which decreased the uncertainties during the first millennium. Thus the result of our reconstruction has a little different with the old version. In addition, two recent publications of temperature series of China (Shi et al., 2012) and East Asian (Cook et al., 2013) suggested by the third reviewer have been added in Figure 3a. Please see our point-to-point response below, and use black and italic font to answer.

We would express our appreciation for your kind comments, which helped to improve the quality of this manuscript.

Thank you,

Anonymous Referee #2 The paper reports a new temperature reconstruction for China based on multiple types of temperature-sensitive proxy. The principal components regression (PCR) and partialleast squares (PLS) approaches were used to reconstruct decadal temperature variations. Some new findings are clear. The paper shows that the present warm period is only the fourth warmest period. The authors suggested that similar warm-cold patterns in temperature variations occurred in both China and the NH during the last millennium. I would say that the period 250-400 AD was the warmest period in their reconstructions but not obvious in the NH temperature records and even a relative cold period in the recent NH temperature reconstruction (Christiansen and Ljungqvist, 2012). I guess it is partly caused by a small number of samples. If possible but the authors need to do some discussions. Overall, this paper adds very valuable information in climate of the past in China since very few temperature reconstructions covering the past two millennia are available yet. The results may contribute to a better understanding of climate changes over East Asia, and provide an opportunity to evaluate the current warming trend over the China in a long-term perspective. After minor corrections, the paper can be accepted for publication.

A: Yes, we added discussions about the uncertainties derived from low number of proxies we used, please see end of result section, and plot the sample number series in Figure 2b, which could show the readers how many proxies we used to reconstruct the temperature changes.

Specific comments:

1) The CRU has developed several versions of temperature datasets. It is useful for the authors to give some reasons for choosing Lin et al. (1995) data rather than the CRU data, maybe there is an effect in final results using different calibration datasets.

A: CRU dataset was from 1901 to present. We did not select due to the two reasons: First, Lin (1995) has longer series started from 1871, and provide more statistical sample numbers (13 decades from 1870s to 1990s) for the calibration procedures during the temperature reconstruction; Second, before 1951, CRU dataset was developed by very few meteorological stations, the temperature representing the whole China region was lower than others, especially in 1921-1950 (Tang et al., 2009); But Lin1995 selected 381 stations and checked the quality of original observations, then developed the temperature series since 1871. Thus, we used Lin 1995 dataset.

2) The authors stated that the PCR reconstruction is better in preserving the common variations of proxies whereas the PLS is better in capturing extreme climate signals. Thus I suggested that maybe a combination of two reconstructions is more indicative of temperature change.

A: Here we were aiming to discuss the differences from the different reconstruction methods, so we did not combine the two reconstructions. In the future, as the method development for the reconstruction, we would like to try.

3) Five temperature proxies for five subregions were used to derive a composite temperature in China. The readers hope to know the details (how many original time series, locations, seasonality of temperature, explained variances (correlation with local instrumental temperatures, the correlations between different pairs of subregion temperature records and so on) for these proxy records.

A: Yes, same as the first reviewer. We added a new table 1 to the manuscript, which including these details for proxy records.

Minor comments: 1) Page 510, line 10: It should be the exact year (e.g. 1900-1950 C.E.) rather than the 1900s–1950s.

A: Yes, we changed.

2) Page 512, lines 6 and 12: For calculation of the amplitude of the temperature

change, the authors should consider the associated error bars shown in Figure 2.

A: We agree, and considered the error bars in the revised manuscript.

3) Page 514, lines 8-10: the author wrote ": : :.due to the low number of proxy samples". How many samples were used in this period? Please add a figure to show the sample depth used for each year during the period of reconstruction.

A: We agree, and new table1 involving proxies detail was given, and the Figure2b showed sample numbers we used during the period of reconstruction.

4) Page 515, lines 13-15: "China is well correlated with the NH during two periods...." There is something wrong with this sentence, please rephrase.

A: We agree, now we changed it "temperature changing trends and warm phases in China are well correlated with those in NH"

5) Figure 1 should be divided into two subfigures as (a) and (b). In the right subfigure, do the dashed lines indicate the average for the separate temperature series?

A: We agree, and divided into a and b. and Yes, the dashed lines are mean value of the temperature series in the subregions. We added the explanation into the caption of Figure1

6) In Figure 2, how the uncertainties for the two reconstructions were calculated should be given a description. In the figure caption the author wrote "the referenced value is the mean temperatures from the 1870s to the 1990s", but in Page 511, lines 24 and 25: you write "Figure 2 contains a plot of the decadal temperature variations (with respect to the mean value for the period 0s–1990s): : :" Please unify the referenced period in the two sentences.

A: We agree, and now the whole manuscript unify the referenced period from 1851-1950.

7) In Figure 3, are the NH temperature time series smoothed by 5-point FFT or 200-yr

FFT filter, or neither? As far as I know, the NH temperature "raw" data had already been interpolated to the annual resolution by the original authors (e.g. Mann et al. 2008 and Christiansen and Ljungqvist 2012), different from the decadal resolution in the authors' reconstructions. Thus, the running correlation between the PLS reconstruction and NH temperature series was calculated at annual or decadal resolution in Figure 3?

A: Among the NH temperature time series, CL2012 was smoothed by 5-point FFT, and Mann2008, Christiansen and Ljungqvist2012, Mcshane and Wyner 2011 are filtered by 50-point FFT based on their annual resolution time series, which reflect the centennial temperature changes. The running correlation was deleted, since the result was not reasonable.

8) Some clarifications for the above two issues are needed in the figure caption or the main text. In addition, as shown by the color bars in Figure 3, the 200-yr moving correlation coefficients are not clear enough to read because of mixed colors. Maybe the author can try to show them as the lines, and if necessary, a new subfigure could be added.

A: We added the clear explanation about the 7 and 8 comments in the captions of Figure2 and Figure3.

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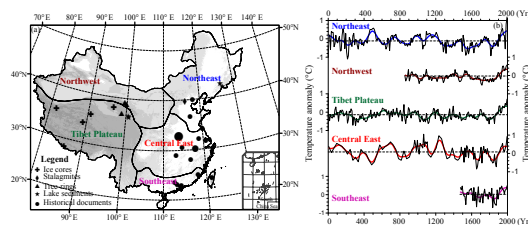Interactive comment on Clim. Past Discuss., 9, 507, 2013.

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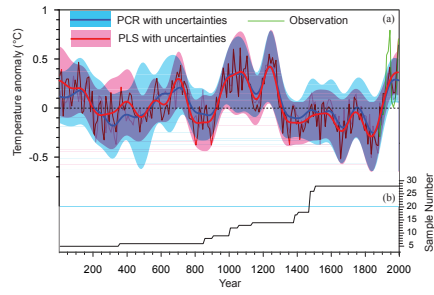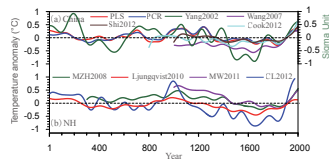**Fig. 1.** Distribution map

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Fig. 2. temperature reconstruction

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Fig. 3. Comparison of temperature reconstructions

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