

## ***Interactive comment on “Characteristics of cold-warm variation in the Hetao region and its surrounding areas in China during the past 5000 yr” by M. Li et al.***

### **Anonymous Referee #2**

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General comments This paper presents a 5000-yr-long temperature reconstruction by combining several proxies from six palaeoclimatic records in Hetao region, northern China. To achieve this, the authors developed a method that integrated the contribution of temperatures in each grid area to the studied region. This method is fine. However, a detailed process of calculations should be given in the text, which will make the paper easier for readers. My another concern is that for six proxy records chosen by the authors, half of them lack the period from 2000 yr BP to the present, which takes nearly half of the past 5000 yr. This would have increased the uncertainty of reconstructed temperature during the past 2000 yr.

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Specific comments 1) Materials Two of six palaeo records are presented as temperature variability, and the others (oxygen isotope, total organic-carbon, magnetic susceptibility and carbonate-content) as climate proxies. However, temperature is not the sole factor influencing those proxies. Other factors, e.g. precipitation and evaporation, may also play an important role in variations of the proxies. Therefore, it is necessary to fully evaluate the relative contributions of the temperature to each proxy prior to quantitative temperature reconstruction.

Page 5, lines 2-4, the authors stated that “6 reconstructions from different proxy archives represent temperature changes and explain between 83% and 94% of annual temperature variability in 1951-2007”. Why?

2) Methods Page 6, line 10, how many grids is the studied region divided into? Is  $n$  (the number of grids) in equation (1) the same with that in equation (4)? A modern surface annual-temperature in each grid area can be calculated using climatological data during 1951-2007 from weather stations. However, for palaeo data, except for the grid areas where six proxy data are located, how to determine temperatures in other grid areas?

Page 7, line 1, “Before averaging, each series is standardized”. How did the authors transfer the proxy variations, oxygen isotope, total organic-carbon, etc., to temperature series?

3) Results and discussion i) Since the combined 5000-yr temperature record is based on several sites including Daihai and Jingbian, it is inappropriate to compare the temperature record again with the palaeoclimate records from these sites. It is arguing in a circle. ii) The 5000-yr-long temperature reconstruction was divided into seven stages and different stages were correlated with various palaeorecords from different sites, including southern China, Finland, Iceland, the North Atlantic, etc. This is not a good scientific logic and the conclusion based on such correlation is not convincing. If the authors want to compare their temperature record with palaeoclimate records from

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other sites, they should put all of them in the whole time interval and to discuss the similarity, difference and their possible causes.

Technical corrections Page 3, lines 23-24, "9 samples were dated using radiocarbon-dated method". The authors gave wrong information here. Although Xu et al. (2003) stated that nine samples were dated in the text, only eight samples were listed in Table 1. A relevant paper also shows eight radiocarbon ages in sediments of Daihai Lake (Xiao et al., 2004, QSR).

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