

Interactive comment on “Multiscale monsoon variability during the last two climatic cycles inferred from Chinese loess and speleothem records” by Y. Li et al.

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1. Some references to important previous works are missing, a more detailed state of the art is requested and a comparison with other similar records should be provided.

Reply: Thank you for your suggestions. In the revised version, we will review several important works about East Asian monsoon variability and dynamics at various timescales using loess grain size and speleothem $\delta^{18}\text{O}$. We will clarify the main objectives of our work to evaluate the relative contributions of orbital and millennial signals in loess grain size and speleothem $\delta^{18}\text{O}$ proxies. Unlike previous work, our results will emphasize the glacial-interglacial differences and millennial similarity between loess

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and speleothem records. Meanwhile, we will compare our grain size variations with similar records, e.g., median size variation of Shagou section (Wu et al., 2005), 249-kyr grain-size stack by Yang and Ding (2014). Moreover, we will cite the 500-kyr mean grain size of Jingyuan section (Sun et al., 2006), and 500-kyr Hulu/Sanbao $\delta^{18}\text{O}$ (Cheng et al., 2012) records to validate our spectral and filtering results.

2. The interpretation of the spectral analysis is questionable and, at least, additional analyses must be provided to support the conclusions.

Reply: We already performed “SSA” and “EMD” to confirm our decomposed components and spectral results. Detail results can be seen in the responses to the #3 referee and will be incorporated in the revised version.

3. We have uploaded three point-by-point responses to three referees’ comments. Briefly speaking, #1 referee questioned our speleothem interpretation and the 100-kyr period in the loess record. Firstly, we agree that the correlation between speleothem $\delta^{18}\text{O}$ records and monsoon is debatable since speleothem $\delta^{18}\text{O}$ may have different palaeoclimatic implications at various timescales. However, recent work by Liu et al. (2014) suggests that Chinese speleothem $\delta^{18}\text{O}$ can be regarded as a monsoon proxy to reflect the southerly wind intensity. Our spectral and decomposed results show loess MGS and speleothem $\delta^{18}\text{O}$ have varied sensitivity to glacial and orbital forcings, but likely share a common driving force on millennial scale. Secondly, we argue that the 100-kyr glacial cycles can be evidence by glacial-interglacial amplitude contrast. We further validate the spectral difference between Chinese loess and speleothem record by conducting repeated spectral analysis on 500-kyr loess (Sun et al., 2006) and 500-kyr speleothem (Cheng et al., 2012) records. The spectral results show that the 100-kyr cycle is robustly existed in loess grain size time series, in contrast to the dominant precessional cycles in speleothem record.

#2 referee put forward seven important comments, we appreciate these remarks and compare our Gulang grain size with similar grain size records from the Chinese Loess

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Plateau (Wu et al., 2005; Yang and Ding, 2014). The results demonstrate that glacial-to-millennial variability of the Gulang grain size is reliably existed in other loess sequences and can be employed to reflect the winter monsoon variability.

#3 referee suggested we perform the software SSA to confirm our spectral results and found the divisions of frequency bands are kind of arbitrary. (1). We used SSA to analyze the spectral features of loess grain size series, and found that the detected periods are similar to those done by Redfit. (2). We used both of SSA and Empirical Mode Decomposition (EMD) to extract the decomposed components of 260-kyr Gulang MGS data. In terms of variability and dominant frequencies, the decomposed components from SSA and filtering components in our study are similar on orbital scale; IMFs done by EMD are comparable to our components on various timescale, highly confirming the reliability of our choices of the frequency bands boundaries.

We have uploaded detail responses to all the referee comments, and would like to know if we are encouraged to upload a revising version at this stage. Thank you for your considerations, we are looking forward to your reply.

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