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

### **Anonymous Referee #3**

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The paper “Multiscale monsoon variability during the last two climatic cycles inferred from Chinese loess and speleothem records” by Li et al. presents a comparison between loess grain size and speleothem  $\delta^{18}O$  records over the last 260 kyr.

In order to evidence the oscillatory components of these series, the authors spectrally analysed the profiles and applied a filtering approach to extract the variability modes. The aim of the study is to evaluate the relative contribution of different forcing factors to the East Asian Monsoon (EAM) variability.

Major comments and suggestions.

The main remarks concern spectral analysis.

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(1) The authors should confirm the results shown in Fig. 3, by applying at least another spectral technique not based on Fourier method. I suggest to use the Singular Spectrum Analysis (SSA, toolkit available online), which is well suited also for series affected by an high-noise level. SSA required equally-spaced data and therefore an interpolation is required.

(2) Regarding the reconstruction of the variability components (Fig. 4, 5 and 6), the choice of the boundaries of the frequency bands C1, C2, . . . , C5 is somewhat arbitrary and the shape of the components reconstructed in Fig. 4 can depend on this choice. The authors should show the stability of the components by changing the position of the boundaries (narrower or wider regions around the peaks of interest). The arbitrariness in the choice of frequency bands can be overcome by extracting the components using SSA. A Monte Carlo test (more specific in respect to that corresponding to the red curves of Fig.3) is associated with SSA. By applying it, a discrimination among the many components identified as significant in the C4 and C5 bands, should be possible.

(3) 80% of c. l. is a low value. It would be interesting to specify which components remain significant at a higher c.l., e.g. 90 or 95%.

(4) It is not clear if the variances of the components in Fig. 4 are a percentage of the two raw series total variance. If the case, the corresponding components of the two series may contain different noise levels, thus distorting the comparison.

Other comments.

Please clarify if the loess measurements presented here are totally or partially new.

I suggest to put in more evidence the new results presented in this work in respect to those previously obtained.

I suggest to add a section briefly explaining the spectral methods used, the Monte Carlo procedure used to calculate the red curves in Fig. 3 and the applied filtering approach.

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In conclusion, the results presented in this manuscript seem interesting, but it is necessary to verify their robustness by applying different spectral methods.

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Interactive comment on Clim. Past Discuss., 10, 4623, 2014.

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