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Climate of the Past Discussions

Interactive comment on "Modeling precipitation δ^{18}O pariability in East Asia since the Last Glacial Maximum: temperature and amount effects across different time scales" *by* X. Wen et al.

Anonymous Referee #2

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The authors used a list of time slice experiments by an isotope-enabled GCM to evaluate the changes in precipitation ïĄď18O on various timescales. It is an interesting work and might give some insights for the interpretation of stalagmite ïĄď18O, especially for the paleoclimate reconstructions in Asia. I do not know whether these experiments are the same as those in Liu et al. 2014 QSR or not. The authors should clarify this in the section of model description. These experiments are no doubt useful for exploring the interpretation of the precipitation ïĄď18O over the East Asian on different time scale. However, I am afraid that the present experiment design is not reasonable enough for examining the changes in ïĄď18O, especially on the seasonal and interannual timescales. The present 0Ka experiment may neglect some major changes in

boundary conditions and can not directly compare to the modern GNIP observations. Are the greenhouse gases and sea surface temperature kept constant? Why do the authors not employ the observed GHG and SST to force the atmosphere model? This experiment is necessary and do not need much time. I strongly recommend to add this experiment and to reanalyze the results.

The authors use a series of time-slice experiments for the last 22 ka to evaluate the "temperature effect" and "amount effect" on millennial time scale in different regions in East Asia. I think that the author should present the long-term changes of precipitation ïĄď18O in these model simulations and compare them with the proxy records. If the outputs of these experiments capture the variations in the proxy time series, then it's robust to test the interpretation of the precipitation ïĄď18O on millennial time scale by using the model simulation. Otherwise, the bias in the model itself will mask the real processes which affect the precipitation ïĄď18O changes. This is fundamental to the model simulation. The authors must cross check the model outputs with the real observations and then come to the conclusion.

As shown in figure 3, the authors correlate the annual mean ïĄď18O weighted with precipitation to the DJF temperature and JJA precipitation on the interannual and millennial time scales (panel c-f) and then use this statistic result to argue the "amount effect" and "temperature effect". This is totally wrong! Because the annual mean temperature may not change the same way as the DJF temperature, and also the varied precipitation seasonality (as shown in figure 2) in different regions may deny the dominant contribution of summer precipitation to the annual precipitation.

Page 1 line 19, the citation of Yuan et al., 2004 is wrong. It presents the speleothem ïĄď18O record from southern China.

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