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Climate of the Past Discussions

Interactive comment on "Quantification of southwest China rainfall during the 8.2 ka BP event with response to North Atlantic cooling" *by* Y. Liu and C. Hu

Y. Liu and C. Hu

yhliu@cug.edu.cn

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Referee #1

This paper reconstructs rainfall variation in southwest China during the 8.2ka BP event by comparing Heshang cave δ18O record with Dongge cave δ18O record. The main method is similar to that in the paper "Hu et al., 2008 (EPSL)". Using this method, one important hypothesis is that Heshang cave and Dongge cave are in the same moisture transport pathway and the precipitation δ18O difference between the two caves is mostly affected by the variation of precipitation amount. In the paper "Hu et al., 2008(EPSL)", they considered that the two caves are in a uniform moisture transport pathway by using analysis of inter-annual variation in moisture transport during the

instrumental record from 1952 to 2001. However, to our knowledge, the factors of stalagmite δ18O at different timescales in monsoon area are very complex. The authors should demonstrate that the stalagmite δ18O difference between the two caves is influenced by the variation of precipitation amount, by comparing the differences of precipitation amount, precipitation δ18O, and stalagmite δ18O between the two caves. Because this is a critical assumption for this paper. As far as I know, some monitoring studies are going on in Heshang cave and Dongge cave during the past few years. I suggest the authors to verify the relation among the precipitation amount, precipitation δ18O and stalagmite δ18O by using modern monitoring data from the two caves. I think this manuscript should be published after revision.

Response

We do agree that the factors affecting stalagmite δ18O at different timescales in this monsoon area are very complex, and modern monitoring data from both Heshang Cave and Dongge Cave would be helpful to assess the δ18O difference method used in this study. Unfortunately, so far, there is no published cave monitoring data from Dongge Cave.

However, another cave located in Guizhou province with published monitoring records, named Liangfeng Cave (26°16'N, 108°03'E), might provide some useful information. There are three separate monthly drip-water δ18O data sets from April 2011 to April 2013 from Liangfeng (Zeng et al., 2015). To avoid evaporation influences, we chose the lowest δ18O value of each month to build a new δ18O sequence. Because of the aquifer above Heshang cave, the drip-water δ18O at HS4 collection site lags behind local rainfall δ18O by at least 1 month or even longer (Johnson et al., 2006). Therefore to establish a difference sequence between Liangfeng drip-water δ18O and HS4 drip-water δ18O, HS4 data is positively offset by two months to analyze the relation between the local rainfall amount and the drip-water Dδ18O.

Fig. S1 shows that there is a weak positive correlation (R=0.33) between monthly drip-

water Dδ18O and average monthly rainfall amount from 6 sites mentioned in Hu et al.(2008a). As stalagmite δ18O derives from cave drip water δ18O, in some degree the weak positive correlation shown in Fig. S1 suggests that stalagmite δ18O differences between two caves located along the same moisture transport pathway could reflect the local rainfall amount.

Relevant revision will be done in the manuscript.

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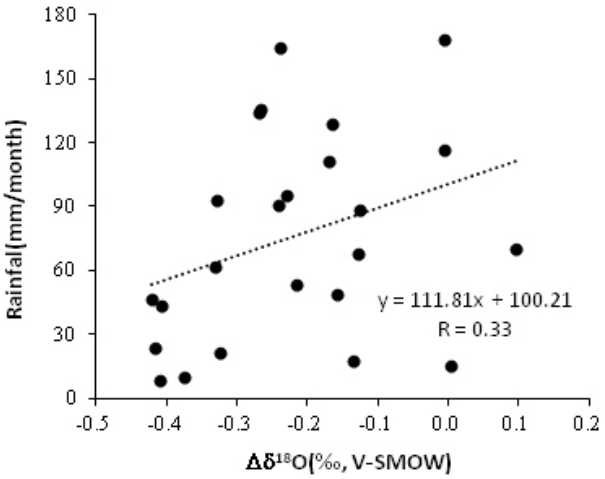

Figure S1. Correlation analysis between monthly drip-water difference of Liangfeng Cave(Zeng et al.,2015) and HS4 collection site and average local monthly rainfall amount from April 2011 to April 2013. Monthly average rainfall data are from instrumental records (http://www. wunderground.com/ history/wmo/) of 6 sites mentioned in Hu et al.(2008), while $\Delta\delta^{18}O$ is from the difference between Liangfeng monthly cave drip-water $\delta^{18}O$ and HS4 drip-water $\delta^{18}O$ being positively offset by two months.

Fig. 1.