

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

Anonymous Referee #2

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This paper presents a reconstruction of rainfall change during the 8.2 ka event based on taking the difference in measured d18O values from two caves supposedly along the same moisture transport pathway in China. Quantitative reconstructions are rare for this time interval, and it is a worthy goal to generate them. However, there are some major concerns about how this reconstruction is being created, including whether the d18O is a good indicator of precipitation amount and the selection of more robust methodologies of differencing two records with chronological uncertainties and different temporal resolutions. Lastly, it is unclear that the analysis computing the scaling of rainfall to Greenland temperature contributes much to our understanding.

Major comments:

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1. Line 16: “decreased by ~ 350 mm” This difference is calculated from a short-lived wet period occurring right before the 8.2 ka event. Rather, a longer-term average of pre-8.2ka conditions should be used to calculate this anomaly.
2. Since the publication of the Hu et al. (2008) paper, several other papers have been published showing that the relationship between d_{18O} and precipitation amount is more complicated than assumed by the authors for their reconstruction. More consideration and discussion of these other results is needed, please see Liu et al. 2014 Quaternary Science Reviews 83: 115-128 and references cited therein.
3. Lines 87-88: Was this wiggle matching always within the analytical error of the U-Th dates?
4. Lines 114-117: A perhaps even larger source of error that could create negative values is the chronological uncertainty, given that two records with uncertain chronologies are being differenced. Wiggle matching will not eliminate this uncertainty, nor is even the best approach since it is subjective. Chronological error should be tracked in the reconstruction process.
5. How was a one-year resolution record created from a 2.5 year resolution record? Linear interpolation? A better approach would be to create records of equivalent ≥ 2.5 year resolution.
6. The analysis of Yichang precipitation and Greenland temperature is not useful to the paper. It is unsurprising that the correlation of rainfall in China to temperature during the 8.2 ka event (perhaps the largest climate event of the Holocene) is larger than for interannual variations today calculated from two noisy station records. Regarding the calculated slopes of precipitation change per Greenland temperature change from the modern data, are these slopes shown to be significantly different than zero using a statistical test? This analysis is problematic in many regards, does not provide insight into “abrupt climate prediction under warming conditions” and should not appear in the paper.

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Minor comments:

1. Line 32-33: The statement “experiencing a warming period similar to that of today” is debatable. There are important ways in which the early Holocene was different from today (e.g., melting of the Laurentide Ice Sheet, lower atmospheric carbon dioxide levels, etc).
2. Line 165-166: “highest annual rainfall of 350 mm/yr” This should read “maximum decline in annual rainfall of 350 mm/yr”

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