Clim. Past Discuss., 9, C3595–C3599, 2014
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Climate of the Past Discussions

Interactive comment on "Variability of the Asian summer monsoon during the penultimate glacial/interglacial period inferred from stalagmite oxygen isotope records from Yangkou cave, Chongqing, Southwestern China" *by* T. -Y. Li et al.

Anonymous Referee #2

Received and published: 7 March 2014

The authors present a new stalagmite δ18O record from a cave in Southwest China, which covers one glacial-interglacial cycle from 206 ka to 124 ka. This record is a valuable addition to the growing number of long speleothem records from China. The important contribution of this new record is that it reproduces interesting features of the Sanbao record, like the large amplitude of the precession-related δ18O minimum during glacial stage 6.5. In light of recent debates of the origin of the δ18O signal in Chinese caves, the reproducibility of the signal over large areas is an important aspect.

In my opintion this is therefore a valuable contribution and should be published in Cli-

mate of the Past. The authors nicely lay out the basis of their study (Hendy test results, age models) and provide clear and informative figures. However, I have some concerns about the discussion and interpretation of the record. In my view the explanation of the strong MIS 6.5 signal is overly confident (see below) and should be tuned down to a possibility. On the other hand, an important contribution of this record is only mentioned but not discussed further, namely the fact that the timing of the sudden jumps in δ18O match between the different records, confirming their robustness and regionality. The sudden δ18O decreases (increases) consistently occur about halfway during NH summer insolation increases (decreases). I suggest adding a discussion about this robust observation.

The suggested explanation for the large amplitude of the MIS 6.5 δ18O minimum (i.e., association with stronger tropical Pacific SST gradients and Walker circulation) is highly speculative and should be stated much more carefully (in the abstract, L. 21-23 on Page 6290, and L. 23-25 on page 6296). Firstly, from the Chinese stalagmite records it is not at all clear that amplitudes of precession-related d18O minima are larger during glacial times than during interglacials. In the Sanbao record, the amplitude of MIS6.5 is similar to or slightly smaller than that of MIS 5.3 (an interglacial period). Furthermore, the amplitudes of the δ18O minima seem to not always be consistent among different sites in China. The subdued signal for MIS 5.5 in comparison to MIS 5.3 in Sanbao is not observed in Dongge cave (see Fig 5 in Cheng et al 2012). Secondly, the hypothesis that glacial times were associated with more La Niña-like conditions in the tropical Pacific is also highly uncertain. While the SST differences observed by Lea et al. (2000), which the authors refer to, suggest enhanced zonal temperature gradients during glacial times, other studies have inferred the opposite, more El Niño-like conditions, for glacial times (Koutavas et al 2002). Furthermore, the exposure of the Sunda Shelf during glacial times likely had a strong influence on regional circulation patterns (e.g., diNezio 2009), which is at present largely unconstrained. In my opinion, the large amplitude of the MIS 6.5 minimum in the presented record is indeed a very interesting feature, and it is important that it is replicated in 2 caves 400 km apart. The authors

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could also mention the correspondence to the Loess plateau record of Rousseau et al. (2009) (as highlighted by Cheng et al. 2012). But given the ambiguities outlined above the interpretation should be done much more carefully. It probably needs long timeseries from multiple Chinese caves to derive a clear picture of amplitude changes in relation to orbital forcing.

The discussion of the Dole effect could be shortened - it would be sufficient to state that the δ18Oatm record from ice cores shows a strong peak at MIS 6.5 as well, and that the inferred enhanced biosphere activity fits well to enhanced precipitation in the low latitudes.

Detailed comments:

The authors should consider shortening the title

Abstract:

L. 5 “mainly from Sanbao”: What about the Hulu and Dongge records (which are further apart from Sanbao than the record presented here)? I assume the authors mean that only Sanbao provides a continuous, long record, but the current statement neglects the other available records

Introduction:

Page 6289

L. 22-25: Records from other archives besides speleothems should be mentioned here, like the Loess sequences or lake records.

Page 6290

L. 20-23: This sentence again disregards the replication already achieved by other speleothem records (such as that from Hulu cave shown in Figure 5).

Material and Methods:

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Page 6291

Dating: Since the dating uses three different isotopes of U and Th, the authors should either say “238U-234U-230Th dating” or simply U-Th dating. The authors should mention here details currently only given in the footnotes to Table 1, namely, which half-lives were used and the assumed detrital Th isotope ratio. It is furthermore not clear what is included in the errors. E.g., is the uncertainty of the detrital Th ratio included?

Minor comments:

Page 6289

L. 2-4: give references

L. 9: . . .time series supports the strong. . .

L. 15: past five G/IG cycles

Page 6291

L. 11: Use the same ages for start and end of the record as in the rest of the manuscript

L. 16: 53 instead of fifty-three

Page 6292

L. 17: 100s - 10000 ppt

L. 21: One to two. . .

Page 6293 L. 17-19: leave out the exact time intervals for δ18O maxima and minima; these can be seen in the Figure. Replace “$\sim$” by “to”

Page 6294 L. 20: “thermal conditions” is a vague expression

Page 6297 L. 7: encompassed instead of enclosed

Table 1: Ages are in kyr (not yr). Also, the Th isotope ratio for date YK5-08 contains

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too many digits

Figure 1: The colored arrow for the trade winds is confusing

References

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Koutavas, A., J. Lynch-Stieglitz, T. M. Marchitto, and J. P. Sachs (2002), El Niño-like pattern in ice age tropical Pacific sea surface temperature, Science, 297, 226–230.

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Interactive comment on Clim. Past Discuss., 9, 6287, 2013.