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Climate of the Past Discussions

Interactive comment on "A tropical speleothem record of glacial inception, the South American summer monsoon from 125 to 115 ka" *by* S. J. Burns et al.

Anonymous Referee #1

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General comments:

This is a very interesting paper that zooms in on the climate transition in MIS 5 from interglacial to glacial conditions. The core of this ms is a comparison of the author's own δ18O record from cueva Huagapo in the Peruvian Andes with previously published data from a speleothem at Hulu cave. These two records compare remakably well, and show that there were two short periods of rapid climate change towards the glacial state of the monsoon systems at 121 and 117 ka. By 117 ka the monsoon systems are considered to be in their glacial state by the authors. New is the high resolution in this record, and the recognition of clear non-linear behaviour of glacial inception. I believe the general line of reasoning in this ms is strong, because the fact that the detailed pat-

tern is so clearly visible in speleothems from two different monsoon systems strongly suggest global significance of the changes. I also believe these shifts were remarkable rapid, but I'm not sure that, with the dating uncertainty at hand, the authors can prove, as they say in section 4.2.1, that the shifts occurred within 200 years.

Another point of mild criticism concerns the assumption that the changes in the SASM as recorded in the speleothem are in sync with changes in North Atlantic climate. I know that there is evidence to support that from existing data from South America and China, but I also know that the response to (global) climate change can be quite variable regionally in speleothem records from South America. The assumption that you are in sync with the higher latitudes (North Atlantic and Antarctica) is pivotal for the rest of the discussion, as you come to conclusions that go against previously published work. For example that the coral U series ages underlying SL curves from that period must be off by several thousands of years, just like the Ice core gas chronologies while we're at it. How sure can you be that there are no leads or lags between cooling and ice accumulation in the Northern Hemisphere and the SASM signal you pick up in your stalagmite? The way I read the ms, your main reasoning why this should be the case now is on page 4371 (lines 15-25). For me it would be helpful if that reasoning is expanded a bit more (if possible), since it it so important for the rest of your paper. That would be useful to convince the non-expert reader why your chronology is right, and theirs is not.

Specific comments:

On page 4369 (line 10) you introduce the Hendy test, but what you describe in line 11-13 is to my believe not a proper Hendy test. A Hendy test as I've been taught is performed by analysing several samples across a single growth line, after which you check for isotope changes as a function of distance from the growth axis. Absence or occurrence of a correlation between δ13C and δ18O along the growth axis does not necessarily tell you about kinetic effects, because other than kinetic parameters can also influence δ13C and δ18O cross correlation through time.

On page 4370 line (1 and 2) you calculate the actual change of δ18O in precipitation at the site to be 6.3 permille. I would say this should be 5.8 permille, since I would only correct for the calcite-water fractionation change and not for the 0.5 permille seawater d18O effect (because the latter is part of the change in d18O of precipitation that you are calculating).

Technical corrections:

Page 4366 line 14. “the monsoons the orbitally-driven” should probably be: “the monsoons to orbitally-driven” Page 4369 line 14: I always get a bit confused by the use of terminology like “least negative” for stable isotope data. I’d prefer to use the simple“highest” instead (but let’s agree that this is not a major issue). Page 4369 line 26: “affect” should be “effect” Page 4371 line 11: “nadir”? Page 4371 line 16: “has” should be “have” Page 4374 line 12: Entire line difficult to read. Remove “are” and “following”? Page 4374 line 15: start new sentence at “Note that. . .”? Page 4374 line 27: replace “relatively high” by “higher”? Page 4375 line 10: “results” should be “result” Page 4376 line 14: “potion” should be “position”

Interactive comment on Clim. Past Discuss., 10, 4365, 2014.