

## ***Interactive comment on “A review of the South American Monsoon history as recorded in stable isotopic proxies over the past two millennia” by M. Vuille et al.***

**M. Vuille et al.**

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We are grateful to referee #1 for his/her thorough review of our paper. We reply to his/her comments as follows:

1) Lines 2-5, Page 642: I applaud Vuille et al. effort for providing a clear distinction between the ITCZ and the SASM. Readers would also benefit if authors can provide relevant references of studies where this distinction was either blurred or incorrectly applied.

Reply: We appreciate the reviewer’s point but it’s not the idea of this paper to highlight previous papers where this distinction was incorrectly applied. We simply draw this

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distinction to highlight how SASM and ITCZ are related, why they show very different sensitivities to different types of forcings and why the SASM may show signs of intensification or weakening rather than large-scale-latitudinal displacement as it is seen in proxy data for the ITCZ.

2) Lines 11-14, Page 642: Please provide appropriate reference(s).

Reply: The reason for the consistent northern hemisphere location of the ITCZ is nicely described in Takahashi and Battisti (J. Climate, 2007). We will add that reference to the revised version.

3) Lines 14-17, Page 643: While it is generally correct that evaporation returns isotopically more enriched vapor to atmosphere, I suspect that the evaporation during the mid-to-late SASM season (for example during ‘breaks’ ) will return more depleted and not ‘more enriched’ (relative to Ocean) water vapor back to atmosphere. This phenomenon is clearly seen in the south Asian monsoon domain where the late season monsoon rainfall is often quite depleted. Perhaps, authors can offer some additional insight into whether or not this is the case in the SASM.

Reply: When mentioning a ‘more enriched’ water vapor flux due to evaporation, we were referring to more enriched relative to the surrounding water vapor atmospheric composition aloft. We agree with the reviewer that the flux may be depleted, relative to the Ocean. We will clarify this confusion in the revised manuscript.

4) Authors have widely used the term ‘monsoon intensity’ throughout the paper. I take it that they are referring to ‘precipitation amount’. Nonetheless, I would encourage authors to fully describe what they mean by ‘intensity’. I write this because there have been numerous instances in the literature where the word ‘intensity’ has been interchangeably used for describing both rainfall amount and circulation.

Reply: This point is well taken. We do indeed refer to precipitation amount when using the term ‘monsoon intensity’. We do, however, consider precipitation amount

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upstream over the core region of convective activity (box in Figure 1) as representative of monsoon intensity and not the precipitation amount at the individual proxy sites, as it has historically been done when implying to so-called ‘amount-effect’. We will clarify this in the revised version of the manuscript.

5) Lines 21-23, Page 646: Please correct: The Cascayunga speleothem record only extends to \_ 1100 AD not 540 AD!

Reply: Thank you for noting this oversight. This will be corrected of course.

6) Figure 3: Because authors argue that there is a “remarkable” coherence among four records on centennial timescale, it would be perhaps appropriate to show some appropriately smoothing curves to highlight the longer-term trends in the records. I would also suggest to show Moberg’s record only once on this figure. Combining it with each proxy record is over-crowding this figure.

Reply: Rather than smoothing the record, we have decided to highlight the three key periods with common excursions (MCA, LIA and CWP) with a color shaded bar. We believe that this is better suited to identify the longer-term trends. We don’t feel like reproducing the Moberg record is over-crowding the figure (as long as we don’t add an additional, smoothed record), since the individual records are plotted on top in color. Bird et al (2011) used the same design to highlight the coherence between three Andean records over the past 2000 years.

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Interactive comment on Clim. Past Discuss., 8, 637, 2012.

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