

Reply to referee comment 1 of Clim. Past Discuss. 8, C119–C120, 2012 “Changes in the strength and width of the Hadley circulation since 1871” by Liu, J., M. Song, Y. Hu and X. Ren

We would like to thank the reviewer for the helpful comments on the paper. A point-by-point listing of our response to these comments follows.

1. the writing style, grammar etc. could do with some ‘fine tuning’

We made some edits.

2. the findings are, as noted above, interesting but no attempt is made to interpret or explain these in any penetrating fashion. This need not of course matter but provided only that the authors are explicit in respect of acknowledging that the science is not yet at a stage where sound judgements on this matter can be offered.

We agree with the reviewer. In the conclusion section, we now stated that “... we speculate that the width of the Hadley Circulation might have not finished a full life-cycle since the 1870s, which indicates the observed expansion in recent decades might be a reflection of a long-period oscillation. The position of the Intertropical Convergence Zone (ITCZ) is effectively a tracer of the horizontal scale of the Hadley cell (Hu et al., 2007). A growing paleoclimatic proxy evidence indicates centennial-scale oscillatory behavior of the position of the ITCZ for the past several millennia, i.e., the planktic foraminifer Globigerinoides sacculifer in Gulf of Mexico sediments shows distinct century-scale cyclicity of ITCZ (Poore et al., 2004). Although the identified secular variability of the width of the Hadley Circulation is not inconsistent with the paleoproxy evidence, the interpretation of such variability must be treated with caution because the science is not yet at a stage where sound judgments on this matter can be offered.”

3. the question of the natural cycle, invoked as a partial explanation of the above remains unconvincing in terms of real evidence and seems more in the way of speculation. Such speculation is fine but needs to be acknowledged as such.

In this revision, we now stated that “... we speculate that the width of the Hadley Circulation might have not completed a cycle since the 1870s, although there is no guarantee that the behavior of the width of the Hadley Circulation has to be cyclical.” and “... the long-term changes of the Hadley Circulation might be

resolved by a network of proxy observations that describes tropical-subtropical divergence gradients and variations.”