Reply to comment by Dr. H.M.J. Barbosa

H.M.J. Barbosa: It seems that the paper title, which immediately caught my attention, does not correspond to what was done in the manuscript. This was a bit of a downside to me, as I read it with great interest hopping to learn about new dynamical mechanisms that could justify the general inability of models to produce tropical precipitation.

Authors: We apologize for this confusion. We tuned down the statements on SST in the abstract and focus this discussion now in the final parts, where it is used to provide a context for the results we obtained.

H.M.J. Barbosa: The introductory and discussion sections, for instance, explained well how different dynamic mechanisms could be responsible for or linked to tropical south american precipitation, nonetheless, the authors did not explore the already identified mechanisms as possible explanations for the model's biases. Since the authors have the data, can you please show how do CMIP 5 models represent Hadley and Walker circulations?

Authors: The pictures about the pattern of meridional and zonal circulation and vertically integrated moisture transport were made and were included in the supplementary material.

H.M.J. Barbosa: It is also not clear to me why the authors have moisture transport in the title, but did not mention it at all in the introduction section nor reviewed/cited the recent literature, for instance: Drumon et al. JGR-Atmos (2008), Arraut et al J. Clim. (2012), Zemp et al (2014), Drumond et al, HESS (2014), Boers et al GRL (2014).

Authors: The revised version of the manuscript now addresses some of these valuable suggestions, including comments to these citations.

H.M.J. Barbosa: The analysis shown in figure 10 is not explained enough and it is hard to get conclusions from it. Since the authors have the data, can you please show how do CMIP 5 models represent moisture transport over the continent? I mean, show the actual vector field, and its bias.

Authors: The purpose of the figure is to verify how the models simulate the flows entering each edge of the examined area. This is important because moisture entering the Amazon is mainly in the northern and eastern borders, and the figure highlights how the models have difficulty in properly simulating these flows. We rewrote the discussion and conclusions so that this is clearer now.

The vertically integrated moisture transport fields was included in the supplementary material.

H.M.J. Barbosa: I do not think ERA interim moisture convergence can be used as observation. This has lots of error and actually is as bad as the precipitation field from ERA-interim itself. For more details on why one can trust the humidity field (and thus the moisture content and transport) but not the divergence of a reanalysis product see, for instance Arraut et al, J. Clim. (2012). I suggest removing this analysis and using the extra space to further discuss the points above.

Authors: The ERAI reanalysis data are used for various analyzes and has proven to be one of the best reanalysis on Amazon when compared for example, to the Modern-Era Retrospective Analysis for Research and Applications [MERRA, NASA] and Climate Forecast System Reanalysis [CFSR, NCEP]) (Lorenz and Kunstmann, 2012). We stressed in the text that they are reanalysis and not data *sensu stricto.*

Reference: Lorenz, C.; Kunstmann, H. The hydrological cycle in three state-of-the-art reanalyses: Intercomparison and performance analysis. Journal of Hydrometeorology, 13, 5, 1397–1420, 2012.