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Interactive comment on "The Indian summer monsoon climate during the Last Millennium, as simulated by the PMIP3" *by* Charan Teja Tejavath et al.

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Modified response to question 3 of Reviewer 2. Consider this new response of question 3 and previous response may be discarded. Sorry for the inconvenience happened.

(3) Apart from the Walker circulation changes, does the land-sea thermal contrast change in the upper-troposphere also play an important role for the ISMR variability during the LM? If yes, can we further attributed to the external forcing drivers? Since the correlations between ENSO and the ISMR may differ on the multi-decadal-to centennial scales from that on the inter-annual timescales.

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Response:

Thank you for the very important comment. We have checked the simulated land sea thermal gradient. Our new analysis shows a weakening land sea gradient at the 850 hPa (e.g. Sinha et al., 2015; Roxy et al., 2015) during LIA compared to MWP in five out of eight models, and also in the upper troposphere (e.g. Goswami et al., 2006; Wang et al., 2013). . Having said that, it is difficult to say whether this is related to the decadal circulation changes associated with ENSO, or independent of them. We cannot also comment whether such changes are associated with external forcings such as volcanoes, unless we conduct sensitivity experiments with AGCMs. Unfortunately, carrying out such experiments is beyond the scope of the current study. These aspects are also reflected in the revised text.

Proxy data analysis (and model experiments) by Schurer et al., (2012) suggest that, the solar changes and increased volcanism are relevant for the climate conditions since 1400 CE. The greenhouse gases may have played a role even around 1600AD and later. However, only half of the proxy datasets used by them suggest any such role of external forcings during the medieval warm period. The paper by Schurer et al., (2012) also suggests that models are unable to reproduce the warming associated with such external forcing around 1000CE. Phipps et al (2013) suggest that detectable weak volcanic signal in Northern Hemisphere temperatures during last 1500 years, but a strong and robust volcanic signal in Southern Hemisphere (Phipps et al., 2013). They claim, bases on their model-cum-proxy data analysis that greenhouse gases, solar irradiance, and volcanic eruptions all influence the mean state of the central Pacific, but there is no evidence that natural or anthropogenic forcings have any systematic impact on ENSO. Just for information, Eurasian snow cover, land sea contrast, Atlantic variability, etc. are some of the other forcings suggested in addition to the tropical Indo-pacific drivers.

Sinha, A.ÂăetÂ al. Trends and oscillations in the Indian summer monsoon rainfall over the last two millennia.ÂăNat. Commun.Âă6:6309 doi: 10.1038/ncomms7309 (2015).

Goswami, B. N., Madhusoodanan, M. S., Neema, C. P. & Sengupta, D. A physical mechanism for North Atlantic SST influence on the Indian summer monsoon. Geophys. Res. Lett. 33, L02706 (2006). Wang et al., 2013. Northern Hemisphere summer monsoon intensified by mega-El Nino/southern oscillation and Atlantic Multidecadal oscillation. Proc. Natl. Acad. Sci. USA 110, 5347–5352. Schurer et al., 2012. Separating Forced from Chaotic Climate Variability over the Past Millennium. 6954 JOURNAL OF CL IMATE VOLUME 26. DOI: 10.1175/JCLI-D-12-00826.1 Phipps et al., 2013. Paleoclimate Data–Model Comparison and the Role of Climate Forcings over the Past 1500 Years. 2013 American Meteorological Society. DOI: 10.1175/JCLI-D-12-00108.1

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