General comments:

By using the available model simulations from the PMIP3, the authors study the mean summer climate and its variability in India during the Last Millennium, with emphasis on the Medieval Warm Period (MWP; CE 1000-1199) and Little Ice Age (LIA; CE 1550-1749). The models simulate higher (lower) mean summer temperatures in India as well as globally during the MWP (LIA) as compared to the corresponding LM statistics. The Analysis shows a strong negative correlation between the NINO3.4 index and the ISMR and a positive correlation between NINO3.4 and summer temperature over India during the LM, as is observed in the last one-and-half centuries. The above (below) LM-mean summer temperatures during the MWP (LIA) are associated with relatively higher (lower) number of concurrent El Niños as compared to the La Niñas. There is a westward shift in Walker circulation during the MWP, and the anomalous divergence center in the west also extends into the equatorial eastern Indian Ocean, which results in an anomalous convergence zone over India and therefore excess rainfall. It is important to understand the Indian summer monsoon rainfall (ISMR) variance and aspects of its possible causes, simply because many severe social and economic impacts are associated with ISMR anomalies. This simulation result well describes major aspects of the ISMR and the possible dynamics. I regard the manuscript by Tejavath et al. is suitable to be published by Clim. Past after some moderate revisions.

Specific Comments:

(1) Paleoclimate reconstructions from proxy data suggest that during the MWP, a cooler tropical eastern Pacific, referred to as a La Niña-like background state, is reconstructed. However, this is not evident in the PMIP3 model simulations. Almost all the models except one consistently simulate more El Niños as compared to La Niñas during the MWP compared to the LIA.

In P.14, the authors state that "It is known that the El Niños (La Niñas) cause anomalous increase (decrease) in global temperature. Therefore, a predominant presence of higher number of simulated El Niños as compared to La Niñas in almost all the models is the reason why the simulated MWP is warmer as compared to the LIA. Given this agreement across the models, we can surmise that, in real world too, the MWP is likely due to the occurrence of a relatively higher frequency of El Niños as compared to the La Niñas".

I think this statement is not reasonable. The reconstruction exhibits a La Niña-like pattern in the tropical Pacific during the MCA (Cobb et al. 2003; Graham et al. 2007; Mann et al. 2009). Besides, the La Niña-like condition is reproduced in simulations employing the simplified Zebiak-Cane model of the tropical Pacific coupled ocean-atmosphere system (Mann et al. 2005), which exhibits a stronger dynamical feedback than most global models. Thus, it is not correct to say that in real world, the MWP is likely due to the occurrence of a relatively higher frequency of El Niños as compared to the La Niñas" just from the perspective of model results. The global temperature changes may have been driven by the effective radiative forcing during the past millennium. However, there is little evidence for globally synchronized MCA and LIA

intervals, with the specific timing of these intervals varying regionally, which may have been dominated by the internal variability.

Cobb, K., C. Charles, H. Cheng, and R. Edwards, 2003: El Nino/Southern Oscillation and tropical Pacific climate during the last millennium. Nature, 424, 271-276.

Graham, N. E., and Coauthors, 2007: Tropical Pacific-mid-latitude teleconnections in medieval times, Climatic Change, 83, 241-285.

Mann, M. E., M. A. Cane, S. E. Zebiak, and A. Clement, 2005: Volcanic and solar forcing of the tropical Pacific over the past 1000 years. J. Climate, 18, 447-456.

Mann, M. E., and Coauthors, 2009: Global signatures and dynamical origins of the Little Ice Age and Medieval Climate Anomaly. Science, 326, 1256-1260.

(2) The simulated ISMR anomaly shows a weak decreasing trend throughout the LM. The authors also attributed the possible dynamics to the more number of El Niños during the MWP as compared to the LM. The distribution of summer velocity potential at 850 hPa suggests a westward shift in Walker circulation, and the anomalous divergence center in the west also extends into the equatorial eastern Indian Ocean, which results in an anomalous convergence zone over India and therefore excess rainfall during the MWP. It is good that the model results are inter-consistent by themselves. Proxy records also suggest that the ISMR was higher during the MWP and relatively weaker during the LIA (Yadava et al. 2005). A speleothem-based reconstruction of ISMR variability exhibits an increased summer monsoon

precipitation during the MWP and a severe weakening of monsoon rainfall during the LIA, apparently associated with droughts particularly between 13th and 17th centuries. However, proxy reconstructions show opposite ENSO conditions as compared with the simulations during the MWP and LIA periods, how can we explain the ENSO-monsoon relationship and the possible dynamics from the reconstruction perspective?

(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.

Typing errors:

(1) P.16, Line 16, there are two “due to”, delete one.