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Interactive comment on "Understanding land surface response to changing South Asian monsoon in a warming climate" *by* M. V. S. Ramarao et al.

Anonymous Referee #1

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The manuscript by Rao et al. is an attempt to understand the changes in land surface processes under a global warming scenario. They use the simulations from LMDZ, which is coupled to the ORCHIDEE LSP model. The work is useful and timely. While results from a single model on such issues cannot be the last word, they provide a possible scenario of what may happen, with plausible dynamical and physical explanations, thereby providing a basis for other relevant science research and policy making. From this context, I find this work to be straight, clear, and adequate. The manuscript has been written well. I suggest that the manuscript be formally published after incorporation of the following minor comments. Specific Comments 1. The authors apparently use the APHROITE datasets to validate the LMDZ simulations. I wonder how well

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the LMDZ simulations compare with the Rajeevan datasets, which are also available at 0.25 degrees resolution. Further, in a recent paper, Collins et al. (2013, Nature Climate Change), have shown that there is a lot of spread in the available rainfall datasets for India, which will have serious implications for model validation. I suggest that the authors at least make a brief comment about how the LMDZ model results compare with the Rajeevan rainfall observations. 2. Page 4: Ground water depletion is a complex issue. It may not necessarily be due to a rainfall decrease, but can be due to increased use by expanding habitats that do not have access to municipal water. 3. Last paragraph, page 7: It is clear that bias-corrected SST was used for the historical simulation. How about that for the RCP simulation? If the authors apply the same bias for the current climate, they should clarify this. This is bit of an issue that the bias may change with the future climate, and this need not even be linear. If this comment is applicable, the authors should briefly discuss this limitation. Having said that, I can see some value in use of such technique. 4. I wonder whether the LMDZ model captures the rainfall peak over the Bay of Bengal. 5. It is not clear whether the coupling of ORCHIDEE to the LMDZ is two ways, or essentially in offline. This needs to be mentioned. Technical comments 1. The figures 4c and 5c look rather cluttered, and unclear.

Interactive comment on Earth Syst. Dynam. Discuss., 6, 943, 2015.