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Climate of the Past Discussions

Interactive comment on "Assessing the impact of large volcanic eruptions of the Last Millennium on Australian rainfall regimes" *by* Stephanie Blake et al.

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Dear Reviewer,

Thank you for taking the time to read and comment on our paper. Your review was very helpful and we plan to make several important revisions in response to your recommendations.

There are five major concerns you outlined: 1) The set up and content of the introduction – In light of your comments, we agree that the Introduction could be more informative and structured. We plan to change the introduction to begin with an expla-

nation of Australian rainfall, rather than the ENSO or IOD, and clarify the uncertainties in the relationship between volcanic aerosols and Australian precipitation. 2) Lack of model evaluation - The GISS E2-R model has undergone evaluation in previous studies in reference to global precipitation and surface temperature (Dee et al., 2010; Flato et al., 2013; Schmidt et al., 2014), Australian precipitation and surface temperature (CSIRO and Bureau of Meteorology, 2015) and the ENSO and IOD (Flato et al., 2013; Schmidt et al., 2014). We plan to include an additional literature review of these results in the simulations section as a justification of GISS's ability to simulate key climate aspects examined in this paper. 3) Lack of spatial figures dedicated to Australia – While we understand your concerns here, we believe the results from this paper will be of broader interest, so we have chosen to show global maps. We believe the maps are sufficiently detailed to show the Australian response, as well as the broader one, and thus, chose not to include maps dedicated solely to Australia. 4) Comparing the response of the largest and smallest eruptions – While a comparison of all 6 eruptions individually to the IOD, ENSO and Australia rainfall is feasible, we believe that providing the overall multi-ensemble multi-volcanic mean as well as the multi-ensemble mean for the largest and smallest eruptions individually was sufficient to support the arguments made in this paper. We are not arguing that larger eruptions will exponentially cause stronger responses in Australian rainfall, the IOD and ENSO, however we do argue that significantly larger eruptions e.g. Samalas (257.91 Tg) when compared to Huaynaptina (56.59 Tg), are more likely to cause a stronger and more persistent response, which the graphs provided, do show. We will modify the discussion section to clarify this aspect of the paper. 5) No examination of physical mechanisms - We shall conduct a further examination of the physical mechanisms, to contribute to our study's agreement with previous work in the results and discussion.

Your more specific remarks on the clarification of certain lines or statements were also noted and appreciated, and those changes will be made.

Once again, we thank you for your comments. We hope that you agree that our re-

sponse has addressed your concerns.

Regards, Stephanie Blake, on behalf of the authors

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