Response for: "Evaluation of Asian summer precipitation in different configurations of a high-resolution GCM at a range of decision-relevant spatial scales"

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Response from authors to reviewer 2

Many thanks for your anonymous review. We have addressed each point in turn below – our responses are in blue. We hope that these satisfy you and we expect that the suggested changes to our manuscript below would improve its structure and its connection to the wider literature.

Reviewer 2

The manuscript deals with an important issue – i.e., the influence of different configuration schemes of convective parameterization of a high-resolution GCM in simulating the Asian monsoon rainfall. The study finds all the configuration produces substantial bias at the very fine resolution but increases its efficiency for the larger basis with fewer precipitation biases. I have some comments on the manuscript, which authors should address during their revision:

(a) The manuscript structure at present is very difficult to follow. I had to go back and forth with the figures to understand what especially authors has to say. This comment applies to both the main manuscript and supplementary figures.

> We believe part of the problem you had is with the figures being split between the main manuscript and the supplement. We will change the figures in the main manuscript so that they contain the hybrid simulation in addition to CMORPH and the explicit/parametrized simulations (see our separate response to RC1 (b), where we say we will include more information in the main manuscript from the hybrid simulation, and which figures we will change). This should, we believe, address your main concern, as it will make the information more accessible and mean that less jumping backwards and forwards is required.

(b) The authors should substantially change the conclusion part. They are just repeating the already mentioned aspects from the results section. I did not get what the authors have to conclude from the work.

> The conclusion has to cover the main results, and hence some repetition is inevitable. However, we will endeavour to shorten the conclusion, as well as offering some further interpretation of our results (see our separate response to RC1 (f). In particular, we would address the following: longer simulations in the future; process-based analysis; and intraseasonal drivers of variability of the EASM).

(c) The usual challenges faced by the policymakers are the information at the fine spatial resolution. The analysis conducted by the authors seems that there is significant bias – specifically over the indo-china peninsula, at a very fine resolution for all the configurations. As the author mentions in their paper that it is computationally difficult to perform such analysis, researchers, therefore, tend to use some of the other techniques such as statistical downscaling (See Kulkarni et al., 2014 for example). There should be some discussion about this in the revised manuscript.

> This is a good point. We have read the cited paper, and note that the statistical downscaling provides a more realistic precipitation field at higher resolution than is possible from the CMIP5 GCMs, for example improving the representation of orographic precipitation near the Western Ghats and near the Himalayas. This is an alternative way of generating high-resolution precipitation data, but we note that the fact that the GCMs are coarser means they will not be able to resolve fine-scale features, and that running them without a CPS is unlikely to yield meaningful results. Additionally, high-resolution GCMs provide consistent physics at all scales, and so their use for representing complex phenomena such as the EASM and other monsoon systems has the potential to be beneficial. We will add a citation and short discussion of this to our manuscript, along the lines of what we have written here.
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> As we have noted, our high-resolution simulations were computationally demanding. Future simulations are planned, which, thanks to improvements in performance and more powerful computers, can be run for 30 years with a 3-member ensemble. These will allow for a better characterization of the climatology of the simulations.

References:

Shashikanth, K., Madhusoodhanan, C. G., Ghosh, S., Eldho, T. I., Rajendran, K., & Murtugudde, R. (2014). Comparing statistically downscaled simulations of Indian monsoon at different spatial resolutions. Journal of Hydrology, 519, 3163-3177.