

Interactive comment on “Selection of multi-model ensemble of GCMs for the simulation of precipitation based on spatial assessment metrics” by K. Ahmed et al.

Anonymous Referee #2

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The authors have evaluated precipitation simulation of 20 CMIP5 GCMs for Pakistan, and developed multi-model ensemble mean at annual and seasonal timescales. The topic is relevant to the journal and the findings are interesting. The authors have shown the application of random forests for MME, which is somehow novel. However, the study needs substantial improvement in explaining the methods. The details of some of the methods are missing and should be further explained. Please find more detailed comments in the following:

P refers to page number and L is the line number (please consider using continuous line numbering in future publications).

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1. P1, L13: “number metrics” » “number of metrics”
2. P1 L14: “very little attention has been given to spatial performance of GCMs” » Better to rephrase this sentence, since several studies have considered both spatial and temporal characteristics for evaluating GCMs.
3. P2, L4: “land and ocean temperature” » “land and ocean surface air temperature”
4. P2, L26: “better GCMs are assigned higher weightages” » “higher weights are assigned to better GCMs”
5. P2, L31: “is climate change modelling” » “in climate change modelling”
6. P3, L7: “such as such as” » please remove the redundant “such as”.
7. P5, L25: “five . . . measures” » six measures are introduced here. Please revise the number.
8. P6, L4-5: did you apply these measures on each grid? Or are they applied on temporally averaged data? For instance, how is KGE calculated? Please explain.
9. P5, L8-9: “comprehensive rating metric” » what does this indicate? How were the ranks of GCMs (from different measures) combined? Do you mean like averaging the ranks? If so, “comprehensive” is misleading and it is better to be revised.
10. P6, L28: Eq (1) seems to be the equation for KGE. Please make sure to provide the equation for SPAEF here.
11. Section 3.1.1: I am still not sure how the measure is calculated? Is it applied to each grid ($2^\circ \times 2^\circ$), and then maybe the spatial mean value of KGE is considered? Or, did you take the long-term average of precipitation and then calculate the KGE for a few grids?
12. Section 3.1.5 is not clearly explained. A, B, and C need more explanation. What do you mean by “total area of historical and GCM simulated maps”? Is this the coverage

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area? If so, then both GCM and obs have the same number of grids and the areas should be identical in all cases. In addition, what does “the degree of intersection (for C)” refer to? How can one quantify such thing? Is there a function for calculating it? These need to be clearly explained.

13. P11, l2: “can be reduce” » “can be reduced”

14. Section 3.4: There is no explanation about the details of the random forest method. How many trees were included? What are the inputs to the model (time series of 4 selected GCMs)? Is the model applied separately for each grid, or did you employ a consistent model for the entire study domain? How long is the training and testing periods? How did you evaluate the performance of the random forest outputs?

15. Figure 4 caption: Does the figure show long-term average values for different grids? Or, does it show spatial mean precipitation in various years. Please clarify it in the caption and the text, and mention the period for it as well.

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