Comment on gmd-2021-54

Anonymous Referee #1

Referee comment on "Precipitation over southern Africa: is there consensus among global climate models (GCMs), regional climate models (RCMs) and observational data?" by Maria Chara Karypidou et al., Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2021-54-RC1, 2021

General Thoughts:

The paper presents an analysis of precipitation in Southern Africa from RCMs, CMIP5 and 6, GCMs and observational data during a historical period from 1986-2005. The authors make use of several groupings of RCMs, GCMs and observational data into ensembles for a more thorough analysis. The focus of the paper is on the differences in annual and monthly rainfall in the southern Africa region between the different sets of ensembles and in terms of various metrics of rainfall. The paper also compares the trend in rainfall over this historical period between the RCMs, GCMs, and observational ensembles to understand the fidelity of the models compared to observed datasets in this region. In general I find the paper well sourced and written however there are some instances where I find the wording confusing. I find the scientific analysis of the paper quite sound and thorough. My main concerns with the paper are that the novelty of the paper within the context of model development is not clearly defined. I also find the analysis and conclusions quite general and I think the focus of the paper could be improved.

Major comments:

1) I recommend more clearly laying out what the novelty or newness is of this work. Based on previous work it seems that precipitation in this region has been studied in similar ways before. Why is the method/results/approach in this work an improvement on those studies?

2) In the second to last paragraph of the introduction the purpose and goals of the paper are given but there are several different statements of goals which I find somewhat unfocused. Is there a main goal that can be defined? It seems that the main focus of the paper is on how the RCM ensemble can be shown to be more useful for precipitation projections over this region compared to the GCMs but this is not clear. From the abstract it is also not very clear what are the main results the reader should see.

3) My understanding is that the CORDEX-Africa 0.22 degree data are available. If so why was the older 50km dataset used when a newer one was available?

Minor comments:

1) Line 17: SAF hasn't been defined yet, it should be defined here

2) Lines 22-23: "…a similar behavior to CMIP5, however reducing slightly the ensemble spread." I would replace 'however' here with 'but'

3) Line 61: Over what period is this trend seen? I assume it's a historical period but it would be good to explicitly say it here.

4) Sentence starting at Line 71 "However,…": This sentence is a little bit confusing I would recommend removing 'still' and the comma between 'period' and 'persist'.

5) Line 90: Provide more detail of what will be addressed in the results section (Section 3). For instance describe the subsections of the results and what will be covered.

6) Line 107: Should this be "less **than** or equal to"?

7) Line 183: How was the calculation of standard deviation done to get the within-ensemble agreement? Was the monthly mean of over the 1986-2005 period calculated for each model first and then the SD of the ensemble taken?

8) Figures 1,2 and 7: The alignment and spacing of the panels is not consistent. I recommend making sure the Figures have consistent spacing and are aligned to improve their visual aesthetic.

9) Lines 355-356: Expand on what improvements can be made. This is an important statement for readers who may be interested in expanding on this work.