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Hydrology and Earth System Sciences Discussions

Interactive comment on "Applicability of ensemble pattern scaling method on precipitation intensity indices at regional scale" *by* Y. Li and W. Ye

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Comment: General Comments This research uses climate model projections to study changes in future precipitation intensity indices in Australia. The results are relevant to regional climate change impact in Australia, and the methodology could be transferable to other region in the world. However, I have two general problems with the paper in its current format. Firstly the result (section 3) need to be made more concise. In its current form it is difficult to extract most relevant and noteworthy pieces of information. In fact the whole paper could be edited to make it clearer. Secondly the clarity of the English in the paper needs to be addressed (see specific and technical corrections below).

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Interactive Discussion

Discussion Paper

Response: Section 3 (result) and the whole MS was shortened with focus being put on national level.

Specific and technical comments

P5228, lines 2-4: This opening sentence is not grammatically correct. Rephrase and define a GCM.

Response: Corrected. Comment:

P5228, lines 9-11/15-17: Rephrase the English. Also, I think for numbers under 10 the number should be written out (e.g. 3 should be three). This occurs throughout the paper.

Response: Corrected. Comment:

P5229, lines 2-7/21-23: Rephrase. These sentences are too long, and are thus difficult to understand.

Response: Corrected. Comment: P5230, lines 15-16: What does “in proportion with the global warming trend” mean? I think you need to elaborate on this point.

Response: Rephrased.

Comment:P5230, line 22: Rephrase - incorrect English.

Response: Rephrased.

Comment: P5232. Add a table describing the 12 models and their characteristics (i.e. grid resolution, institution that built them).

Response: Table added.

Comment: P5232, lines 10-12: What does “GCM-internal ensemble” mean? Please define this concept.

Response: The GCM-internal ensemble made use of the 6 simulation runs (2 periods

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× 3 emission scenarios) of a given GCM in calculating the normalized pattern value for each grid cell. (Also added in MS).

Comment: P5232, line 14: define GHG.

Response: Done.

Comment: P5232, lines 18-19: It may be best to rephrase "randomness: : :" and say about the non-linearity (chaotic nature) of the climate system.

Response: Done.

Comment: P5233, line 8: Are there 72 ensemble members? If so please say so to make it is easier for the reader (e.g. N=72).

Response: 6 ensemble numbers for each GCM from 2 simulation periods x 3 emission scenarios. Detail in MS.

Comment: P5233, line 15/19-20: This needs more explanation. I have always been told that an ensemble average is better (than the median) because an average takes into account all the information in the ensemble. Also, give some details on the bootstrapping and L-moments method that you have applied (not just referencing other authors).

Response: The median value is preferred in this study because the ensemble seize is relative small, i.e., 6. When the sample size is small, any outlier will have significant influence on the average value. It would require quite a lot space to explain in detail the bootstrapping and L-moment methods. As these methods were just used for analysing the result, no improvement and/or modification was made to them, hence we decided to let reader to find the details from references.

Comment: P5234, lines 21-23: Rephrase, as it is confusing in its current format.

Response: Rephrased

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Comment: P5236, line 12: It is not possible to tell what models refer to what numbers in Figure 2. I know that you have mentioned the models (and numbers) in the text, but a table would make it much easier to interpret these results instead of trying to find the model numbers in the methods section (see comment above).

Response: Model names were used in the Figure in this MS.

Comment: P5237, lines 6-7: “significant” should be “significance”. Response: Corrected

Comment: P5239, line 23: Remind readers what the three precipitation indices are for ease of reading.

Comment: P5240, line 3: “ECHAM_MPI” is not the name format of this model in Table 4. Response: Corrected

Comment: P5241, line 2: “quantified” would be a better word than “analysed”. Response: Corrected

Comment: P5241, lines 18-20: Have you got a reason for this result? Response: Possibility due to the difficulties of GCM in simulating the precipitation in the arid regions such as the inland area Australia. (Also added in the MS) Comment: P5241: “SD” is used earlier in the manuscript, so please define it when it first appears. Response: Defined.

Comment: P5242, line 18: “prediction” should be “projection”. Response: Corrected

Comment:P5242, line 21: What are the “certain effects”?

Response: What we mean is that, within an ensemble approach, provided the members of the ensemble are independent, a larger the ensemble size could lead to a more reliable statistical result. (Also revised in MS)

Comment: P5242-43: Be careful not to dismiss the results of your work. By saying that the small sample size was insufficient, you are saying that your results are not good. I

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would recommend rephrasing. (The same applies to lines 1-9 on P5244).

Response: Rephrased

Comment: P5244, line 24: “good compromised method”. It is unclear what you mean here. Please rephrase. Response: Changed to one of the practical methods.

Comment: P5245, line 23: Should “10th and 90th” be followed by percentile? Response: Corrected

Comment: P5245, line 27: It would be best to say “the two other extreme precipitation indices”. Response: Corrected.

Comment: P5245, lines 28-29: Parts of this sentence needs to be rephrased. Also, I am not sure that this does show the random nature of precipitation. Perhaps, the GCMs just can’t resolve extreme precipitation?

Response: Agreed. Changed to “The $\triangle$RP’20 , which is the most extreme index among the three, had the lowest number of GCMs showed significant linear correlations to $\triangle$T, indicating the random nature as well as the limitation in GCM simulation for precipitation when it becomes more extreme .”

Comment: Tables: In the text you have generally used “significance level”, but in the tables you have used “confidence level”. It would best to be consistent in the manuscript. Also,some where in the text the Australian Territories should be defined, as not everyone will know what NSW, NT, QLD etc means.

Response: Agreed and corrected.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 5227, 2011.