

Interactive comment on “Precipitation bias correction of very high resolution regional climate models” by D. Argüeso et al.

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The manuscript tries to call attention to the existing assumption used to bias-correct regional climate models' precipitation, which is that the RCM produces the same or a higher number of rain days than the observational datasets (e.g. gridded datasets). However, with higher resolution RCM, this assumption will be invalid. The higher resolution RCM will produce fewer rain days than the gridded observation. To offer a solution for this emerging problem in future simulation, the manuscript proposes a method to use station data directly to correct the very high resolution RCM outputs. In general, this manuscript is well written and has potential influences on the community. Therefore, the suggestion is to accept this manuscript, with minor revision. There are some

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details required to be described explicitly. General Comments:

1. It is understandable to use gridded dataset to do the regionalization by using the multi-step method, due to its continuity in space and time. However, the reference data used to regionalize climatological affinity of precipitation is crucial in interpreting the final results. Therefore it is important to explain why use the AWAP data set to do the regionalization, instead of using station data. Is it simply due to data continuity issue or is there any other issue? If only AWAP data set can be used, at least, the check on comparison in monthly climatology of precipitation in different region, between the AWAP and the station data should be implemented.
2. Before doing the comparison mentioned above, the general comparison (e.g. pattern in time and space) between the two datasets will help readers understanding more about the data set.
3. The approach has been described very clearly. However, the mathematic forms related to the algorithms should be present in details. It is important for readers who are interested in the methodology, and tries to repeat the same approach with their own datasets. Please list all equations related to the methodology used for the new paradigm.
4. Why the 5 nearest stations? Why not 3 or 6? Please discuss more on this point.
5. Why the penalty factor is 0.5? Why not 0.7 or 0.1? Please discuss more on this point. The determination of the threshold value is important.
6. Instead of saying 5 nearest stations or a penalty factor of 0.5, the sensitivity analysis on the choice of the number of the nearest stations, or the penalty factor should be implemented to enrich the content of the manuscript.

Minor Comments:

1. On page8152, in line 21, the author mentioned the topography effect. However, what is the detail related to this topography effect is not presented. Please detail the

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statement on this point.

2. On page 8153, paragraph starting from line 20, why the traditional probability distribution function is abandoned? You should present both results to demonstrate the statement in this paragraph.

3. On page 8153, in the paragraph starting from line 14, it is indeed the argument that the correct distribution of events according to their intensity as well as their occurrence is crucial to evaluate the risks and characterize their possible impact. However, there are no results or discussion related to occurrence being presented in the manuscript. This should be examined to enrich the content of the manuscript. The importance of occurrence time of precipitation should be addressed, associated with the precipitation density. It will help assessing climate impacts on the local region.

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