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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Technical note: Changes of cross- and auto-dependence structures in climate projections of daily precipitation and their sensitivity to outliers" *by* Jan Hnilica et al.

Anonymous Referee #2

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The manuscript deals with the temporal and spatial dependence structure of climate model simulated daily precipitation. Especially, the authors analyse the bias and changes in auto- and cross-correlation of simulated precipitation by coupled global and regional climate models (GCM, RCM, respectively) related to simulated outliers. They found, that a few simulated outliers can have a strong influence on both serial and cross correlations and provide a scheme to remove the outliers for downscaling procedures which rely on dependence.

The paper is not easy to follow and methods are arguable. I personally have problems with the following issues. First, there is a scale mismatch between observation

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(∼25x25km) and RCM simulated precipitation (∼10x10km), which is usually the other way around. Why do the observation here not have a higher spatial resolution. Interpolation of observation leads to smoothing and to overestimation of dependence (likely as stronger as coarser the scale). This is not considered for bias calculations. Even with smoothed observations the fields may still contain outliers (for some cells and days), which is not discussed, either. Second, I would not include the days with zero in all calculations. This may hurt the pre-conditions for analysing Pearsons correlations and distort the picture if the number of rainy days changes from past to the future or is different from observations to models. It would be better to analyse this separately (e.g. by using binary correlations and wet day correlations). Third, the use of catchments instead of corresponding rasters makes analyses and corrections very specific to the application and hardly transferrable. Finally, I doubt that such a "big" procedure is necessary to solve the problems of simulated outliers. May be a class-wise or trimmed calculation of correlations would be a simpler solution. Altogether, I am neither convinced that the topic is sufficiently researched in the paper nor that the proposed methodology for outlier removal is necessary and suitable. For these reasons I am sorry that I cannot recommend publication of the paper in its current status. I hope these remarks may help for further research on this topic. I am not including detailed comments at this stage, since I think first the major issues need to be solved.

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