

## ***Interactive comment on “Scaled distribution mapping: a bias correction method that preserves raw climate model projected changes” by Matthew B. Switanek et al.***

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Dear Dr. Uwe Ehret,

The authors would like to thank you for your valuable comments and suggestions. You have summarized well our analyses and have agreed that our proposed method is a reasonable advancement of existing bias correction methods. The authors appreciate your concerns regarding the validity of bias correction methods, and we have now included an additional paragraph highlighting these issues. The “Conclusions” section now begins:

“Bias correction methods are used extensively in impact assessment studies (Ines and

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Hansen, 2006; Muerth et al., 2013; Teng et al., 2015). The application of these methods, however, is not without controversy (Ehret et al., 2012). A number of important questions that require consideration are: 1) Does independently applying bias correction to different meteorological variables (separately to precipitation and temperature) adversely alter the thermodynamically consistent spatio-temporal fields provided by climate models? 2) Do bias correction methods avoid pushing the corrected values beyond physically realistic limits? 3) Can GCMs/RCMs with large biases be reliable in their projections of climate change? 4) How can substantial model deficiencies not simply be falsely treated as bias and corrected as such? These are difficult questions, and more reflection and investigation is required before we find answers that are indisputable. In any regard, for the foreseeable future, there will continue to be scientists that use bias correction methods for impact assessment studies.”

Unfortunately, we cannot address or answer all of these questions in this paper. It is outside the scope of our manuscript. Our primary contribution has been to provide a method that does not rely on faulty assumptions (found in other methods) while more accurately preserving raw climate change projections across the entire distribution. We agree that these issues you raise need to be considered. However, answering these questions is far from an easy task. We are not aware of any publications where these questions have indisputably been put to rest. It is important that the scientific community continues to explore where, when and why bias correction could or could not be valid. During this ongoing process, researchers will still make the choice to bias correct climate model output data. Our proposed method provides a more robust and justifiable approach for impact modellers to use while these more challenging questions are pursued and become more well understood.

Thank you again for your thoughtful review and for highlighting these difficult but important questions.

Yours sincerely,

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