Geoscientific

Model Development

Discussions

[GMDD]

Interactive

comment

Interactive comment on "Climate projections of a multi-variate heat stress index: the role of downscaling and bias correction" *by* Ana Casanueva et al.

Anonymous Referee #2

Received and published: 6 April 2019

This study examines simulations of a climate indicator over Europe with implications for human health (heat stress index, Wet Bulb Globe Temperature (WGBT)). Bias corrected simulations from both Global and Regional Climate Models (GCMs and RCMs) are compared with the goal of determining the added value provided by the RCM in this scenario as well as more complex BC methods (QM vs ISIMIP). One novel aspect of this study in particular is the fact that the WBGT is multi-variate as it is based on both temperature and dew point temperature, which adds considerable complexity in the context of assessing the value of bias correction methods due to intervariable relationships. Overall, the manuscript is very clear, concise, and provides some evidence to support its conclusions, in particular that the chosen RCMs added little value with

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respect to the GCM after bias correction. The authors have properly acknowledged some major caveats to this conclusion, including (1) Only 1 GCM was used in the comparison between RCMs and (2) Regridding the high-resolution RCM simulations to the much coarser reference dataset may reduce any potential added value they would have otherwise provided. These open up several avenues for future work.

Specific Comments:

- Page 5, Line 31: Given the issues you had to account for due to the 360-day calendar in HadGEM-ES, why did you select it for this study over other CMIP5 GCMs which have more standard calendars?

- Page 6, Lines 4-6: Could you also be more specific in regards to what beneficial features aren't smoothed out from the high-resolution simulations after regridding?

- Page 11, Lines 20-25: Some interpretations which explain these results would be nice to have here, in particular to explain the lower skill in Scandinavia for the RCMs. It might be helpful to see some additional maps showing the standard deviations of daily max temperature and daily mean dewpoint temperature.

- Page 14, Lines 27-28: This would be a bit beyond the scope of this paper, but given that the RCMs chosen in this study are still coarse enough to require many parameterizations, I would be interested in seeing future work examine the robustness of this conclusion for convection permitting models.