Overall comments

This paper describes the differences between ways to achieve bias correction. The outcomes are qualitative in nature so it is difficult to see if they have managed to achieve their aims, as no confidence intervals can be put around the results to examine if they were achieved. For an area that is very keen on numerate approaches I was a little surprised they did not use a statistical approach to differentiate between the differing adjustments for bias.

► We appreciate the reviewer's helpful comments. In the revised manuscript, we added the Kolmogorov–Smirnov (K-S) test to check the maximum differences between the observed and modelled empirical cumulative distributions and offer a quantitative comparison of the modelled distribution from different BC methods.

Also, for the calculation of Spearman correlation, we set a confidence interval of 99% and the information is added to the text and figure caption in the revised manuscript.

Section 3

To assess the quantitative differences in the marginal distributions corrected by different BC methods, Fig. 5 (a , b, e, f) presents the maximum differences calculated from the Kolmogorov–Smirnov (K-S) test (Eq. S3) between the observed (i.e., ERA5) and bias-corrected empirical cumulative distribution functions (CDFs). A smaller value stands for a better correction output. For the direct correction, QDM and MBCn show better performances than LS and VA across all the indices and matrices considered. However, for indirect correction, MBCn shows its unique advantage in the multivariate index depending unequally on the components (i.e., WBGT' in this study), that it can provide a similarly good result in either the direct or indirect correction. In this aspect, QDM shows the largest difference between the direct and indirect applications. Fig. 5 (c, d, g, f) is the D value calculated between outputs from direct and indirect applications of the same BC method, and a smaller value stands for more similar outputs. It clearly indicates a higher similarity seen in the multivariate method than the univariate methods in WBGT, as MBCn successfully retains the intervariable dependence during the correction procedure.

Since the heat-stress indices are functions of T and RH, we investigate the T vs. RH Spearman's rank correlation at a confidence interval of 99% ~~(p-value < 0.01)~~ using daily T and RH at the time when the heat-stress indices reach their daily maxima (Fig. 78).

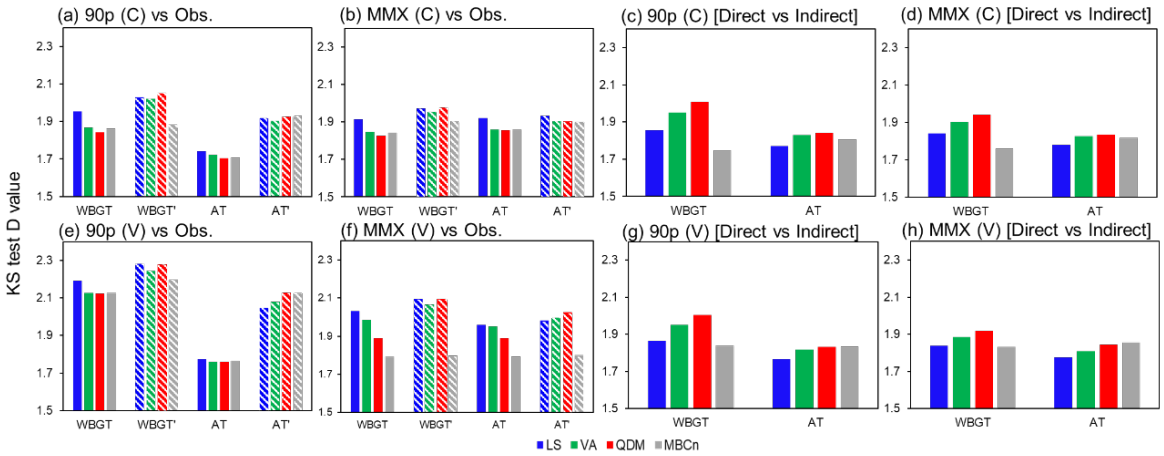

Figure 5: K-S test D value between bias-corrected output and observation for (a,e) 90p, and (b,f) MMX, and between direct and indirect corrected output for (c,g) 90p and (d,h) MMX. The D value is ensemble mean of 5 RCMs averaged over South Korea (land only). The different colors stand for different BC methods. The first row is for the Calibration period (C) and the second is for the Validation period (V). In (a, b, e, f), the solid and patterned fill is for the direct and indirect BC, respectively.

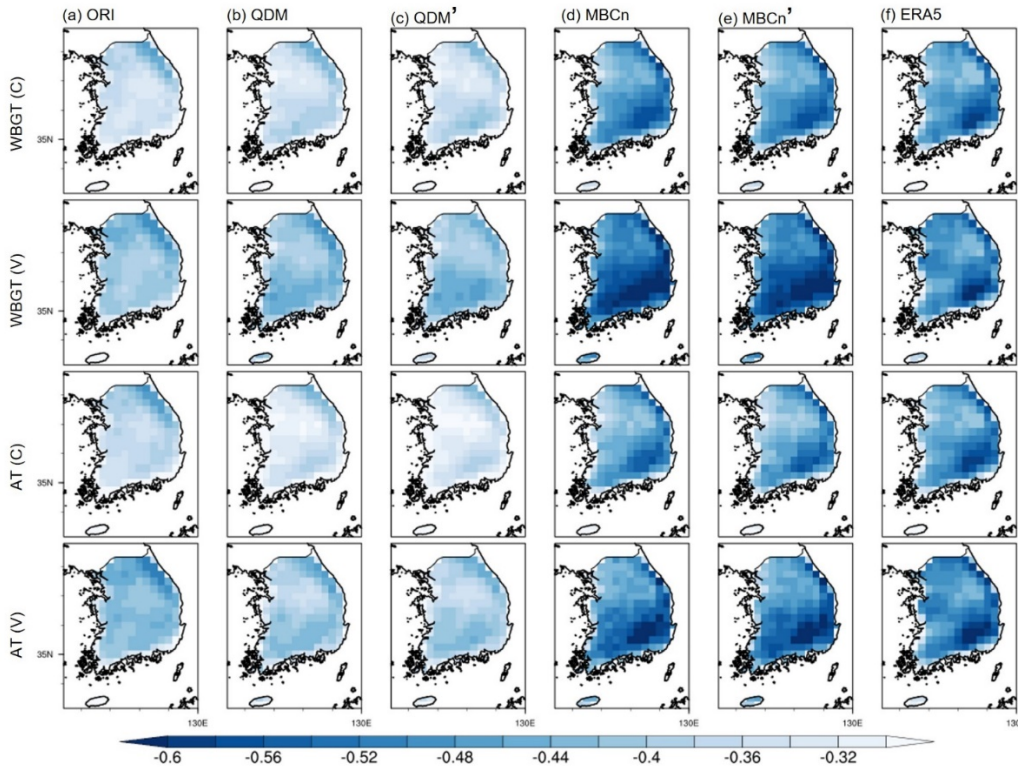

Figure 8: Spatial patterns of T vs. RH Spearman's rank correlation $(\alpha = 0.01)$ computed in each grid cell during the calibration (rows 1 and 3) and validation (rows 2 and 4) period. Column (a) shows the results from ORI simulations. Columns (b) and (d) are the heat-stress indices directly corrected by QDM and MBCn. Columns (c) and (e) are the heat-stress indices indirectly corrected by QDM and MBCn. Column (f) is from ERA5.

Specific Comments

The phrase "On the other hand" is used too often.

► Thank you very much for the comment and we have removed most "on the other hand" and rephrased the corresponding sentences.

Section 1

~~On the other hand~~Meanwhile, the choice of BC approaches in different contexts…

~~On the other hand, d~~Despite the BC method used, …

Section 2.3

The direct correction of heat-stress levels is defined as WBGT/AT directly adjusted by BC, while~~; on the other hand,~~ the levels calculated …

Section 3

For the indirect correction, ~~on the other hand~~ however, there is more variability …

~~On the other hand~~However, if the relationship between T/RH…