Supplementary materials

Bias correction

Figure S1 presents empirical cumulative distribution functions (ecdf) of areal maximum temperature from observations and raw, bias-corrected 18 GCM models. As shown in Fig.1, it can be observed that ecdf of observed maximum temperature and corrected GCMs data show close agreements for all GCM models. For low value of maximum temperature, the effect of bias correction is very obvious, with overlapping of ecdf of observation and bias-corrected data. For high value of maximum temperature, the effect of bias correction is slightly not satisfactory, i.e., the values of corrected GCM data is slightly lower than observation data for several models, including BCC-CSM1-1, BNU-ESM, CanESM2 and so on. Although performance of high value is slightly less ideal in some models, the overall bias is corrected greatly by the QM-Gaussian method.

Figure S2 presents empirical cumulative distribution functions (ecdf) of areal solar radiation from observation and raw, bias-corrected 18 GCM models. From this figure, it is found that ecdf of corrected GCMs data are much closer to observation data for most GCM models, especially CSIRO-Mk3-6-0, GFDL-CM3, GISS-E2-H and GISS-E2-R models. However, the effect of MCF method is slightly less satisfied for NorESM1_M model. Although high value of the corrected GCM data is slightly larger than observation in few models, overall MCF method can successfully adjust errors from GCM solar radiation data to match observation.

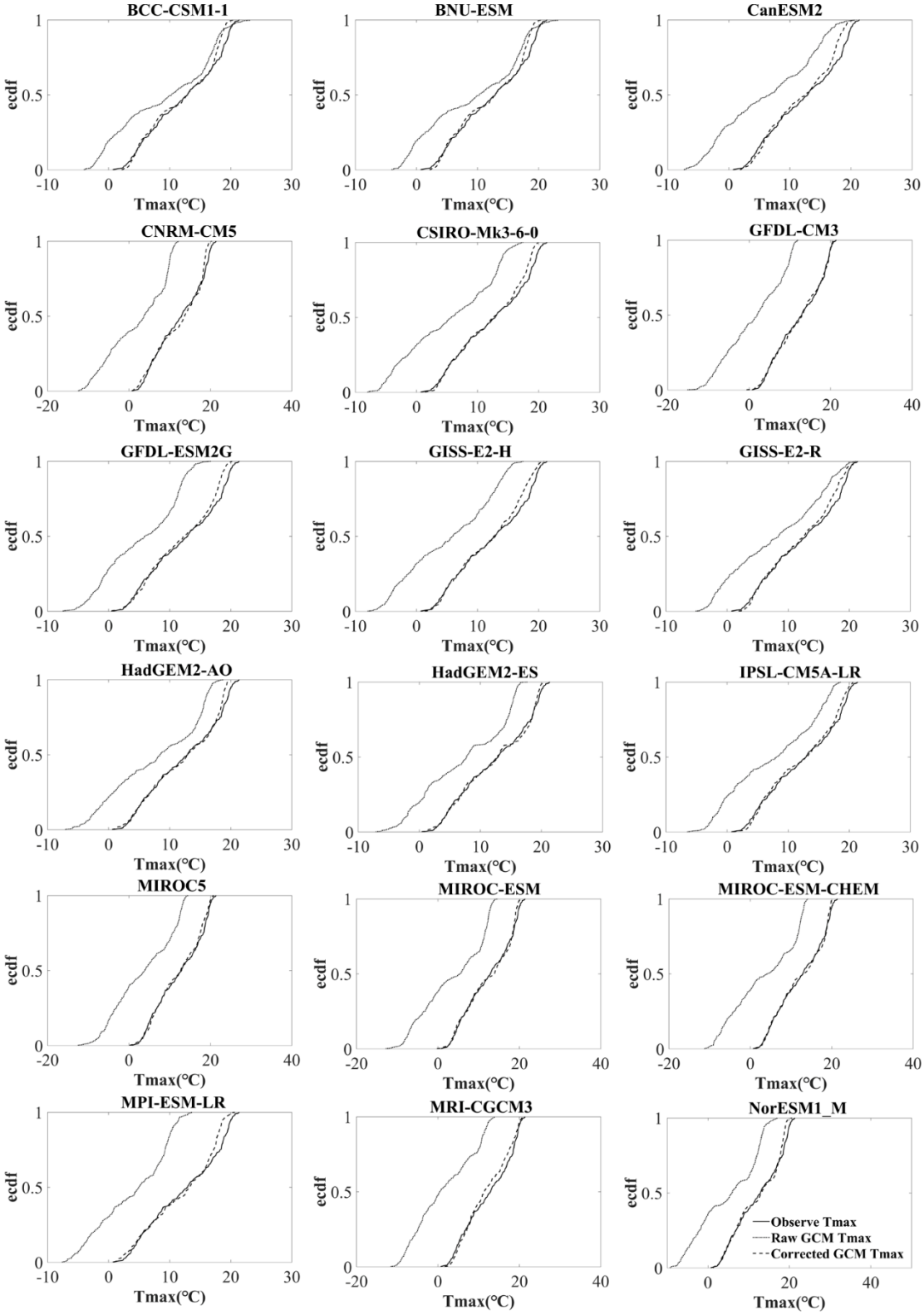

Figure S1. Comparison of empirical cumulative distribution functions (CDF) of areal maximum air temperature from gauge observations and raw, bias-corrected (BC) 18 GCM models.

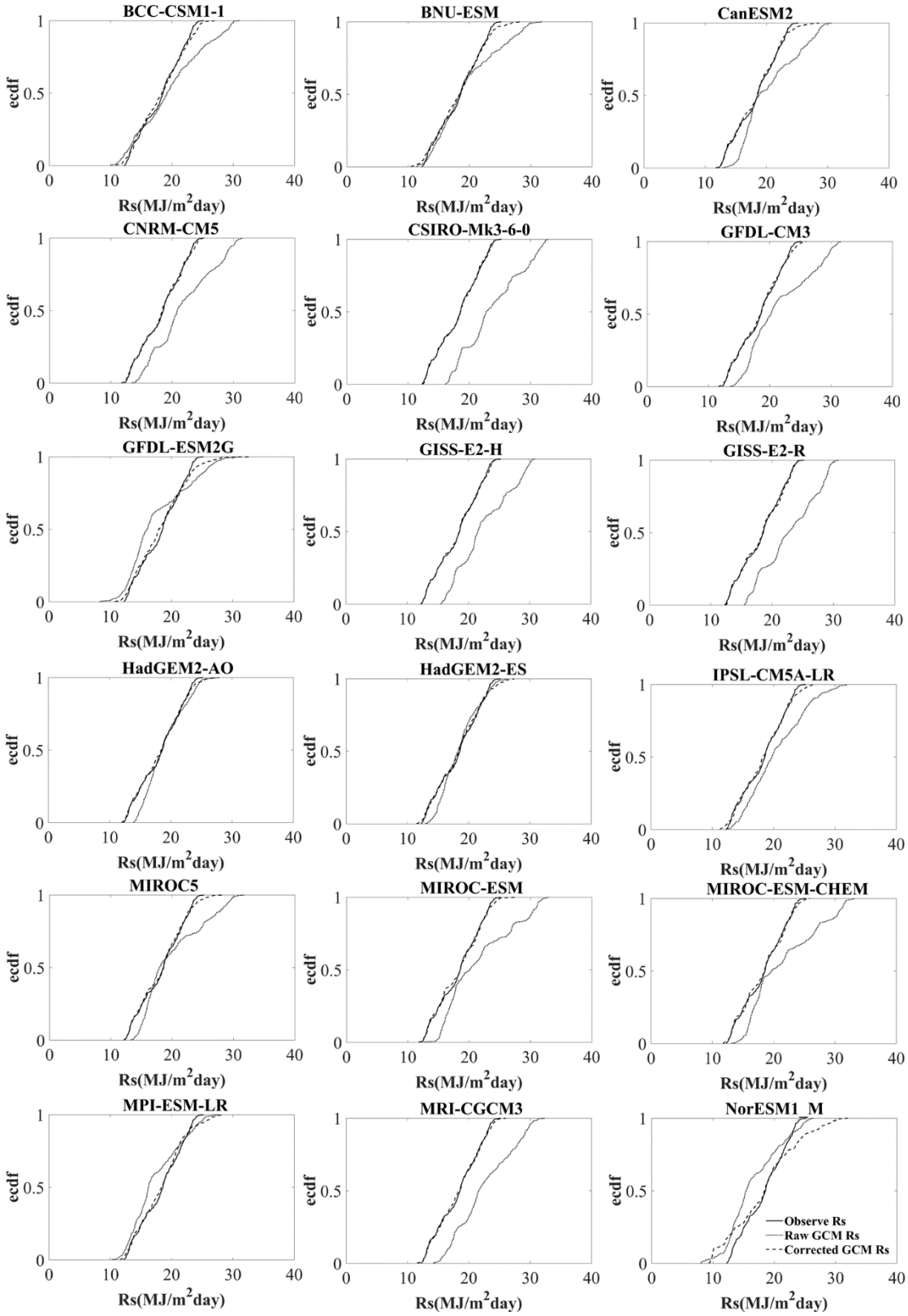

Figure 2. Comparison of empirical cumulative distribution functions (CDF) of areal solar radiation from observations and raw, bias-corrected (BC) CMIP5 18 models.