Supplementary Material for Projecting Changes in Temperature Extremes in the Han River Basin of China using Downscaled CMIP5 Multi-model Ensembles

Weiwei Xiao [1,2], Bin Wang [3,*], De Li Liu [3,4,*] and Puyu Feng [3,5]

[1] School of tourism and environment resources, Ankang university, Shaanxi 725000, China; lhy_xww@aku.edu.cn

[2] Engineering Technology Research Center for Water Resource Protection and Utilization of Han River, Shaanxi 725000, China

[3] NSW Department of Primary Industries, Wagga Wagga Agricultural Institute, NSW 2650, Australia; puyu.feng@dpi.nsw.gov.au

[4] Climate Change Research Centre and ARC Centre of Excellence for Climate Extremes, University of New South Wales, Sydney, New South Wales 2052, Australia

[5] School of Life Sciences, Faculty of Science, University of Technology Sydney, PO Box 123, Broadway, Sydney, NSW 2007, Australia

*Correspondence: bin.a.wang@dpi.nsw.gov.au (B.W.); de.li.liu@dpi.nsw.gov.au (D.L.L.)

In this study, 16 extreme temperature indices were calculated by using the NWAI-WG statistically downscaled T-max and T-min data. The annual extreme temperature indices based on observed and 28 GCMs data were paired according to their rank and plotted to yield a q-q plot (Fig. S1). The bias-corrected GCM projected annual extreme temperature indices in the period of 1961–2013 were fairly close to the observed annual indices, except for WSDI. WSDI (warm spell duration index) is defined as the annual count of days with at least six consecutive days when T-max > 90th percentile. It is not surprising that the relationship between the WSDI calculated by GCMs projected climate and that derived by observed data is poor. This is because the WSDI is a weather-based index. The observed climate data represent the weather sequences but GCM projected data represent long-term climate projections. This means the q-q plot comparison is under different climate scales, i.e., weather-based vs climate-based index. Therefore, we would recommend the weather-based WSDI may not be applicable for future climate projection.
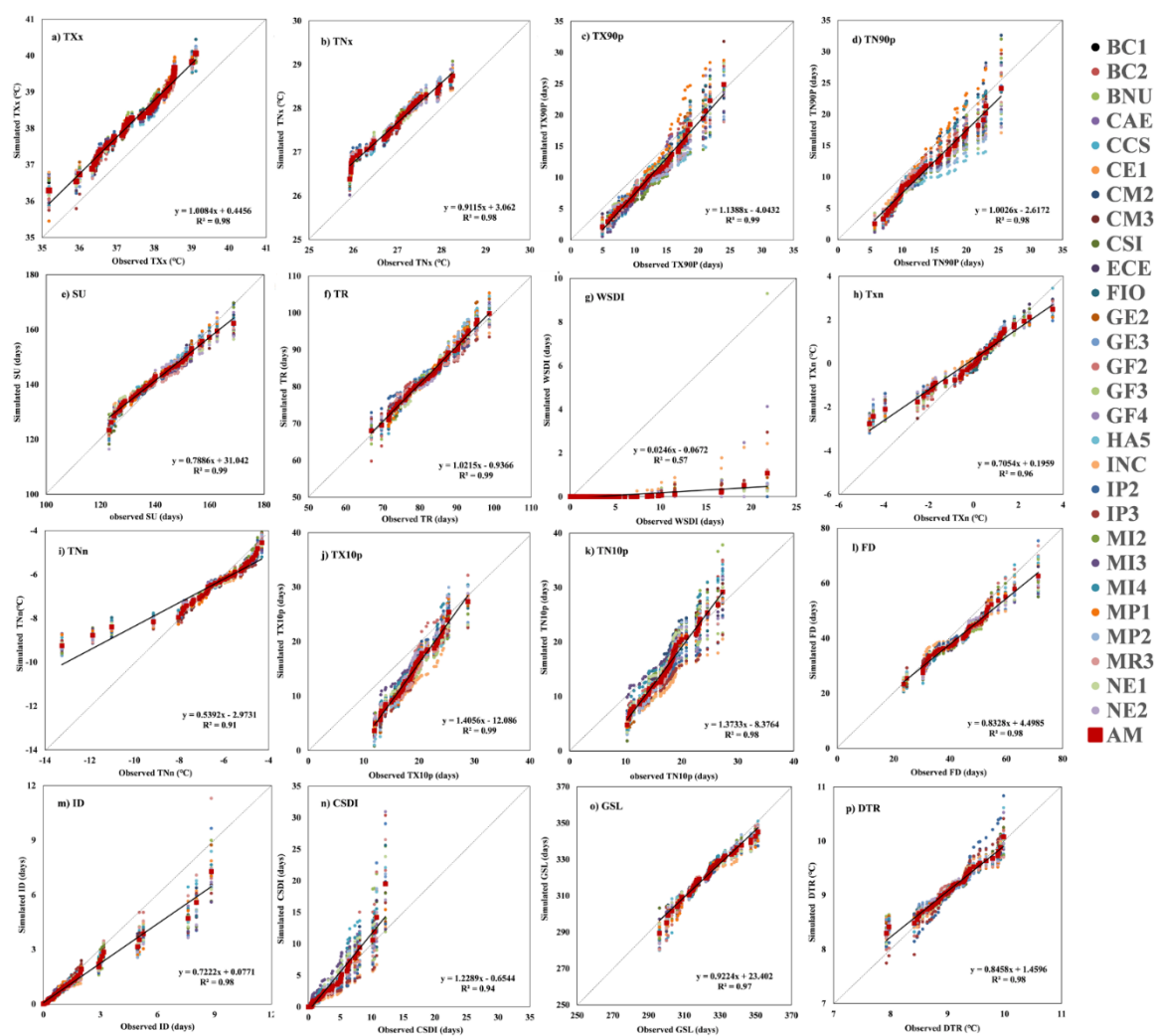
Figure S1. The q-q plot of observed versus simulated data of 16 extreme temperature indices from 28 GCMs in 1961–2013 in the Han River Basin. AM is the mean value of 28 GCMs simulated data after ranking. The solid black line is fitted by AM and observed values.