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Hydrology and Earth System Sciences Discussions

Interactive comment on "Spatial disaggregation of bias-corrected GCM precipitation for improved hydrologic simulation: Ping River Basin, Thailand" *by* D. Sharma et al.

Anonymous Referee #1

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General comments

This paper addresses a common scale issue for hydrologic modelers which want to employ climate change scenarios for assessing the impact of climate change on water resources at catchment scale.

Climate change scenarios are generally produced by Global Climate Models (GCMs) which are characterized by spatial support scales much larger than the spatial support scales in catchment modeling.

This paper suggests that this scale mismatch can be faced by manipulating GCM rain-

fall predictions with two consecutive operations prior applying them for catchment modeling. First, GCM rainfall data are to be adjusted to reduce the bias compared to the observed data. Second, bias-corrected predicted rainfall are to be disaggregated down to the support scale of the hydrological model applied for evaluating the water resources at catchment scale.

Both the bias-correction method and the spatial disaggregation model applied in this paper have been introduced in other published papers. But, as far as I know, they have never been applied within the same framework.

This paper shows that an improvement in hydrological predictions can be achieved when both bias-correction and spatial disaggregation are applied to GCM rainfall simulations.

The overall methodology and results are well illustrated in this paper.

Specific comments

Page 41, equation (1). The authors apply a type of plotting position that is unusual and generally not recommended, especially when probabilities of events larger than the maximum in the sample data-set are to be taken into account. Cunnane, Hazen, Gringorten or Weibull plotting positions are generally applied.

A discussion on the sources of uncertainties which could affect the conclusion of the paper is missing. The results of the hydrologic model applied (HEC-HMS) are affected by uncertainty, due to input data uncertainty, parameter uncertainty and model structural errors. How significant are the differences between the hydrographs simulated with the 4 type of scenarios (see Figure 14 and Table 5) compared to the uncertainty of the simulated hydrographs?

Technical corrections

The quality of figures 9-13 should be improved.

HESSD

4, S84–S86, 2007

Page 37, line 14. Check the expression “GCMs simultaneously Ĕ..”.

Page 38, line 18. Check the reference “Gunter et al., 2001”.

Figure 14. In the legend, specify that "Simulated" means simulated with observed rainfall.

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