Biogeosciences Discuss., 10, C9242–C9243, 2014
www.biogeosciences-discuss.net/10/C9242/2014/

Biogeosciences Discussions
Open Access

Interactive comment on "What is the importance of climate model bias when projecting the impacts of climate change on land surface processes?" *by* M. Liu et al.

M. Liu et al.

mingliang.liu@wsu.edu

Received and published: 14 March 2014

This manuscript is very well written and is easy to follow, and it is a publishable study with some revisions. I have some specific comments:

1) I suggest that the authors should more clearly describe the bias-correction method used in this study (e.g., list the regression equations).

Reply: We added a summery for this method in Section 2.3: Re-gridded T and P were then subjected to BC by using a quantile mapping approach applied at daily time step and detail descriptions can be found in Salathé et al. (2013) and Wood et al. (2002). The quantile mapping BC is achieved by replacing simulated values for T

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

and P with values having the same percentiles (non-exceedance probabilities) (Wood et al., 2002). For each grid cell, cumulative distribution functions (CDF) of T and P were generated for each calendar month and climate scenario for both observation and projections. For a given period of WRF projections, the quantile mapping algorithm looks up the simulated CDF of the training period (1970-1999). The corresponding quantile value from the observed CDF then replaces the simulated value for that period. For future periods, systematic shifts in the magnitude and variance result in projected T and P falling outside of the original CDF of the training period. Thus, for each 30-year future period, the average shift in T is removed before BC but is added back after the corresponding value is identified in the simulated CDF during draining period. However, extrapolation of the CDF during training period is still needed because future simulated T or P frequently fall outside its range. For this study, values that fall outside the simulated training-period CDF were mapped to an equivalent observed value via the multiplicative (P) or additive (T) anomaly from the observed mean.

2) The authors correct only temperature and precipitation, and they assume that the other forcing variables don't have a significant impact on their simulations. Thus, they need to justify this in a revised version. Reply: Thanks for this comment. In this study, we only investigated impacts of bias-corrections of T & P, which are most widely conducted for using GCM modeled results, but we agree with the reviewer that other forcing variables may also have significant impacts. In the discussion section, we have detailed arguments on this issue, while it is worthy to be studied in future research.

3) In the results part (Section 3), the authors give the numbers of the changes in the hydrological and biogeochemical variables under the change of climate. If the physical processes behind these changes are described, this study will be more solid. Reply: In the revision we have added insightful arguments and discussions on the mechanisms.

Interactive comment on Biogeosciences Discuss., 10, 17145, 2013.