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Hydrology and Earth System Sciences Discussions

Interactive comment on "Assessing water resources in China using PRECIS projections and VIC model" *by* G. Q. Wang et al.

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All authors do appreciate anonymous referee #2 for her/his great efforts on the manuscript reviewing. All comments from anonymous referee #1 are very valuable and helpful for us to improve the manuscript. We improved the manuscript based on fully consideration of these comments. Sorry for my late reply as I was busy with technical aid for Thailand flood forecasting during the last months. Responses to each comment are given as follow:

(1) Response to comment #1: The manuscript was fully improved, especially in English, to make each statement and conclusions more precisely and clearly.

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(2) Response to comment #2: Yes, just as the referee mentioned VIC model and PRECIS both have well been developed before the study. We revised our expression in the context of the manuscript to properly illustrate our new work in the study, for example, "The objectives of this study are to (1) apply the VIC model at the China's national level for the purpose of climate change impact assessment, (2) to investigate climate. . .. . ."

(3) Response to comment #3: VIC model requires a number of forcing terms, including precipitation, air temperature, solar radiation, vapor pressure and wind velocity, etc, among which, precipitation, maximum and minimum temperatures are the most important forcing terms. In some previous studies, only daily precipitation, daily maximum and minimum air temperatures are used to calibrate model parameters (Xie et al, 2007; Zhang et al, 2007,2009; Lu et al, 2010), while other forcing terms are adopted with default values. Vegetation parameters, including architectural resistance, minimum stomata resistance, leaf-area index, albedo, roughness length, et al, together with Penman-Monteith formula were used to estimate transpiration. The default value of wind velocity is 1.5m/s at height of 2m above land surface. As VIC model is a well developed hydrological, there are more detailed description for the model in the website of VIC model (http://www.hydro.washington.edu/Lettenmaier/Models/VIC/) and some of previous studies, therefore, we just very briefly describe the principle of VIC model in the revised manuscript and added two more references related to VIC model.

Lu, G.H., Wu, Z.Y., He, H. (2010). Processes of Hydrological Cycle and Quantitative Forecasting. Science Press, Beijing, China. (In Chinese with an English abstract)

Zhang, J. Y., and Wang, G. Q. (2007) Impacts of Climate Change on Hydrology and Water Resources. Science Press, Beijing, China. (In Chinese with an English abstract)

Zhang, J. Y., Wang, G. Q., He, R. M., Liu, C.S. (2009). "Variation trends of runoffs in the Middle Yellow River basin and its response to climate change." Adv. Water Sci., 20(2), 153–158. (In Chinese with an English abstract)

Xie et al., Regional Parameter Estimation of the VIC Land Surface Model: Methodol-

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ogy and Application to River Basins in China, Journal of Hydrometeorology, 8(3),447-468,DOI: 10.1175 /JHM568.1,2007.

(4) Response to comment #4: In the revised manuscript, we gave a little bit more detailed description on how to transfer calibrated parameters to grid cells not covered by the calibrated catchments. “Parameters of hydrological model reflected hydrological features of a catchment, which were determined by climate condition and soil texture to some extent. As the calibrated catchments cover all types of soil texture, for a specific grid cell which was not covered by the calibrated catchments, we selected the most similar calibrated catchment, which is the nearest catchment with a same dominant soil type, by comparing distance and dominant soil texture between objective grid cell and calibrated catchments. The calibrated hydrological parameters of the most similar catchment were then transferred to the objective grid cell not covered by the calibrated catchments.”

(5) Response to comment #5 and #6: In the revised manuscript, we added one more table to illustrate the performance of VIC model for 15 major control stations on the major rivers in China. The total drainage area of the 15 major control stations is about 2,600,000 km2, accounting for approximate 27% of total territory of China.

(6) Response to comment #7: Just as mentioned by referee, the model error, e.g., RE has already reached nearly the same order of magnitude of the projected changes concluded. In order to avoid errors induced by the hydrological model to some extent, we enhanced “taking simulated runoff in the period 1961$\sim$1990 as a baseline,” in the revised manuscript. Meanwhile, we enhanced uncertainty issue in the section of discussion. “Although we presented a likely variation trend of runoff in the study, undoubtedly, the current projections of future water resources is of high uncertain due to uncertainties in emission scenarios, the outputs from GCMs, downscaling approaches, as well as assessment model itself. Therefore, uncertainty issue should be enhanced in the further study”

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(7) Response to comment #8: We double checked simulated and recorded flows in Figure 5. Yes, we mistook the simulated discharge flow 187 m3/s at January of 1970 as 787m3/s when we drew the figure, possibly due to error typing. We do appreciate referee's careful reviewing, and we double checked all figures, all tables in the manuscript, in case such errors appeared again.

For a more clear version, please find the supplement below.

Please also note the supplement to this comment:
http://www.hydrol-earth-syst-sci-discuss.net/8/C4724/2011/hessd-8-C4724-2011-supplement.pdf

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 7293, 2011.