

## ***Interactive comment on* “The influence of precipitation and temperature input schemes on hydrological simulations of a snow and glacier melt dominated basin in Northwest China” by X. Ji and Y. Luo**

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Dear Editor and anonymous reviewer,

We are very grateful for your helpful comments according to which we have made modifications in the following aspects.

The authors

Comments: First of all, in the title should be changed and the model name (SWAT) should be included otherwise it reflects all kinds of hydrological model.

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Reply: Appreciated. The title was changed into "The Influence of Precipitation and Temperature Inputs on Hydrological Simulations using SWAT in a Snow and Glacier Melt Dominated Basin in Northwest China"

Major comments [1] The author did not describe what is the weather generator they use to convert monthly input to daily input? (page 813 lines 9). "Four of them have only monthly precipitation data from between 2000 and 2007" I believe there should be a consistency check with the other daily data series. If the consistency test is done there should be some discussion and graph/statistics needs to be provided.

Reply: The monthly data at the stations Bajiahu, Meiyao, Qinshuihezi, Shimenzi were used to assess and correct the monthly precipitation of TRMM3B43. As a matter of fact, daily precipitation were measured at these stations, while only the monthly data is accessible to the public. This was clarified in the revised manuscript (P7 L19, section 2.3.1). The simulation was performed with the daily climatic input from the Kensi-wate Weather Station and Shihezi Weather Station.

[2] There are some very high peaks in both calibration and validation [Fig.11 Calibration: year 1968 Validation: 1988] from the model generated flow should be fixed. I think the author should try surface water lag coefficient [SURLAG] for minimizing the peaks. Or it may be linked with the inconsistency with TRMM input.

Reply: As a common procedures, we first take a sensitivity analysis to all related parameters, then calibrate the most sensitivity parameters, and we spend a lot of time in this process. We have tried to adjust many parameters, included SURLAG. Adjust the surface water lag coefficient (SURLAG) could minimize the high peaks, however sometimes this may cause the peak offset and distort seasonal discharge curves.

The frequent high peaks of discharge might be due to the use of single base weather station at the low elevation and the precipitation and temperature lapse rates. This approach assumes that when there is a precipitation event at the station, there is precipitation over the basin. It is similar for the temperature. Most high peaks in the

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simulated streamflow correspond to an extreme value of precipitation at the station, e.g., that happened on 1967/7/26 and 1988/7/23 as you pointed out (Figure 1 of this document).

[3] Why only two performance evaluation statistics used? Volume ratio or Root Mean Square Error (RMSE) can be a good indicator to see the change in flow. I think 0.68 NSE is not good enough.

Reply: Appreciated. We added RSR (RMSE-observations standard deviation ratio, Moriasi et al., 2007) as an evaluation index in the revised manuscript (P13 L3, section 2.6).

[4] It is not clearly mention the input is precipitation or rainfall. I think the issue raised by another reviewer. It's extremely important to clarify otherwise the work is conceptually wrong.

Reply: Thanks for your comment. The input was precipitation.

Comments: I think the model really needs better calibration. Also I could not find the recent publications on application of SWAT model in the high altitude catchments in the literature. Here are some very recent papers you can consider (not mandatory!) Fuka DR, Easton ZM, Brooks ES, Boll J, Steenhuis TS, Walter MT (2012) A Simple Process-Based Snowmelt Routine to Model Spatially Distributed Snow Depth and Snowmelt in the SWAT Model. *JAWRA Journal of the American Water Resources Association* 48 (6):1151-1161. doi:10.1111/j.1752-1688.2012.00680.x Rahman K, Maringanti C, Beniston M, Widmer F, Abbaspour K, Lehmann A (2013) Streamflow Modeling in a Highly Managed Mountainous Glacier Watershed Using SWAT: The Upper Rhone River Watershed Case in Switzerland. *Water Resources Management* 27 (2):323-339. doi:10.1007/s11269-012-0188-9

Reply: Appreciated. The suggested papers are valuable references to the current study. We have updated our reference to the latest work (P21 L23, section 3.4 in

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revised manuscript).

Minor Comments: [1] Lots of grammatical error [e.g. page 814 line 22: you wrote 'its also covers' it should be 'it also covers']

Reply: We changed to "The corrected TRMM 3B43 also covers" (P9 L2, section 2.3.2 in revised manuscript).

[2] Please correct the sentence: Four of them have only monthly precipitation data from between 2000 and 2007 in the page no 813 line 9.

Reply: We changed to "Four of them have only monthly precipitation data between 2000 and 2007". The extra word "from" was deleted. (P7 L18, section 2.3.1 in revised manuscript)

[3] Figure 1 do not have scale and north arrow. Overall a thorough check by a professional English editor is essential to improve the manuscript.

Reply: Scale bar and north arrow were added into Figure 1 in revised manuscript.

References:

Fuka, D. R., Easton, Z. M., Brooks, E. S., Boll, J., Steenhuis, T. S., and Walter, M. T.: A Simple Process-Based Snowmelt Routine to Model Spatially Distributed Snow Depth and Snowmelt in the SWAT Model, *JAWRA Journal of the American Water Resources Association*, 48(6), 1151-1161, 2012.

Legates, D. R., and G. J.: McCabe. Evaluating the use of "goodness-of-fit" measures in hydrologic and hydroclimatic model validation, *Water Resources Res.* 35(1): 233-241, 1999.

Moriasi, D. N., Arnold, J. G., Van Liew, M. W., Bingner, R. L., Harmel, R. D., and Veith, T. L.: Model evaluation guidelines for systematic quantification of accuracy in watershed simulations, *Transactions of the ASABE*, 50(3), 885-900, 2007.

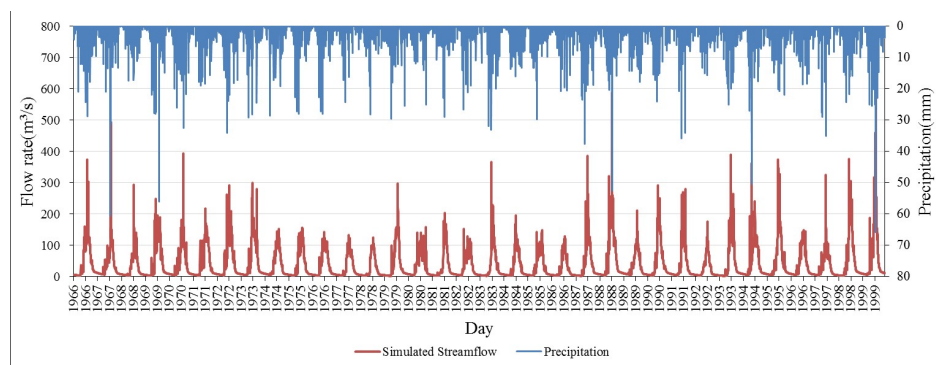
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Rahman, K., Maringanti, C., Beniston, M., Widmer, F., Abbaspour, K., and Lehmann, A. Streamflow Modeling in a Highly Managed Mountainous Glacier Watershed Using SWAT: The Upper Rhone River Watershed Case in Switzerland, *Water Resources Management*, 27(2), 323-339, 2013.

Please also note the supplement to this comment:  
<http://www.hydrol-earth-syst-sci-discuss.net/10/C832/2013/hessd-10-C832-2013-supplement.zip>

Interactive comment on *Hydrol. Earth Syst. Sci. Discuss.*, 10, 807, 2013.

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**Fig. 1.** Precipitation data of Kensiwate Station and simulated streamflow

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