Interactive comment on "Hydrologic modeling of a Himalayan mountain basin by using the SWAT mode" *by* Sharad K. Jain et al.

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Although some of my comments below are critical, I should acknowledge that the authors have put enormous effort in undertaking this study and I congratulate them for the work. The manuscript has been focused in details on hydrologic modeling of a part of Ganga basin which is a Himalayan mountain basin. Authors chose SWAT model to model the basin to achieve the aim of understanding hydrological responses of the basin. I believe this paper is also relevant to the special issue "The changing water cycle of the Indo-Gangetic Plain". However, I would like to recommend the authors to revise the manuscript thoroughly by addressing following issues.

General comments on Text

1. I found the novelty of this study is very limited to publish it in a high impacted journal

like HESS. There are many study already conducted on mountain basin in different parts of the world using various hydrologic model including SWAT. Several those previous studies are also discussed by the authors in the Introduction. However, it is difficult to find the uniqueness of their study among those studies. Therefore, I think, authors should identify the novelty of the study and should highlight it in Introduction. 2. In the Introduction, the authors presented literature review in great detail. However, I think, some studies should not be mentioned here as these are not relevant with current study. For instance, the paragraph in page-3, line 82-92 can be removed. 3. As I understand the central aim of the study is to improve the understanding of hydrological processes of the mountain basin. To achieve that goal, the authors have just calibrated and validated the SWAT model on the basin. I think this is not enough to understand the whole hydrological processes. The study needs in depth analyses of all hydrologic and climatic components and relationship among the components. They should justify/compare their results with existing previous studies. 4. If their objective is just hydrologic modeling of the basin, then it is better to incorporate the following additional analysis to improve the paper. (a) update/modify any module of the SWAT model and then apply it or (b) include addition analysis on model parameter uncertainty, sensitivity. The following paper may help Masood, M, Yeh, P. J. F., Hanasaki, N., and Takeuchi, K.: Model study of the impacts of future climate change on the hydrology of Ganges–Brahmaputra–Meghna basin, Hydrology and Earth System Sciences, 19(2), 747-770, doi:10.5194/hess-19-747-2015, 2015c.2. 5. NSE of daily simulated hydrograph for calibration and validation is 0.57 and 0.49, respectively, which are below satisfactory. The authors should conduct additional parameter sensitivity analysis to find better parameter values aiming better model performance. 6. Throughout the manuscript, this group of words "Ganga basin up to Devprayag.." has been repeated several times. Please avoid this repetition. 7. The model was simulated using bit old data (1992-2005). Why don't they choose recent data?

General comments on Figures

1. Overall quality of figures should be improved. 2. Sub-title with figure number (a) and (b) should be placed in all sub-plots of all figures with multi-plots. 3. Statistical indices (NSE, coefficient of determinant.. etc.) should be put in the relevant figures. 4. Importance of presenting the scatter plots (Fig. 7b. 8b) is limited; because well defined trend is not observed in those figures.

Specific comments on Text

1. Page-4, line-120: predict => project. 2. Page-4, line-121: Although studies... => Although many studies... 3. Page-7, line-236: Please provide a space in between km2 and. 4. Page-8, line-295: model parameters were systematically adjusted. Please discuss in details which procedure were followed for model parameter adjustment. 5. Page-8, line-299: It is mentioned that the streamflow data of the study basin is classified and cannot be disclosed. Please provide the reference of this statement. 6. Page-8, line-300: Please discuss how the streamflow were scaled down. 7. Page-9, line-329: Please provide a space in between study. SUFI2. 8. Page-9, line-336: Please provide a space in between the SUFI2. 9. Page-10, line-345: Please remove dot after Figure. 10. Page-10, line-350: Please provide a space in between output. A. 11. Page-10, line-378: visual inspection is not a good procedure to judge the performance. Please calculate more other statistical indices such as correlation coefficient, root-mean square error (RMSE). 12. Page-10, line-381: 9a. => 9a, respectively. 13. Page-11, line-386: 10a. => 10a, respectively. 14. Page-11, line-394: Please provide a space in between 0.57 and. 15. Page-11, line-396: Please provide a space in between 0.49 and. 16. Page-11, line-397: show => shows. 17. Page-11, line-400: this => these. 18. Page-11, line-420: Please provide a space in between 0.69 and.

Specific comments on Figures

1. Fig. 4: As the elevation range is very high, multi-color gradient can be chosen instead of current two color (black and white) gradient. 2. Fig. 6 should be removed; because same figure is put in the Fig. 7(a).

Specific comments on Tables

1. Table 1: References of the data sources are not appropriate. Please provide the references of relevant publications/report instead of web link. www.iitd.ac.in is an university web address. How can it be a data source? Please provide the specific data reference. For instance, the reference of APHRODITE data is Yatagai et al., 2012.

Yatagai, A., Kamiguchi, K., Arakawa, O., Hamada, A., Yasutomi, N., and Kitoh, A.: APHRODITE: Constructing a Long-Term Daily Gridded Precipitation Dataset for Asia Based on a Dense Network of Rain Gauges, B. Am. Meteorol. Soc., 93, 1401–1415, doi:10.1175/BAMS-D-11-00122.1, 2012.

2. Table 2: What is the basis of sensitivity rank of model parameters? Please provide the reference of the Sensitivity Rank (column-3), Default Value (column-4) and Range (column-5).