Hydrology and Earth System Sciences Discussions

Interactive Comment

Interactive comment on "Catchment modeling and model transferability in upper Blue Nile Basin, Lake Tana, Ethiopia" *by* A. S. Gragne et al.

Anonymous Referee #4

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This paper examines model transferability between two catchments (UGASC and KSC) which have different runoff response characteristics. In their daily simulations, the authors successfully identified different parameters representing the characteristics in the two catchments. Consequently, they concluded that it was not feasible to transfer the model parameters between the two catchments. The other interesting conclusion of this paper is that the transferability improves in the model simulations with longer time steps (15-day and 30-day). These findings are important to the community because they were obtained from the Blue Nile River Basin, which has important practical benefits for water supply in a region with limited hydrologic data. Therefore, I believe that the paper and eventual publication of a revised version in HESS will provide important insights to the application of hydrologic models in ungauged basins.

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In contrast to the well organized simulations and detailed discussion on the non-transferability of parameters in the daily simulations, the paper contains no physical interpretation on the reason for the transferability of parameters in the simulations with longer time steps. The reader, therefore, may be confused as to whether or not this transferability can be considered as general phenomenon or if it is caused by some features of the model structure or the evaluation indices. In particular, I believe it is worthwhile to discuss how the parameter sensitivity shown in Fig. 6 will be altered if the model time step is changed from daily to 15 days or 30 days. Particularly, the well identified parameter (FC) representing catchment storage in the daily time step should be examined to see if it is still a well identified parameter when the model time step is different. Analyzing which parameters become insensitive as the model time step increases may help to understand the key hydrologic processes for certain model time steps. In this way, the reason for the success of parameter transferability for the longer time steps may become clearer.

Besides the above comments, I would like to add some more minor, detailed comments to be address by the authors:

- Introduction: The present introduction is composed of "the background of Blue Nile Basin", "previous studies conducted in this basin", and "the structure of this present study". In spite of the main theme of this study, any of previous study on the model transferability is not reviewed. Previous parameter transfer studies should be well reviewed in the introduction to know what the status quo might be in this field to enable to reader to assess the novelty of the present work.

- HBV model descriptions: This study applies three different catchment representations (CRs) within HBV model. Additional descriptions in terms of the differences among the three structures should be helpful for readers with little knowledge of the HBV model. Specially, the vegetation model applied in CRII and the distributed model applied in CRIII require more thorough description.

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- Model time step: The authors need to describe the method they used to change the model time step. It is unclear whether or not the temporal resolution of input variables were aggregated to 15 days and 30 days, or if the time step of the numerical simulation was changed. It should be also stated how to aggregate the observed discharge data to be compared with the simulation; for example, calculate average discharge for 15-days or 30-days from daily discharge data.

- Figure 6: The setting of the sensitivity analysis and the results in Fig. 6 should be explained clearly. For example, the model time step of this sensitivity analysis is not stated. The meanings of the bars and the lines in Fig. 6 are also not described.

Overall, I recommend publication of this paper in HESS following revision as stated above with my comments and modification requests, The topic of model transferability in ungauged basin is of great interest to the hydrological community and the HESS readership.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 811, 2008.