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

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Please note our general introduction to the referees' comments in our reply to referee #1.

We thank the reviewer for all positive remarks and the through review. Of course, all technical corrections and other unclear points (listed at the end of the referee's report) will be taken up in the revised version of the manuscript. In the following, we would like to respond to the critical 'specific comments' of the referee.

1) Agreed. However, we did estimate confidence bands for the parameters for the daily model (figure 6), but we did not go further and estimated the confidence bands for the predicted runoff. We agree that much more on model uncertainty could be done in this study, which was not the focus of this paper. In our response to referee # 1, we

detailed also our reservations to make this aspect a major part of the study due to the limitations of the input data quality.

2) We will clarify the calibration procedure. This comment was addressed in our response to referee # 1 and the remaining will be included in the revised manuscript.

3) The manual parameter adjustment was done to optimize between the two mainly used objective functions (R_{eff} and volume error). We basically followed the approach introduced by Lindström et al. (1996). We also wanted to make sure to finally obtain a parameter set that make sense from a process point of view, as this can be done for a process-based, conceptual, semi-distributed model. This was essential for testing the model transferability for different time steps.

4) The mathematical symbols will be revised according to HESS guidelines.

5) We opted for a simple and robust estimation of areal rainfall estimation method, i.e. Thiessen polygon method and elevation gradients for different elevation zones. This seems defendable because of the location of the stations and the relief. Of cause, more stations would increase regionalization of input data. We feel that the suggested Kriging methods are not applicable for the small number of available stations (6).

The use of TRMM data after some local calibration or to obtain a better spatial structure of the precipitations fields would certainly have been an interesting study. However, in such African high mountain environments and a still relatively small study area (1600 $km^2$and 300 km^2) a local calibration and use of TRMM data is not straightforward and might not necessarily lead to better input data (cf. Winsemius et al. 2008). But, we would like to follow up this good idea for large scale model developments (whole Upper Blue river basin) and link to pertinent research in the basin (e.g., by ITC, Enschede).

6) Agreed. We will carry out additionally Spearman rank tests, but can assume that the general findings will not change, which seems to be caused by the poorer data quality in the earlier years of the records. Note, that we did the statistical time series analysis

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only to be on the save side with the selection of the calibration and validation records.

7) Yes, the relatively similar values of three parameters are striking. Even though there is 'normally in HBV applications' a tendency of the parameter values of $K_0 >> K_1 >> K_2$, it is not possible to estimate this parameters a-priori from the catchment properties and dominant hydrologic process. Other HBV applications also resulted in more equal parameter vales (e.g. Braun et al. 1992). We do not have a physical explanation of the parameter values.

8) How could we regionalize the parameter with having only two catchments with contrary catchment properties and runoff response patterns? We agree that the regionalization of (at least some) model parameter would be the final aim, but we think that is not possible with the available data sets.

9) We will reword the objectives and conclusions accordingly and clarify that the applied HBV model structures were not appropriate to cover the short-term dynamics in particular in the Koga catchment (likely the impact of dambos).

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