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Hydrology and Earth System Sciences Discussions

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

A. S. Gragne et al.

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Authors’ response to referee # 3 (anonymous)

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

We thank the reviewer for all the positive remarks and the through review. In the following, we would like to respond to some critical points (listed as ‘B. Specific comments’ in the referee’s report). Of course, all detailed comments about the language and other unclear points (listed as part C in the referee’s report) will be taken up in the revised version of the paper.

1) A figure with the HBV model concept and model structures will be included. We left it out before, as we thought it is such a widely used model. We will give a more explicit

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description of the vegetation and elevation zones as used in the model.

2) Model calibration: We elaborated on this in our response to referee # 1. The remained points will be further described in the revised manuscript.

3) We generally agree with the referee’s critical assessment of the Nash-Sutcliffe efficiency, and are grateful to him/her for the provided reference. However, we used the model efficiency and the mean difference between simulated and observed discharge (‘volume error’) as the guiding criteria to assess the model goodness in additions to visual inspection. The other efficiency criteria used were the coefficient of determination (R2) and the Nash-Sutcliffe efficiency using logarithmic runoff values (logReff), which enabled us to assess low flows better (cf. discussion of Table 6). Additionally, as suggest by the referee, we will give volume error as percentages and point in the text more explicitly to the remaining model shortcomings of 15- and 30-days models.

4) It will be clarified that the models for longer-time step simulations were recalibrated, incl. a discussion why this makes sense.

5) This will be clarified in the revised manuscript.

6) Yes, this has an impact on the response patterns of the two catchments. The poor fits between observed and simulated hydrographs during the flashy response of the catchments can occur for two reasons: (i) data inaccuracy, and (ii) insufficient structure and parameterization of the model. The first is an issue, as flow measurements in the study area are done only two times a day (instantaneous water level observations are converted to discharge using an average rating curve) what can cause timing problems and other inaccuracies. Furthermore, the cross-section was assessed in a visit to the site as hydraulically not ideal, what causes inaccuracies in particular during high flows. This resulted in implausible runoff fluctuations from day to day, and for the given water level measurement (cf. discussion of figure 2 and 5). The second reason is also possible and led to the examination of variable model structures. However, much

HESSD

5, S779–S781, 2008

more could be done here in future studies, incl. more drastic changes of the model concept. We think that a better incorporation of interception processes and changes of the runoff generation modules would be promising, as well as the ability to run the model for shorter time steps (e.g., 1-hourly or 6-hourly).

7) If invited by the editor, we will revise the paper significantly and then address also this suggestion to move this part further to the beginning of the results section.

8) To be done.

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