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Hydrology and Earth System Sciences Discussions

Interactive comment on "Prediction of runoff and discharge in the Simiyu River (tributary of Lake Victoria, Tanzania) using the WetSpa model" *by* J. Rwetabula et al.

Anonymous Referee #3

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General comments :

The paper describes the application of the WetSpa Model to the Simiyu river basin, a tributary of Lake Victoria (Tanzania). This river is of major concern due to important water quality problems that eventually also threatens Lake Victoria. Since the discharge of the Simiyu river was not monitored until recently, the authors have tried to apply the WetSpa model to this river basin, so to obtain discharge information that would in the end also help in estimating the pollutant loads going into Lake Victoria.

The paper does not introduce any new concepts in the field of hydrological modelling.

It is a case study where a well-known model is applied to a new region of climatological and physiographical conditions.

Specific comments :

The title should be shortened by only referring to discharge : Prediction of daily discharge in the Simiyu river (tributary of Lake Victoria, Tanzania) using the WetSpa model.

In section 2.2. the authors refer to the estimation of evapotranspiration by the means of pan evaporation data. Some additional information on how this was done would be welcome.

The relationships that were used in section 3.1. to determine the potential runoff coefficients via slope, soil type and landuse should be explained with more details.

In the model calibration (section 3.2.) description the authors refer to PEST. They should indicate that this refers to : Parameter EStimation Tool. It would be necessary to indicate for each parameter to what corresponds the - reasonable range - within which the authors vary the model's parameters during the automated calibration procedure.

The sentence on - spatial parameters and parameters in the lookup tables - at the end of the first paragraph of section 3.2. does not look very clear. What is the exact difference between the two ?

Given the lack of climatological and hydrological data of sufficient spatio-temporal resolution, the application of the model has proven to be quite problematic. This aspect of the study set aside, the overall approach for the assessment of the performance of the model that has been chosen needs some additional clarification. The authors refer to a calibration period of the model which reveals to be very similar to the verification period. This is problematic, in the sense that the calibration period of the model should not overlap with the validation period of the model, so to guarantee for a proper assessment of the model's performance. Why did the authors not split the observed data

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set in two periods of equal length and used them for calibration and validation of the model ? By switching the data sets the same operation could have been performed again, so to account for the relatively short period of discharge observations.

In their comment of figure 8 (section 3.3.), the authors state that - concentration time and flow volumes are accurately predicted -. They also refer to the maximum recorded peak rainfall intensity of 48 mm/d and a corresponding maximum observed peak discharge of 208 m3/s : from figure 8 it rather seems that the rainfall occurred around February 1999, while this maximum discharge happened around April or May 2002. Maybe this is only due to the high density of information in figure 8, which renders it rather difficult to interpret. In any case, in their comments the authors should be more careful in evaluating the model's performance. It is rather surprising that the model bias is of only 2.4%, while the model efficiency is of 57.4%, which indicates a rather low performance. Some further developments on this would be needed. Figure 8 rather suggests that the modelled discharge is most of the time largely over-estimated compared to the observed discharge. Furthermore, in figure 8 the observed discharge during early summer 1999 indicates a kind of slow recession, that might be due to some groundwater contribution. It would be good to comment on this observed feature, which was by the way not simulated by the model. A final remark concerning figure 8 concerns the rainfall : it looks as if there were several grey-scales for the rainfall bars ? Would it not be good to zoom into a given part of the whole period so to have more details being visible, which would then help for the interpretation ?

The comments in the second paragraph of section 3.3. should be skipped, since they are both too optimistic and put before the actual assessment of the model's performance via the evaluation criteria (4th paragraph of section 3.3.).

With respect to the above comments the authors should rewrite the conclusions of their paper and evaluate the performances of the model more carefully.

All references cited in the text are listed in the references list.

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As previously stated, this paper describes a model application to a river basin with little available hydro-climatological information. The description of the model calibration and validation procedure, as well as the evaluation of the model's performance needs to be largely improved. Therefore, this paper should be subject to a moderate to major revision.

Technical comments :

1 Introduction - 1st §, line 5 : — is mainly due to fertilizers — - 2nd §, line 3 : The hydrological cycle — - 3rd §, last sentence : Therefore, models capable of predicting discharge and water quality are needed to predict the effects of land use and waste management for decision making. - 4th §, last sentence : — will be useful to estimate chemical loads —

2.2 The Simiyu catchment and field data collection - 1st §, line 6 : (Meertens and Lupeja, 1996 ; FAO, 2002) - 2nd §, line 2 : Five and a half years —

3.3 Model results and discussions - 3rd §, line 1 : The required density of precipitation gauging stations — - 3rd §, line 6 : — estimated from the daily water level recordings cannot capture all discharge variations.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 4, 881, 2007.

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Interactive Comment