

Interactive comment on “Improving SWAT model performance in the Upper Blue Nile River Basin using meteorological data integration and catchment scaling” by Erwin Isaac Polanco et al.

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Received and published: 28 March 2017

Dear Anonymous Referee #2

We appreciate very much your corrections and suggestions provided to improve the content of this paper. All the improvements and changes suggested were already done trying to find a balance between the recommendations given by both reviewers. In the general context, the structure of the document was improved and modified so several repetitive parts were removed.

On the main concerns: (i) The title was edited as recommended by Referee #1. (ii) A better explanation on the data integration was given. (iii-iv) More literature was re-

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viewed and values for water balance based on Mengistu (2012) was added. More comparisons with previous hydrological models of the UBNRB were done. The results from literature were not used as basis to calibrate our models, however they helped as good guide to obtain approximate values of the water balance in the UBNRB. (v) A second SEI test was done at the Ribb catchment, it did provided better SEI values, however the MOD16 ET values are not very accurate, further test should be done on this index but in another watershed in the world, since the data for all the catchments in the UBNRB are not very accurate. (vi) Since there is not measured ET data available, the idea of using MOD16 ET was to show how SEI works, although now is clear that it does not represent very well the evapotranspiration of the UBNRB. (vii) The conclusions were improved. (viii) uncertainties and also r and p-factors were given.

On the specific comments:

-The abstract was improved and SUFI2 results were presented.

-Nash Sutcliffe (NS) was corrected.

-The phrase “the integrated model represents the land use and soil conditions” was removed, because yes they are the same on all the models.

-The introduction was improved and more background on hydrological modeling was done and also on the effect of sub-basin discretization.

- All the references were corrected and given based on the HESS guidelines.

-The phrase “problems concerning the evapotranspiration...” was corrected, it was meant to be referred to the fact that analyses of evapotranspiration values are not often given for the UBNRB.

-A better and more detailed explanation on how the data was integrated and compared was given in section 2.4

-The official sub-basin distribution and soil map was included.

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- Section 2.3 and 2.6.1 were shortened although in section 2.6.1 an explanation of p and r-factors was added following recommendation from Anonymous Referee #1.
- Yes, the same parameterization was used for both discretization levels and for the three datasets (this was added in text too).
- A second test was done in the Ribb catchment and it is shown in this corrected version of the paper. However the results of the ET are still not very good. Since it is very possible that MOD16 is very good in another watershed in the world, it could be good to make another test. However in other sub-catchments in the UBNRB the MOD16 ET continues to show an underestimation. Therefore, I left this part as further research, improvements and corrections that should be done to this index.
- Based on the results of this research I would recommend 87 as the adequate number of sub-basins. However if an optimal number of sub-basins is to be defined based on the limited number of station, with the objective of including every single stations, sub-basins could be added manually.
- Considering the pros and cons that both datasets have, the objective was to find which dataset provided better results and trying to find a solution, a dataset that could as much as possible have the pros from both datasets.
- Yes, improvements at Kessie are very small, further studies of this integrated dataset in small catchments upstream Kessie should be performed.
- The phrase “the calibration of Kessie were good for models using the ground and integrated datasets in statistics as well in terms of water balance” was removed, as it is right, a general comparison of the water balance values was only done with values for Eldiem based on literature.
- The calibration was done using the Hargreaves method because under the Penman Monteith method it was not possible to calibrate the model, the flow discharge was way too high and was not possible to get an evapotranspiration rate higher than 45-50%,

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- unlike Hargreaves where the evapotranspiration rate is approximately 60%.
- The conclusion were modified and more recommendations on further studies were given.
- Name of figures and tables were corrected, the axis of all the graphs was improved. Figure 3 was modified and the graphs were numbered (A, B, C. . .) and referenced in the text.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., doi:10.5194/hess-2016-664, 2017.

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