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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Hydrological Modeling in an Ungauged Basin of Central Vietnam Using SWAT Model" *by* A. Rafiei Emam et al.

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We appreciate the referee's comments on our manuscript, which have helped us to clarify several key points. We revised the new version of the manuscript based on these comments.

Comment 1-1: As much as I understand that English is not the mother tongue of the authors, there are too many typos and grammatical errors. This is really distracts from the review process. The manuscript must be proofread and edited by a professional.

@ Answer 1-1: As a response to the reviewer's comment, the manuscript was proofread again by a native speaker.

Comment 1-2: The approach adopted by the authors rather than reducing uncer-

tainty, increases it.

@ Answer 1-2: As a response to the reviewer's comment, it is important to note that the calibration of hydrological models by river discharge and crop yield is already discussed by various researchers (Vaghefi et al., 2014; Folberth et al., 2013) with the same approaches. We believe that a good calibration with crop yield would result in a good calibration of actual evapotranspiration (ETa) adding more confidence to simulation of other water balance components. However, as agricultural areas are less than 10 percent of the whole watershed, we calibrated ETa directly in the forest lands in which covered more than 90 % of the watershed. We disagree with the reviewer for his/her comment. Because in each step the uncertainty analysis was done by Sequential Uncertainty Fitting Analysis in which shows decreasing of uncertainty in each step. In order to decrease the uncertainty in our sequential calibration procedure (I.e by river discharge, crop yield and ETa) the approach is as follows: First we calibrated the parameters for river discharge, then we fixed the parameters in a range (instead of single value), and added the ETa relevant parameters. Same as the first step, we defined again the best range for each parameter and then added the third set of parameters (i.e. for crop calibration). With this strategy we overcome the trade-off between the targets and reduce the uncertainty.

Comment 1-3: Instead of using the regionalisation method to generate runoff, they should use SWAT to identify model parameters in the relevant catchment that has sufficient data. Those parameters can then be transferred to the ungauged catchment.

@ Answer 1-3: Although the predictions of river discharge by ratio method is discussed by some researchers (Bloeschl et al., 2013-page 238, last paragraph), we have already changed our methods and we used the approach suggested by the reviewer. We set up the SWAT model in a gauged basin and we calibrated the model based on the river discharge, then the parameters transferred to our study area (i.e. Aluoi). The results in the paper further changed based on the new approach.

Comment 1-4: use the quantitative statistics and performance ratings recommended by Moriasi et at (2007) to evaluate the model simulation.

@ Answer 1-4: As a response to the reviewer's comment, we should emphasize that in the first version of the manuscript we have already evaluated the performance of calibration in each step by using statistical analysis mentioned by Moriasi et al (2007). Those parameters are shown either in the figures or in the text rather that in the table (e.g. figure 3; line 24 page 9).

Comment 1-5: the authors should use a multi-objective calibration approach (Bekele and Nicklow, 2007). Please see Sther et al, 2008, to see how to present the input data.

@ Answer 1-5: We really appreciated for the reviewer for introducing some references to improve the calibration processes. The methods discussed by Sther et al (2008), and Bekele and Nicklow,(2007) are interesting. As our calibration processes show high performance of the model, it would be nice if our results compare to the multi-objective approach. However, doing that is out of the goals of this paper.

Comment 2: The bias correction of Modis 16 is inadequate:

@ Answer 2: The methods of Bias correction have been described in detail in the new version. However, to summarize, we should mention that as MODIS products are globally scaled and they have coarse resolution, data should be evaluated in case of accuracy before using data in the research studies. As we have enough observed data to estimate ETP, we compared our results of ETP with those obtained by MODIS product (i.e. MOD16). We understand that the dynamic of MOD16 is correct but the absolute values are not match with our data. Therefore, we multiplied a constant obtained by trial and error in MOD16 data to overcome the bias issues.

Specific comments

Comment 3: There are several minor correction that are hardly relevant since so much work needs to be done.

@ Answer 3: In the case of language, the paper was revised again by a native speaker.

References:

- Ashraf Vaghefi, S., S. J. Mousavi, K. C. Abbaspour, R. Srinivasan and H. Yang, 2014. Analyses of the impact of climate change on water resources components, drought and wheat yield in semiarid regions: Karkheh River Basin in Iran. Hydrological Processes Volume 28, Issue 4, pages 2018–2032, 15 February 2014

- Christian Folberth, Hong Yang, Thomas Gaiser, Karim C. Abbaspour, Rainer Schulin, 2013. Modeling maize yield responses to improvement in nutrient, water and cultivar inputs in sub-Saharan Africa, Agricultural Systems Volume 119, July 2013, Pages 22–34

- Bloeschl,G., M. Sivapalan, T. Wagener, A.Viglione, and H. Savenije, 2013. Runoff Prediction in ungauged basins, Cambridge university press.

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