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Discussions

Interactive comment on "Calibration and validation of SWAT model and estimation of water balance components of Shaya mountainous watershed, Southeastern Ethiopia" *by* A. A. Shawul et al.

Anonymous Referee #2

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Summary: The manuscript presents the calibration and validation of SWAT model and estimates the water balance components of a mountainous watershed in southeastern Ethiopia.

Overall comments: The manuscript presents an interesting application of the SWAT model. It applies it to a new area and thus presents an inference of the underlying mass balance components. This is the most important contribution of the study, especially from its policy and water management perspective. In particular, the manuscript

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draws important conclusions about the dominant mass balance components of the study area. If the estimation of model parameters at monthly and annual scale has been done based on aggregating daily simulations (and not applying the model at scales other than daily), I find no fundamental flaw in the paper for it to be rejected. However there are some issues, especially editorial (language and copy editing) that deserves authors' attention. Given the brevity of the paper, I wonder if the authors would be interested in publishing it as a technical note.

Detailed/technical comments: 1) Serious editorial/copy editing is required. 2) Line 15-20, page 13956: Statement '. . .confirmed the appropriateness..simulation' should be toned down. 'Future' scenario predictions are always tricky. You may want to use the word 'suggests' instead of 'confirmed'. Calibration and validation of a model that ignores the effect of anthropogenic (& climatic) changes is not a robust bet for the suitability of its future predictions. 3) Line 15-20, page 13956: In the statement 'Therefore, SWAT mode.. watershed", the authors should remove the word 'therefore'. The authors may also want to use the word 'may' rather than 'can' in the statement. 4) Line 5, page 13958: further explanation of how the runoff yield is calculated is required (should be done in a separate sub-section within Section 2). 5) Line 13, page 13958: Explicit mention of which meteorological and streamflow gauge stations were used in the study is needed in figure 1. Also how the meteorological data was interpolated before its use in SWAT in section 2.3.4 is needed (atleast a one-liner). 6) Lines 20-25, page 13959: The author should be careful with the units. The units of fluxes are mm/day while of state (storage) variables are mm. This should be checked throughout the paper and corrected (as required by the journal guidelines as one of the necessary criteria for its publication)! 7) Equation 5: An explanation is needed for which of/how the 3 curves are used in the simulations. A further explanation of how antecedent conditions are used to use appropriate curves is needed in the corresponding section. Perhaps the discussion of the SCS curve deserves its own subsection. 8) Line 25 onwards, page 13963: The use of thresholds to obtain HRUs/attribute classification is not clear. A further explanation is required. 9) Line 6, page 13964: '..and the simulation..', do you

HESSD

10, C7311–C7313, 2014

mean the remaining 5 years of the calibration data. If so, please state clearly. 10) The first paragraph of section 2.4.4. should clearly describe how calibration was done successively at multiple scales. The issue also appears later, where the authors suggest that the parameters were fine-tuned based on its predictions on annual to monthly to daily scale. The authors must clearly explain that the calibration of the parameters was done by aggregating parameter specific daily simulations to annual scale and comparing it with aggregate statistics of streamflow observations (and not calibrating the model on aggregate statics itself). 11) Line 21, page 13964: please refer to equation (8) to define D. Same holds for other performance statistics used. 12) Line 18-21, page 13966: 'Model calibration . . .processes' should be moved to section 2.4.4 and described appropriately. Please see comment 10 as well. 13) Line 20-21, page 13967: is it at monthly scale? If yes, please specify. Also how validation is done at monthly scale also needs to be described in section 2.3 somehow. 14) First paragraph, section 3.4 is not clear. Why is the word 'base' being used? Also there is no need for the sentence 'after an .. parameters'. 15) Line 19-20,page 13968: 'total water..step'.. what is its context? What do the authors mean? That outflow is another major component of the water balance? - If so, please clarify 16) I think a discussion section is needed on policy/management implications of lines 11-12, page 13968 'It indicated that .. the watershed', of line 18-20, page 13968, and how the calibrated model can be transferred to ungauged mountainous watersheds in the region. 17) A discussion is also needed on how changing landuse/landcover and (other) anthropogenic effects, if any, over the study period were considered by the model. As I understand it, it has not been incorporated. Is then the use of the calibrated model under change appropriate?

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 13955, 2013.