

Interactive comment on “Critical review of the application of SWAT in the upper Nile Basin countries” by A. van Griensven et al.

Anonymous Referee #2

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General comments: This critical review of SWAT applications in the upper Nile Basin is a valuable piece of work that deserved to be published as it is well in the scope of the HESS journal. Evaluating correctly water resources is of prime importance in the face of global changes such as climate, land use and demography. SWAT has imposed itself in several parts of the world as a very powerful and meaningful hydrological tool, however it appears that its success hides some important pitfalls in which beginners users, often coming from the Geographic Information System rather than hydrology, are ready candidate to fall into. With 22 studies from the upper Nile basin, spanning studies focusing on model calibration, parameterization and validation, land use changes, climate impacts and erosion modeling, this review brings an important critical assessment of some of the drawbacks and limitations of an intensive use of

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SWAT from many different more or less expert groups. The value of the tool is not questioned in this review, but rather its misuse and the lack of scrutiny in the review process of SWAT applications before publication. In this respect several useful recommendations are given at the end of the manuscript that can be well applied beyond the specific case of the Nile Basin. By advocating for an evaluation in three parts: fit-to-observation, fit-to-reality and fit-to-purpose, this paper brings a valuable reminder to all scientists that are using SWAT about the needs to properly evaluate and report on their model calibration and parameterization. The manuscript is generally well written in an appreciable pedagogical style very suitable for its purpose.

Specific comments: I would encourage the authors to give a few reference papers that are properly evaluating their model as good examples to be followed. In the climate impact section, the uncertainty of available Global Circulation Models and Regional Climate Models is well presented. However, one other aspect is not mentioned which is the systematic bias that most of these models have when compared to observational data from weather stations. An additional recommendation could be to encourage the authors to map the outputs of SWAT along rivers networks and sub catchment in order to evaluate the geographic soundness of the results in an additional section that would be fit-to-geography. Indeed, one can have a good statistical evaluation of his model's outputs with a wrong routing of some of the rivers due for instance to a coarse elevation model.

Technical comments: I could find only a few typographic and language problems that I am listing below: P3764-L14: replace “journals” by “articles” P3765-L12: replace “More than 20 peer-reviewed papers were identified out of which more than half are located in Ethiopia which are listed in Table 1 according to their topic.” By: “Twenty-two peer-reviewed papers were identified with their main topics addressed (Table 1), out of which more than half are located in Ethiopia.” P3766-L19: I do not understand this sentence: “. . .by bracketing more than 60% of the observed river discharged”, please express this better. P3766-L21: Split and simplify the sentence: Mekonnen et al.

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(2009) developed a generic rainfall-runoff model better suited to Ethiopian catchments. They used a spectrum analysis method to extract the relationships between different temporal scales of available daily rainfall and runoff series that reflect the temporal and spatial scales of 25 discharges in two watersheds in Ethiopia.“ P3776-L24: change to: “...between 0.49 and 0.6 are more in line...” P3777-L7: replace: “...and cause that in the model there is an increase...” by “...causing an increase...” P3777-L9: split and correct sentence like this: “...into the calibration process. This may result in simulations where the shallow aquifer volume is much larger at the end compared to the beginning of the simulation (up to 1500 mm).” Table 2. GW_REWAP, number of reported values: 2.6??? This number should be an integer?

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