Hydrology and Earth System Sciences Discussions

Hydrol. Earth Syst. Sci. Discuss., referee comment RC2
https://doi.org/10.5194/hess-2022-169-RC2, 2022
© Author(s) 2022. This work is distributed under
the Creative Commons Attribution 4.0 License.

Comment on hess-2022-169

Anonymous Referee #2

Referee comment on "Improved representation of groundwater-dominated catchment using SWAT+gwflow and modifications to the gwflow module" by Estifanos Addisu Yimer et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2022-169-RC2, 2022

The interactions between surface water-soil-groundwater is critical for the terrestrial hydrological processes especially over humid regions that have low water table depth. Estifanos et al. presented a modeling work over a groundwater-influenced catchment named Dijle by using SWAT and SWAT+gwflow model, and showed improvements of streamflow modeling after adding the gwflow. Although the topic is important, the current manuscript is more a technical report than a scientific research. Detailed comments are below.

- The authors declare that the primary novel side of this research article is representations of groundwater-soil interactions in the introduction. However, I did not see any details on the parameterization of groundwater-soil interactions in the model description. Moreover, detailed analysis on the influence of this process on the modeling result.
- Again, the current analysis simply compared two modeling results in modeling streamflow and simply showed the modeled groundwater balance. A scientific analysis on why the SWAT+gwflow model shows improvement in modeling streamflow (e.g., you can analyze the runoff components, the difference between two modeling results in water table depth, recharge) is needed.
- In addition, the current work also include the pumping in the SWAT+gwflow model. However, how much influence does the pumping process have? The relative importance between pumping and groundwater-soil interactions? Which factors contribute to the improved streamflow modeling (e.g., the original groundwater module, the groundwater-soil interactions, and the pumping) are not analyzed.
- The authors also emphasize that, compared with the precious study that used MODFLOW and SWAT, the current SWAT+gwflow model does not require any additional hydrological model. However, as the precious work obtained “nearly similar results”, I think the current point is relatively weak and is technical. Instead, it is more scientific

to analyze the influence of direct coupling of groundwater module and SWAT on hydrological processes. For example, whether the SWAT model presents improved simulation of soil moisture, evapotranspiration after coupling the groundwater module and considering the groundwater-soil water interactions.

- The manuscript also needs improvement. For example,

- I did not find any introductions to the streamflow data (including its record length, location) in the "Study area and data".
- Very detailed information is given in the study catchment in section 2, including the tributaries. However, the locations of tributaries are not given in Figure 1, which makes the reader confused.
- What does the different colors in Figure 2 mean?
- What does the "uncalibrated zone"mean in Figure 3? Why it is not calibrated?
- Whose simulation results is shown in Figure? SWAT or SWAT+gwflow? Moreover, both SWAT and SWAT+gwflow should been shown in Figure 5 to help us better understand the improvement in SWAT+gwflow.
- The unit of PBIAS should be given in Table 1.
- I can not see the yellow, light blue and blue regions in the right panel of Figure 7. And what does the white area in the right panel of Figure 7 mean is not declared.
- L385 "MDOFLOW"should be "MODEFLOW"