



Comment on hess-2021-247

Anonymous Referee #1

Referee comment on "Improved Representation of Agricultural Land Use and Crop Management for Large Scale Hydrological Impact Simulation in Africa using SWAT+" by Albert Nkwasa et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-247-RC1>, 2021

The paper presents an important step forward to better capture crop phenology in hydrological modelling. It is well written and structured. To demonstrate its reach and inspiration for future modelling, the paper could be better positioned with regard to existing modelling advances considering crop dynamics. It would gain from a discussion of results in view of existing modelling approaches and advances, going beyond the mention of omitting these in most models. Discussing uncertainties arising from the sole focus of the most widespread crop per pixel and simulation of the 5 representative crops would also make the paper stronger.

Further remarks

- The start of the introduction would be more interesting to read if it wasn't a copy of the abstract.
- Lines 34-35: some details of the "simplistic way"/"abstract terms" of considering crops in hydrological models and what we learn from these would provide a good start.
- Line 62: examples on current knowledge derived from the implementation of cropping dynamics in hydrological modelling would be useful (e.g. The Crop Generator: Implementing crop rotations to effectively advance eco-hydrological modelling. <https://www.sciencedirect.com/science/article/abs/pii/S0308521X21001360>).
- Lines 70-75: How is phenological crop development simulated in other hydrological models, e.g. SWIM? Has there been any coupling attempts with modelling of land surface processes that consider phenology, e.g. PROMET?
- 4a and c show a good improvement of LAI, also seen to some extent in Figs. 5a and c. Also erosion is reduced accordingly. But why do erosion values show strong peaks in March and May in Figs. 5b and d? In March LAI is already high.
- Line 191: The idea is clear that results are compared with reality to the extent possible. But what does 'scientific validation' mean? How is this different from just 'validation'?
- Lines 261-263: wouldn't this speak to an increase of ET as water is applied without limits? Please clarify.

