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Geoscientific Model Development Discussions

Interactive comment on "Enhancement and validation of a state-of-the-art global hydrological model H08 (v.bio1) to simulate second-generation herbaceous bioenergy crop yield" *by* Zhipin Ai et al.

Anonymous Referee #1

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The manuscript evaluates yield potential and water use efficiency of bioenergy crops Miscanthus and switchgrass at global scale using H08 model. The study reads as an adaptation of Trybula etal 2017 to H08 model and calibrating model for field cites from multiple countries to expand to global scale simulation. My major concerns are whether the model parameterization from Trybula et al for Midwest US weather suitable for global scale (specific comments below) and is the general water stress accounting model is reasonable for perennial bioenergy crops. The manuscript is well organized and easy to read.

Specific Comments: 1. Selection of hydrologic model H08: Authors mentions H08 as a state-of the art model multiple times in the manuscript. Of the available hydrology models, what makes H08 state of the art model? Additional discussion would be helpful 2. The study primarily focuses on bioenergy production potential and water use efficiency. The water use efficiency is estimated using simple scenario analysis of with and without water stress (through irrigation). I am wondering whether specific crop model could be better suited for such analysis rather than hydrologic model 3. It will be nice if authors list the goals and objectives of the manuscript 4. Enhancement of H08 for miscanthus and switchgrass: a. Authors chose potential heat units to maturity as 1830 and 1400 for miscanthus and switchgrass respectively based on Tryubla et al (2015). The HU for Trybula et al was estimated for continental climate with winter crop senescence. Is this valid for other climates? b. The water stress representation is similar to many hydrological models with stress as direct function of actual ET/potential ET. The crop water stress tolerance and impact on biomass production is crop specific. Some additional discussion of the stress functions for specific crops will be interesting since WUE is major focus of the study. 5. 2.5 Simulation and analysis: why authors chose to reduce interannual variability in temperature? 6. Results and discussion: I appreciate authors efforts to list all model parameters and compare parameters and simulation results with literature. The optimal RMSE and R performance after calibration is on lower side especially for switchgrass. 7. In section 3.2 authors claim "over estimation and underestimation tendencies having been successfully fixed" for H08 model, this seems to be a strong claim considering low performance indicators. I agree the improved version is better than original H08 simulations. Figure 4 simulated yield relative error well distributed along the 0 line, the range is -100 to +100 and the x axis relatively small and that makes the lines look closer to 0 relative error. 8. Section 3.3: " the land available for calculation was set as 10% of the pastureland and cropland" any specific justification for choosing this?

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