

Interactive comment on “Modeling sugar cane yield with a process-based model from site to continental scale: uncertainties arising from model structure and parameter values” by A. Valade et al.

Anonymous Referee #1

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General comments: The manuscript proposes to perform a uncertainty evaluation in an agro-LSM emerging from the model structure and parameter values. One of the main merits of the manuscript is the synthetic form and logical connection. The methods and analyzes presented transcend the universe of ORCHIDEE-STICS's model users, and can be applied to other models. However, a large portion of the analysis are focused on determining the role of ORCHIDEE vs. STICS parameters in controlling biomass simulation uncertainty, which is somehow more connected with the specific reality of the ORCHIDEE-STICS model (who opted to couple two models, instead of inserting

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explicitly new equations that describe the behavior of agricultural crops into the LSM).

Specific comments: 1. The way that ORCHIDEE and STICS models were coupled may result in some inconsistencies along the simulation. For example, both models solve soil water status, which may differ significantly in some moment, and have inconsistent impacts on both models. One simple way to reduce this independence is coupling the models in a two-way perspective, i.e., not only STICS influences ORCHIDEE, but also some state variables may be passed from ORCHIDEE to STICS (allowing the feedback between models). In the perspective of the paper, this may reduce the total uncertainties arising from parameters, and provide a more non-linear coupling.

2. The lower influence of STICS may be influenced by the lower number of processes solved by it. Additionally, for annual crops, like soybean, its influence in the final yield may be higher - since the establishment of canopy (closure) is temporally closer to the phase more related to the final yield. The authors could include some discussion in the Concluding remarks section.

3. Page 1219, line 23: " but T_{opt} disappeared and the area dominated by T_{min} expanded and now covers the cooler area of the southeast coastal zone." - this result may be explained by the fact that the later of growing season take place along the winter over this region.

4. Page 1220, line 21: replace "at continental scale" to "at sub-continental scale".

5. Page 1222, lines 1-12: I disagree from your conclusions: "With the hypothesis that our uncertainty calculation is applicable to the LPJml results, we can translate the potential mean production uncertainty as a range of (59–90 tha⁻¹). The land requirements when including parameters uncertainty would then becomes (2.3–4 million ha), almost a 2 to 1 ratio." Those ranges certainly would be constrained by actual yield observed in the region as well as in this situation one would use the best estimation and a range of uncertainty representative of that region – remember that you had derived your parameter's ranges from different countries (management, cultivars, etc....) and

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climates.

6. Table 2. This table could include one column with parameter description (the names of the variables may mean something for the ORCHIDEE users, but not for the public in general) and the units of the variables. Additionally, please provide the references for the observations and expert judgment (you can include symbols and present the list at the bottom of the table).

7. Figure 8 b - you can set the Biomass scale from 0-2500.

Interactive comment on Geosci. Model Dev. Discuss., 7, 1197, 2014.