Geoscientific
Model Development
Discussions

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 #2

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This paper asks an important question relevant to the uncertainties of Agro-LSM models and the spatial variation of parameter sensitivities. To consider model uncertainty and analyzing the factors that have influence on it would become essential information for decision-makers. For answering this question, authors conduct well-designed screening, uncertainty, and sensitivity analyses. The study is well conducted and the methods used are appropriate. Particularly, the results showed in Figure 6 and 11 are important. These results enables us to understand not only how large the uncertainty of model output is but also which parameters should be refined. However, I think the

paper needs some minor improvement. My detailed comments are as follows:

1. Page 10, line 16: The symbol "σ" is already used at line 1 of page 10. Therefore, this is slightly confusing.

2. Page 12, line 20: The authors assume that the second (site-constrained) a priori estimation is the "real" probability distribution when estimating model uncertainty. However, for example, when predicting the productivity of sugar cane under future climatic conditions, what is "real" priori probability would depend on the assumption of the future scenarios. In other word, if we assume that all possible crop cultivars can be used anywhere in the world in a future scenario, the "pessimistic" priori probability may be more "realistic". I think that the meaning of "real" in this paper should be defined.

3. Page 14, line 7: A period is needed between "...Marivoet, 1990)" and " The larger...".

4. Page 14, line12: Which spatial resolution was used, 0.5°or 0.7°?

5. Page 15, line 13: In the screening analysis, the parameters that have large non-linearities are eliminated from the final parameter set, and the uncertainty analyses are conducted with the parameter set. This treatment would be reasonable when discussing about the parameter sensitivity. However, I cannot understand why it can be assumed that the parameters that have large non-linearities do not have large influence on the uncertainty of the model. I think that the authors should discuss the effect of eliminating the parameters that have large non-linearities on the evaluations of uncertainties of model output.

6. Page 24, line 6-8: The relationship between PRCC and temperature explained here is different from that described in Fig. 11.

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