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Interactive comment on "Crop physiology calibration in CLM" *by* I. Bilionis et al.

Anonymous Referee #2

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General comments: The manuscript presents a calibration methodology for the physiological parameters of the newly developed CLM-Crop model. The algorithmic scheme is developed in a Bayesian framework using a sequential Monte Carlo sampling. The performance of the proposed approach is tested using data from one AmeriFlux test site, Bondville, and considering soybean as crop type.

Overall, the study is well designed and the methodology is scientifically sound. The illustrations are all good quality, and well organized. The issues discussed in this paper should be of interest to the scientific community, and is suitable for GMD. I recommend this manuscript being accepted with some minor/moderate revisions. The issues that I have just require the presentation of few additional results that, in my opinion, would strength the whole content of the manuscript.

Specific comments: 1. Authors state that the numerical examples of their scheme can

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perform model calibration at a fraction of time required by plain vanilla MCMC. Could this statement be corroborated with a table/figure showing the comparative computing performance of the two approaches? Moreover, could the authors show that their approach outperforms also in simulating the selected model outputs?

2. Did authors verify the improvements of model performance shown in Figure 6 and Figure 7 considering other "independent" variables? As an example, soil moisture and/or energy fluxes (LE/H). Additional results along this line would make the final conclusions of the work more robust.

3. The list of calibrated parameters looks a bit narrow if compared with other studies existing in literature (White et al. , 2000). Could authors comment on the ratio of neglecting highly sensitive parameters as the percent of leaf nitrogen in Rubisco and the slope of stomatal conductance?

4. As an additional test I would consider applying the calibration approach using data from another test site (e.g. Ponca City, AmeriFlux site) having a different crop type (e.g. winter wheat). At least observations on NEE (GPP) and LAI should be available. This will enlarge a bit the perspective of the work.

Typo. corrections:

- Please check the caption ("unsing") of Algorithm 1.

- Page 6741, "x" should be replaced by z.

References

White, M. A., P. E. Thornton, S. W. Running, and R. R. Nemani, 2000: Parameterization and sensitivity analysis of the BIOME–BGC terrestrial ecosystem model: Net primary production controls. Earth Interact., 4, doi:10.1175/1087-3562(2000)004,0003:PASAOT.2.0.CO;2.

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