Comments on:

Calibrating soybean parameters in JULES 5.0 from the US- Ne2/3 FLUXNET sites and the SoyFACE-O_3 experiment

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submitted to Geoscientific Model Development, May 2020

Decision: revision and clarification needed before further consideration

General comments:

This manuscript calibrated physiological and other crop parameters for ozone damage in soybean in JULES-crop model, making use of measurements from the SoyFACE with ozone experiment and from FLUXNET sites. Then authors evaluated the model performance against yield data and LAI, and the model is able to reproduce reasonably good magnitude and seasonality (for LAI specifically). In general, I think this manuscript meets the criteria for publication on Geophysical Model Development:

- the manuscript contributes to ozone impact modeling
- scientific approach and methods used are valid, results are discussed an appropriate way, and resulted model could potentially be applied regionally and globally in future studies and could potentially help build a state-of-the-art impact assessment model
- modelling work is reproducible because of data and code availability, and sufficient description in the main manuscript and supplements

However, some questions and details need to be further addressed before further consideration, specifically:

- methods, results and conclusions should be presented in a clear way for the readers to follow

Specific comments:

- Could crop rotation and irrigation vs. rainfed issues affect the tuning parameters? Introduction and discussion on this are necessary for readers unfamiliar with the sites and the tuning process. In the tuning process, seems like 2002 and 2004 (and 2006 and 2008?) are picked for tuning, why are these years selected? Is it because of data availability or other reasons? Please clarify.

- Section 2.1 description is too short. Could it be extended by two or more sentences with more details in the main manuscript?
- Figure 3, 4 and Section 3 include the major results of this manuscript, which is the evaluation of aboveground carbon and yield against SoyFACE observations and previous model results, and the new, calibrated run underestimates ozone impact significantly at most of the ozone levels. Authors argue that this is due to underestimation of water stress in the model and some testing has been done. Could authors make some assumptions about water stress (like p0=0 mentioned) and include the results in Figure 3 and 4?
- Figure 5, could these figures be condensed into 9 panels or fewer instead of 27? So that three sets of model runs could be compared against each other. Results and discussion around Figure 5 could be easier to comprehend if they are compared side to side.

Technical corrections:

- Line 138, please include definition of daytime hours.
- Line 183, linear -> linearly
- Line 183, photosynthetic rate A, if A will not be used in the manuscript, don't include it.
- Line 189, '(dfp_dcuo_io)' is this used later? If not, don't include it.
- Line 173 and line 194, what is this F? is it the same as f in equation 2, 3 and 6. I am confused. Line 193-195 doesn't make sense to me.
- Line 191, should be "… the threshold ozone flux **above** which ozone would cause damage to …"
- Line 246, Section 3.1 is not necessary if there is not Sect. 3.2, 3.3, … and next section should be Section 4, instead of 5. Numbering in Sect. 2 has some issues too, please correct them.

Issue with figures:

- Simulation names: "Mead tuning", "Osborne 2015 tuning" and "Oseborne 2015 higho3sens tuning" in the figures and in the main text. Could these names be shortened and renamed?

- Supplementary Figure S1-1, S1-2, S3-2, S3-3 and S3-5, image quality is low (S1-1, low resolution), and presentation is not quite clear. Vertical and diagonal crosses are difficult to differentiate. Caption for Figure S1-2, should be ‘Figure S1-1’ instead of ‘Figure 10’.
- Figure 4 caption: “… according to Table 4 and Figure 8.” There is no Figure 8.
- Figure 3 title unnecessary. Titles and axis labels in other figures are also messy, these need to be fixed for readers to follow.
- Should Figure A2 be included in the supplements instead of the main manuscript? I don’t see the necessacity of having appendix and supplements at the same time.