Author Responses to Reviewer 1 Comments on "Calibrating soybean parameters in JULES5.0 from the US-Ne2/3 FLUXNET sites and the SoyFACE-O3 experiment" by Leung et al., (Manuscript ID: gmd-2020-97-RC1)

Our point-by-point responses are provided below. The referees' comments are *italicized*, texts from the manuscript is in blue and our new/modified text is highlighted in **bold**. The revised manuscript with tracked changes is also included in the linked file below for the Editor's easy reference:

Response to Reviewer #1

We thank the reviewer for the complement and helpful comments. The paper has been revised substantially to address the reviewer's concerns point by point, and all changes are cited and discussed in the responses below.

L47: The authors mentioned "Recently. . ." but Morgan et al. 2004 is a quite old paper.

> Yes, I agree that Morgan et al., 2004 is an old paper. Thank you for suggesting other more recent publications. I have now included them.
>
> Recently the introduction of Free-Air-Concentration-Enrichment (FACE) technology avoids the artefacts from enclosed chambers, and O_3 fumigation was adapted to FACE facilities **(Agathokleous et al., 2017; Paoletti et al., 2017).**

L147: Better to cite also CLRTAP (2017):
https://icpvegetation.ceh.ac.uk/sites/default/files/FinalnewChapter3v4Oct2017_000.pdf

> Thanks for the suggestions. I have now updated it here at L148:
>
> To improve these indices, the Stockholm Environment Institute developed the Deposition of Ozone for Stomatal Exchange model (DO_3SE) **(Emberson et al., 2007; ICP Vegetation, 2017).**

L193-194, ". . . fractional reduction of photosynthesis by O3, F. . .", "F=1.40", "F=0.25": I suppose not "F" but "a" as you mentioned in lines 168-169.
L194, ". . .equation 1, 2 . . ..": I suppose not "equation 1, 2" but "equation 2, 3".

> Yes, you are correct. Sorry for the mistakes. Now I have change it in Line 195:
>
> …plant functional types with two different O_3 sensitivities (fractional reduction of photosynthesis by O_3**, *F, equation 2, 3*), where *a* = 1.40 is high sensitivity, and *a* = 0.25 is lower sensitivity** for C3 grass (Sitch, 2007), using monthly average O_3 data and calibration to yield observations.

L221, "Threshold of O3 flux (mmol m-2 s-1)": The unit should be "nmol m-2 s-1".

Yes, you are correct. I have amended it in L222:

We then tuned the O_3 parameterisation of Fractional reduction of photosynthesis by O_3 (sensitivity) and Threshold of O_3 flux (**nmol m-2 s-1**) to match the modelled leaf photosynthesis rate to the observed rate (Figure 2). The tuned parameters are showed in Table 4.

L307: Better to add some brief sentence in order to support your speculation about plant density and leaf area. For example, Jaumer Ricaurte's paper (Ricaurte et al., 2016, Crop Science, vol. 56, pages 2713-2721) would be helpful.

Thanks for the suggestions! This paper is very helpful. I have added a sentence in L310 to support the leaf area results.

Ricaurte et al., (2016) showed that higher sowing density would increase phyllochron in a linear relationship, which results a higher LAI measured that is consistent with our study.

Fig. 2: It is hard to identify symbols (model simulations vs observations). Better to use different colours as you did in the other figures.

Yes, I agree. I have now assigned colours for each symbol in Figure 2.

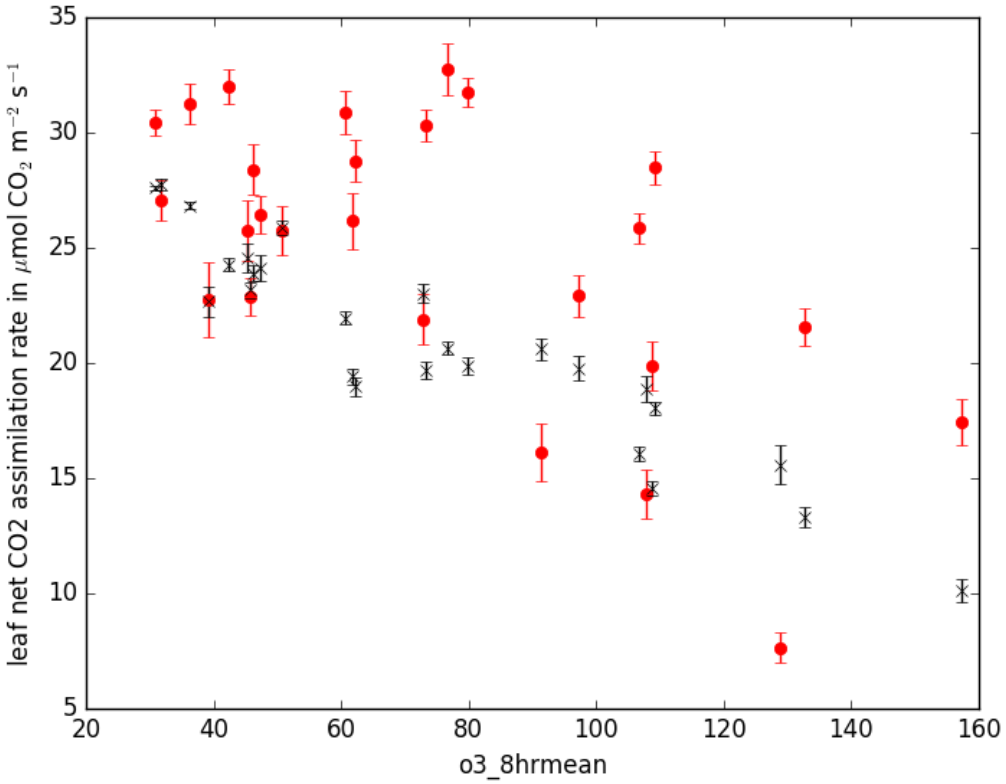

Figure 2. Net leaf CO_2 assimilation rate for calibrated JULES, simulated using the Leaf Simulator (black crosses) and observations from Betzelberger et al., (2012) (grey circles). X-axis is the daytime 8-hour mean O_3 concentration (ppb)

Table 4: Correct the units. The unit of fractional reduction of photosynthesis should be "mmol-1 m2". Instead, the unit of the threshold of ozone flux should be "nmol m-2 s-1".

Thanks for spotting the error. I have now corrected Table 4.