Letter of Response (responses below each comment)

Reviewer #1 (R1): Thanks for the revision of authors. After reading, I still have one concerns:

For the odd observations, the authors claimed an increased drought effects in control treatment. It seems that the new model has reproduced this confounding effect, as the model has simulated a higher yield for elevated O3 in these experiments. I think this is a great example to show the advantage of DSSAT model. Please show the simulation results in the manuscript (like the simulated soil moisture between the two treatments).

Response: There may be a misunderstanding with the description of the odd observations. The sentence detailing the increased drought effects on the control treatment in lines 558-560 was in reference to the soybean anomalous observation (34% increase in cv. Cumberland) from Mulchi et al., 1988 mentioned in lines 554-558. To clarify this, we modified the sentence in lines 558-560 to, "*Mulchi et al. (1988) speculated that the large yield difference reported was due to changes in the seasonal water dynamics thereby causing increased drought stress under the control treatment compared to the elevated O3 treatment.*"

For the soybean field experiment that was used for model calibration, only one of the seven cultivars, cv. Pana, showed an odd increase in yield as O3 increased (mentioned in lines 548-549). Although the exact cause of this is unknown, we describe the potential causes in lines 549-555, i.e., hormesis or increases in available end-of-season resources due to seasonal nutrient dynamics. Regarding model performance for this cultivar, the model did not reproduce the yield increase under higher O3 reported in four of the nine treatments (see Fig. S7 below), however, the simulated results were still acceptable because the model performed well in the other five treatments where elevated O3 decreased yield (RMSE = 0.14, r2 = 0.887). It may be possible for the models to simulate yield increases under elevated O3 depending on the interactions of other stresses and available resources throughout the season which was seen in Guarin et al. (2019) Fig. 5a.

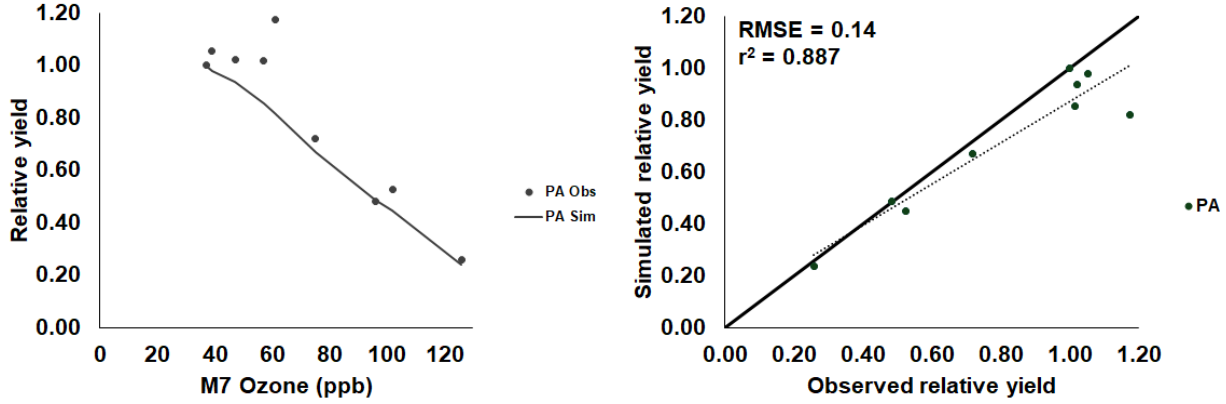

Figure S7: Observed relative yield under elevated M7 O_3 concentrations (left) and simulated model performance of the relative yield (right) of the soybean cultivar, cv. Pana (PA). The root-mean-square error (RMSE) and coefficient of determination (r^2) show the model performance. Solid black line shows 1:1 comparison and dotted black line shows linear fit.

We now added Figure S7 to the supplementary and reference it in lines 548-549, "*For several of the observations from the actual soybean field experiment using cv. Pana, the yield increased under higher O_3 concentrations (~2% to 18%, Fig. 3 (c), Fig. S1 (b), and Fig. S7)*".

To clarify the model performance, we added the sentences in lines 560-563, "*Reproducing rare occurrences where elevated O_3 may result in yield increases can be a challenge for the models because of the linear response of the stress equations (Fig. S7). However, it may be possible depending on the simulated interactions between seasonal dynamics of resources as shown with the sensitivity analysis of wheat yields in Guarin et al. (2019).*"