We thank very much for the helpful comments and suggestions from the reviewer, which help us improve our manuscript. The comments were carefully considered and revisions have been made in response to suggestions. This round of author responses to review comments are shown in blue text.

Reviewer: The authors stated that they used Lombardozzi et al. (2013)'s parameterizations for their study (L209). I am confused from where in Lombardozzi et al. (2013) the authors obtained their ap, ac, bp, and bc for the 6 vegetation types in their Table 2. In their results from "the exposed to charcoal-filtered air with medium or high confidence in cumulative O3 uptake (CUO) calculations", Lomdardozzi et al. (2013) showed no significance in the linearly regressed equations of photosynthesis in % of control vs. CUO for all plant types except crops and showed no significance in the linearly regressed equations of conductance in % control vs. CUS for all plant types except temperate evergreen trees (L2013's Tables 2&3). In their results from "ambient air" data, Lomdardozzi et al. (2013) showed no significance in the linearly regressed equations of photosynthesis in % of control vs. CUO and conductance in % control vs. CUO for all plant types except "temperature deciduous trees" (L2013's Tables B1&B2).

The values the authors used that I recognized, albeit not the ones intended for their purposes in this reviewer's opinion, were 2 orders of magnitude smaller than those in Lombardozzi et al. (2013). This reviewer was taken by surprise by the authors' statement that most of their plant types had "time-independent" sensitivity to CUO since ac and ap values were zero. First, I did not see zero values for ac and ap in Lombardozzi et al. (2013); instead, L2013 showed no significance in regression for most plants as stated above. Second, if what the authors stated were true, it'd totally defeat the purpose of that epic study of Lombardozzi et al. (2013)'s. In short, it was very confusing how and where the authors got the values in their Table 2 from.

Response: We are sorry for the confusion. The parameters we employed for L2013 scheme in our paper were originally adopted from Lombardozzi et al. (2013), which were provided in the unit of percentage but converted to the fraction in our study. As a result, the values in our paper are 2 orders of magnitude smaller than those in Lombardozzi et al. (2013). The specific values of ac and ap were set to zero in the Table 1 of Lombardozzi et al. (2015) based on the conclusions of Lombardozzi et al. (2013), as we presented below.

To clarify the source of parameter settings, we added a footnote to Table 2: "[a] The data source is Lombardozzi et al. (2015). Due to the data limit, we apply the same sensitivity parameters for EBF, DBF, and SHR."

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TABLE 1. Values used to parameterize plant functional types in CLM. Slopes (per mmol m^{-2}) and intercepts (unitless) are based on values presented in Lombardozzi et al. (2013).

Plant group	Photosynthesis Slope (a_p)	Photosynthesis Intercept (b_p)	Conductance Slope (a_c)	Conductance Intercept (b_c)
O_3 response				
Broadleaf	0	0.8752	0	0.9125
Needleleaf	0	0.839	0.0048	0.7823
Crop and grass	−0.0009	0.8021	0	0.7511
Sensitivity simulations				
High vulnerability				
Broadleaf	0	0.8502	0	0.89
Needleleaf	−0.038	1.083	−0.0144	0.8874
Crop and grass	−0.0007	0.8564	0	0.7074
Low vulnerability				
Broadleaf	0	0.9798	0	0.9425
Needleleaf	0	0.8595	0.0067	0.7574
Crop and grass	0	0.7159	0.0229	0.4621
Fixed decrease				
Broadleaf	0	0.8752	0	0.9125
Needleleaf	0	0.839	0	0.8645
Crop and grass	0	0.7722	0	0.7511
Single plant type				
All plant types	−0.000 98	0.8434	0	0.8444

Table R1 The source of slopes and intercepts (Lombardozzi et al. 2015)

Table 2. Slopes and intercepts used for L2013 O_3 damage scheme [a].

PFTs	a_p (mmol m^{-2})	b_p	a_c (mmol m^{-2})	b_c
EBF	0	0.8752	0	0.9125
NF	0	0.839	0.0048	0.7823
DBF	0	0.8752	0	0.9125
SHR	0	0.8752	0	0.9125
GRA	-0.0009	0.8021	0	0.7511
CRO	-0.0009	0.8021	0	0.7511

[a] The data source is Lombardozzi et al. (2015). Due to the data limit, we apply the same sensitivity parameters for EBF, DBF, and SHR.

We have the same concern as the reviewer that the L2013 scheme may not reasonably reflect the vegetation responses to CUO. However all the previous researches applied L2013 scheme to explore the climatic feedback of O_3-vegetation interactions (e.g., Sadiq et al. 2017; Zhu et al. 2022; Jin et al. 2023). In this study, we used both L2013 and S2007 schemes to assess and compare the climatic feedback due to O_3 vegetation damage so as to understand the uncertainties due to the differences in schemes. We also discussed the possible limitations of the L2013 scheme in the text: “The L2013 scheme considered the decoupling between photosynthesis and stomatal conductance. However, we found this scheme showed no significant different changes for sunlit and shaded leaves. In addition, the calculation of CUO heavily relied on the O_3 threshold and accumulation period, leading to varied responses among different studies using the same scheme. Furthermore, the slopes of O_3 sensitivity in L2013 scheme were set to zero for some PFTs, leading to constant damages independent of CUO." (Lines 466-472)

Further, Lombardozzi et al. (2013) emphasized "chronic ozone exposure" throughout their work, and thus they included the studies that used experimental periods longer than 7 days. That means that the parameterizations derived from L2013 would be only applicable for calculations over periods > 7 days. Hence, the question is: how could the authors' calculations for times shorter than that be valid?

Response: As mentioned by the reviewer, L2013 would only be applicable for calculations over periods > 7 days. In this study, we conducted four consecutive months of simulations with the first month excluded from the analysis as the spin-up. Hence, all of our simulations were longer than periods > 7 days and valid for the further analyses.

Since S2007 calculated instantaneous effects while L2013 the effect of CUO, it is critical to know what exactly was presented in Figures 2 and 3. The author just stated "O3 damage", but they had 3 months simulations. The two figures must be showing post processed values. So, what exactly was shown in those figures? This question points to the comparability of those two figures and consequently their main findings.

Response: Figures 2 and 3 showed the three-month averages of O_3 vegetation damage. In the revised paper, we added month-to-month variations of O_3 vegetation damage in Figure S1 and S2 to clarify. For L2013 scheme, the O_3 damage to photosynthesis of sunlit and shaded leaves increases month by month with the increase of CUO, reaching a maximum in August. In contrast, For S2007 scheme, the O_3 damage peaks in July due to the highest O_3 concentrations. We modified the sentence as follows: "The S2007 scheme is dependent on instantaneous O_3 uptake, which peaks in July when both O_3 concentrations and stomatal conductance are high (Figures S1 and S2)."(Lines 300-302). For L2013: "The O_3 damage to photosynthesis of sunlit and shaded leaves increases month by month, reaching the maximum in August (Figures S1 and S2)." (Lines 307-309).

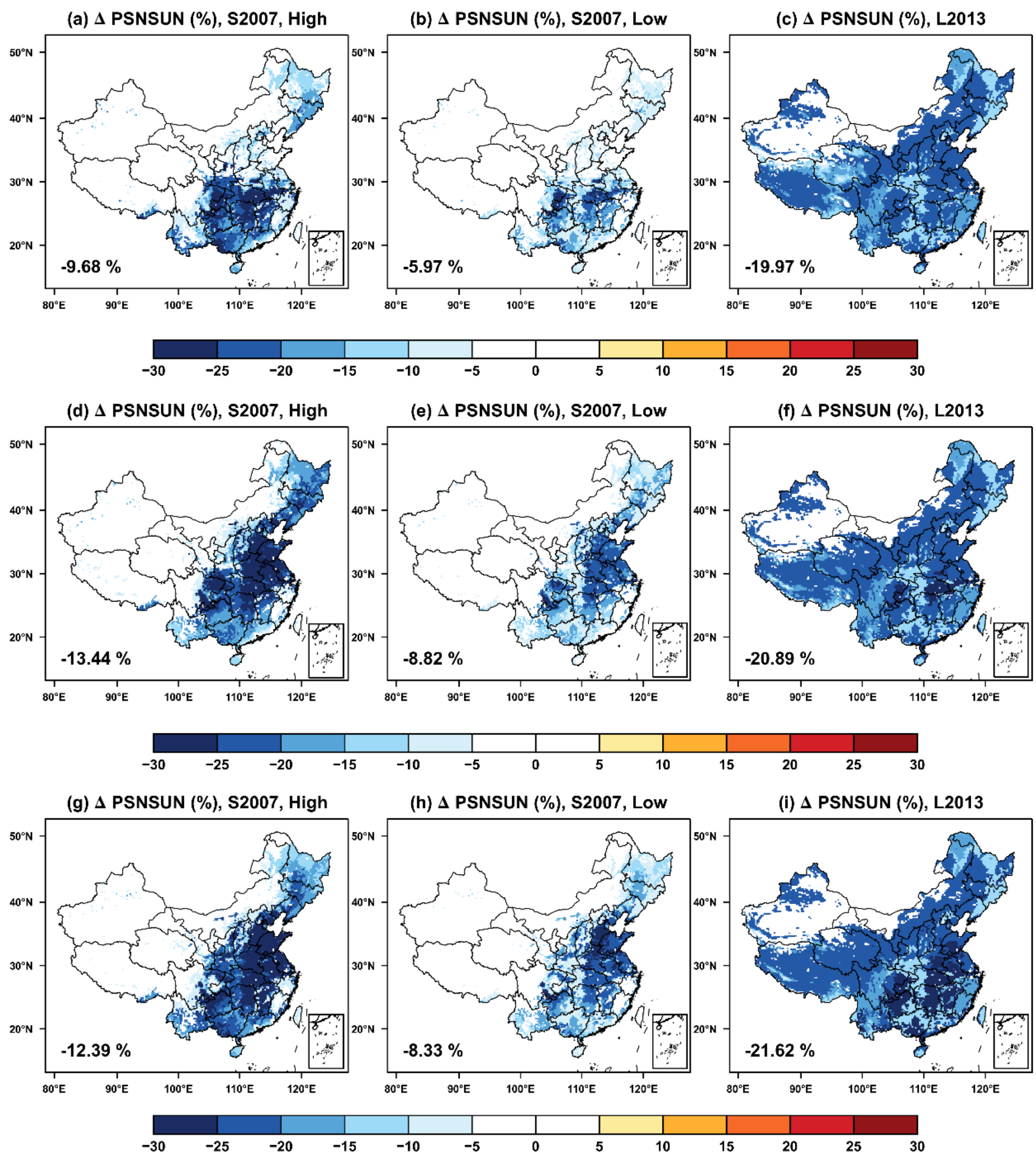

Figure S1 Offline O_3 damage (%) to the summertime photosynthesis of sunlit leaves in (a-c) June, (d-f) July, and (g-i) August for different O_3 damage schemes and sensitivities. The area-weighted percentage changes are shown in the lower left corner.

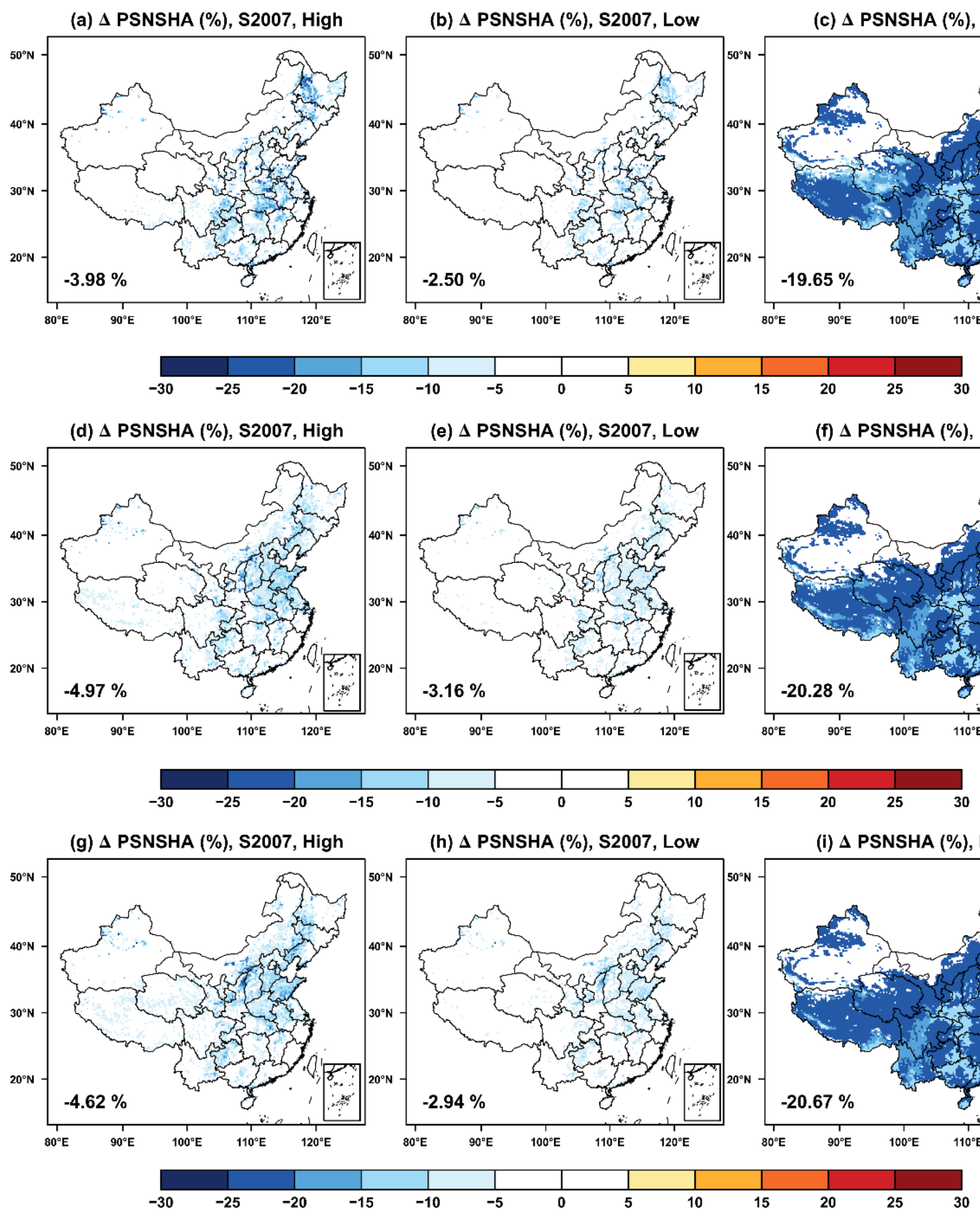

Figure S2 The same as Figure S1 but for the changes in photosynthesis of shaded leaves.

Reference:

Lombardozzi, D., Levis, S., Bonan, G., Hess, P. G., and Sparks, J. P.: The influence of chronic ozone exposure on global carbon and water cycles, J. Climate, 28, 292–305, https://doi.org/10.1175/JCLI-D-14-00223.1, 2015.

Jin, Z., Yan, D., Zhang, Z., Li, M., Wang, T., Huang, X., et al. (2023). Effects of elevated ozone exposure on regional meteorology and air quality in China through ozone-vegetation coupling. Journal of Geophysical Research: Atmospheres, 128, e2022JD038119. https://doi.org/10.1029/2022JD038119

Sadiq, M., Tai, A. P. K., Lombardozzi, D., and Val Martin, M.: Effects of ozone–vegetation coupling on surface ozone air quality via biogeochemical and meteorological feedbacks, Atmos. Chem. Phys., 17, 3055–3066, https://doi.org/10.5194/acp-17-3055-2017, 2017.

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