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Interactive comment on “Integrating O₃ influences on terrestrial processes: photosynthetic and stomatal response data available for regional and global modeling” by D. Lombardozzi et al.

Anonymous Referee #1

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The article by Lombardozzi et al. provides a comprehensive meta-analysis of data from existing literature to determine the effect of ozone on photosynthesis and stomatal conductance as a function of Cumulative Uptake of Ozone (CUO). There is a huge need for such an analysis to make sense of all the individual ozone studies that have been published, and to put past synthesizing studies (like the original Reich work from 1987) into proper context. This article should be published, with just some minor revisions as specified here.

The end result is that while ozone negatively affects photosynthesis and stomatal conductance, and photosynthesis more than stomatal conductance, there are not really any significant correlations between the two when analyzed over a large range of ex-

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periments. In the discussion the authors do point out the potential role of threshold measures for models, which they are not able to discern from the existing literature. I would like a little more comment in the discussion about models that apply negative ozone effects at the monthly or seasonal time increment, which in some way gets at the idea of applying the overall mean reductions rather than trying to correlate with hourly CUO. These models generally use a threshold index like AOT40, but then apply the results monthly or seasonally based on seasonal regressions against these threshold indices. Is there any possible way there could be significant correlations at this time scale against these types of indices for broad ranges of PFTs even if not at the hourly time scale for CUO? Or, how would the authors suggest applying mean changes instead of correlations?

The figures are good but just need some clarification. In the captions it states that p values are listed only when significant, but they seem to be listed on most figures, whether or not the value is greater than 0.05, so I would just remove that statement from the figure captions. The regression equations are supposed to be listed only when significant, so why are they listed for Figure 3? The authors should just go through the figures and make sure they are consistent with what they say they are doing in the figure captions. Is figure 4 meant to be just the high confidence data and not also the data that is charcoal-filtered? In Figure 5 (and similarly for 8d), what explains the increase in stomatal conductance for ozone values greater than 150 ppm (is this the guava points)? Is there something peculiar about that experiment that resulted in ozone leading to better plant growth (or what can lead to such an effect)? In Figure 9 I assume the information within the figure refers to all the data points?

Other specific points: 1. First paragraph, Introduction: Ozone increases with more warming, but what about radiation? Often historical or future warming is associated with more clouds and less incoming solar radiation, so that might counteract the effect of the warming. 2. P. 6977, first paragraph: Why are hydrological changes under-predicted due to ozone? If the effect of ozone on stomatal conductance is generally

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overrepresented, wouldn't the effect on hydrological changes be overpredicted? Also, rather than stating "if conductance responds differently than photosynthesis" just state "if conductance responds less than photosynthesis". 3. Methods, p. 6981, I don't understand why if a stomatal conductance value is recorded on days 10 and 20, the value for day 11, for example, would equal the value on day 20, instead of some linear interpolation of the two values. The authors show a strong correlation using their method with other published values, but can they please explain this reasoning better? 4. Results, section 3.1, second paragraph: data "were" not "was" 5. Table 1: The rows in this table are not related to the columns, so it is really just a listing of individual items. As such, I would make it look more like a list, rather than aligning columns. 6. p. 6985, last paragraph: "studies using . . ." shouldn't it be "charcoal-filtered air"?

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