

Interactive comment on “Influence of future climate and cropland expansion on isoprene emissions and tropospheric ozone” by O. J. Squire et al.

Anonymous Referee #2

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This paper describes a modeling study of the effects of future climate and land use changes on atmospheric chemistry, and in particular, tropospheric ozone. The authors present a systematic study to elucidate the contribution to total change in isoprene emissions and ozone concentrations from individual processes. Overall, this paper is well-written and very clearly explains the methods and results. The authors did have to make several decisions and assumptions in their model framework (e.g., the different scenarios). Although these can lead to certain uncertainties and inconsistencies in the model set-up, I believe that the authors explained the choices made and the implications of these choices well. Further, the authors present a nice review of the

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previous studies that have investigated similar issues. I recommend that this paper be published, after minor revisions. I have a few comments and questions below, and I have suggested some minor edits.

Section 2.1: I am concerned that the isoprene emissions were calculated as a function of either grasses or trees. How are shrublands and wooded savannas considered here? Are they treated as forests? In Section 2.2., it is also stated that the remaining LSTs, which do not appear in the SDGVM, are adapted from their present-day values to account for cropland expansion. This is a bit confusing to me. Do the SDGVM PFTs cover the entire land area of the globe? How are the emissions of shrublands and in urban areas assigned?

In the sections explaining the results, I think it would be interesting to not only include the absolute changes, but also the % change in ozone concentrations and burdens. (This is done with isoprene, e.g., the 55% reduction in emissions when all changes are included). For example, on page 18323 (lines 27-29), how substantial are 9ppb increases in ozone relative to the base case? On that same section, the authors find more than 10ppb decreases in ozone over the eastern US; this is attributed to changes in anthropogenic emissions in that area. How does this compare to other studies? If using a different emissions scenario, how would the results differ?

Page 18316-18318: Although the Figure 2 is included, a table summarizing the results in isoprene emission estimates (described in Section 3) would be helpful.

An editorial note: throughout the paper, the authors use “which” as a nonrestrictive clause. In this case, there should be a comma preceding the “which”. If it is a restrictive clause, then “that” should be used instead of “which”, and no comma should be used. I recommend that the authors go through the paper to ensure that these words are used properly, and are properly punctuated.

Page 18314, line 7: “as detailed below” can be removed (or changed to “as detailed here”?)

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Page 18319, lines 10 and 12: There should be a semi-colon before "however"

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