

Atmos. Chem. Phys. Discuss., referee comment RC1  
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## Comment on acp-2021-492

Anonymous Referee #1

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Referee comment on "Responses of surface ozone to future agricultural ammonia emissions and subsequent nitrogen deposition through terrestrial ecosystem changes" by Xueying Liu et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-492-RC1>, 2021

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This study provides a very interesting modelling study of the potential global impacts of changing agricultural demand, and thus ammonia emissions, on future surface ozone concentrations. The study provides a comprehensive set of scenarios looking at different vegetation responses to increased fertiliser use on ozone concentrations between 2000 and 2050, using both prescribed and dynamic meteorology. Overall it was shown that increased nitrogen fertiliser use by 2050 leads to increased LAI and thus enhanced surface ozone concentrations, with the biggest impact seen when dynamic meteorological effects were allowed. This study is suitable for publication in ACP after the following comments are addressed.

### Specific Comments

Does this version of the CLM include the impacts and feedbacks of ozone damage on stomatal resistances? If so were they included in the simulations performed in this work? This could potentially have further impacts on the nitrogen deposition effects on vegetation, particularly through stomatal uptake.

In Section 5 the authors present a very good summary of the potential feedbacks caused by changes in nitrogen deposition in response to future changes in agricultural practices. In particular they focus on the feedbacks through changes in LAI and canopy height. However, they do not cover the potential feedbacks involved where changes in ozone concentrations could lead to plant damage and thus impacts on not only ozone concentrations themselves but also uptake of nitrogen species. It is appreciated that given the current setup of the modelling system a further simulation is not possible but would the authors be able to give a more detailed comparison with the potential effects of ozone damage on the results observed or comment on how this could affect the results simulated by the model.

### Technical Comments

Page 1, Line 24: Please change to emissions

Page 2, Line 4: The start of this sentence seems a little repetitive, please correct to something like 'Crops typically take up only about 40-60% of the nitrogen fertiliser applied.....'

Page 5, Line 13: Do you mean Fig 2 here?