

# ***Interactive comment on “Responses of surface ozone air quality to anthropogenic nitrogen deposition in the Northern Hemisphere” by Yuanhong Zhao et al.***

## **Anonymous Referee #2**

Received and published: 30 May 2017

This manuscript presents a modeling study on the effects of anthropogenic nitrogen deposition on ozone pollution through surface-atmosphere exchanges. The Authors combine GEOS-Chem with CLM to produce an interesting, smart modeling experiment to study several processes (e.g. soil NO<sub>x</sub>, biogenic VOC, LAI, dry deposition velocity, etc) that affect surface ozone. They find that enhance atmospheric N deposition increases surface ozone by changes in biogenic VOC emissions and dry deposition velocities. Enhanced atmospheric N deposition also increases soil NO<sub>x</sub> emissions, but the effect on surface ozone is more scattered. The resulted increases in ozone are comparable to changes in climate and land use alone, as determined by previous studies. This study highlights the importance of considering biosphere-atmosphere feedbacks in future

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airquality predictions.

The effect of human activities on atmospheric N deposition and further consequences to ecosystems and air quality is an important topic and results from this work are of relevant interest for the ACP readers. The manuscript is of very good quality, well written and organized. I did not find any major concern with the analysis and manuscript in general, and consider this article adequate for publication. I have added a few comments and editorial corrections below, and I hope the Authors consider in the revision of their manuscript.

Main Text

Line 153 Typo, 'CRUNCEP' not 'CURNCEP'

Supplementary Material

Line 21. In 'RNOx:N2O' equation. Is 'ATAN' the Arctangent?

Line 61 Typo, 'Hanes Woolf' Mechanism,

Line 67 Odd sentence, "f(Tsoil) represents the limitation of soil temperature on plant nitrogen uptake that we apply the same function as soil decomposition and nitrification in CLM".

Line 75 How does the modifications in CLM (NH3 volatilization, N update and soil NOx) correct LAI? Do all these modifications contribute the same, or is it mainly because the N uptake by the plants? May you please elaborate?

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Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2017-242, 2017.

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