

Supplement of Atmos. Chem. Phys., 20, 3859–3877, 2020
<https://doi.org/10.5194/acp-20-3859-2020-supplement>
© Author(s) 2020. This work is distributed under
the Creative Commons Attribution 4.0 License.



Supplement of

Global inorganic nitrate production mechanisms: comparison of a global model with nitrate isotope observations

Becky Alexander et al.

Correspondence to: Becky Alexander (beckya@uw.edu)

The copyright of individual parts of the supplement might differ from the CC BY 4.0 License.

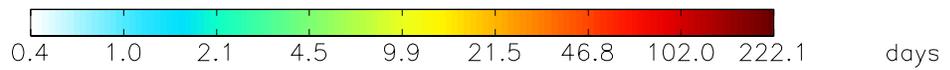
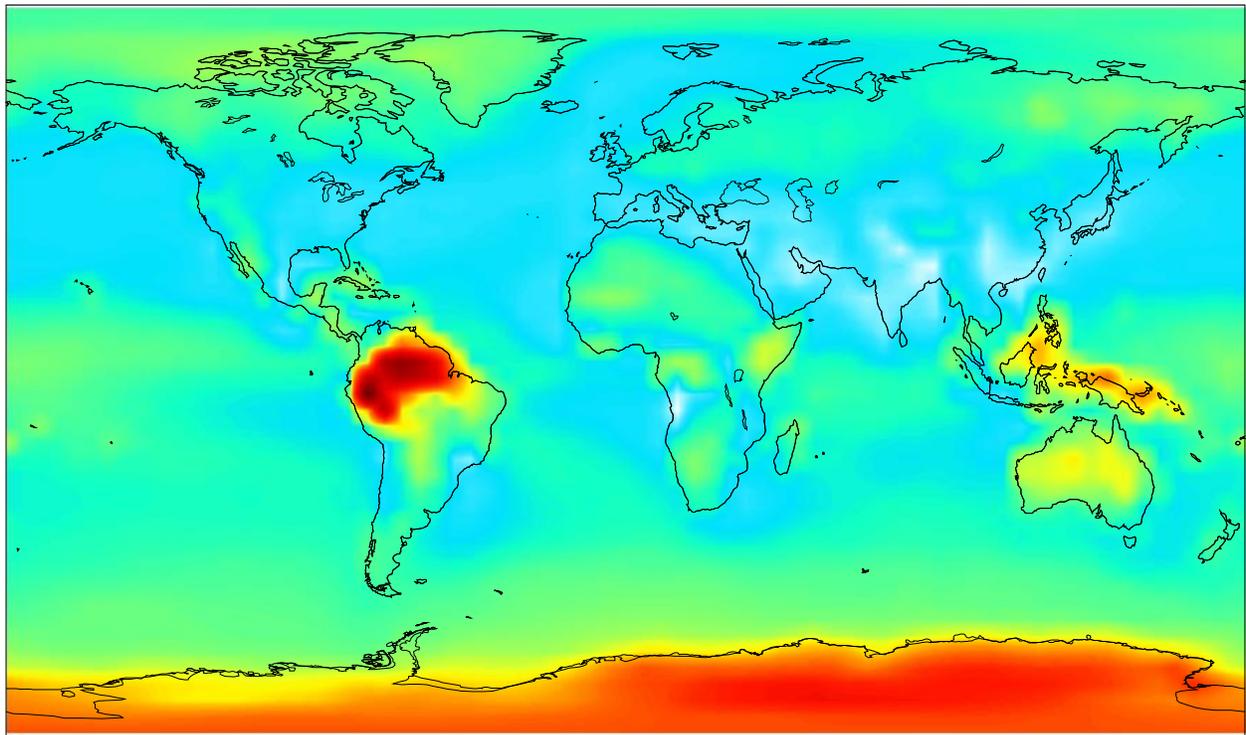


Figure S1. Annual mean lifetime of NO_x below 1 km altitude against oxidation to nitrate via reactions that occur only at night (R2+R4+R5).

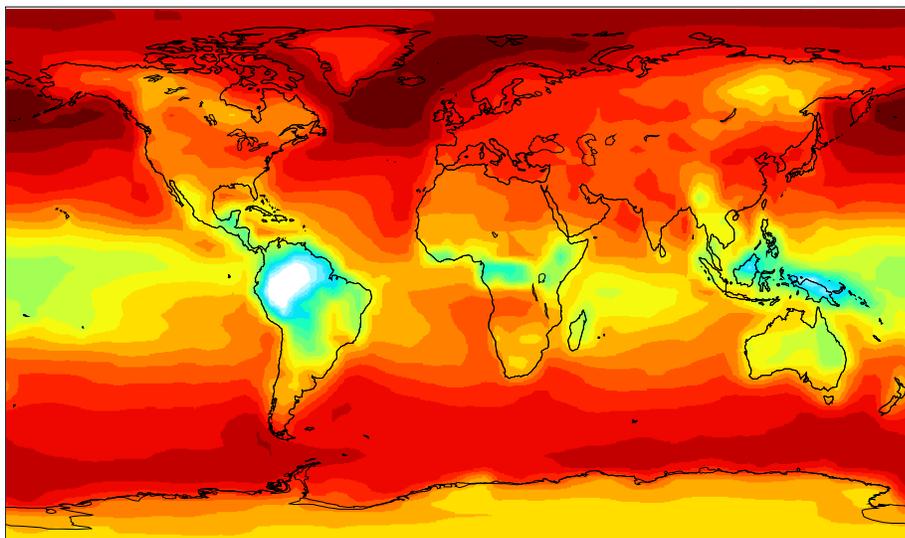


Figure S2. Same as Figure 4 but for the “standard” simulation.

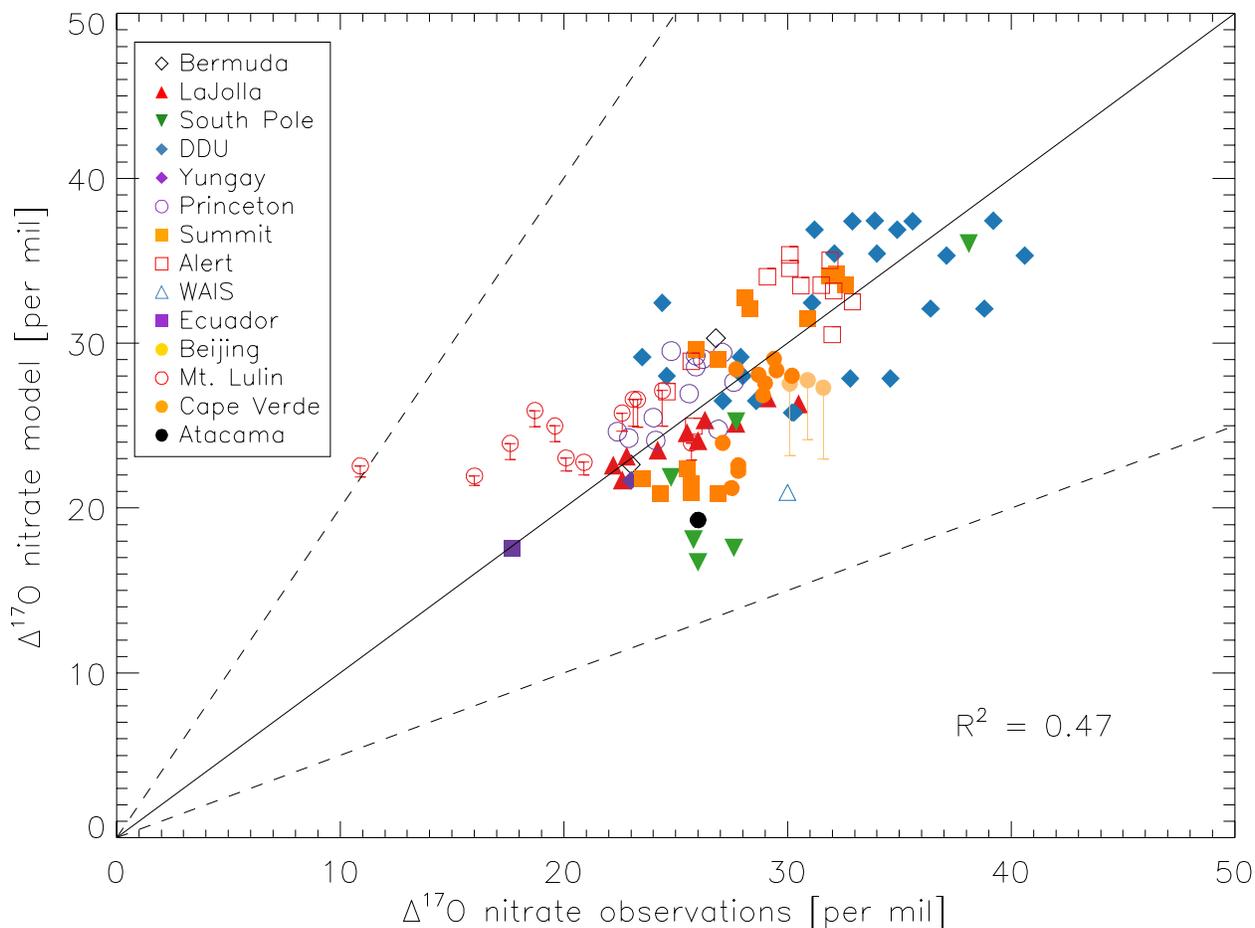


Figure S3.

Comparison of monthly-mean modeled (“standard”) and observed $\Delta^{17}\text{O}$ (nitrate) at locations where there are enough observations to calculate a monthly mean. References for the observations are in the text. The error bars represent different assumptions for calculated modeled A values for nighttime reactions as described in the text. Error bars for Beijing and Mt. Lulin reflect the range of possible modeled A values for nighttime reactions as described in the text. The $y=x$ (solid line) and $y=2x$ and $y=0.5x$ (dashed) are shown.

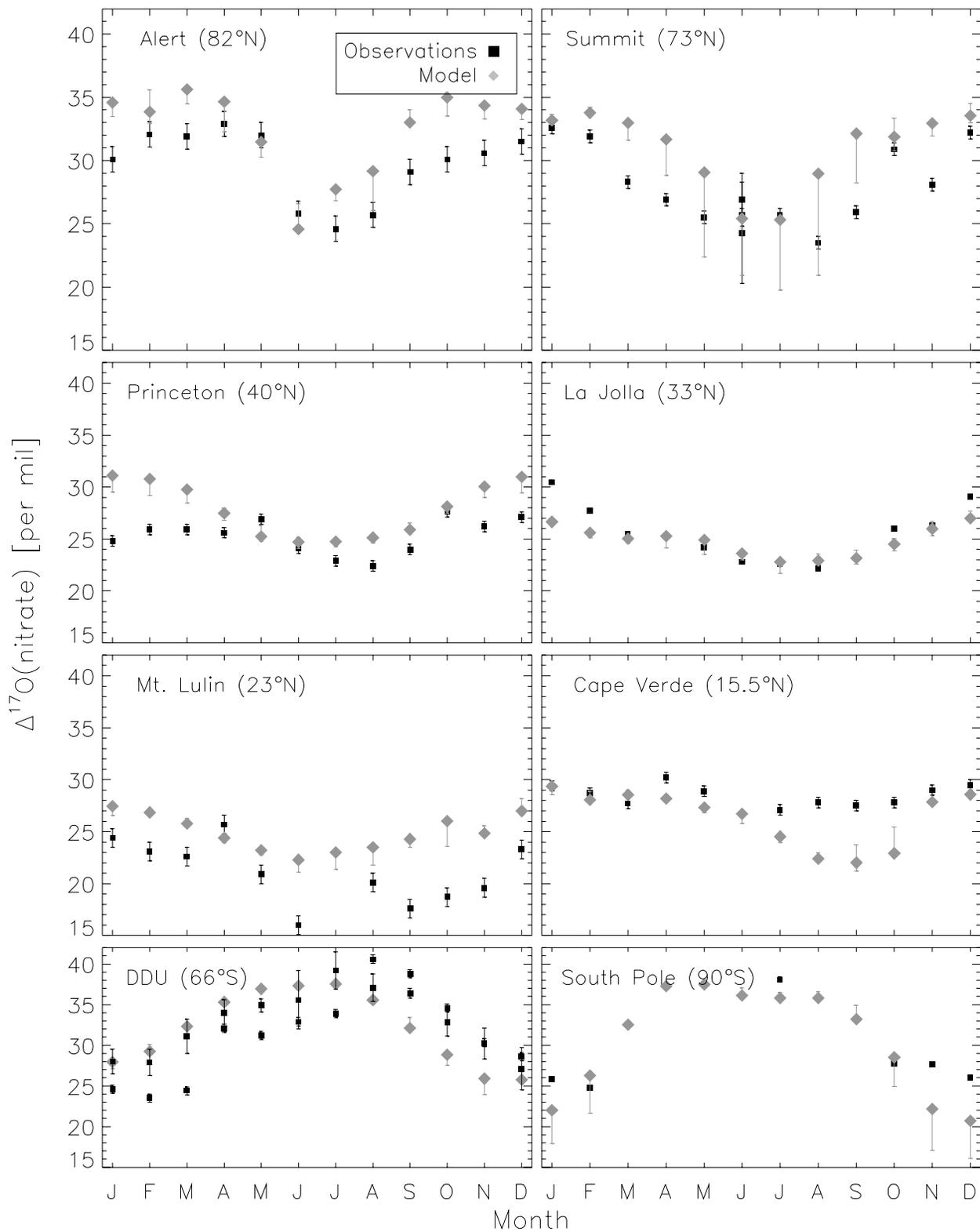
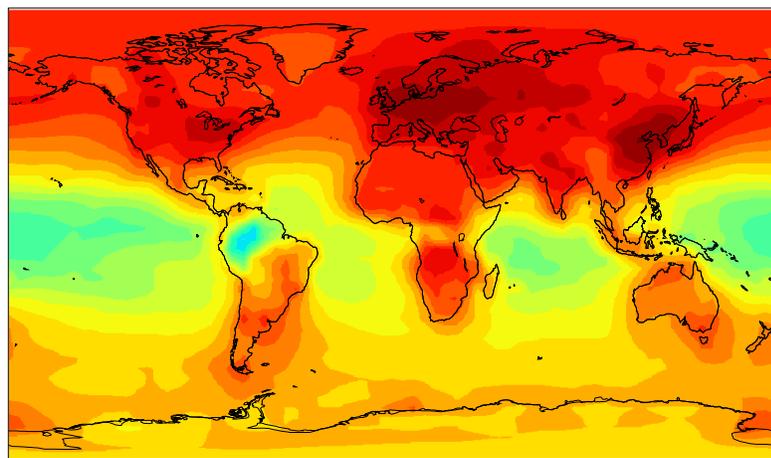


Figure S4. Comparison of monthly-mean modeled and observed $\Delta^{17}\text{O}(\text{nitrate})$. Model points are from the “cloud chemistry” simulation, while the modeled error bars reflect the full range of calculated values from all sensitivity simulations. Error bars for the observations reflect the analytical uncertainty in the

measurements, except for two data points in June for Summit which reflect the standard deviation of $\Delta^{17}\text{O}(\text{nitrate})$ from multiple measurements during that month.



3.0 12.2 21.5 30.8 40.0 [permil]

Figure S5. Modeled, annual-mean $\Delta^{17}\text{O}(\text{NO}_2)$ below 1 km altitude for the "cloud chemistry" model.

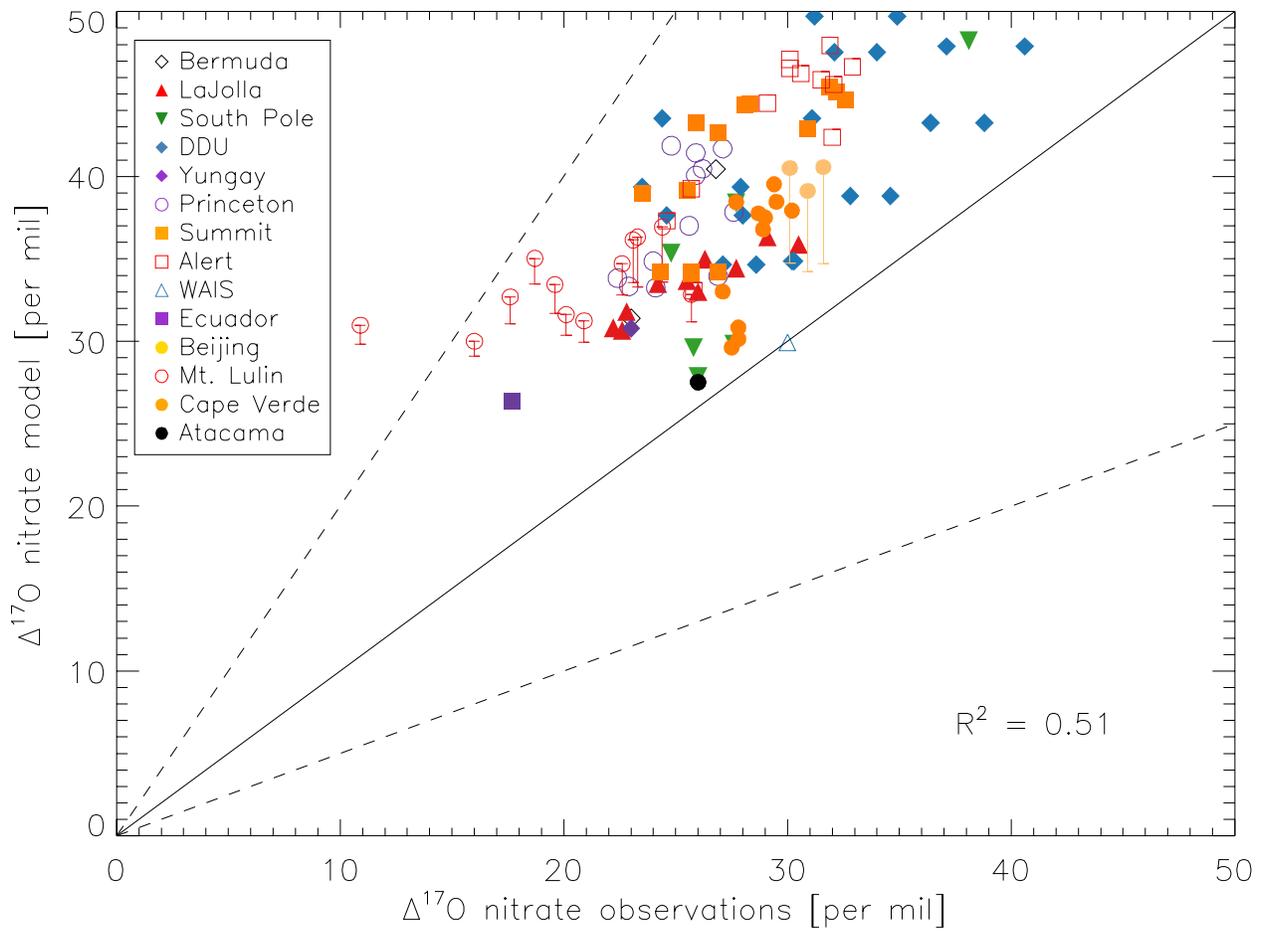


Figure S6. Same as Figure S3 but assuming $\Delta^{17}\text{O}(\text{O}_3) = 35\text{‰}$.

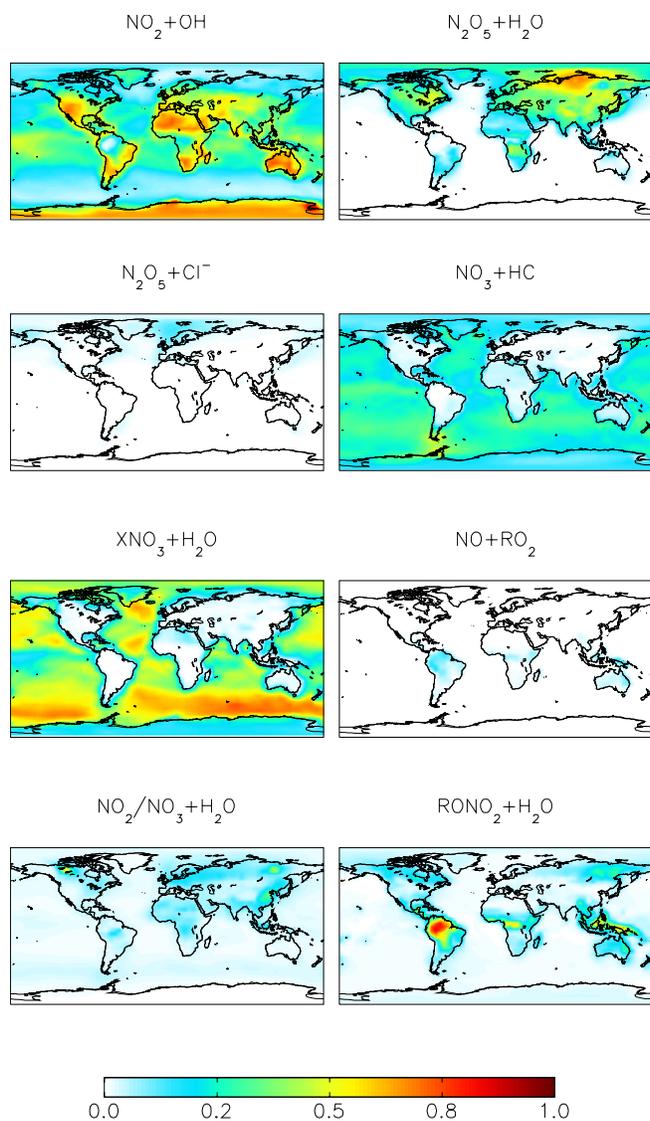


Figure S7. Same as Figure 3 but for the “standard” simulation.

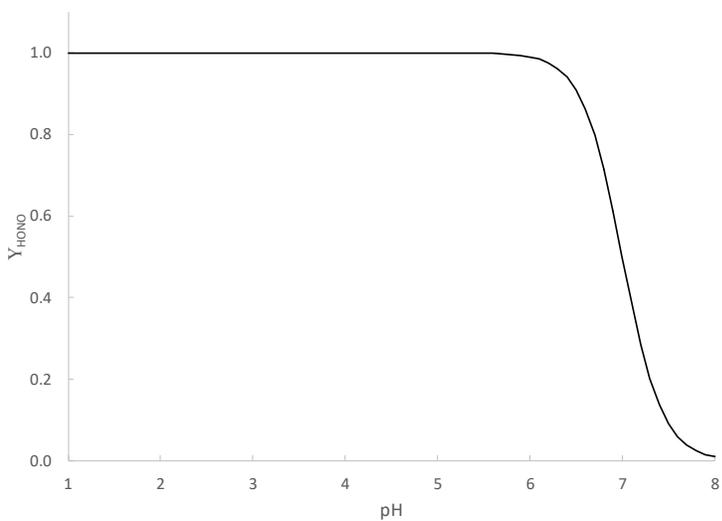


Figure S8. Calculated yield of HONO from the heterogeneous reaction of NO₂ on aerosol surfaces as a function of pH.

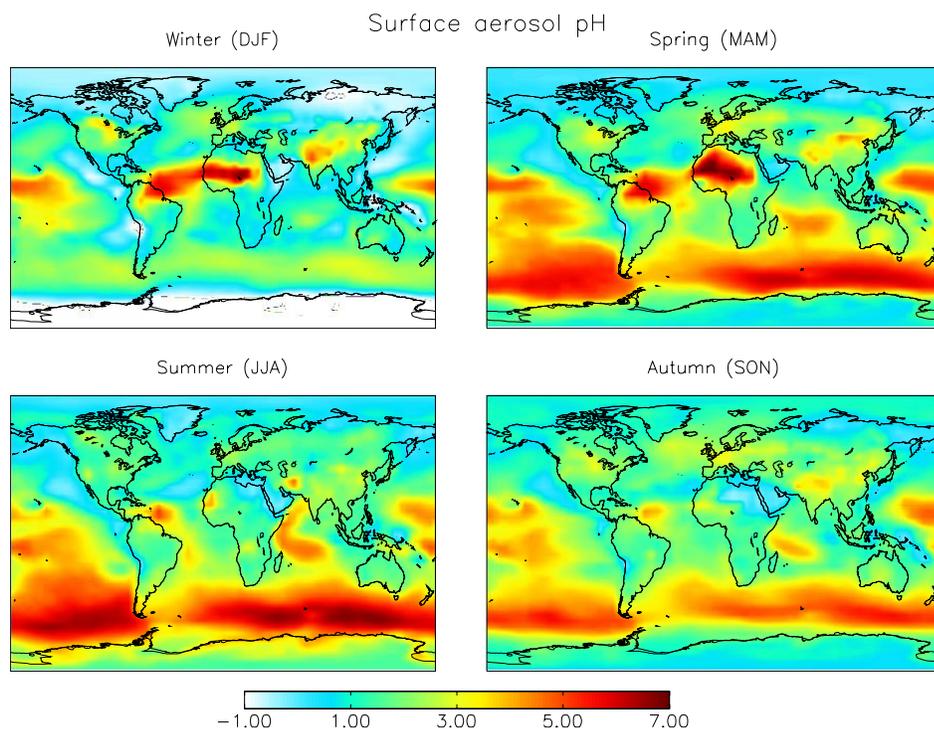


Figure S9. Calculated surface aerosol pH in the model in each season.

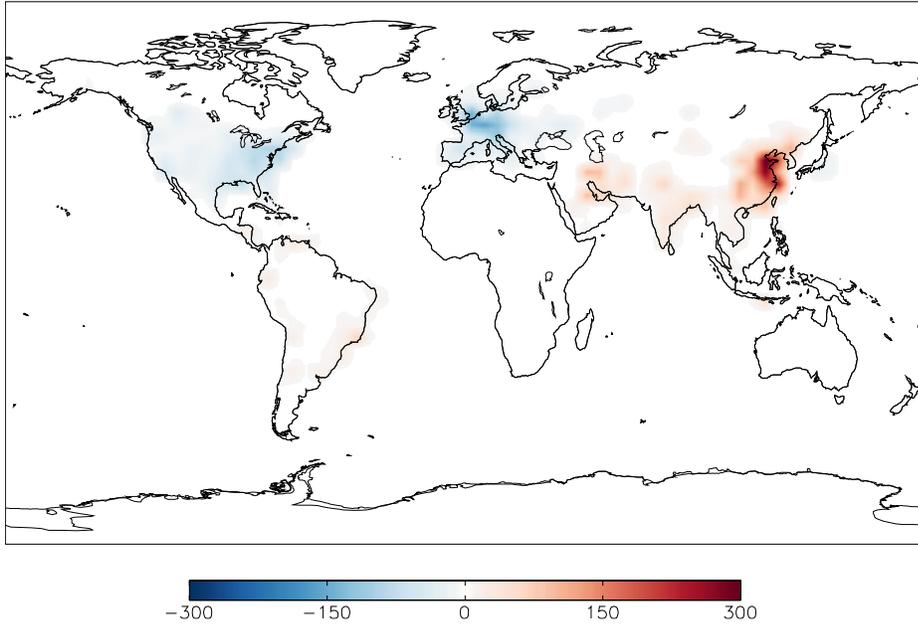


Figure S10. Modeled change in anthropogenic NO emissions (Gg N yr^{-1}) from the year 2000 to the year 2015 (2015 – 2000).