Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2019-25-RC2, 2019

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Effects of organic coating on the nitrate formation by suppressing the N_2O_5 heterogeneous hydrolysis: A case study during wintertime in Beijing-Tianjin-Hebei (BTH)" *by* Lang Liu et al.

Anonymous Referee #2

Received and published: 19 April 2019

This paper presents the implementation of N2O5 hydrolysis on organic-coating particles in WRF-Chem, and analyzes the impact of such implementation on the simulation of nitrate and other aerosol particles. Overall, nitrate concentration is reduced due to this newly-added pathway for N2O5 heteregenous hydrolysis.

While the parameterization for N2O5 hydrolysis on organic-coating particles is not new, it appears that this paper is among the first to add this parameterization into WRF-Chem. I recommend the paper to be published after addressing the following comments.

During the study time period of Feb 10 to Feb 26, there were multiple times that RH values are below 40% (especially during daytime). For sulfate particles at least, their phase is regulated by the hysteresis loop - solid sulfate will not become liquid until RH is above 80% and liquid sulfate particle will not become solid until RH is below 40%. Hence, there is another possible pathway to suppress N2O5 hydrolysis - that is - the inorganic particles can be in solid phase even without organic coating. Authors should at least mention how the particle phases are treated in the model? Are all sulfate particles in aqueous phase? And discuss additionally possible pathway. The following paper is recommended for the discussion. Wang, J., A. A. Hoffmann, R. Park, D. J. Jacob, and S. T. Martin, 2008. Global distribution of solid and aqueous sulfate aerosols: effect of the hysteresis of particle phase transitions, J. Geophys. Res., 113, D11206.

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2019-25, 2019.