

Evaluation of bi-directional ammonia exchange in GEOS-chem using in-situ observations

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Ammonia is an important species in atmosphere which contributes to air pollution, climate change and environmental health. Ammonia emissions are known to be primarily from agricultural sources, however there is persistent uncertainty in the magnitudes and seasonal trends of these sources. In most current air quality models, the inventories are based on the assumption of unidirectional ammonia emissions from the soil and vegetation canopies. However, the ammonia air-surface exchange is known as bi-directional. Therefore, we investigate the impact of implementing the ammonia bi-directional exchange to the GEOS-Chem chemical transport model. We also update the diurnal variability of the ammonia livestock emissions in the GEOS-Chem emission inventories. The coupled bi-directional exchange model with new diurnal variation of ammonia emissions is evaluated by comparing the modeled surface ammonia, aerosol ammonium and nitrate, and reduced nitrogen wet deposition to the independent surface measurements AMoN, NTN, and IMPROVE.

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