3.093 Deposition velocity of nitric acid above a forest in suburban Tokyo using relaxed eddy accumulation.

Early Career Scientist

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Abstract:

Asian region has high risk of atmospheric deposition of reactive nitrogen. Estimations of dry deposition of reactive nitrogen by the inferential model still have large uncertainties, especially for the forest surface. Gaseous nitric acid (HNO_3), which is highly reactive and soluble in water, well deposits to land surfaces due to its highest deposition velocity. Therefore better understanding of the deposition velocity of HNO_3 on forest can contribute to improve the inferential model. In this study, we developed a direct measurement system for the fluxes of HNO_3 and $PM_{2.5}$ components based on relaxed eddy accumulation (REA) by improving previous REA system (Matsuda et al., Atmos. Env., 107, 255-261, 2015). The REA method is an alternative to the eddy correlation method that is the method to most direct measure flux. For the collection of HNO_3 in the REA system, we used annular denuder tubes coated with a solution of 9% NaCl and 1% glycerol is prepared by dissolving in 100ml of 50/50 (v/v) ethanol-water solution. We carried out the measurements from October 2016 to March 2017 and September 2017 to January 2018. We set the REA system at the top of 30m-high walk-up tower in a deciduous forest of the Field Museum Tamakyuryo (FM Tama) located in western suburb of Tokyo, Japan. Height of the forest canopy was about 20m. Weekly samplings were done continuously during the observation periods. We could obtain the dataset of directly observed HNO_3 deposition velocities covering leafy and leafless period. The HNO_3 deposition velocities were mostly higher in the leafy period than in the leafless period. In addition, we attempted to validate a resistance model by using the dataset obtained in this study.