Geophysical Research Abstracts
Vol. 12, EGU2010-12367, 2010
EGU General Assembly 2010

Eddy covariance flux measurements of ammonia with eTR-MS

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Micrometerological flux measurements of ammonia (NH_3) are very difficult due to the stickiness of the NH_3 molecule to all surfaces. Only recently, sensitive and fast responding instruments became available that opened the posibility to perform an Eddy Covariance approach to measure NH_3 fluxes. Norman et al. (2006, 2007) showed that a modified commercial Proton Transfer Reaction-Mass Spectrometer from IONICON using charged oxygen molecules instead of protons reliably measured concentrations, but had too strong damping within the drift tube and the inlet lines for EC flux measurements.

In the mean time a new smaller drift tube became available that can be heated up to 180°C. With this configuration the response time was below 1 sec. Heating also the whole inlet line to temperature above 100°C enabled NH_3 EC flux measurements. The performance of the system was tested during two fertilization events (organic manure and urea application) at the Oensingen grassland site in Switzerland. The measured fluxes were in good agreement with an Aerodynamic Gradient approach and showed a similar dynamic range. The sensitivity of the eTR-MS systems seems to be in the same order of magnitude as state of the art gradient systems.

References:

Norman, M., Wisthaler, A., and Hansel, A. (2007). O2+ as primary reagent ion in the PTR-MS instrument: Detection of gas-phase ammonia, International Journal of Mass Spectrometry 265, 382–387.

Norman, M., Spirig, C., Wolff, V., Trebs, I., Flechard, C., Wisthaler, A., Schnitzhofer, R., Hansel, A., and Neftel, A.: Intercomparison of ammonia measurement techniques at an intensively managed grassland site (Oensingen, Switzerland), Atmospheric Chemistry and Physics, 9, 2635-2645, 2009.