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Field scale measurements of NH3 emissions

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The uncertainty in the ammonia emissions after application of organic manure contributes to a large extent to the overall uncertainties of the nitrogen budget of managed grassland systems (Ammann et al., 2009). Due to the sticky nature of the ammonia molecule and the variability of the emission fluxes the experimental determination is still a major challenge and a wide spread range of emission factors can be found in the literature.
We report on two field experiments performed in August 2009 at the NitroEurope site in Oensingen, Switzerland. The ammonia emission flux after liquid manure application was investigated simultaneously by various micrometeorological methods: (1) a mass balance approach measuring the horizontal advection flux with open-path FTIR sensors (Gärtner et al., 2008), (2) aerodynamic gradient methods, and (3) eddy covariance measurements based on a novel fast ammonia analyser. Due to the sequential application of the manure and the fast decrease of the ammonia volatilisation, detailed footprint calculations (Neftel et al., 2008) and corrections with a high temporal resolution were crucial for obtaining representative emission fluxes. The plausibility of flux measurements has been evaluated with back trajectories simulations (WindTrax, Flesch et al., 2009). The results of all applied flux measurement methods confirmed the low emission levels found earlier by Spirig et al. (2009). A comparison of the field observations with results of process oriented models showed considerable differences in the temporal course of the ammonia emission indicating the need for improvements of the models.

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