

Measurement of air-surface exchange of speciated nitrogen and sulfur compounds using a modified MARGA 2S: Concentrations and fluxes above a grass field

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Improved measurement methods are needed to characterize dry deposition of sulfur and nitrogen compounds to assess ecosystem exposure to nutrients and acidifying compounds and to develop atmospheric deposition budgets in support of critical loads assessments. The purpose of this study is to develop an integrated measurement system for speciating the dry deposition budget of nitrogen and sulfur using micrometeorological flux measurement approaches. The Monitor for AeRosols and GAses in ambient air (MARGA) is an on-line analyzer that measures gases and soluble ions in aerosols at an hourly temporal resolution. A modified version of the MARGA 2S was used, which employs dual sample collection boxes to measure vertical gradients of gases (NH_3 , HNO_3 , HONO , and SO_2) and aerosols (NH_4^+ , NO_3^- , and SO_4^{2-}) for the purpose of calculating air-surface exchange fluxes via the modified Bowen-ratio technique. The presentation describes preliminary measurements of gas and aerosol concentrations and fluxes above a grass field, during the late spring and summer of 2012, with a focus on flux data quality. The contribution of micrometeorological and chemical measurements to total uncertainty in the fluxes is examined. The general features of the compound-specific fluxes, including relationships with meteorological and surface characteristics, are also discussed along with the relative importance of individual nitrogen compounds to the total flux of $\text{NH}_3 + \text{HNO}_3 + \text{HONO} + \text{NH}_4^+ + \text{NO}_3^-$.

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