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# FACTORS CONTROLLING SULFUR GAS EXCHANGE IN *SPHAGNUM*-DOMINATED WETLANDS

Atmosphere-peatland exchange of reduced sulfur gases was determined seasonally in a fen in NH, and in an artificially-acidified fen at the ELA in Canada. Dimethyl sulfide (DMS) dominated gas fluxes at rates as high as 400 nmol $m^{-2}$ $hr^{-1}$. DMS fluxes measured using enclosures were much higher than those calculated using a stagnant-film model, suggesting that *Sphagnum* regulated efflux. Temperature controlled diel and seasonal variability in DMS emissions. Use of differing enclosure techniques indicated that vegetated peatlands consume atmospheric carbonyl sulfide. Sulfate amendments caused DMS and methane thiol concentrations in near-surface pore waters to increase rapidly, but fluxes of these gases to the atmosphere were not affected. However, emission data from sites experiencing large differences in rates of sulfate deposition from the atmosphere suggested that chronic elevated sulfate inputs enhance DMS emissions from northern wetlands.