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ABSTRACT

FACTORS CONTROLLING FLUXES OF VOLATILE SULFUR
COMPOUNDS IN SPHAGNUM PEATLANDS

by

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Exchange of DMS and OCS between the surface of *Sphagnum* peatlands and the atmosphere were measured with dynamic (S-free sweep air) and static enclosures. DMS emission rates determined by both methods were comparable. The dynamic method provided positive OCS flux rates (emission) for measurements performed at sites containing *Sphagnum*. Conversely, data from the static method indicated that OCS was consumed from the atmosphere.

Short and long-term impacts of increased S deposition on fluxes of volatile S compounds (VSCs) from *Sphagnum* peatlands were investigated in a poor fen (Mire 239) at the Experimental Lakes Area, Ontario, Canada. Additional experiments were conducted in a poor fen (Sallie's Fen) in Barrington, NH, USA. At Mire 239, emissions of VSCs were monitored, before and after acidification, at control and experimental sections within two major physiographic areas of the mire (oligotrophic and minerotrophic). DMS was the

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predominant VSC released from Mire 239 and varied largely with time and space. Sulfur addition did not affect DMS emissions in a period of hours to a few days. DMS emissions in the experimental oligotrophic area of the mire was ~3-fold greater than in the control oligotrophic area, and ~10-fold greater than in the minerotrophic zones. These differences could be due to a combination of differences in types of vegetation, nutritional status and S input. At Sallie's Fen, DMS fluxes was not significantly affected by sulfate amendments, while DMS and MSH concentrations increased greatly with time in the top 10 cm of the peat column.

The major environmental factors controlling fluxes of DMS in a *Sphagnum*-dominated peatland were investigated in Sallie's Fen, NH. DMS emissions from the surface of the peatland varied greatly over 24 hours and seasonally. Temperature seemed to be the major environmental factor controlling these variabilities. Concentrations of dissolved VSCs varied with time and space throughout the fen. Dissolved DMS, MSH and OCS in the surface of the water table were supersaturated with respect to their concentrations in the atmosphere. *Sphagnum* mosses did not appear to be a direct source of VSCs, however they increase transport of DMS from the peat surface to the atmosphere.