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ABSTRACT

A PRELIMINARY STUDY OF THE VARIABILITY AND MAGNITUDE OF THE FLUX OF BIOGENIC SULFUR GASES FROM A NEW HAMPSHIRE SALT MARSH

by

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Salt marshes have highly variable spatial and temporal fluxes of hydrogen sulfide, carbonyl sulfide, methane thiol, dimethyl sulfide, and carbon disulfide (H_2S, COS, MeSH, DMS, and CS_2 respectively). This variability was tested at nine emission sites in a New Hampshire, USA salt marsh: three replicates in each of three vegetation zones, *Spartina alterniflora*, *S. patens*, and a transition zone. Three sites were sampled simultaneously, either within or across vegetation zones, using a dynamic flux chamber technique. Difficulties with calibration and field equipment resulted in fluxes with maximum absolute uncertainties of greater than ±200%. However, the relative uncertainty between subsequent samples was closer to ±20%. Chambers are expected to affect the natural flux of gases by altering the humidity, temperature, and composition of the gas inside the chamber. Summertime fluxes are highest for all gases except COS which demonstrated evidence of a springtime peak. A summertime background flux of 5 to 100×10^{-9} g S m^{-2} min^{-1} was observed for all gases, while *S. alternifora* fluxes of MeSH and DMS were ~8 fold and ~100 fold higher than *S. patens*, respectively. DMS and MeSH fluxes were higher during the day than at night. Evidence of COS uptake by plants was observed. CS_2 appeared to be the quantitatively least important sulfur gas emitted. Improved laboratory and sample collection techniques and further data collection in the field will yield information on the details of salt marsh variability, will improve estimates of the error

associated with single flux measurements, and will allow a more accurate estimation of sulfur fluxes from salt marshes based on vegetation and area coverage data. Inability to control the temperature and humidity inside of the chamber remain significant problems with the chamber design.