

Speciation of atmospherically deposited arsenic in peat bogs

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In the northern hemisphere peat bogs have received considerable atmospheric inputs of arsenic and sulfur since the start of the Industrial Revolution. However, the effect of sulfur deposition on the fate of arsenic is largely unknown. It may involve the formation of arsenic sulfides, organosulfur-bound arsenic, or the indirect stimulation of arsenic biomethylation. The latter process is presently not considered as an important pathway of arsenic immobilization in wetland environments. This study explored the solid-phase speciation of arsenic, iron, and sulfur in English peat bogs by X-ray absorption spectroscopy, in tandem with an assessment of the speciation of arsenic in pore- and stream-waters using HPLC-ICP-MS. Our results reveal that the majority of solid-phase arsenic (<92 mg/kg) was present as methylated As(V). Surface waters also contained appreciable concentrations of methyl-arsenic species. The results provide evidence for extensive biomethylation of arsenic and the enrichment of methyl-arsenic in the peat. Our findings suggest that the significance of organometal(loid)s in wetlands has been previously underestimated.