

Publication**Assessing the origin of sulfate deposition at the Hubbard Brook Experimental Forest****JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)****ID** 86908**Author(s)** Alewell, C; Mitchell, MJ; Likens, GE; Krouse, R**Author(s) at UniBasel** [Alewell, Christine](#) ;**Year** 2000**Title** Assessing the origin of sulfate deposition at the Hubbard Brook Experimental Forest**Journal** Journal of environmental quality**Volume** 29**Number** 3**Pages / Article-Number** 759-767

The geographical and chemical origin of SO₄²⁻ deposition has become a concern, because anthropogenic S emissions have influenced the biogeochemistry of forested ecosystems and surface waters. Our aim was to evaluate the origin of SO₄²⁻ in bulk precipitation at the Hubbard Brook Experimental Forest (HBEF), New Hampshire. We analyzed 26 years of archived bulk precipitation samples for sulfur stable isotopes. We compared the delta(34)S values with anthropogenic SO₂ emissions, the relative contribution of sea salt aerosols (as the SO₄²⁻/Na⁺ ratio in precipitation), and temperature and solar radiation effects on the long-term patterns of delta(34)S values. The long-term pattern of delta(34)S values in bulk precipitation could be explained partly by the relative contribution of marine SO₄²⁻ or solar radiation but not by temperature variation or anthropogenic SO₂ emissions. The high variability of the delta(34)S values of various fossil fuels makes it difficult to use stable S isotopes for identifying whether changing fossil fuel use is affecting the delta(34)S values in bulk precipitation. The seasonal pattern of delta(34)S values in bulk precipitation (significantly higher values in the winter than the summer) may be explained by the temperature dependence of the isotopic shift during SO₄²⁻ formation in the atmosphere. A greater relative contribution of marine SO₄²⁻ during the winter also may have contributed to the higher delta(34)S values in the winter. Previous investigations may have overestimated the role of biogenic emissions in affecting the delta(34)S pattern.

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