

## Nitrogen and Sulfur Atmospheric Deposition on Whiteface Mountain, 1985-2010

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Controls of SO<sub>2</sub> and NO<sub>x</sub> emissions due to the 1990 Amendments of the Clean Air Act and the U.S. Environmental Protection Agency Nitrogen Budget Program have resulted in marked decreases of atmospheric SO<sub>4</sub><sup>2-</sup> and NO<sub>3</sub><sup>-</sup> deposition in the eastern United States. Because of the high elevation, high rainfall and shallow soil, the forest ecosystems of Whiteface Mountain, Adirondack Park, New York are particularly sensitive to acid deposition. Acid anions in wet and cloud water deposition were compared before and after 2000 to assess the relative effectiveness of emission controls. NH<sub>4</sub><sup>+</sup>, NO<sub>3</sub><sup>-</sup> and SO<sub>4</sub><sup>2-</sup> ion data from the National Atmospheric Deposition Program were used to quantify annual nitrogen and sulfur wet deposition at 610m on Whiteface Mountain from 1985 to 2010. From 1985 to 1999, the average annual N and S total wet deposition were 4.80 kg N ha<sup>-1</sup> and 5.94 kg S ha<sup>-1</sup>, respectively. Between 2000 and 2010, wet N and S deposition averaged 4.06 kg N ha<sup>-1</sup> and 3.96 kg S ha<sup>-1</sup>, decreases of approximately 15% and 33%, respectively. In addition to measured wet deposition, cloud deposition contributes significantly to ion fluxes at Whiteface Mountain. The magnitude of cloud water deposition was greater than wet deposition, averaging 7.29 kg N ha<sup>-1</sup> and 7.96 kg S ha<sup>-1</sup> at 1150m annually from 2001-2010. Both N and S concentrations in cloud water have similar rates of decline as wet deposition since the implementation of emission controls.

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