

# Aerosol major ion record at Mount Washington

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## Abstract

This study examined the seasonal cycles and regional-scale meteorological controls on the chemical properties of bulk aerosols collected from 1999 to 2004 at Mount Washington, the highest peak in the northeastern United States. The concentrations of  $\text{NH}_4^+$  and  $\text{SO}_4^{2-}$  peaked during summer months. The pattern for aerosol  $\text{NO}_3^-$  was more complicated with relatively high median concentrations characterizing spring and summer months, but with major elevated events occurring during fall, winter, and spring. The seasonal relationship between  $\text{NH}_4^+$  and  $\text{SO}_4^{2-}$  indicated that during warmer months a mixture of  $(\text{NH}_4)_2\text{SO}_4$  and  $\text{NH}_4\text{HSO}_4$  was present, while it was mainly the latter in winter. More acidity and higher concentrations of the major species were generally associated with winds from the southwest and west sectors. The highest ( $\geq 95$ th percentile) concentrations of  $\text{SO}_4^{2-}$  and  $\text{NH}_4^+$  were associated with air mass transport from major upwind source regions in the Midwest and along the eastern seaboard. The ionic composition and seasonal cycle observed at Mount Washington were similar to those measured at other northeastern sites, but the range and average concentrations were much lower. These differences were exaggerated during wintertime. Included in this paper are several Eulerian case studies of  $\text{SO}_2$  conversion to  $\text{SO}_4^{2-}$  during transit from Whiteface Mountain, New York, to Mount Washington. The calculations suggest a gas-phase  $\text{SO}_2$  oxidation rate of  $\sim 1\text{--}2\%$  per hour and demonstrate the possibility of using these two sites to investigate the chemical evolution of air masses as they move from Midwestern source regions to northern New England.

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