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Measurement of Ambient Ammonia over a Forest Area in Northern Michigan

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Ammonia has long been known to play an important role in atmospheric chemical processes and biogeochemical processes in sensitive ecosystems. The information on ambient ammonia above forest area will provide insights into the interactive processes between growing natural vegetation and gaseous ammonia. In this research, ambient gaseous ammonia and particulate ammonium over a transition forest in northern Michigan were measured by aqueous sampling coupled with Long Path Absorption Photometer from July 17 to July 31, 2003. Gaseous ammonia mixing ratios were in the range of $\leq 0.03 - 0.94$ ppbv with a median of 0.27 ppbv and a mean of 0.30 ppbv. The concentration ammonium in aerosol were in the range of $0.04 - 2.18$ ppbv with a median of 0.51 ppbv and a mean of 0.55 ppbv. On a 24-hr scale, the total ammonia concentration showed a maximum at afternoon and a nighttime minimum. This diurnal pattern strongly correlated with the local meteorological conditions: temperature, humidity and wind speed. The data shows that particulate ammonium was dominant which implies the ambient SO_4^{2-} and NO_3^- were far from fully neutralized thus there should be a fast ammonia gas-to-particulate conversion.

