

Observations of elevated particle number concentration events at a rural site in New England

L. D. Ziemba

Institute for the Study of Earth, Oceans, and Space, Climate Change Research Center,
University of New Hampshire, Durham, New Hampshire, USA

R. J. Griffin

Institute for the Study of Earth, Oceans, and Space, Climate Change Research Center,
University of New Hampshire, Durham, New Hampshire, USA

R. W. Talbot

Institute for the Study of Earth, Oceans, and Space, Climate Change Research Center,
University of New Hampshire, Durham, New Hampshire, USA

Abstract

Particle number (PN) concentrations collected over a 4-year period at the Thompson Farm atmospheric observatory in New Hampshire in conjunction with the Atmospheric Investigation, Regional, Modeling, Analysis and Prediction (AIRMAP) program are reported here. One hundred and ninety-five elevated PN events, occurring on approximately 7.5% of sampled days, were identified on the basis of PN concentration statistics. Events were segregated into five event types defined according to auxiliary measurements and event duration. A distinct seasonality is observed, with PN concentrations peaking in the winter and PN event observation most frequent in the spring. Long-lived PN events associated with clean, northwesterly flow and PN events associated with primary pollutant plumes were observed most frequently, each making up 33% of all identified events. PN events characterized by air masses enriched in sulfur dioxide and originating southeast of Thompson Farm contributed 20% of the total PN events. All PN events are well correlated with solar intensity, with estimated particle diameters during events well below 100 nm. No relationship between PN concentrations and temperature or precipitation could be identified on either seasonal or daily timescales. PN events described here are unique and exclusive of other aerosol mass loading events previously identified at Thompson Farm.