Whiteface Mountain Summer Intensive 2002
July 10 – August 7
Very Preliminary Results

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Overview

- The Sampling Site
- Mass Concentration Data
- Diurnal Patterns
- Comparison with TEOM: Mass Balance
- Sulfate Comparison with R&P 8400S
- Nitrate Comparison with R&P 8400N
- Size Distribution Data (Average, Examples)
The Sampling Site

ASRC Field Station at Whiteface Mountain
‘Lodge Level’
Elevation: 610 m a.s.l.

Instrumentation:
- AMS
- R&P 8400 S/N (Sulfate/Nitrate Monitors)
- PILS-IC (Particle-into-Liquid Sampler with IC)
- HSPH Sulfate Monitor (Allen Type)
- R&P TEOM (50 ºC/30 ºC)
- Filter Sampler
- TSI CPC, SMPS, nano-SMPS, APS
- TDL (Formaldehyde, NO, SO₂)
- GTHOS (OH, HO₂)
- Auto-GC (Hydrocarbons)
- Several Standard Gas-Phase Instruments
Instrument Performance

- Total 10-min cycles: 4050 (100 %)
- Complete cycles: 4009 (98.99 %)
- Lost cycles: 41 (1.01 %)
- Calibration: 19 (0.47 %)
- Power Outage: 22 (0.54 %)
- Computer Problems: 0 (0 %)
- Instrument Problems: 0 (0 %)

→ Excellent Performance of the AMS!

Mass Concentration Time Series

Episode like mass concentration patterns with high Sulfate concentrations.
Mass Concentration Overview

<table>
<thead>
<tr>
<th>µg/m³</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrate</td>
<td>-0.04</td>
<td>2.58</td>
<td>0.23</td>
</tr>
<tr>
<td>Sulfate</td>
<td>0.03</td>
<td>29.51</td>
<td>3.36</td>
</tr>
<tr>
<td>Ammonium</td>
<td>0</td>
<td>7.45</td>
<td>1.57</td>
</tr>
<tr>
<td>Chloride</td>
<td>-0.11</td>
<td>0.17</td>
<td>0.01</td>
</tr>
<tr>
<td>Organics</td>
<td>0.07</td>
<td>28.20</td>
<td>3.52</td>
</tr>
<tr>
<td>Water</td>
<td>0</td>
<td>7.78</td>
<td>1.22</td>
</tr>
</tbody>
</table>

Diurnal Patterns

Mass Concentrations

Nitrate, Sulfate, Organics: Maxima during night, Sulfate slightly later in early morning.
Comparison with TEOM: Mass Balance

AMS Total Mass: Nitrate + Sulfate + Ammonium + Organics + Water

Semi-continuous Mass Balance with 10-min resolution
Comparison with TEOM: Mass Balance

\[ MC_{AMS} = 0.74 \times MC_{TEOM} + 1.59 \, \mu g/m^3; \quad R^2 = 0.84 \]

On average AMS ‘sees’ 82 % of TEOM Mass Concentration

Sulfate Comparison with R&P 8400S

\[ Sulfate_{AMS} = 1.26 \times Sulfate_{8400S} - 0.31 \, \mu g/m^3 \]
\[ R^2 = 0.95 \]

(8400S Data not corrected for several QA tests)
Nitrate Comparison with R&P 8400N

\[ \text{Nitrate}_{\text{AMS}} = 0.85 \times \text{Nitrate}_{\text{8400N}} + 0.16 \ \mu\text{g/m}^3 \]

\[ R^2 = 0.60 \]

(8400N Data not corrected for several QA tests)

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Size Distributions

Average Size Distribution for whole Campaign

- **Organics**: 370 nm (m/z 44 only: 410 nm)
- **Sulfate**: 450 nm
- **Nitrate**: 420 nm
- **Ammonium**: 400 nm
Size Distributions (Example)

Quebec Forest Fire Plume

Size Distributions (Example)
And now something completely different …

Postdoc Position available!
At SUNY Albany
As soon as possible

AMS experience very welcome!