Motivation

- Dry deposition rates affect
  - Ambient aerosol concentration
  - Mass transfer via particles
    - Toxic organic compounds
    - Acidic species
    - Nutrients
Dry deposition depends on
  - Meteorology
  - Canopy structure
  - Surface properties
  - Chemical affinity
  - Particle morphology
  - Particle composition

Large uncertainties in deposition rates

Particle deposition velocities as a function of size to forest canopies (Gallagher et al., *Atmos. Environ.* 31:359-373, 1997).
PROPHET

- Program for Research on Oxidants: PHotochemistry, Emissions, and Transport
- Northern Michigan
- 20 Jun – 10 Aug 2001
- 31 m tower
- ~ 20 m forest canopy

Aerosol Sampling

Cyclone 11 l/min (2.1 µm)
AMS 0.09 l/min
Eddy Correlation

- Calculate flux of species \( i \), \( F_i \), from covariance of concentration, \( C_i \), and vertical wind component, \( w \),
  \[
  F_i = \langle w' C_i' \rangle
  \]
- Deposition velocity, \( v_i \), is
  \[
  v_i = -\frac{F_i}{C_i}
  \]
8  Sulfate Deposition

![Graph showing sulfate deposition with text: Agreement with literature values.]

9  Organic Deposition

![Graph showing organic deposition with text: Scatter around zero; Insufficient signal.]

Title goes here
Conclusions

- Synchronized sampling with AMS and anemometer
- Sulfate deposition velocity
  - 0.0 - 0.6 cm/s
  - Agrees with range of literature values
- Low organic concentration at remote site
  - Signal too low for direct eddy-correlation measurement

Future Work

- Improve AMS sensitivity
- Long term measurements in polluted atmosphere
  - Better precision
  - Effect of particle size
  - Effect of particle composition
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