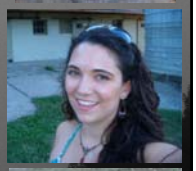
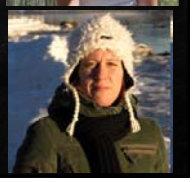
Sub-micron aerosol chemical composition at the Montseny site



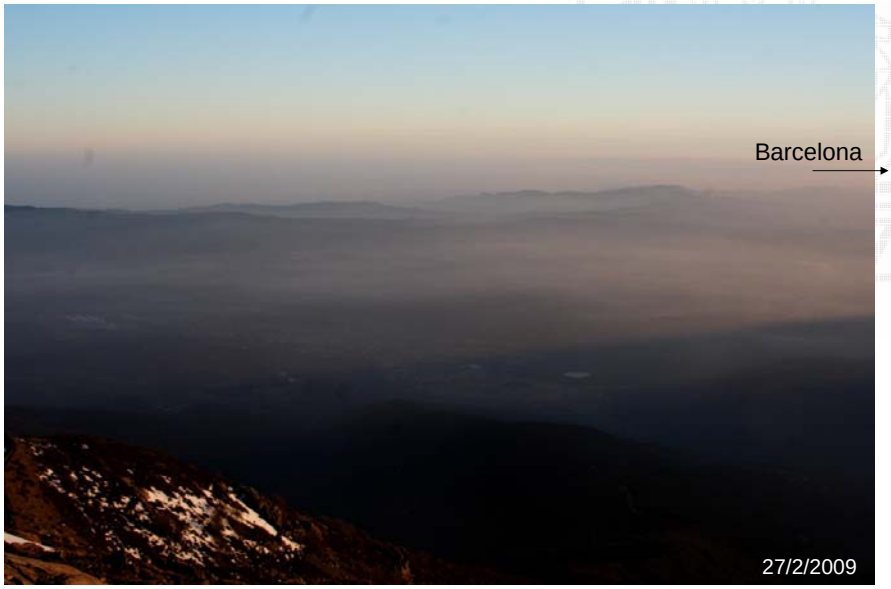
Aerodyne High-Resolution Time-of-Flight Mass Spectrometer

University of Colorado team:

Mike Cubison, Amber Ortega, Carly Robinson, Sanna Saarikoski, Jose-Luis Jimenez

CEH Edinburgh team:
Chiara Di Marco, Eiko Nemitz

Regional haze

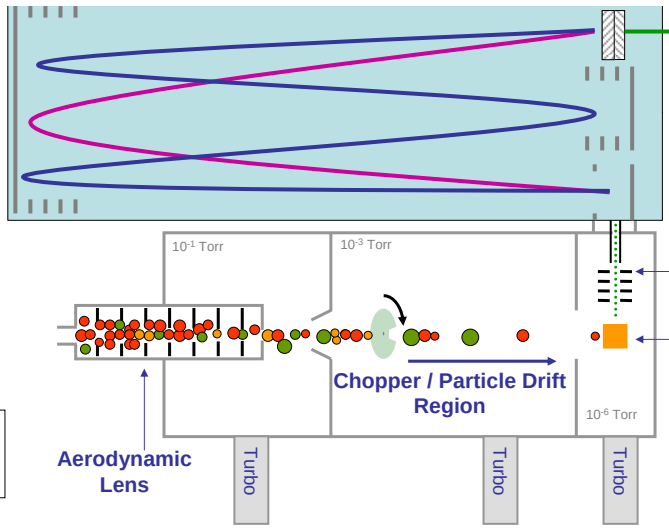


Regional haze

Field-Deployable, High-Resolution, Time-of-Flight Aerosol Mass Spectrometer

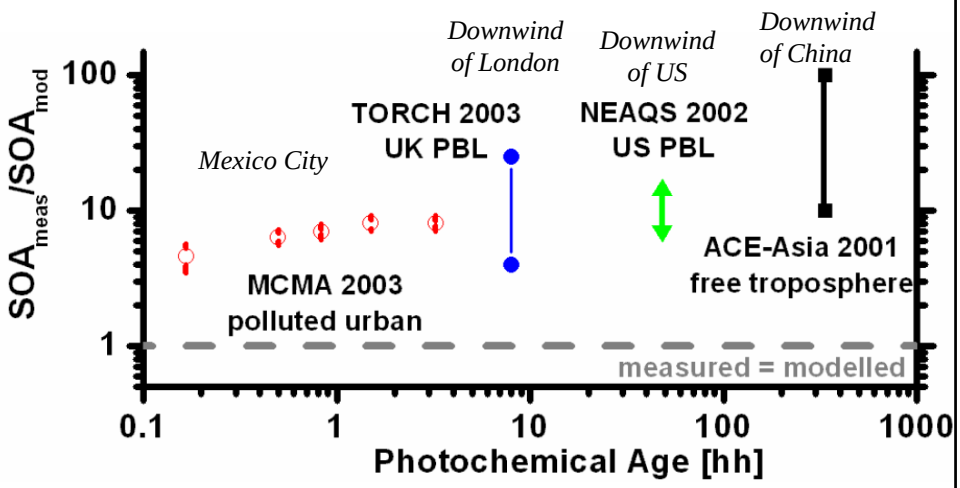
Peter F. DeCarlo,[†,‡] Joel R. Kimmel,[†] Achim Trimborn,[⊥] Megan J. Northway,[⊥] John T. Jayne,[⊥] Allison C. Aiken,[†,§] Marc Gonin,[∥] Katrin Fuhrer,[∥] Thomas Horvath,[∥] Kenneth S. Docherty,[†] Doug R. Worsnop,[⊥] and Jose L. Jimenez*[,†,§]

Anal. Chem. **2006**, *78*, 8281−8289



Aerodyne Colorado Tofwerk

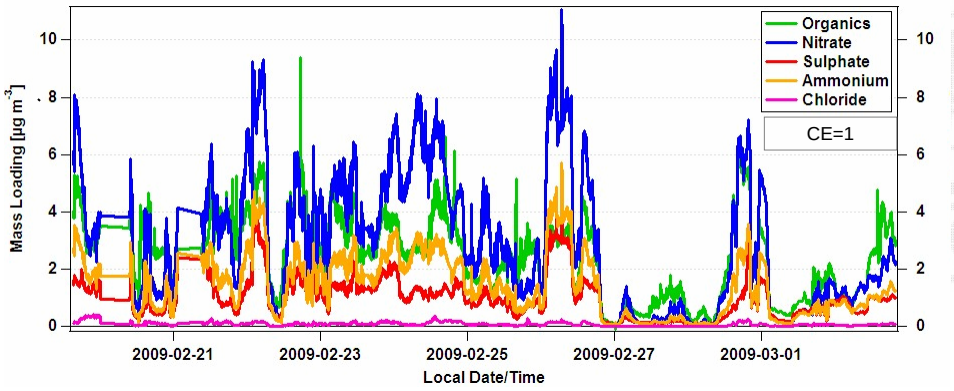
SOA Measurements vs. Models



- Much higher SOA than predicted with current models
- Extrapolating to global models: 14-22 Tg / yr "Extra SOA"

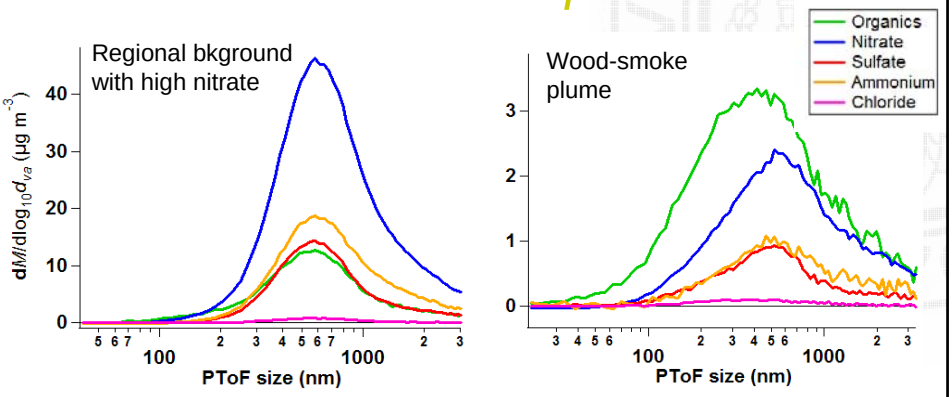
Volkamer, Jimenez, et al., *GRL*, 2006.

Sub-micron composition



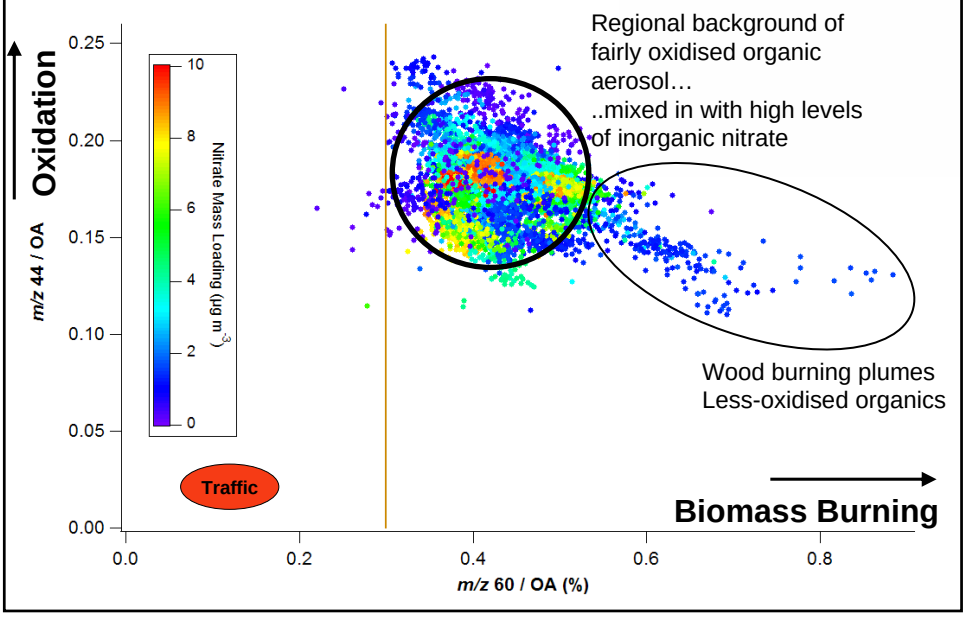
- Nitrate is often the dominant species
  - Maybe some organic nitrate
- Aerosol appears neutralised
- CEH: Eiko Nemitz & Chiara DiMarco: HNO_3 + NH_3 + HCl

Size-resolved composition

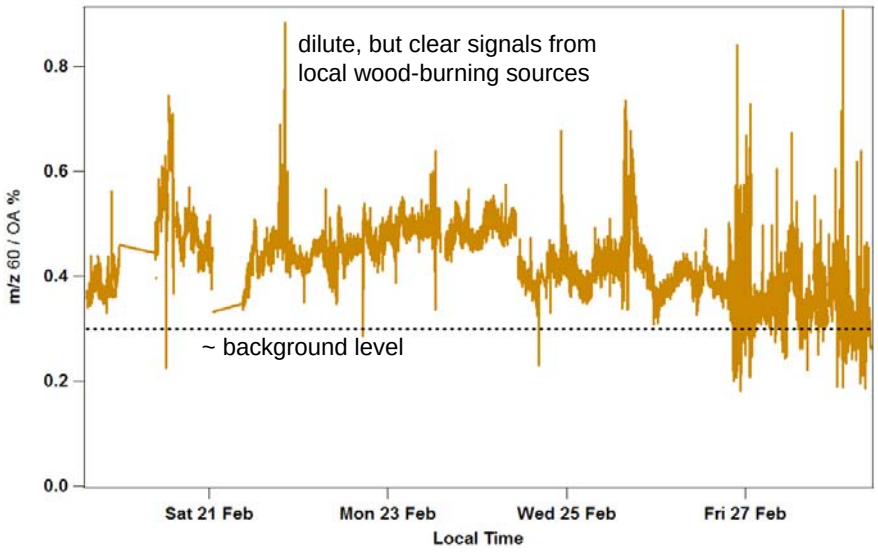


- Note difference in vertical scales
- Sizes too large, they will be reduced owing to inlet pressure reduction since calibration

OA: OOA and local BBOA



Local Biomass-burning OA



Potential Aerosol Mass (PAM): Penn State (Bill Brune) & Colorado

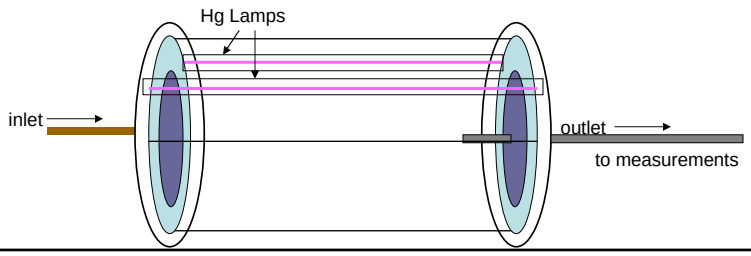
Measurements: AMS, SMPS, DustTrak, O_3, Rel. Humidity and Temp.

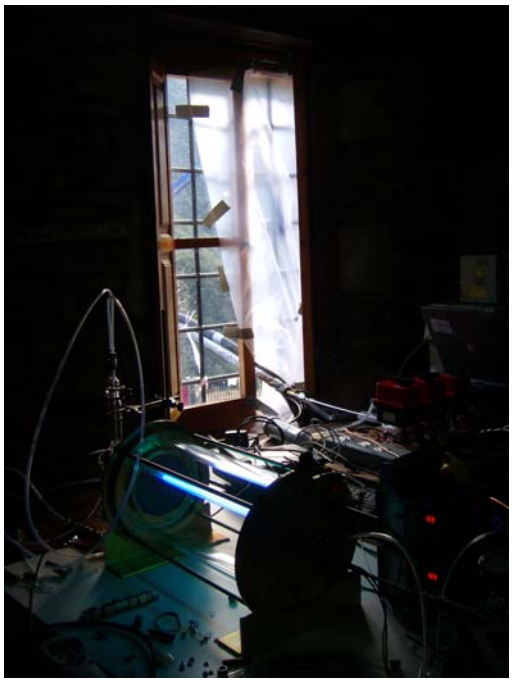
Hg Lamps produce 185 nm and 254 nm light

O_3 and OH formed by photochemistry, oxidizing sample

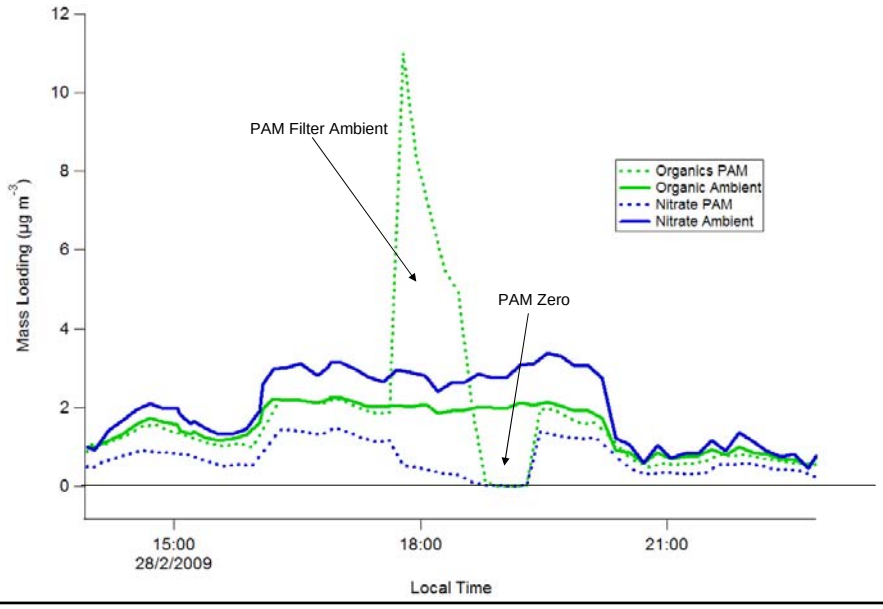
OH exposure in the chamber on the order of days, variable based on the following parameters and equation:

$$OH_{Exposure} = (1.3 \times 10^{12}) \frac{[O_3(ppm)][H_2 0(\%)]}{[flow(LPM)]}$$





Our First PAM Time Series

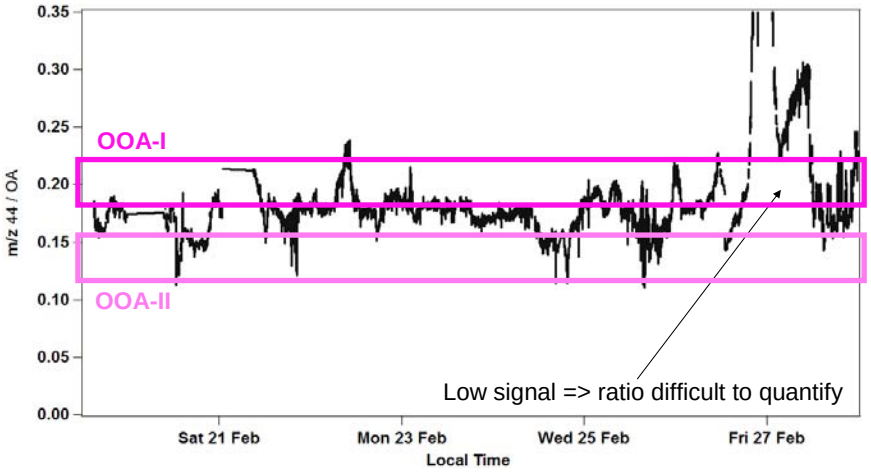


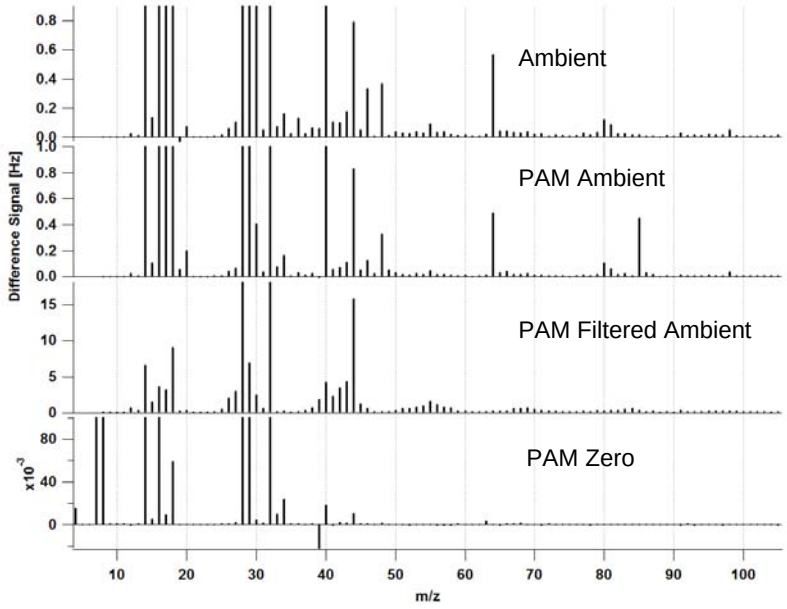
Other topics

- Proposed Data policy
  - Based on MILAGRO
  - Upload data to FTP site every ~2 days
  - Do not present field data w/o permission of owner
  - Analysis phase: need permission of data owners, offer coauthorship

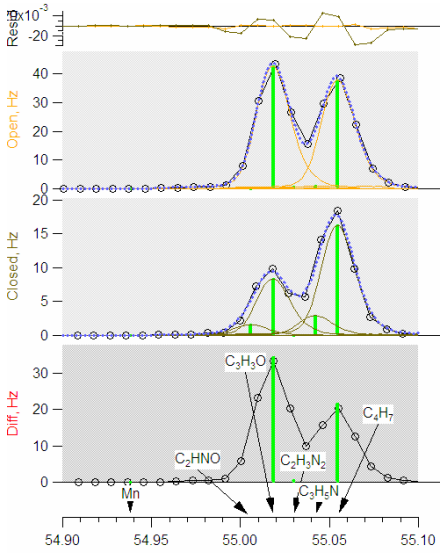
END

Oxidation of organics



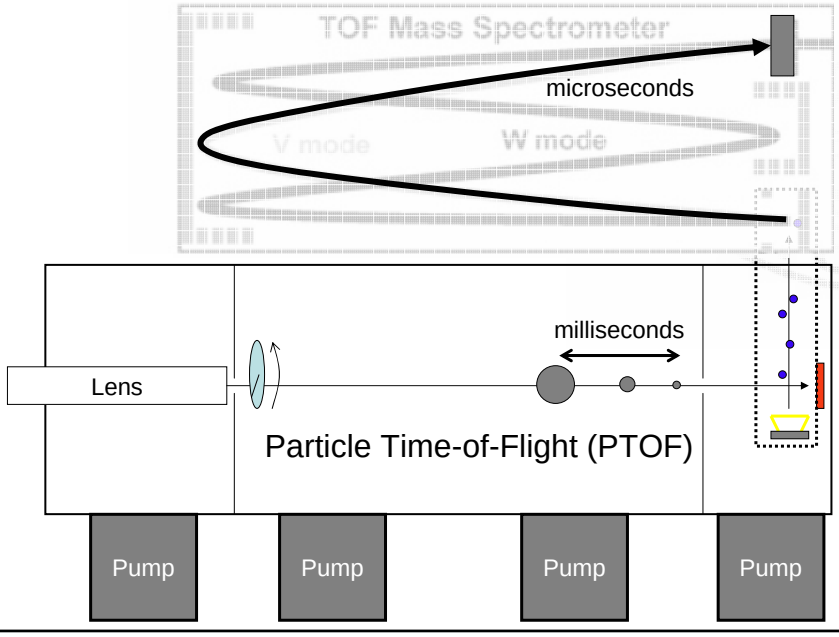


HR fitting routine



- Custom peak shape is fit to the open (= particle beam + background) and closed (= background only) mass spectra
- Multiple ions are fit for each mass/charge
- Aerosol signal is the open stick less the closed stick … can be –ve
- Sensitivity study is performed moving mass calibration and determining consistency of peak heights

Size-resolved AMS



First High Resolution Aerosol Field Data