

Characterizing $PM_{2.5}$ in Atlanta: ASACA

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Project Description

- ❖ *Monitoring of $PM_{2.5}$ in Atlanta*
- ❖ *Characterize the spatial, seasonal, daily and diurnal variation in composition and mass*
 - Daily filter samples for composition
 - ◆ Ions, EC/OC, elemental
 - ◆ Three sites (+ new site in 2002) around Atlanta
 - Continuous TEOM
 - ◆ 3 sites
 - Continuously operated from March 1999
 - ◆ Develop long term chemical characterization of PM (past December 2002)



Application

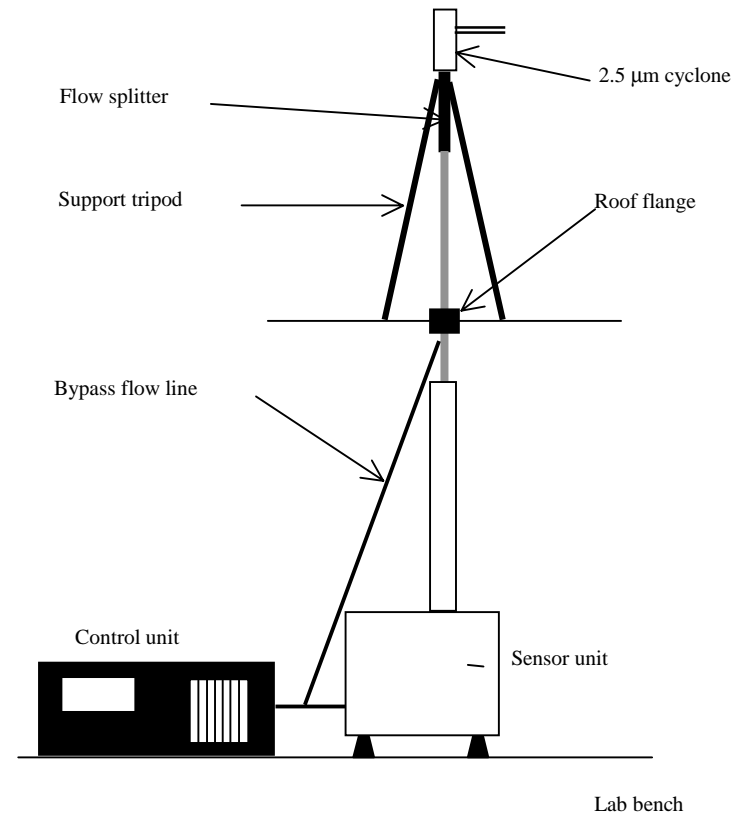
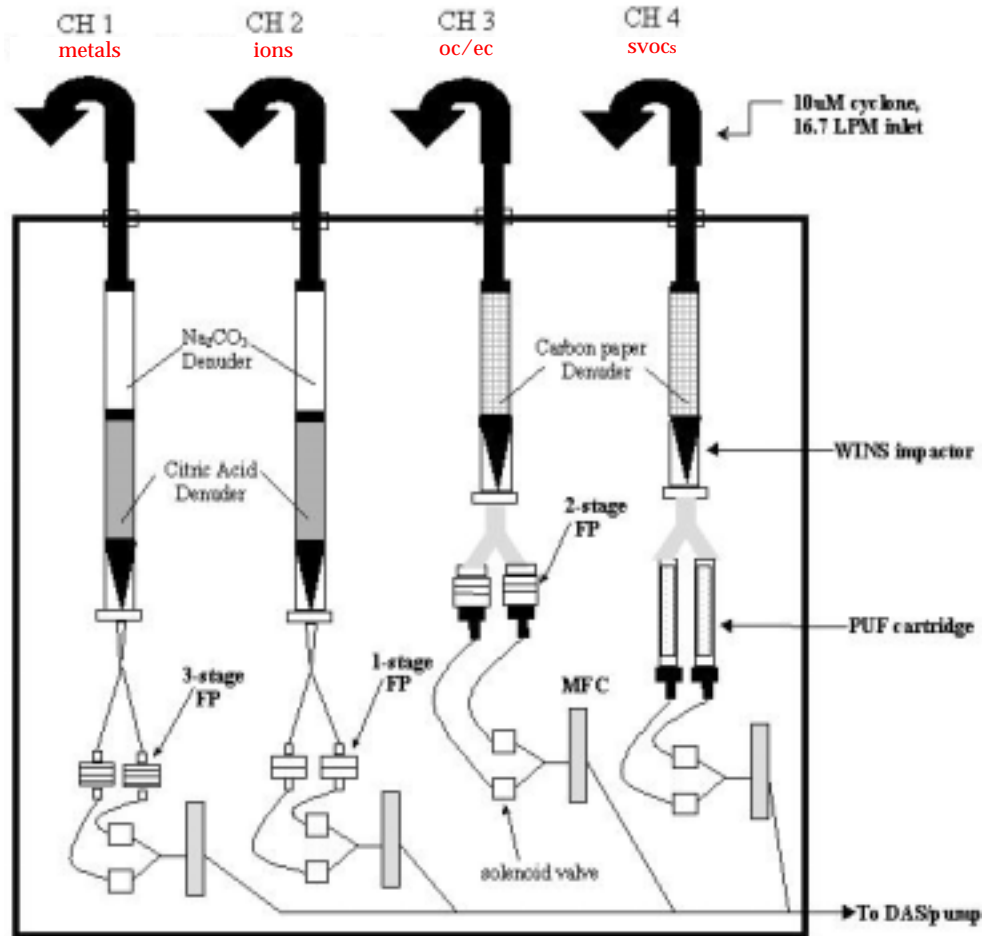
- Health effects
 - ◆ Contributing to ARIES
- Identification of sources impacting AQ
 - ◆ PCA/CMB/... analysis
- Photochemical air quality model evaluation
 - ◆ FAQS/SOS/SCISSAP regional & urban PM
- Emissions inventory assessment
 - ◆ FDDA application (Mendoza-Dominguez et al. 2000)
- Representativeness of Atlanta Supersite
 - ◆ Spatially and temporally



Sampling Methods

- ❖ Particulate Composition Monitor (PCM)
 - Manual, filter-based multi-channel system
 - 24-hr integrated samples: ions, metals, carbon-containing species
- ❖ TEOM
 - Commercially available, continuous mass
 - Retrofit with Nafion dryer to minimize volatilization

Schematics of PCM and TEOM



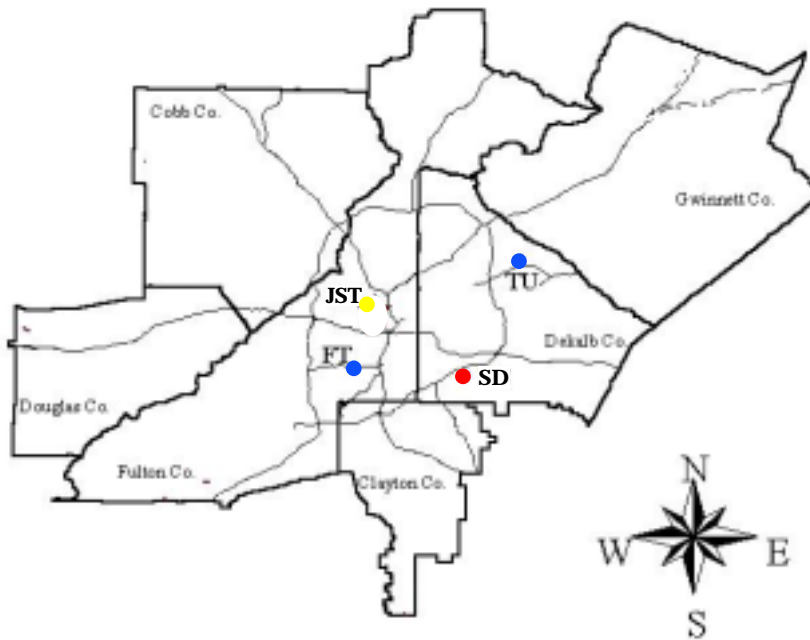


Analytical Methods

- ❖ Ion chromatography (SO_4^{2-} , NO_3^- , NH_4^+ , etc.)
 - Added acetate, formate and oxalic acid in 2000.
- ❖ Thermal-optical transmittance (OC/EC)
 - Addition OC speciation for some periods
- ❖ ICP-AES (crustal and trace metals)
 - Species extracted from teflon filters in acid solution
 - Extract “nebulized” into Ar plasma ($10,000^\circ\text{C}$); valence e-excited; characteristic photon emitted

Monitoring Locations and Site Characteristics

ASACA Domain



- TEOM and PCM (FT and TU)
- TEOM only (JST) (Superstation/site)
- PCM only (SD) (Site also has FRM)

TU and SD PAMS sites

Site Characteristics

Site	Description	Coordinates
Jefferson St (JST)	Urban/industrial	33.777, -84.414
Fort McPherson (FT)	Urban, near major highway	33.699, -84.443
South Dekalb (SD)	Residential, near maj. highway	33.688, -84.290
Tucker (TU)	Suburban/commercial	33.848, -84.214

Fort Yargo PCM Site (2002-on)



Site is in grass field in Park, approximately 100 m from lake.
Closest major road is 29, about 8 km south. Winder, GA about 3 km north



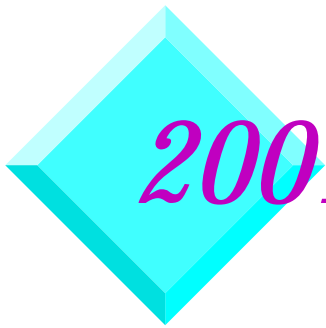
Results

- ❖ $PM_{2.5}$ mass

- TEOMs & FRMs
- Temporal (diurnal, daily, seasonal)
- Spatial

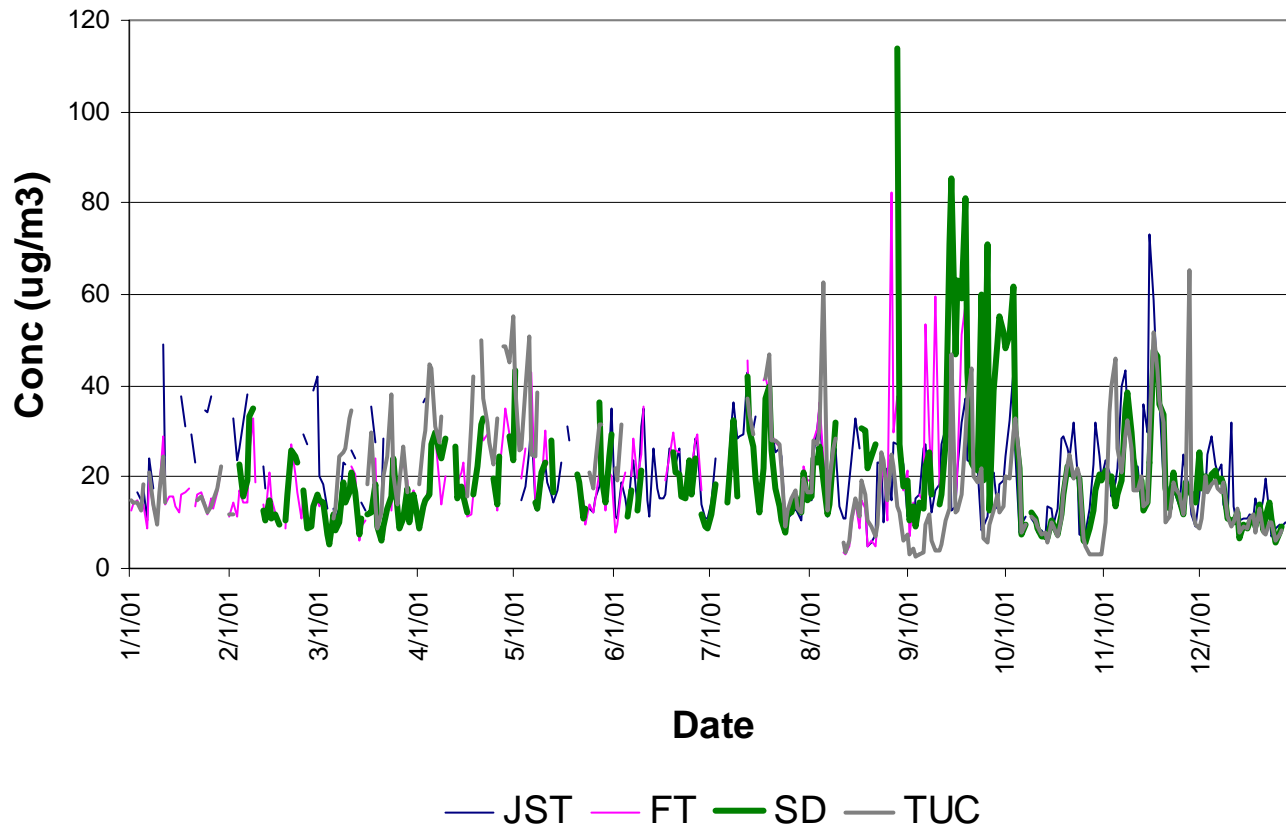
- ❖ Composition

- PCMs
- Daily and seasonal
- Spatial



2001 Mass Data (TEOMs)

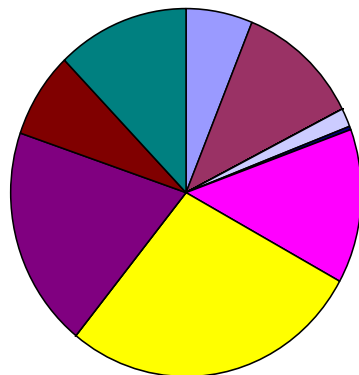
24hr averages





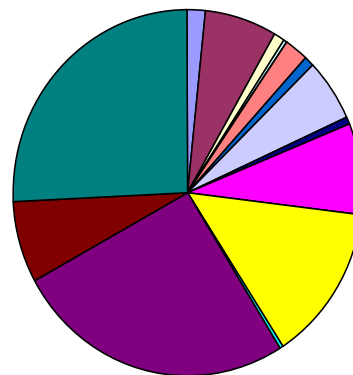
Composition Results

February 2000

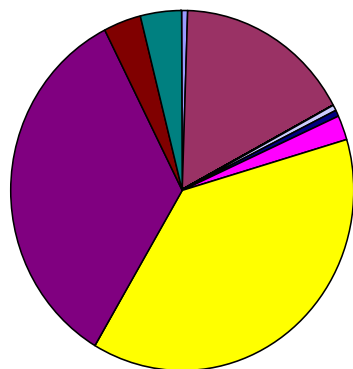


Tucker

February 2001

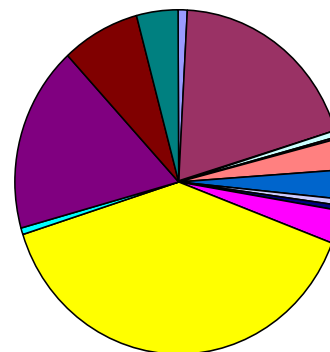


August 1999



Fort McPherson

August 2000



- Sodium
- Ammonium
- Potassium
- Calcium
- Fl
- Ace
- Formate
- Cl
- NO2
- NO3
- SO4
- Oxalic Acid
- OC
- EC
- Metals

- Sodium
- Ammonium
- Potassium
- Calcium
- Fl
- Ace
- Formate
- Cl
- NO2
- NO3
- SO4
- Oxalic Acid
- OC
- EC
- Metals



Summary

- ❖ ASACA continues to provide PM_{2.5} mass and composition in Atlanta
- ❖ New site being added in 2002
 - Mirror of Yorkville
- ❖ Complements EDP and FAQs monitoring
- ❖ Considering adding continuous ionic speciation (PILS)



Acknowledgements

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