

The word "SEARCH" is written in a large, bold, white, sans-serif font with a blue outline, set against a solid blue rectangular background.

SEARCH

The title is written in a bold, orange, sans-serif font with a white outline and a slight drop shadow, centered on the slide.

A Window on Fine PM Air Quality in the Southeastern USA

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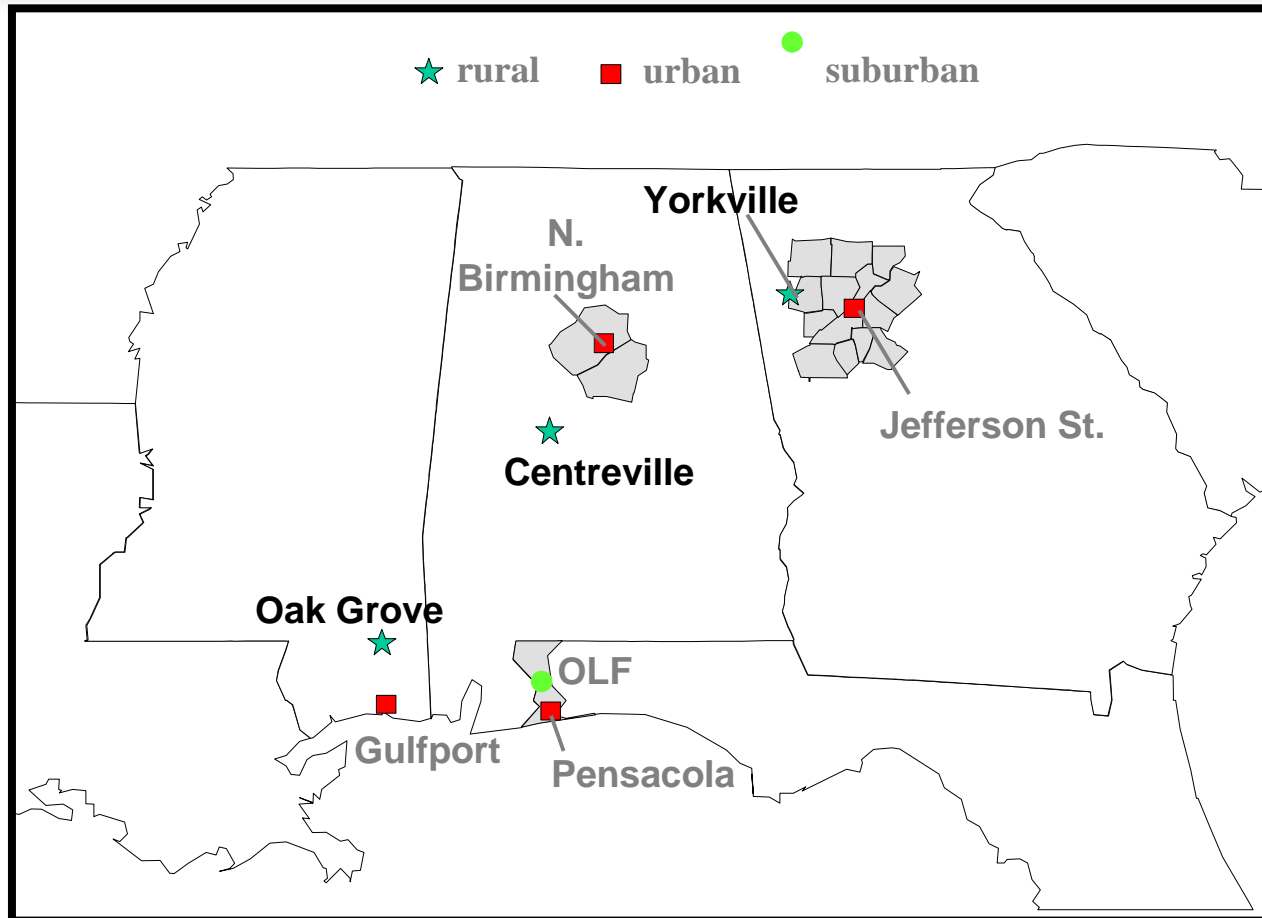
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Southeastern Aerosol Research and Characterization Study (SEARCH)



SEARCH Objectives

- Develop a PM_{2.5} Climatology for 8 Sites
- Understand Composition and its Variability
 - Year to Year, Season to Season
 - Rural vs. Urban
 - Coastal vs. Inland
- Estimate Source Contributions
- Test and Improve Methods
- Collaborate with States and Others

SEARCH Current Measurements

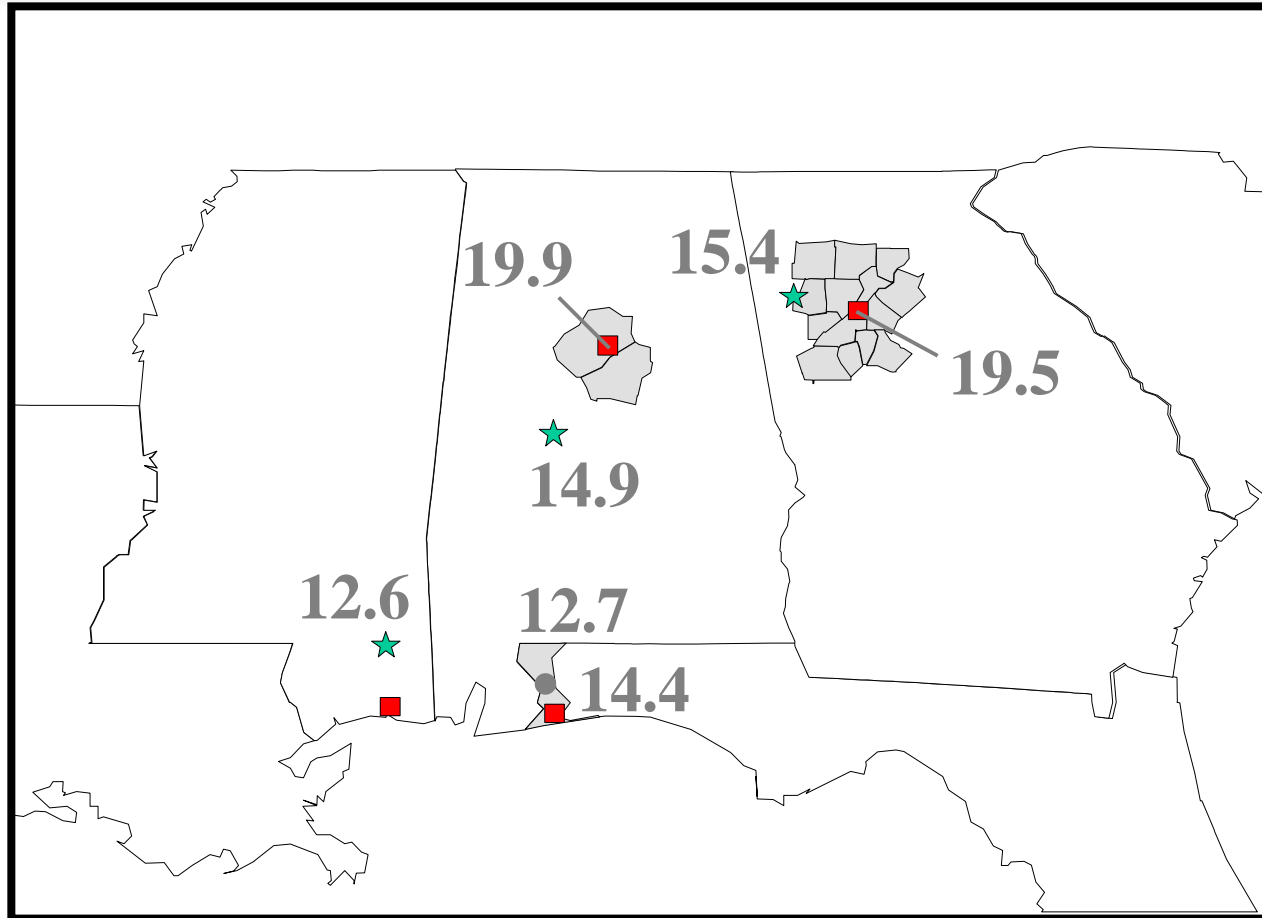
- Discrete Particles (24-hour)
 - FRM: $PM_{2.5}$
 - PCM and Dichot: $PM_{2.5}$, PM_{coarse} and Speciation
- Continuous Particles (1-min to 1-hr)
 - TEOM: mass
 - R&P 5400: OC/EC
- Trace Gases (1-min)
 - O_3 , NO, NO_2 , NO_y , HNO_3 , SO_2 , CO
- Meteorology (1-min)
 - WS, WD, T, RH, BP, SR, rainfall
- Visibility (limited sites)

SEARCH Filter Analyses

- PM_{2.5} Mass – Teflon filter, FRM sampler, blank corrected
- SO₄, NH₄, NO₃, crustals - Teflon filter, denuded
- NO₃ – Nylon filter, denuded
- OC/EC – Quartz filters (2), denuded

1999 PM_{2.5} Concentrations

Blank-Corrected FRM ($\mu\text{g}/\text{m}^3$)

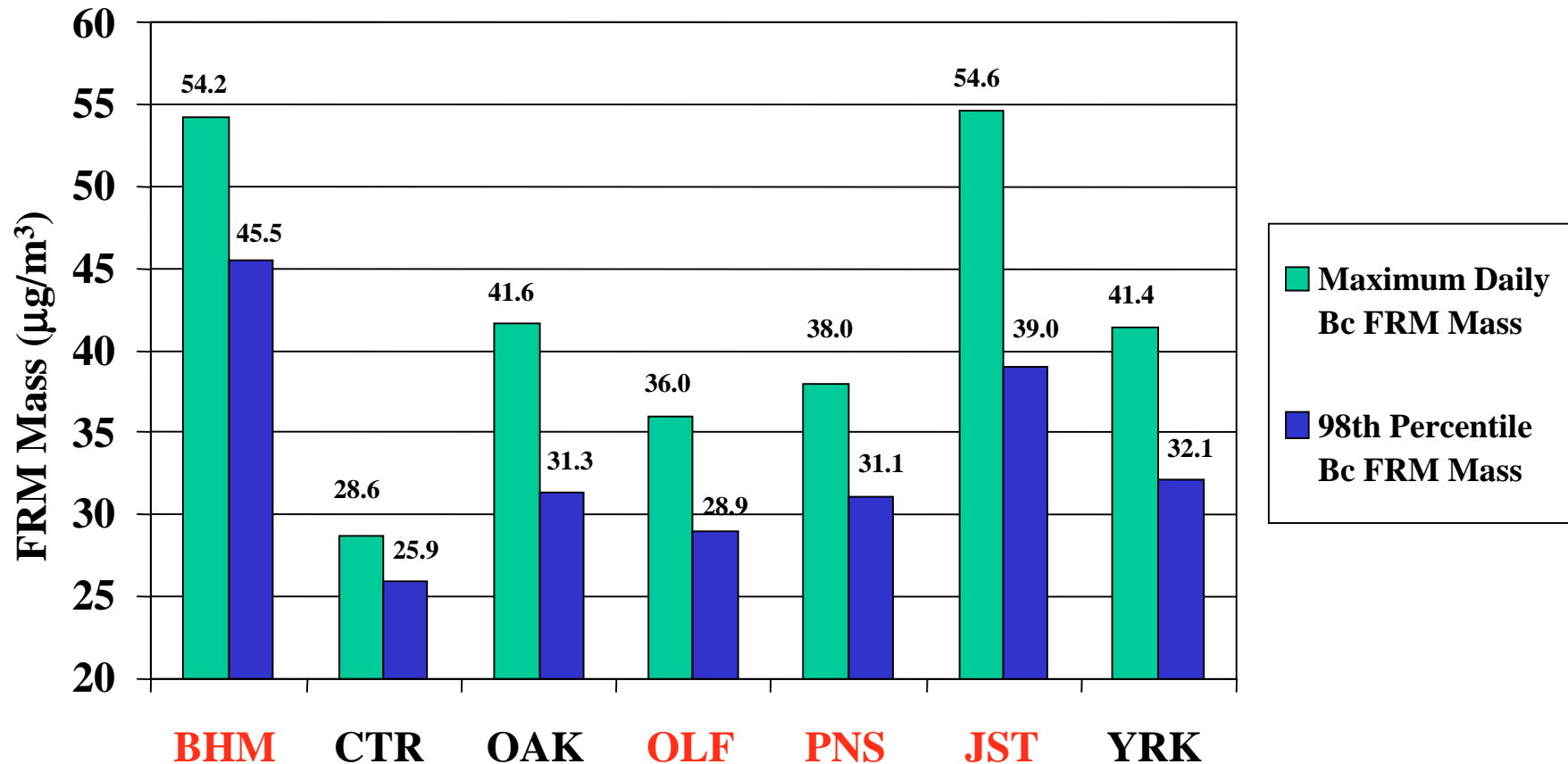


1999 Summary Statistics for Blank-corrected FRM Mass

	BHM	CTR	JST	YRK	PNS	OLF	OAK
Mean ($\mu\text{g}/\text{m}^3$)	19.9	14.9	19.5	15.0	14.4	12.7	12.2
s.d. ($\mu\text{g}/\text{m}^3$)	10.2	8.3	9.2	8.5	6.8	6.4	6.8
Range ($\mu\text{g}/\text{m}^3$)	51.6	41.0	53.9	39.4	35.5	33.9	42.9
n	314	335	307	325	309	311	331

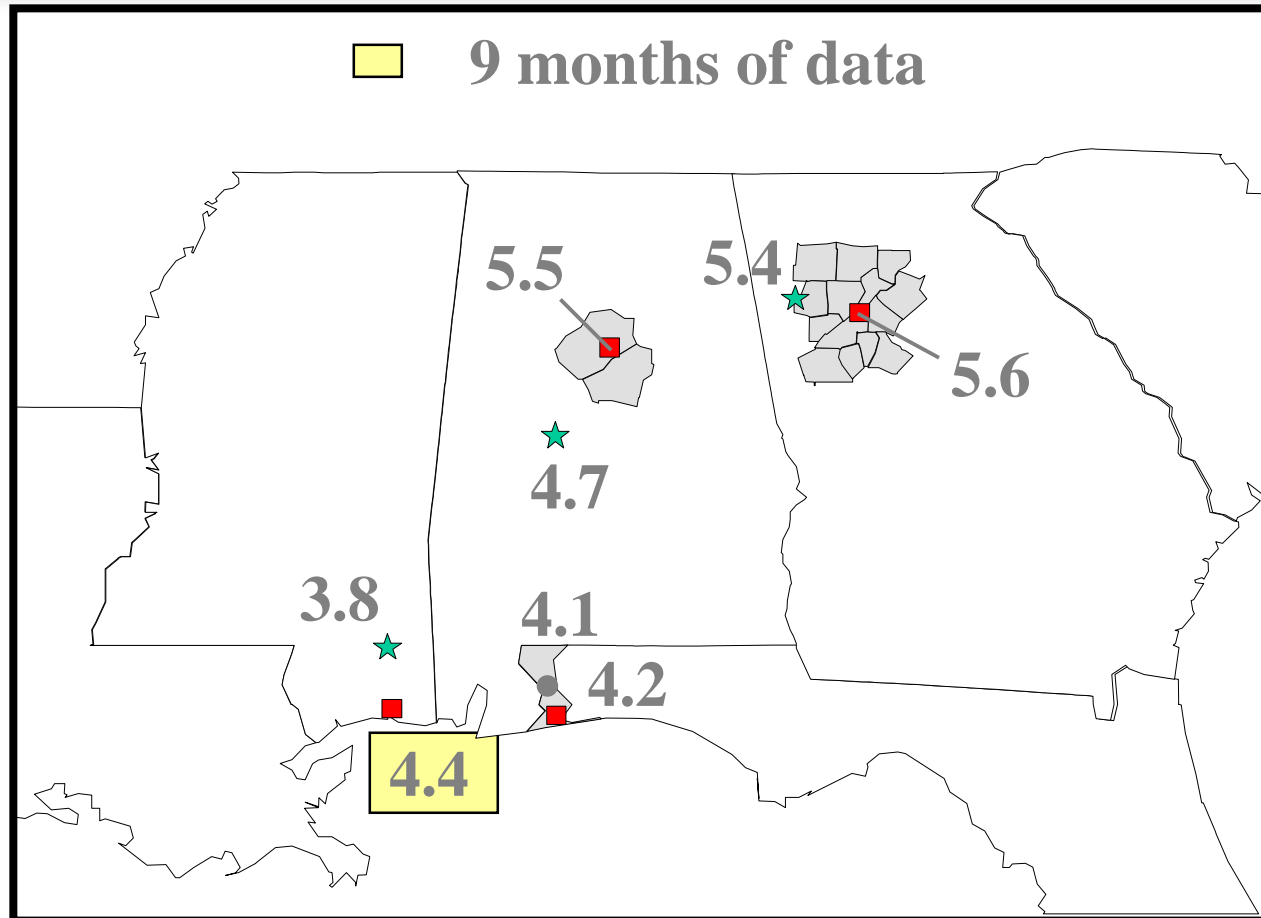
Note: red sites daily FRM, others 24-hour average TEOM

Annual Max and 98th Percentile FRM Mass Blank-Corrected (Bc) CY 1999

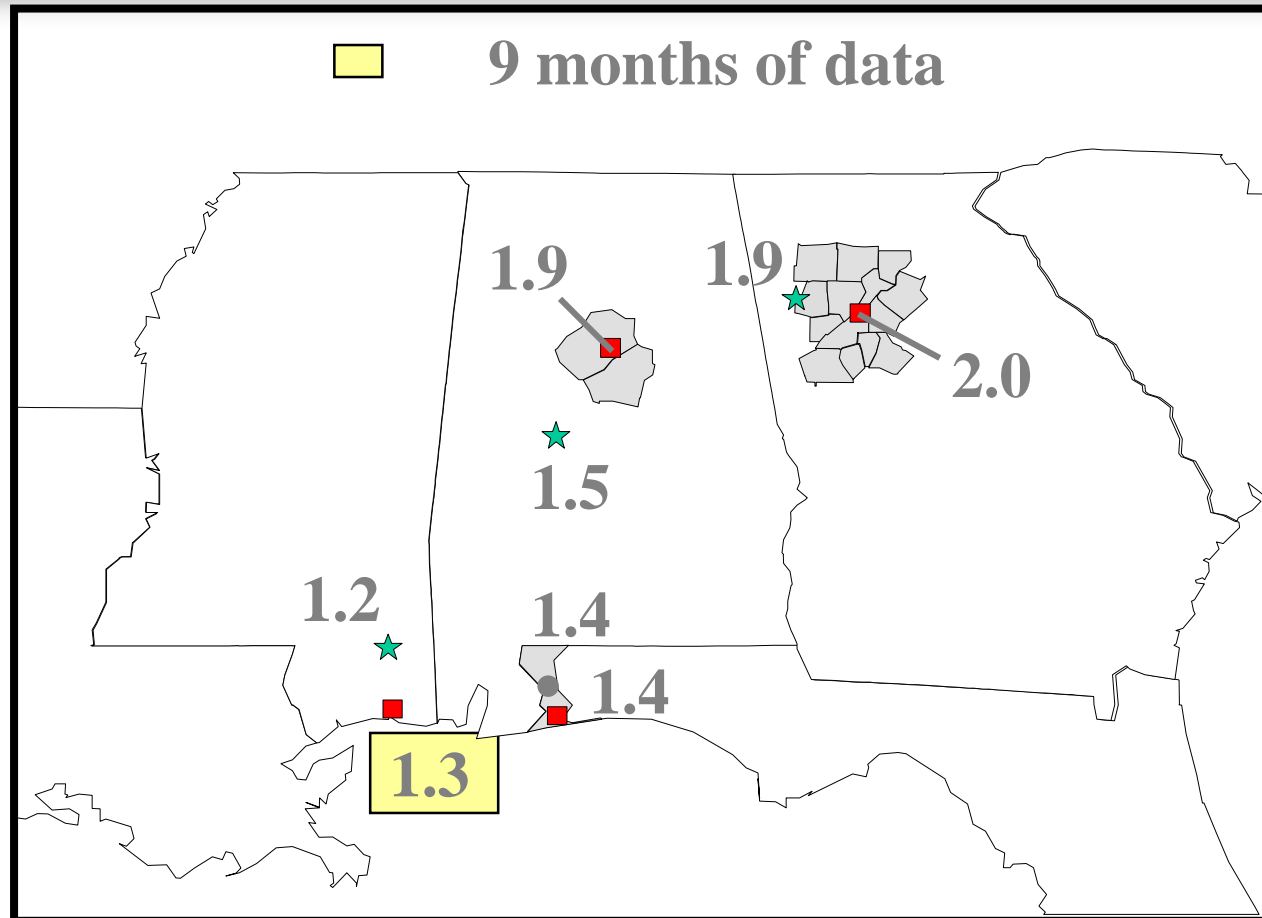


Note: red sites daily FRM, others 24-hour average TEOM

1999 SO₄²⁻ Concentrations PCM (μg/m³)

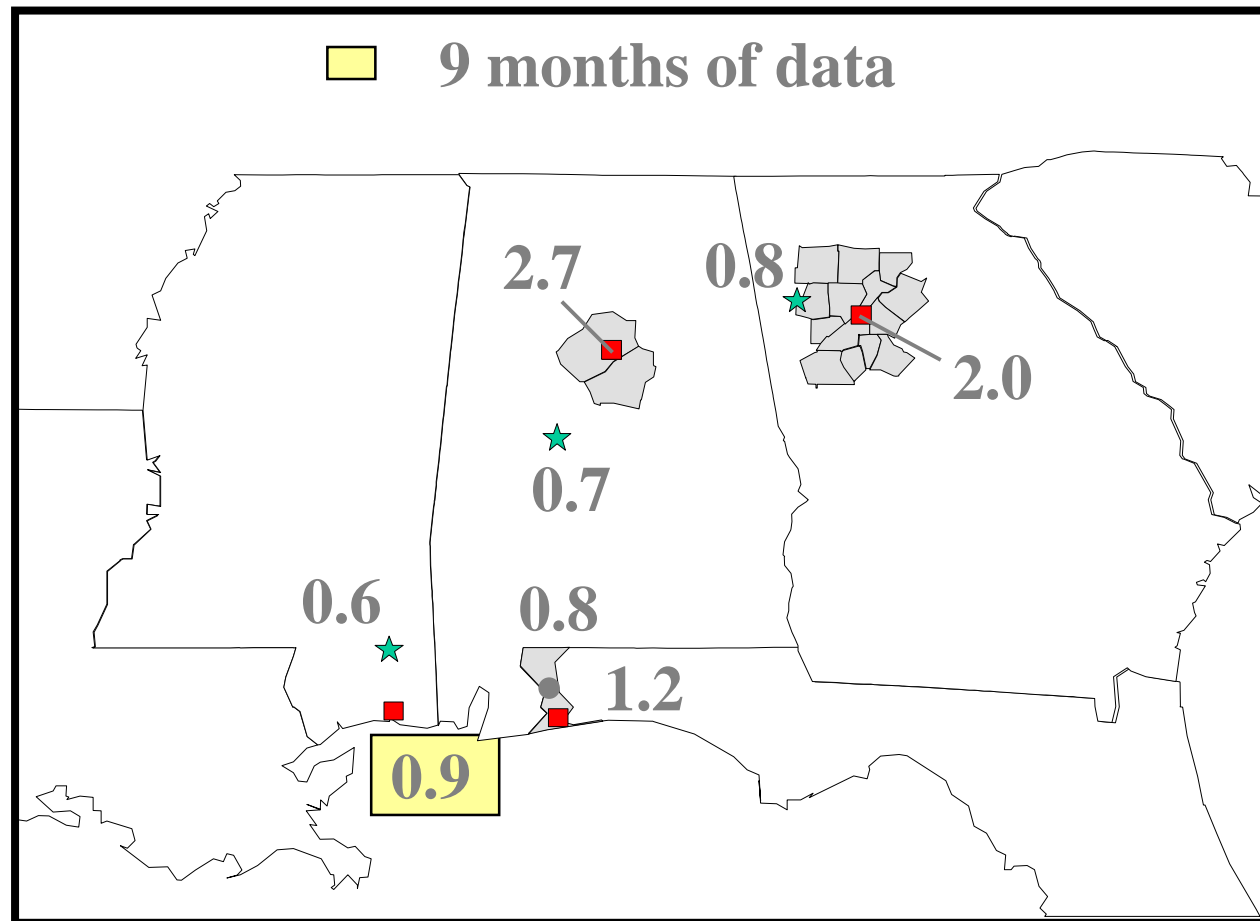


1999 NH₄⁺ Concentrations PCM (μg/m³)



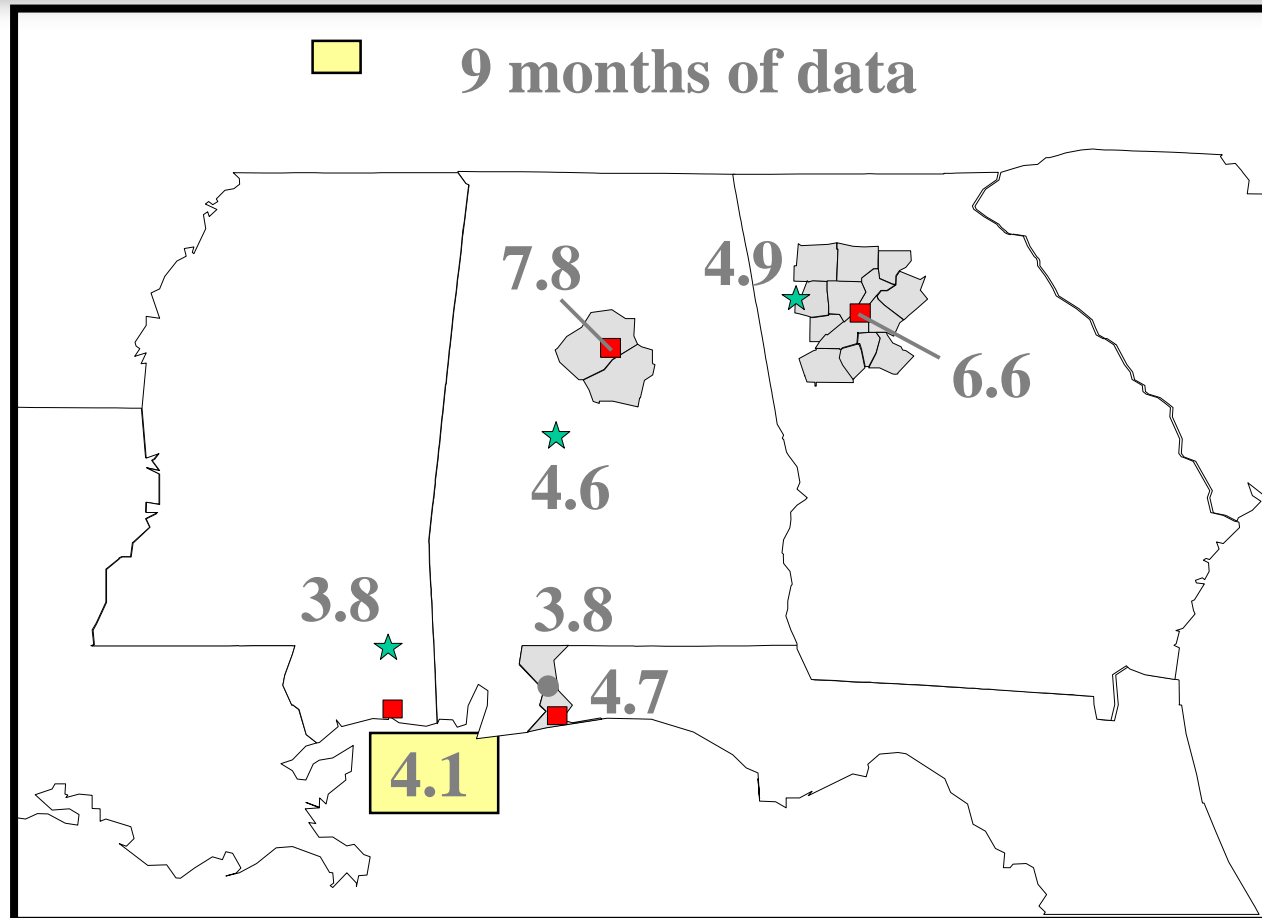
1999 EC Concentrations

PCM ($\mu\text{g}/\text{m}^3$)



1999 OM Concentrations

PCM ($\mu\text{g}/\text{m}^3$)

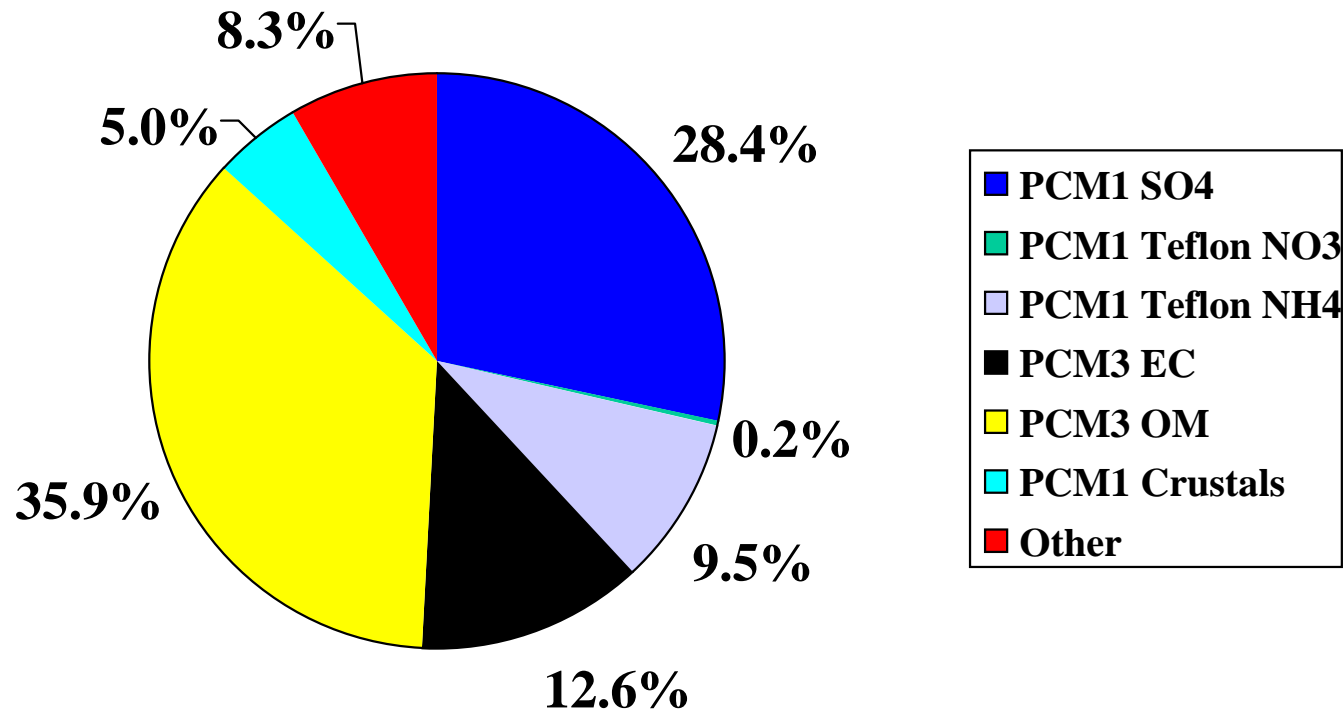


Note: $\text{OM} = \text{OC} * 1.4$

NARSTO PM Symposium, Queretaro, 10/00, SEARCH.

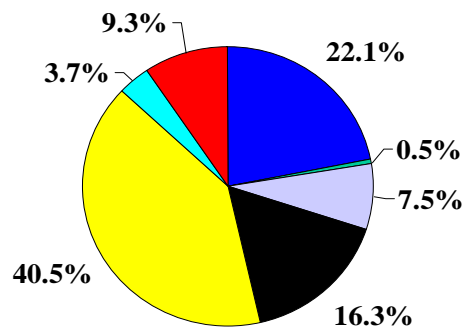
Relative Composition for 1999 BHM Annual Average by percent

Average FRM mass = $19.9 \mu\text{g}/\text{m}^3$, n=191

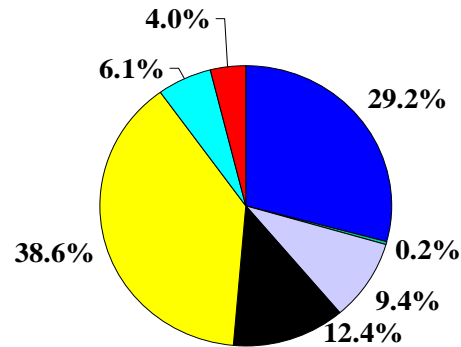


Relative Composition for 1999 BHM Quarterly percent

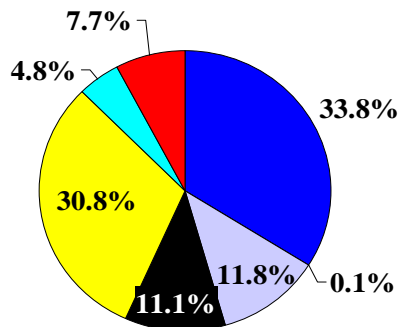
BHM 1st Qtr 1999
Avg FRM mass = 18.09 ug/m³, n=31



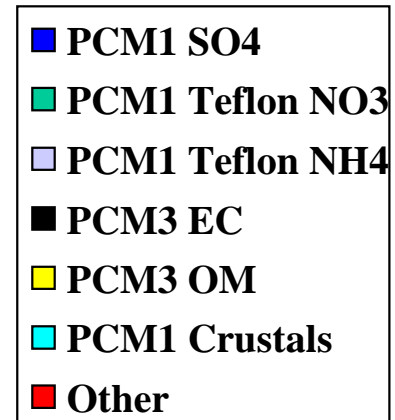
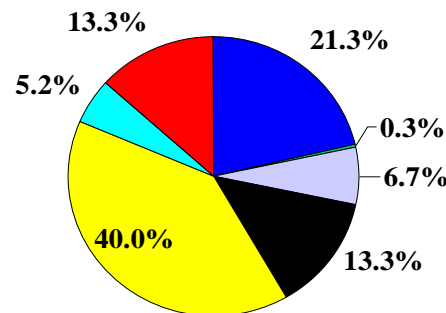
BHM 2nd Qtr 1999
Avg FRM mass = 16.66 ug/m³, n=53



BHM 3rd Qtr 1999
Avg FRM mass = 24.95 ug/m³, n=69

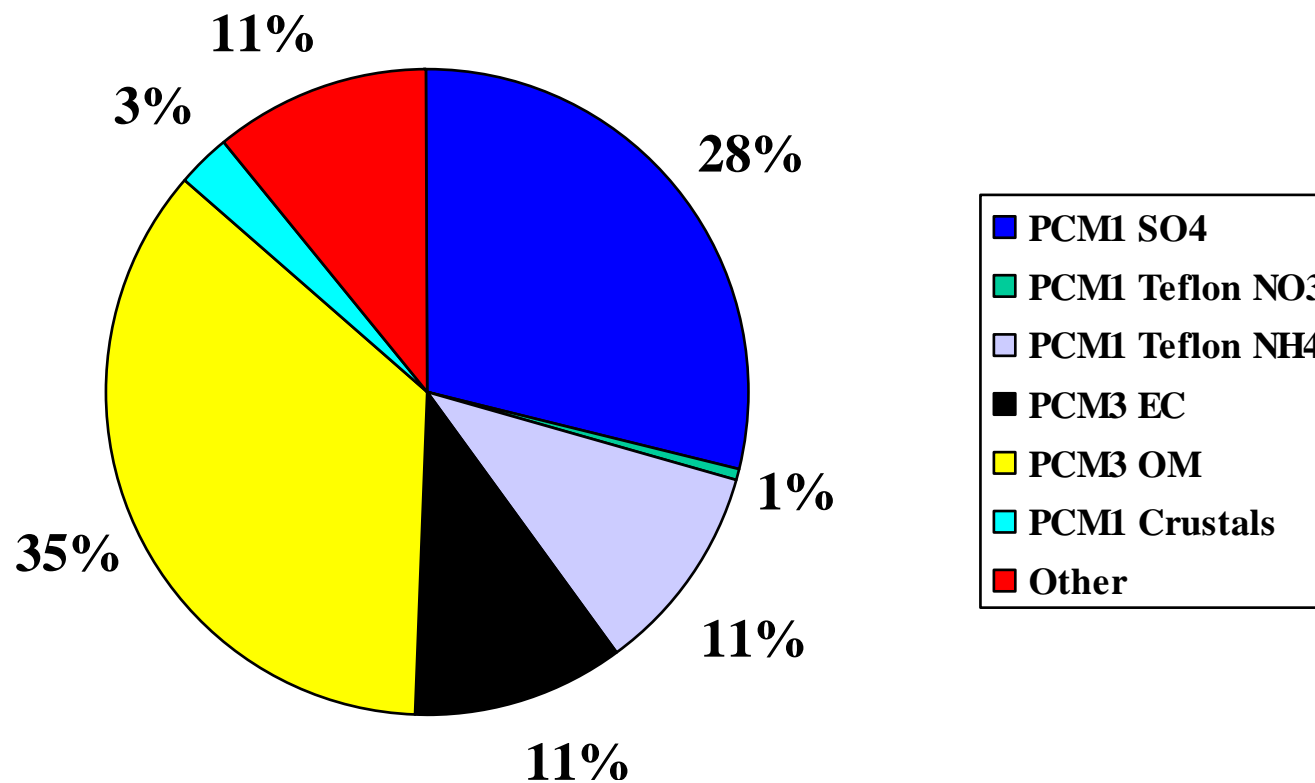


BHM 4th Qtr 1999
Avg FRM mass = 23.76 ug/m³, n=38



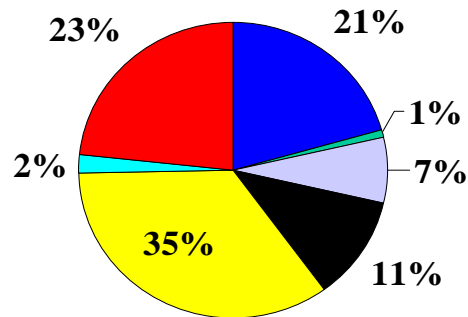
Relative Composition for 1999 JST Annual Average by percent

Average FRM mass = $19.5 \mu\text{g}/\text{m}^3$, n=239

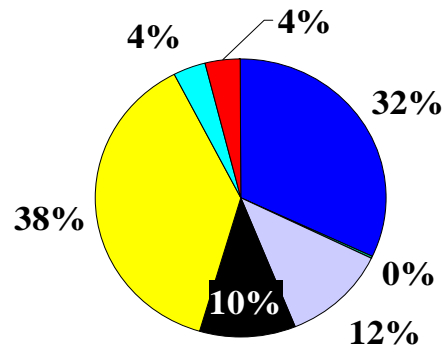


Relative Composition for 1999 JST Quarterly percent

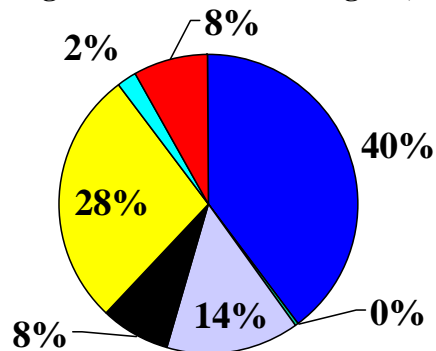
JST 1st Qtr 1999
Average FRM mass = 18.89 ug/m³, n=52



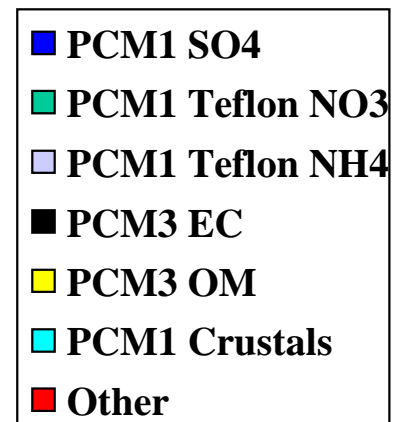
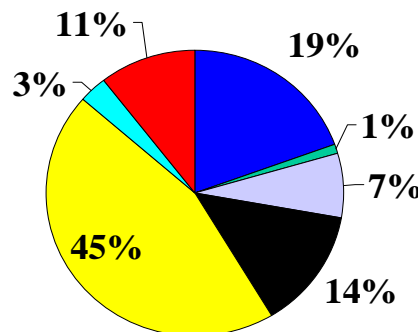
JST 2nd Qtr 1999
Average FRM mass = 16.32 ug/m³, n=68



JST 3rd Qtr 1999
Average FRM mass = 25.26 ug/m³, n=55

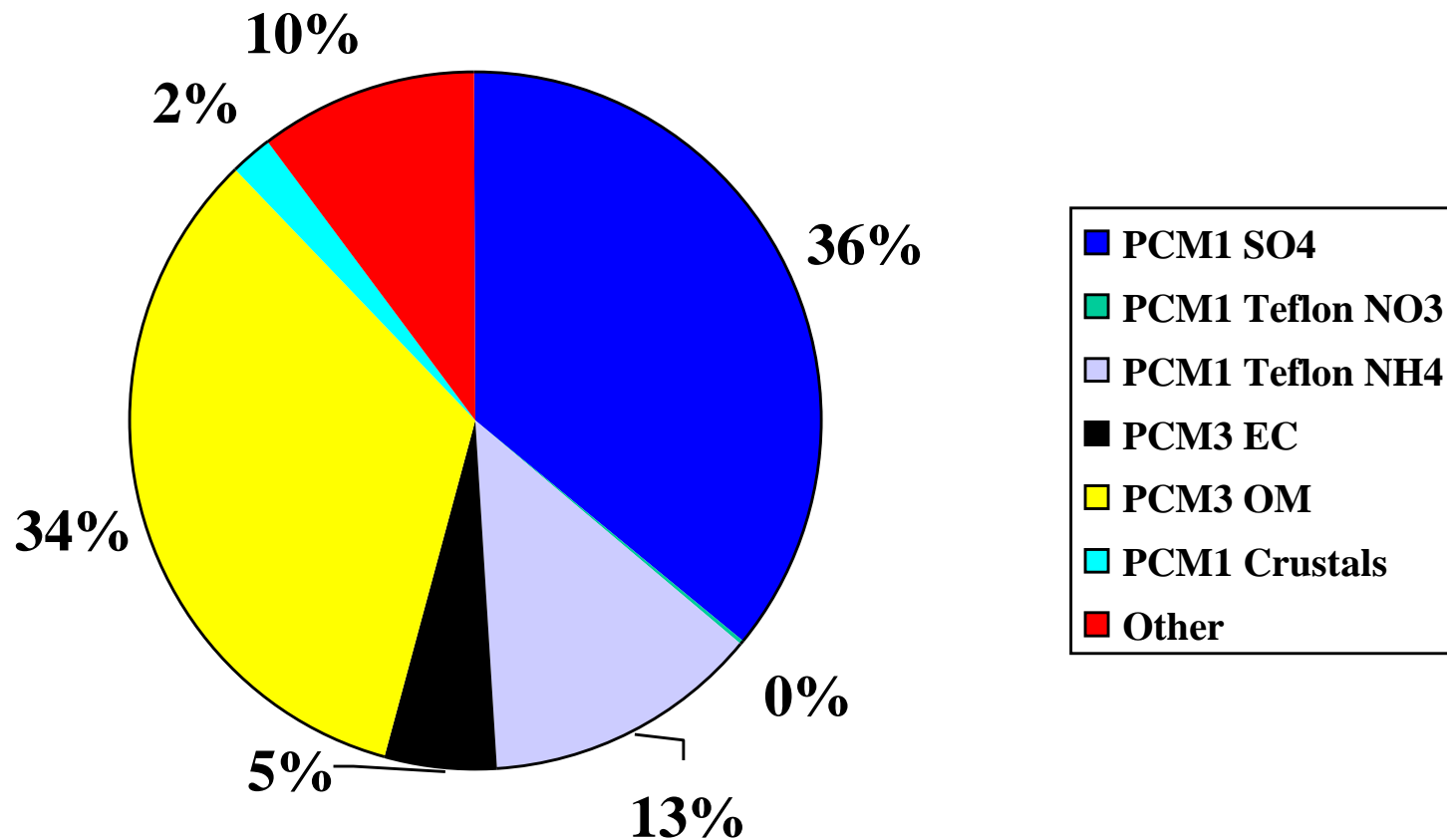


JST 4th Qtr 1999
Average FRM mass = 17.18ug/m³, n=64



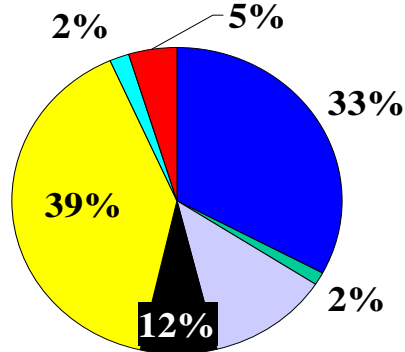
Relative Composition for 1999 YRK Annual Average by percent

TEOM* mass = 15.0 $\mu\text{g}/\text{m}^3$, n=220

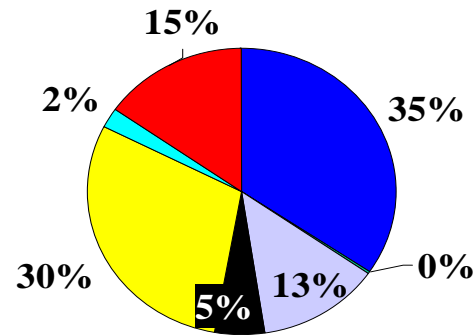


Relative Composition for 1999 YRK Quarterly percent

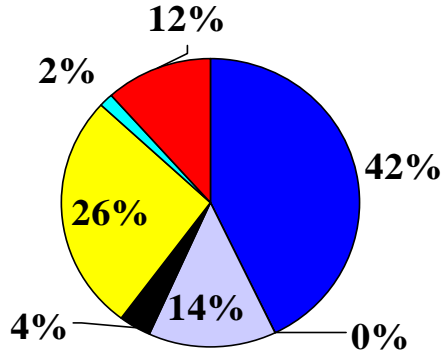
YRK 1st Qtr 1999
Average TEOM* mass = 9.86ug/m³, n=39



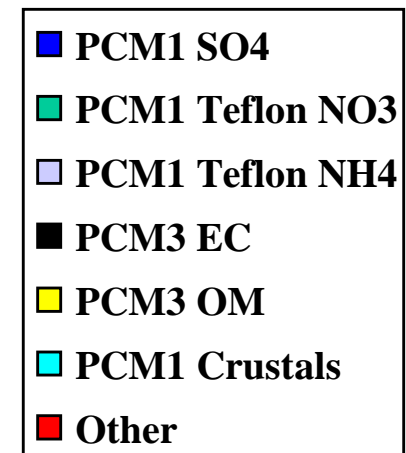
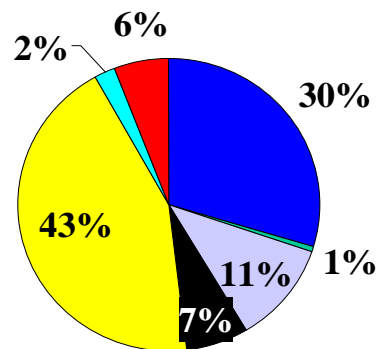
YRK 2nd Qtr 1999
Average TEOM* mass = 15.67 ug/m³, n=54



YRK 3rd Qtr 1999
Average TEOM* mass = 19.67 ug/m³, n=55



YRK 4th Qtr 1999
Average TEOM* mass = 11.89 ug/m³, n=72



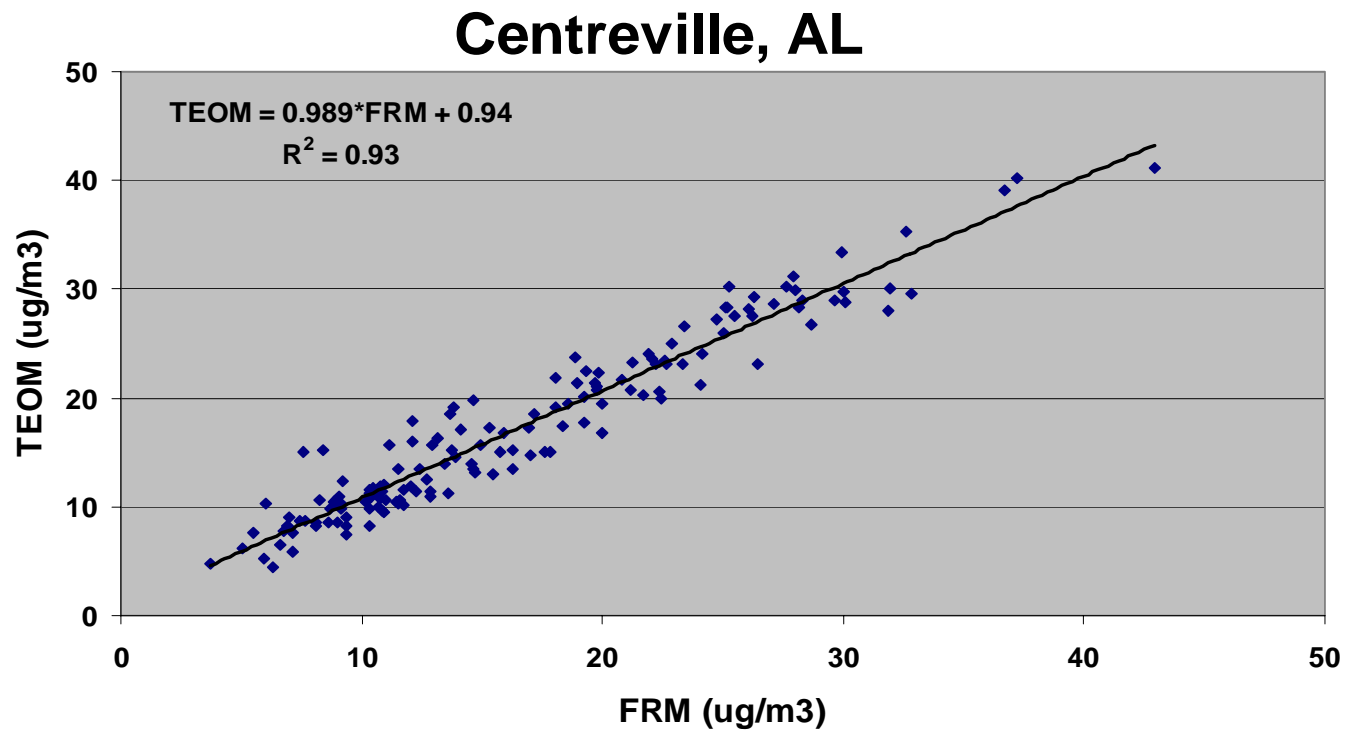
FRM Volatilization Losses

(inferred from PCM, 8/98-7/99)

Site		Retained (ug/m3)	Lost (ug/m3)	Total (ug/m3)	Bias (%)
JST	NO3	0.14	1.00	1.14	-88
	NH4	2.10	0.98	3.08	-32
	OC	6.42	0.7*	7.1*	-10*
YRK	NO3	0.10	0.81	0.91	-89
	NH4	1.91	1.11	3.02	-37
	OC	5.12	0.5*	5.6*	-9*

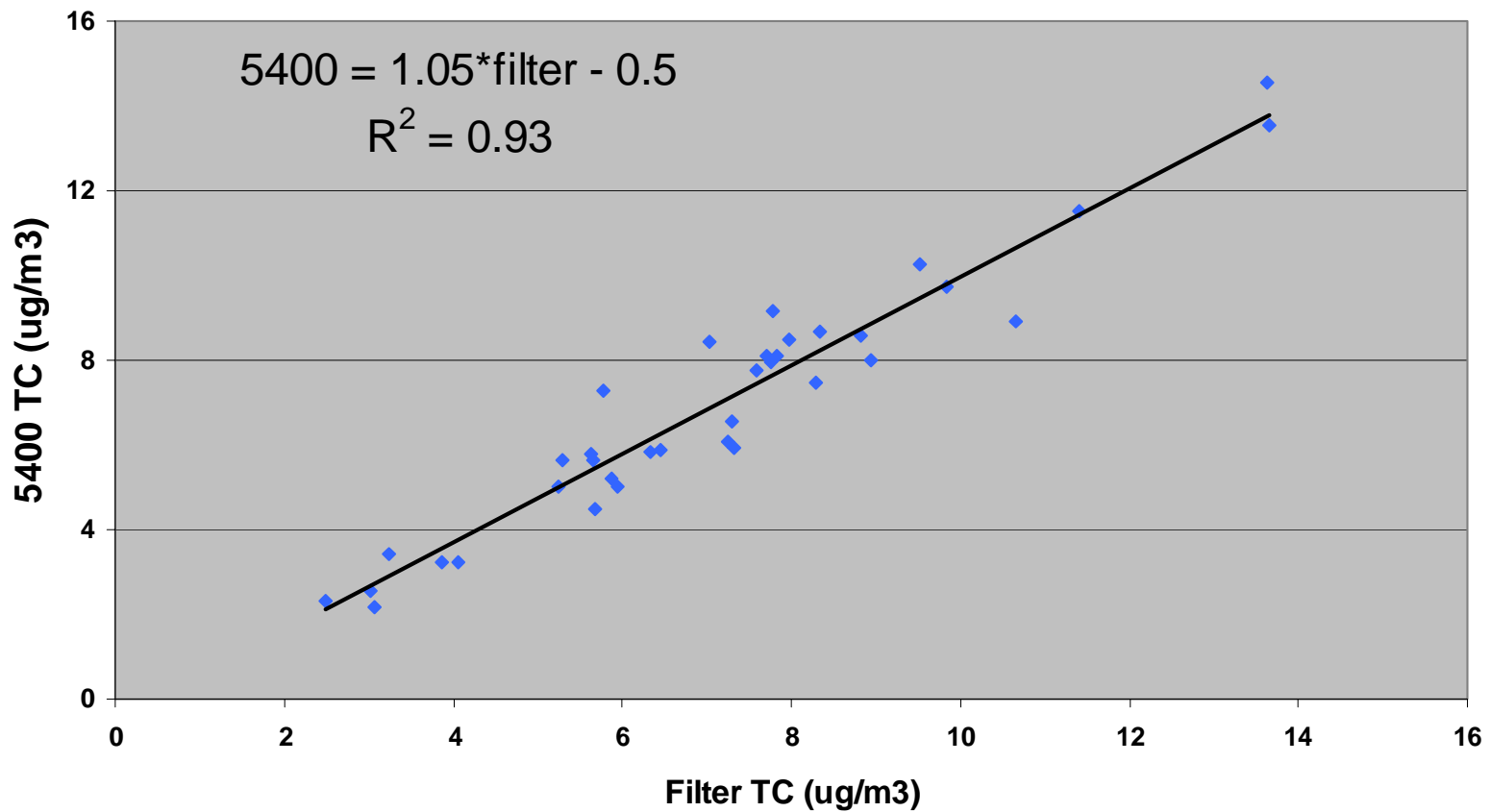
* lower limit

Continuous PM_{2.5} (24-Hour TEOM vs. FRM)



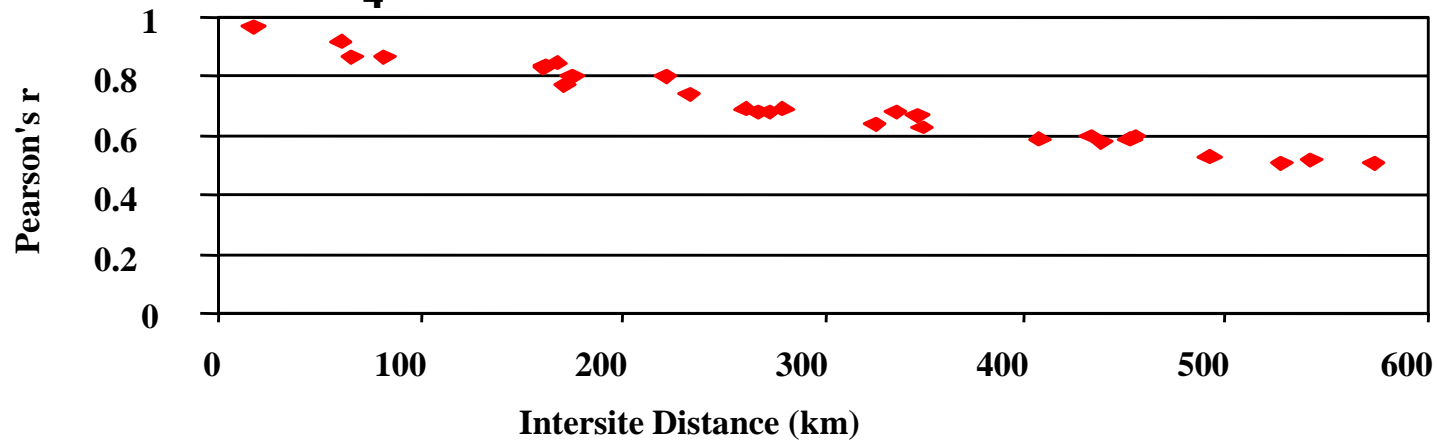
JST Continuous Total Carbon

(5400 vs. Filter)

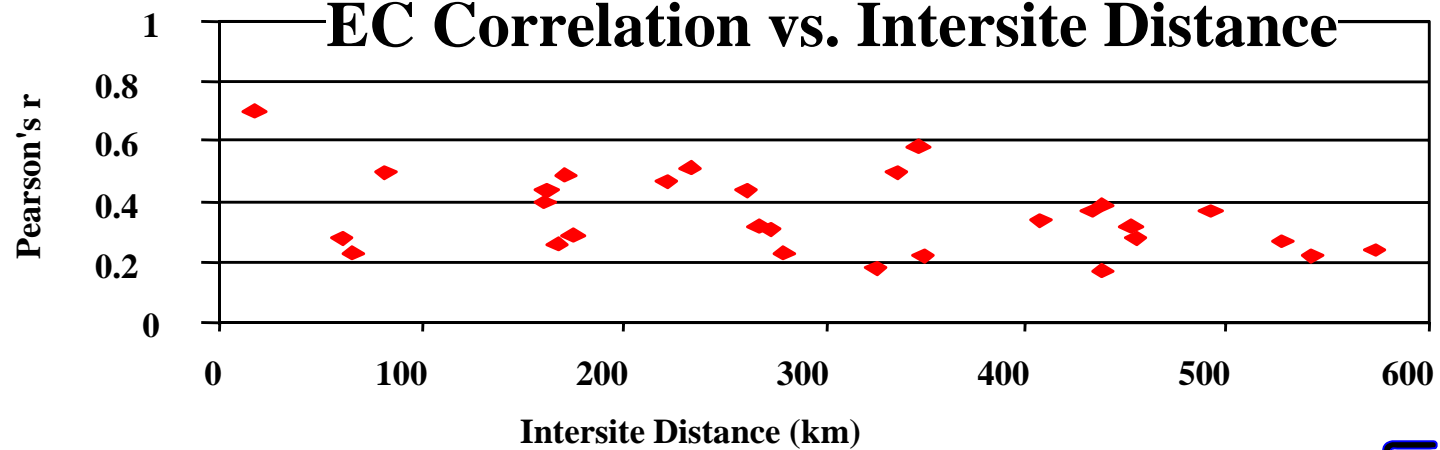


Inter-Site Correlations

SO₄²⁻ Correlation vs. Intersite Distance



EC Correlation vs. Intersite Distance



Future Plans

- **Continue SEARCH operations through December 2005**
- **Test/Deploy Continuous Speciation**
 - **SO₄/TRN** testing underway
 - **NH₄/NO₃** deployment underway
 - **B_{scat}/B_{abs}** deployment underway
 - **OC/EC** deployed
- **Special Studies**
 - **Continue daily sampling in Atlanta (support health studies)**
 - **PM_{coarse} speciation (missing mass issue)**
 - **Collaborations of opportunity (e.g., SuperSites)**
 - **Continuing Data Analysis**
 - **Visibility Analysis**
 - **Preliminary Modeling**