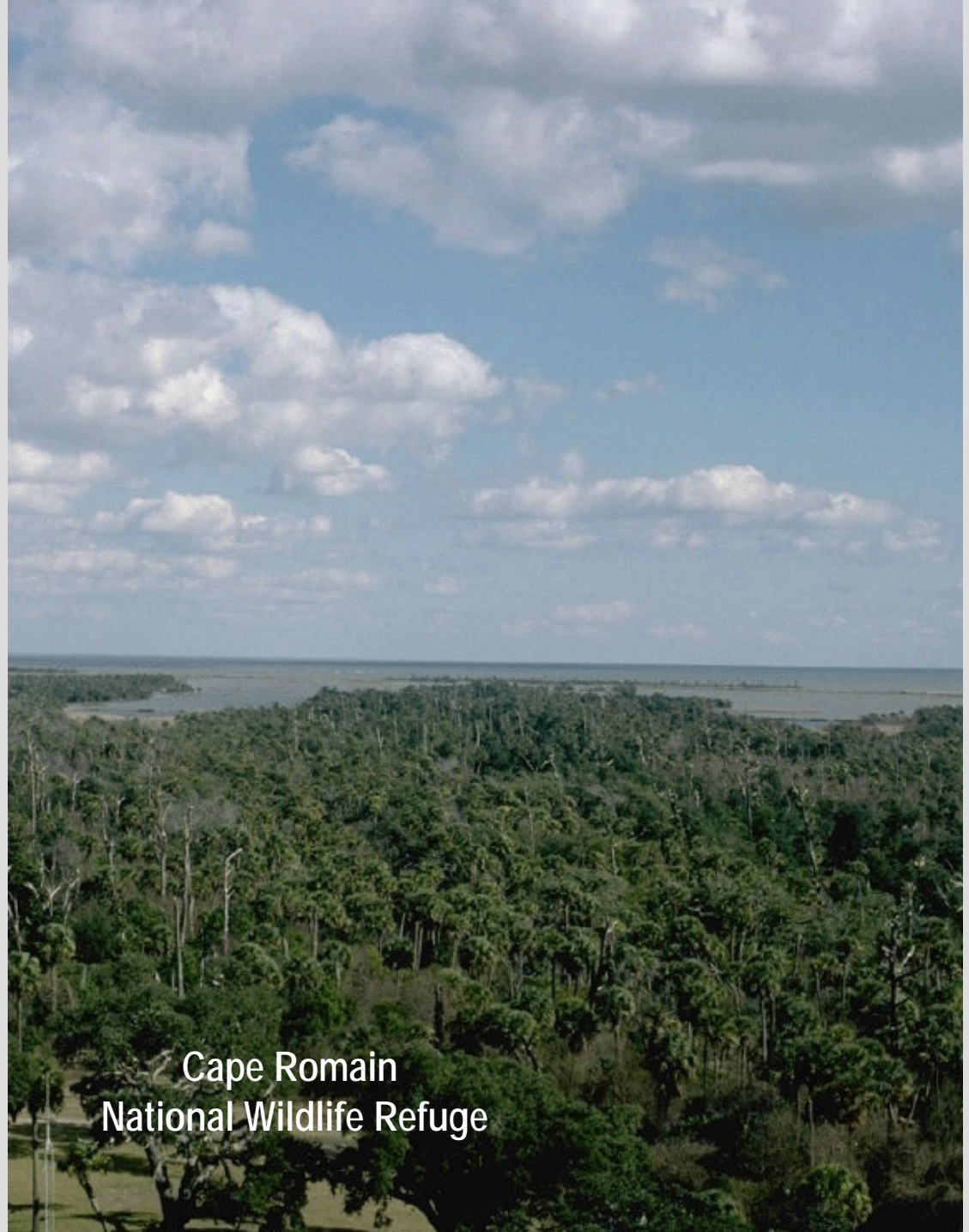




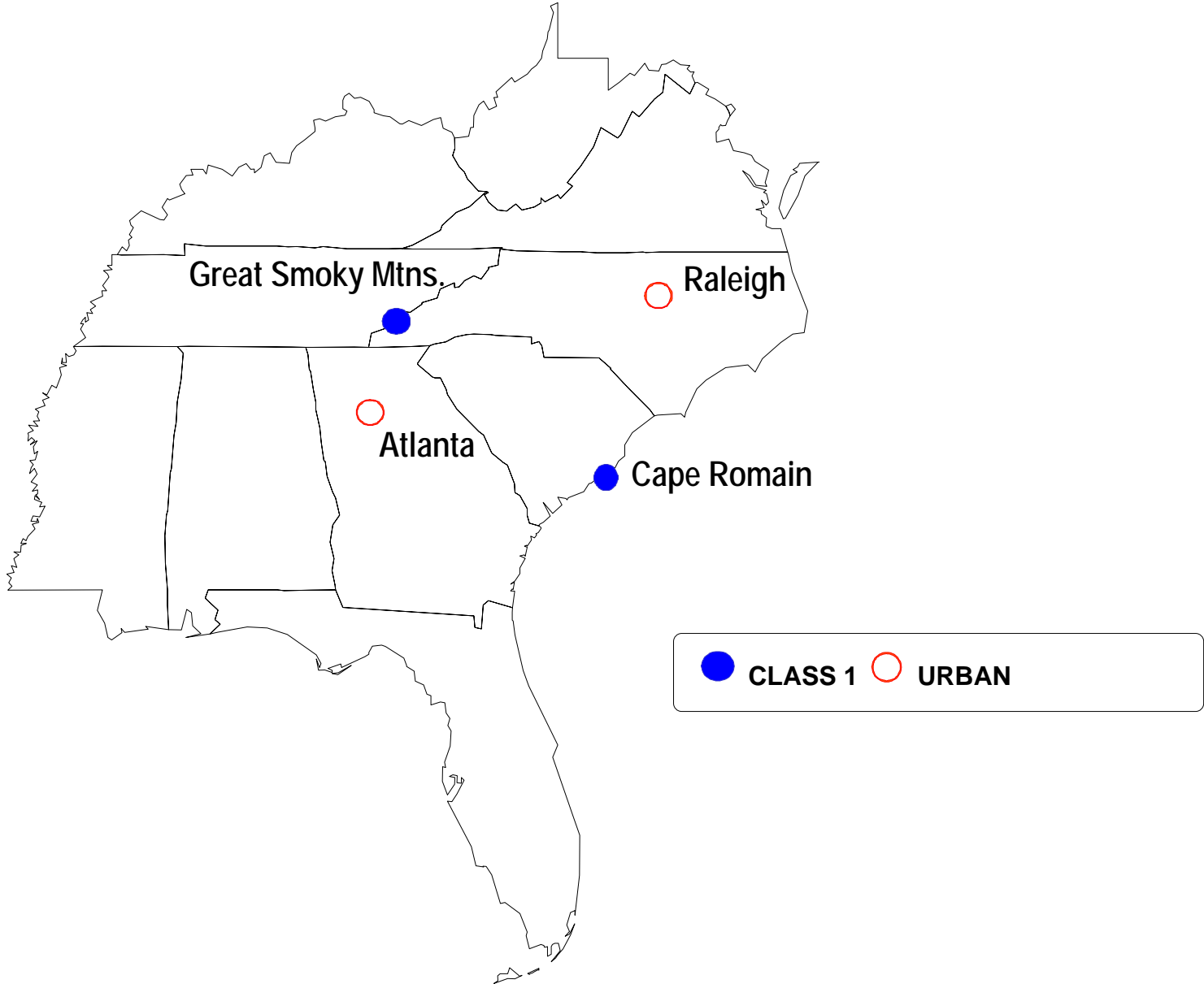
VISTAS Monitoring

RPO National Technical Meeting
June 8, 2005
Denver, Colorado

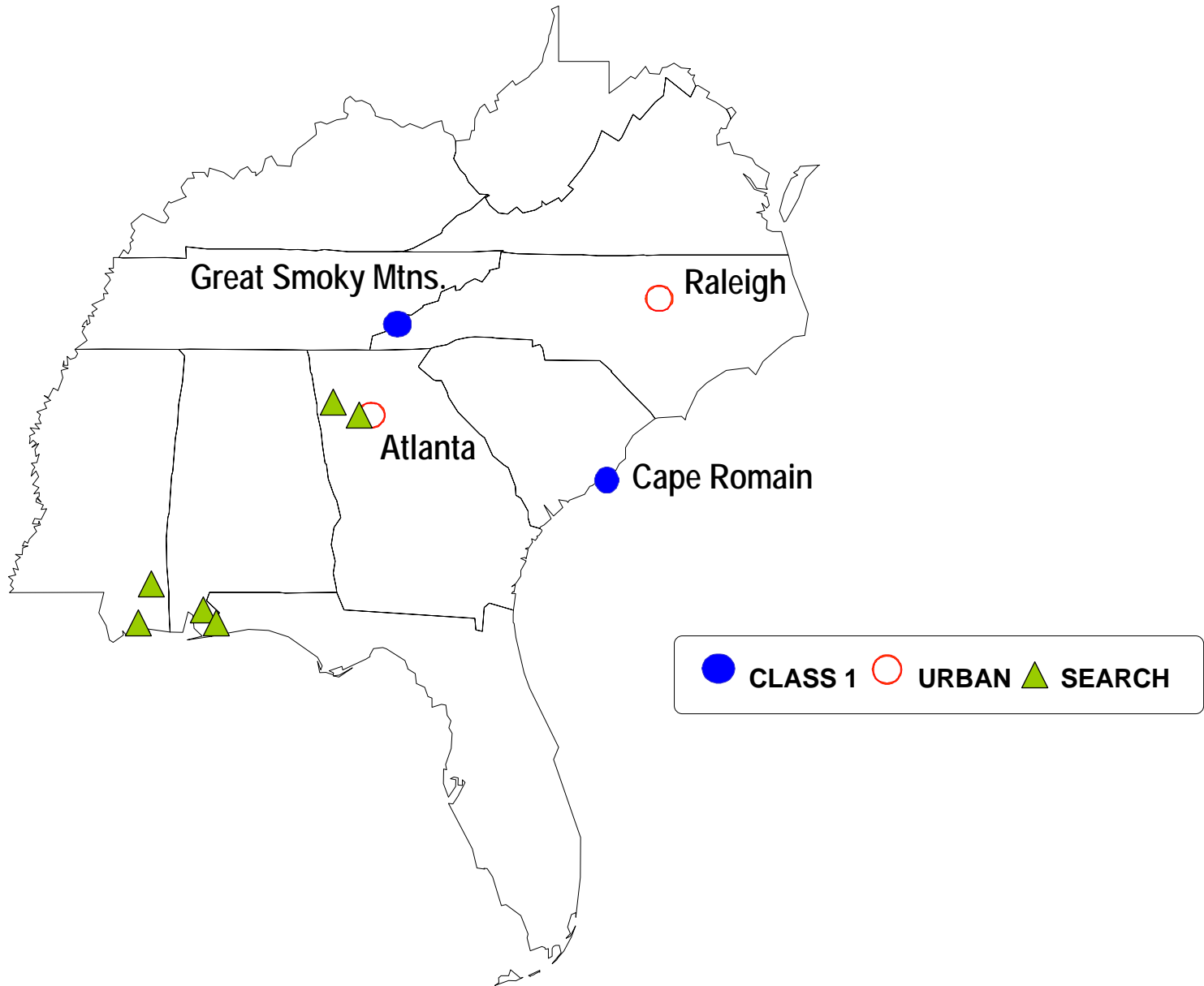


Cape Romain
National Wildlife Refuge

VISTAS Focus Sites



VISTAS Focus Sites





Focus Site Data

- **Objectives:**
 - Create as complete a record as possible of local conditions, gas, fine particulate mass and component concentrations at source and receptor sites.
 - Make the data available for use in model evaluation.
 - Evaluate the continuous methods used for comparability with existing networks.
- **Responsibility:** States, Contractors
- **Deliverables:**
 - Verified data in AQS
 - Normalized data on VISTAS site



Focus Sites

Cape Romain - Cape Romain NWR, SC



Cape Romain- May 2004 5



Focus Sites

Look Rock - Great Smoky Mountains NP, TN



Look Rock - GRSM



Focus Sites

Millbrook – Raleigh, NC



Millbrook - April 2004



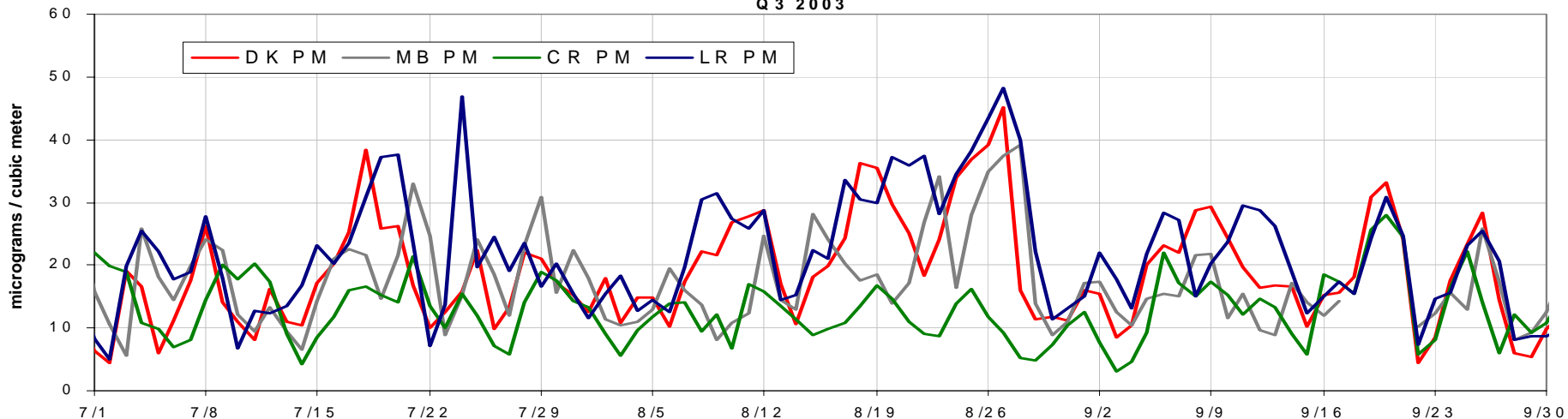
Focus Sites

March 2003 - December 2004

- Continuous monitoring:
 - Sulfate, Nitrate, Carbon
 - Precursor gases - SO_2 , NO_y , CO
 - Continuous Mass
 - Scattering (at the Class 1 area sites)
 - Meteorology
 - Alternative methods
- Filter Speciation: IMPROVE and STN

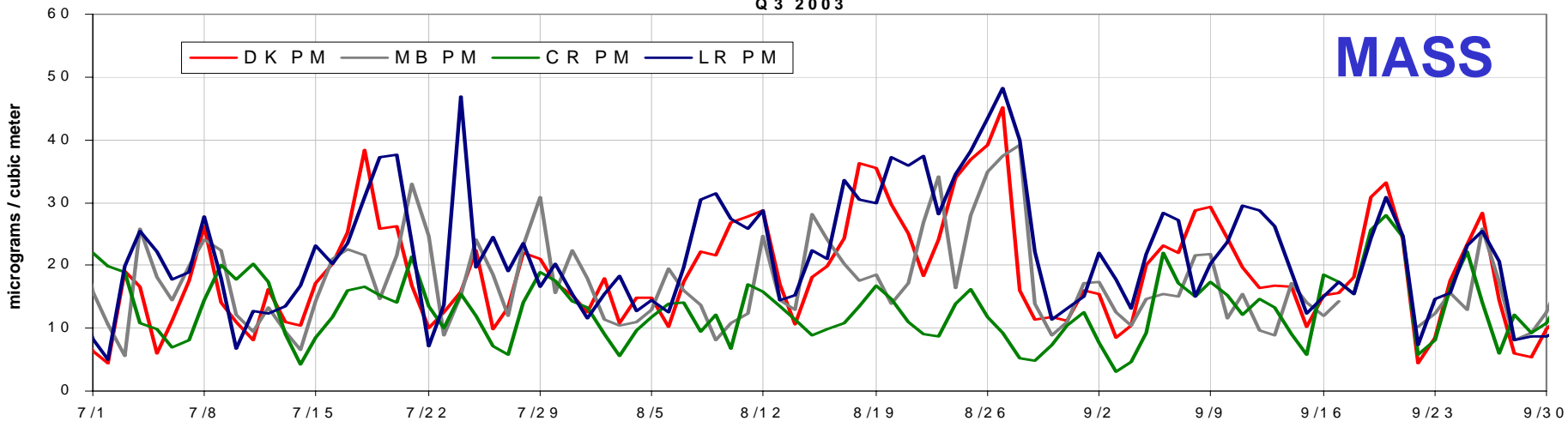
Third Quarter 2003

VISTAS Focus Site TEOM PM_{2.5}
Q3 2003

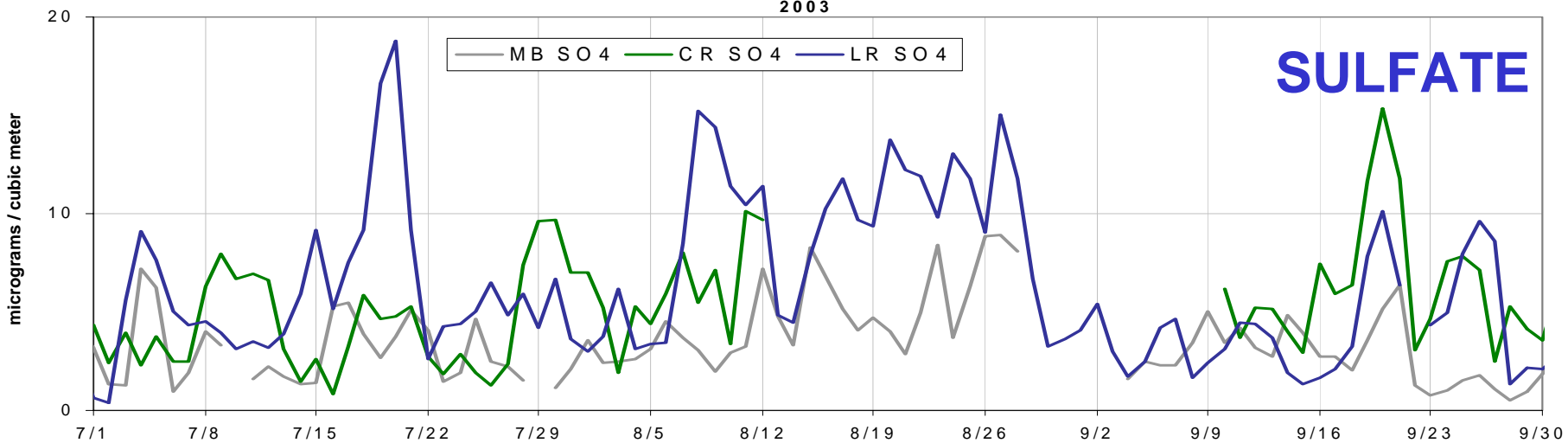


Third Quarter 2003

VISTAS Focus Site TEOM PM_{2.5}
Q3 2003



VISTAS Focus Site Sulfate
2003





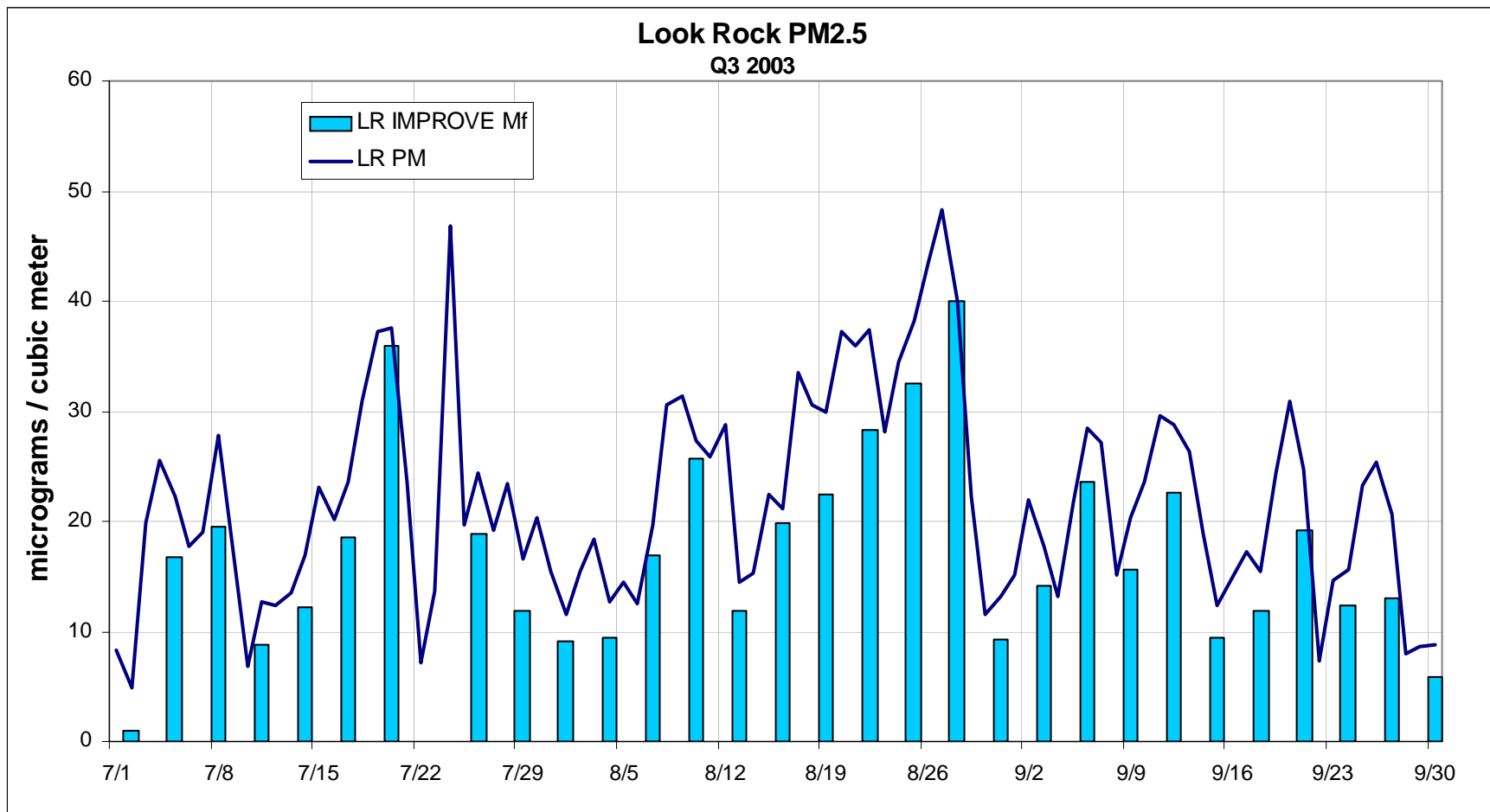
Focus Sites

- Objectives:
 - Evaluate the continuous methods used for comparability with existing networks.
- Collocated with IMPROVE or STN
- ‘Alternative’ methods at Millbrook
 - SEARCH Sulfate, Nitrate (plus ammonium)
- TVA/Harvard Sulfate at Look Rock
- Aethalometers at all sites



Filter comparisons

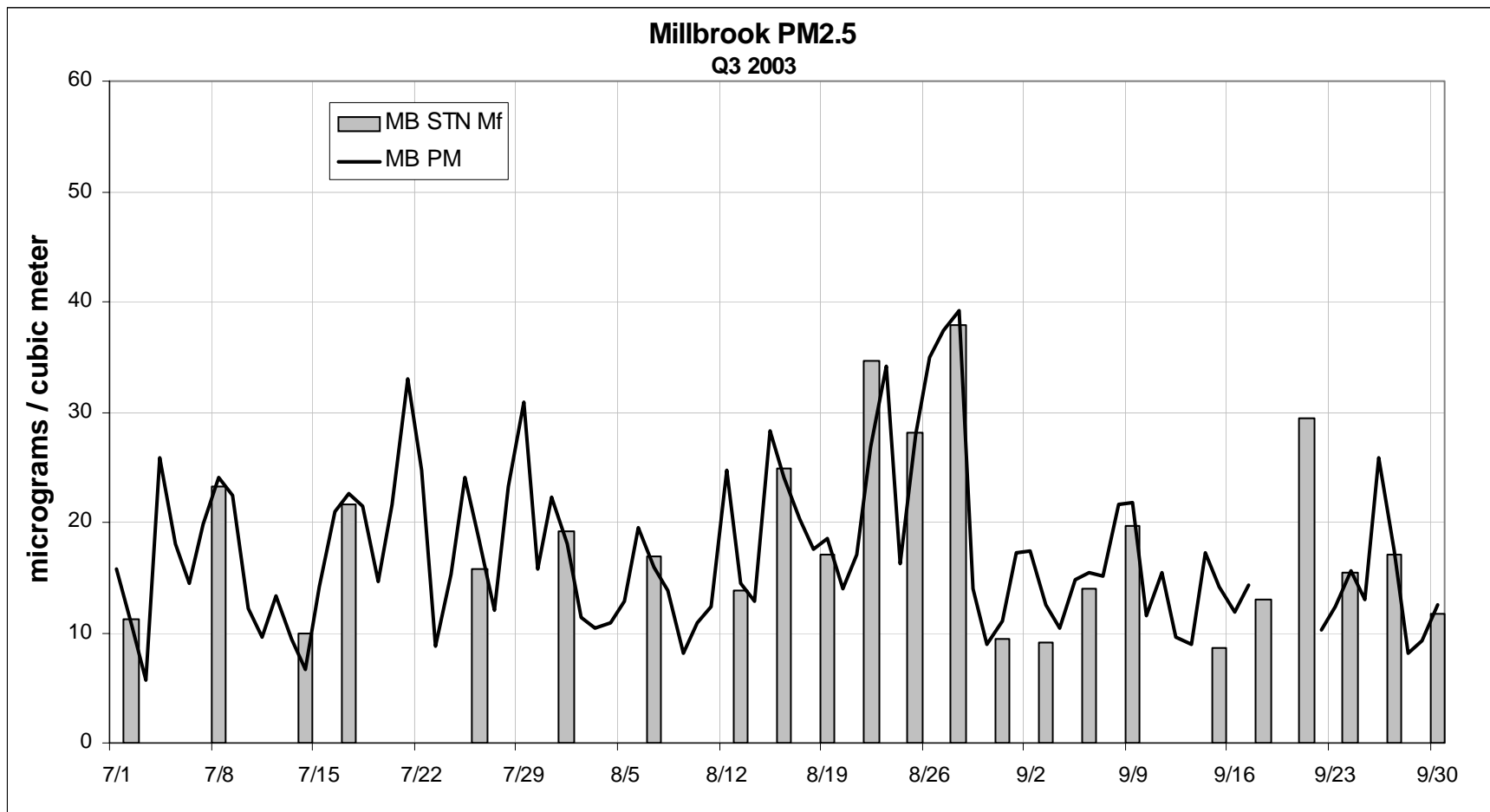
Mass - IMPROVE





Filter comparisons

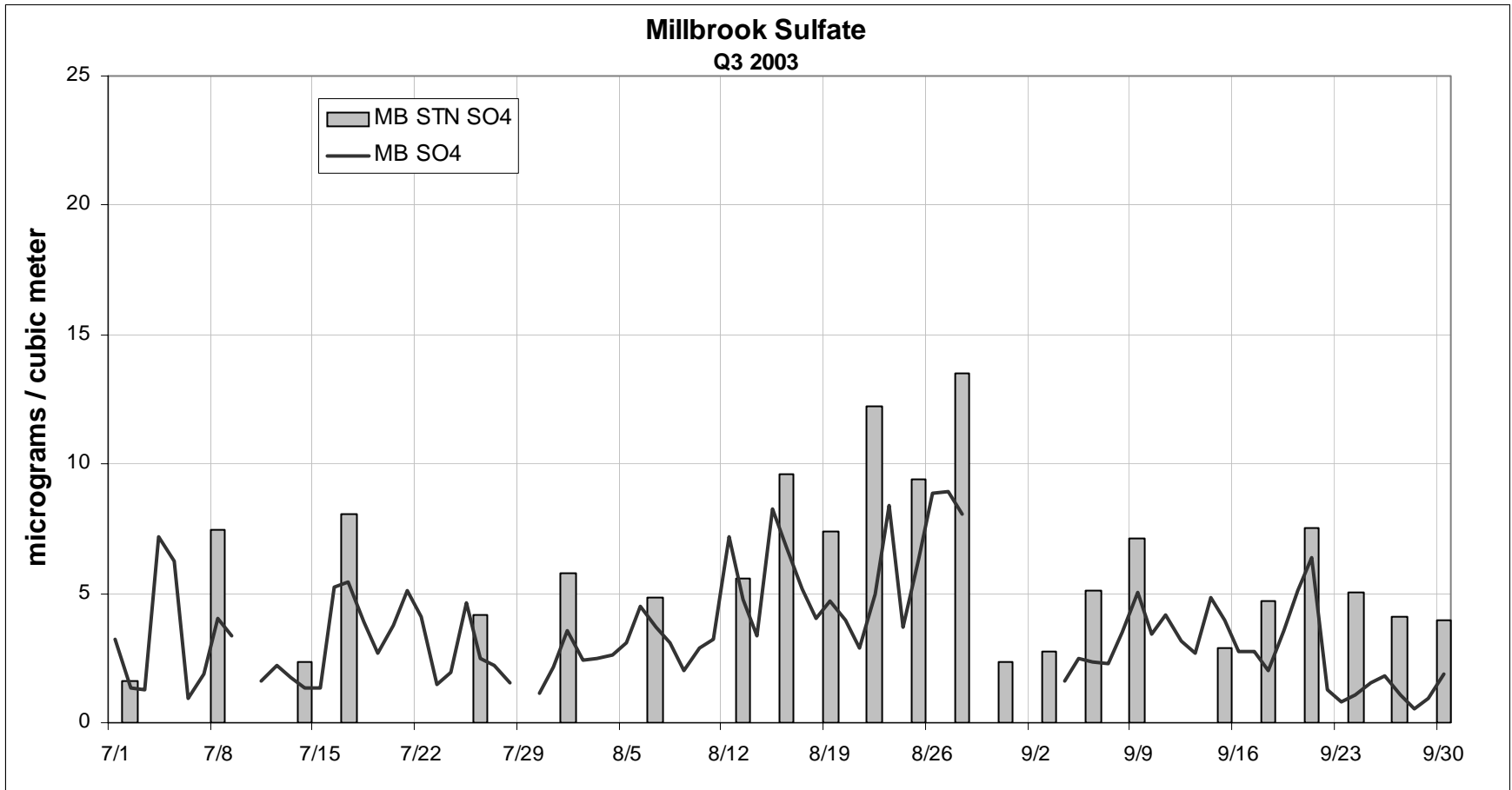
Mass – STN





Filter comparisons

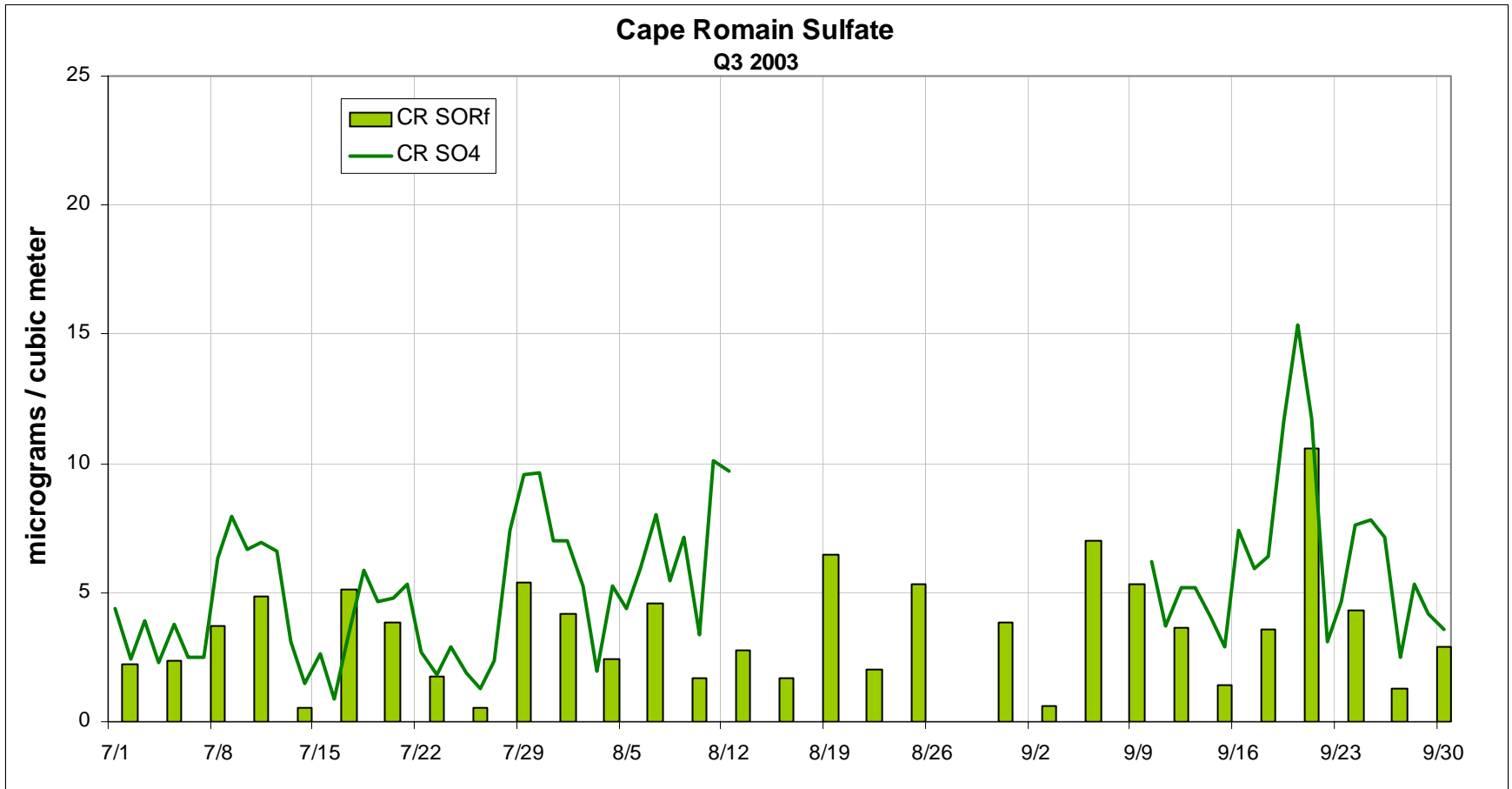
Sulfate – STN





Filter comparisons

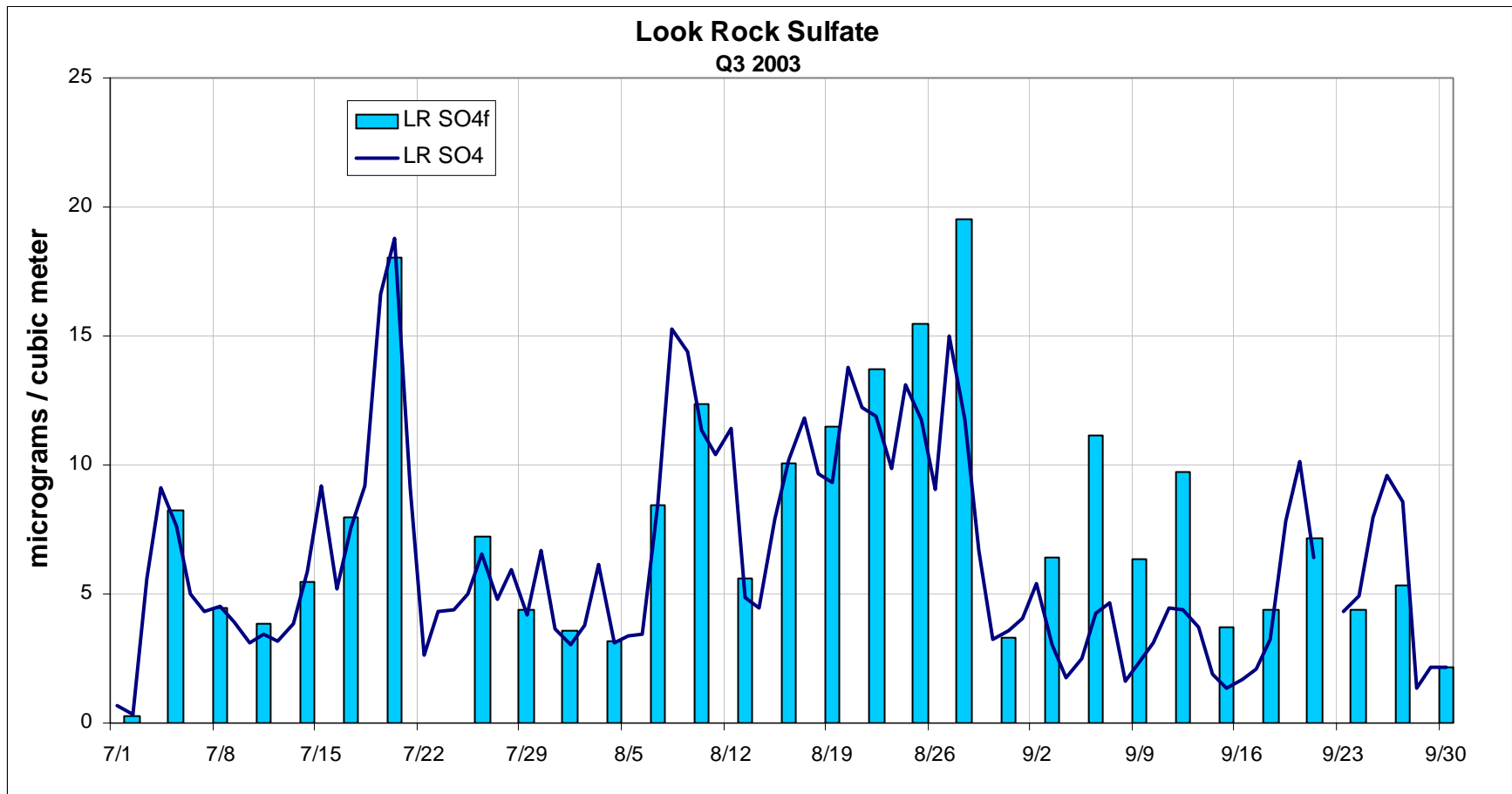
Sulfate - IMPROVE





Filter comparisons

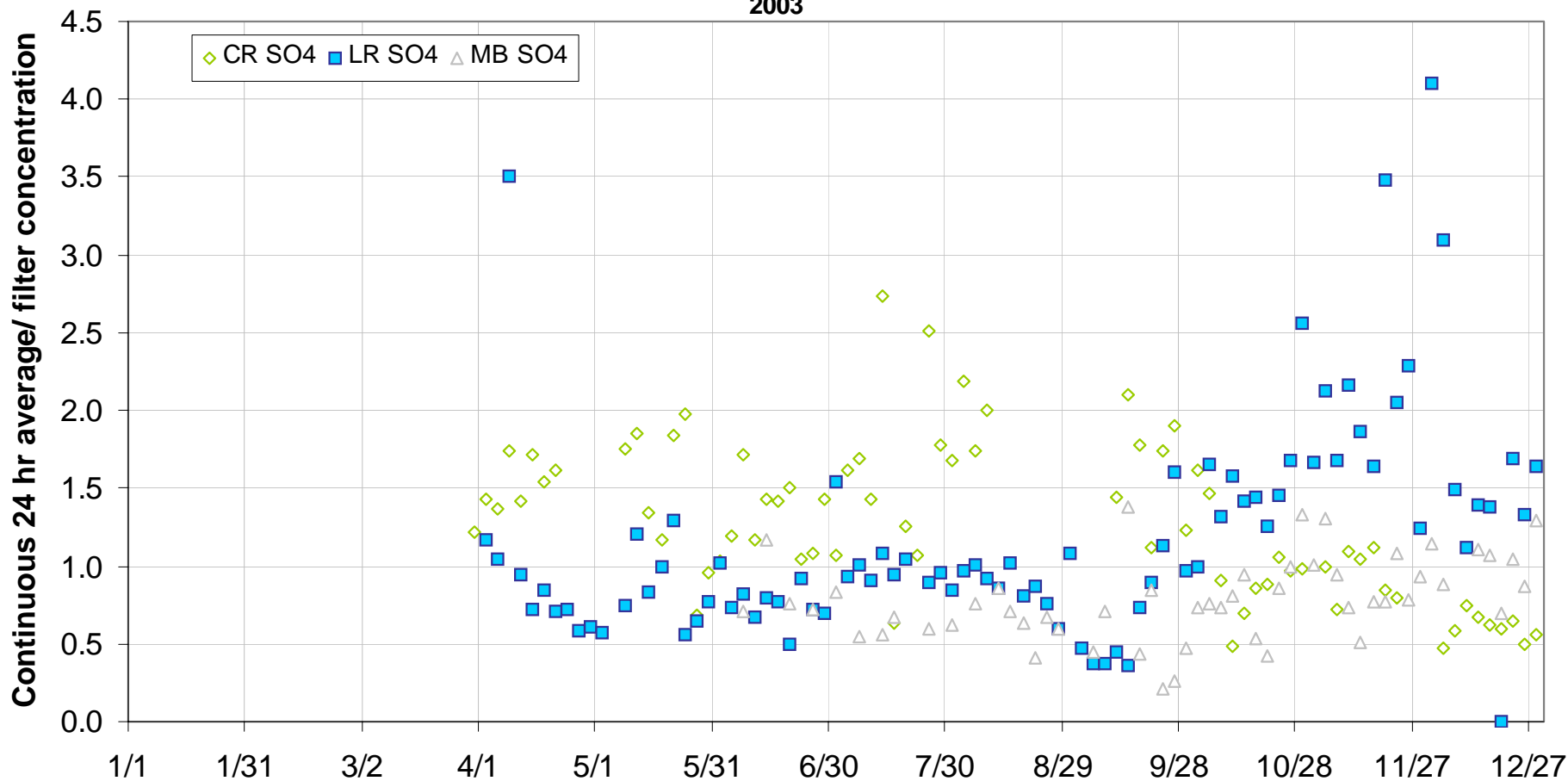
Sulfate - IMPROVE





Continuous to Filter ratio Sulfate

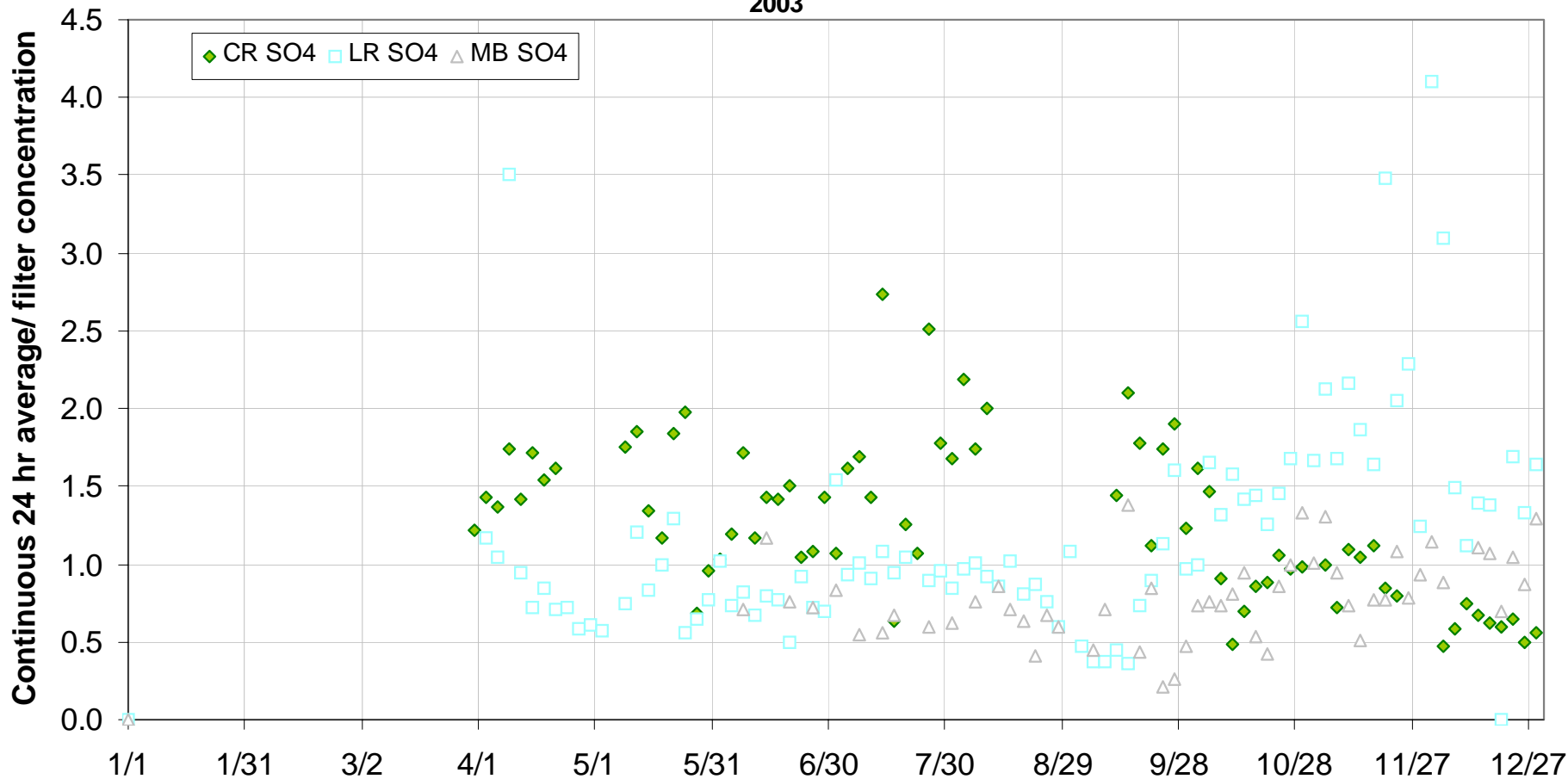
Continuous Sulfate - IMPROVE / STN Filter Sulfate Ratio
2003





Continuous to Filter ratio Sulfate

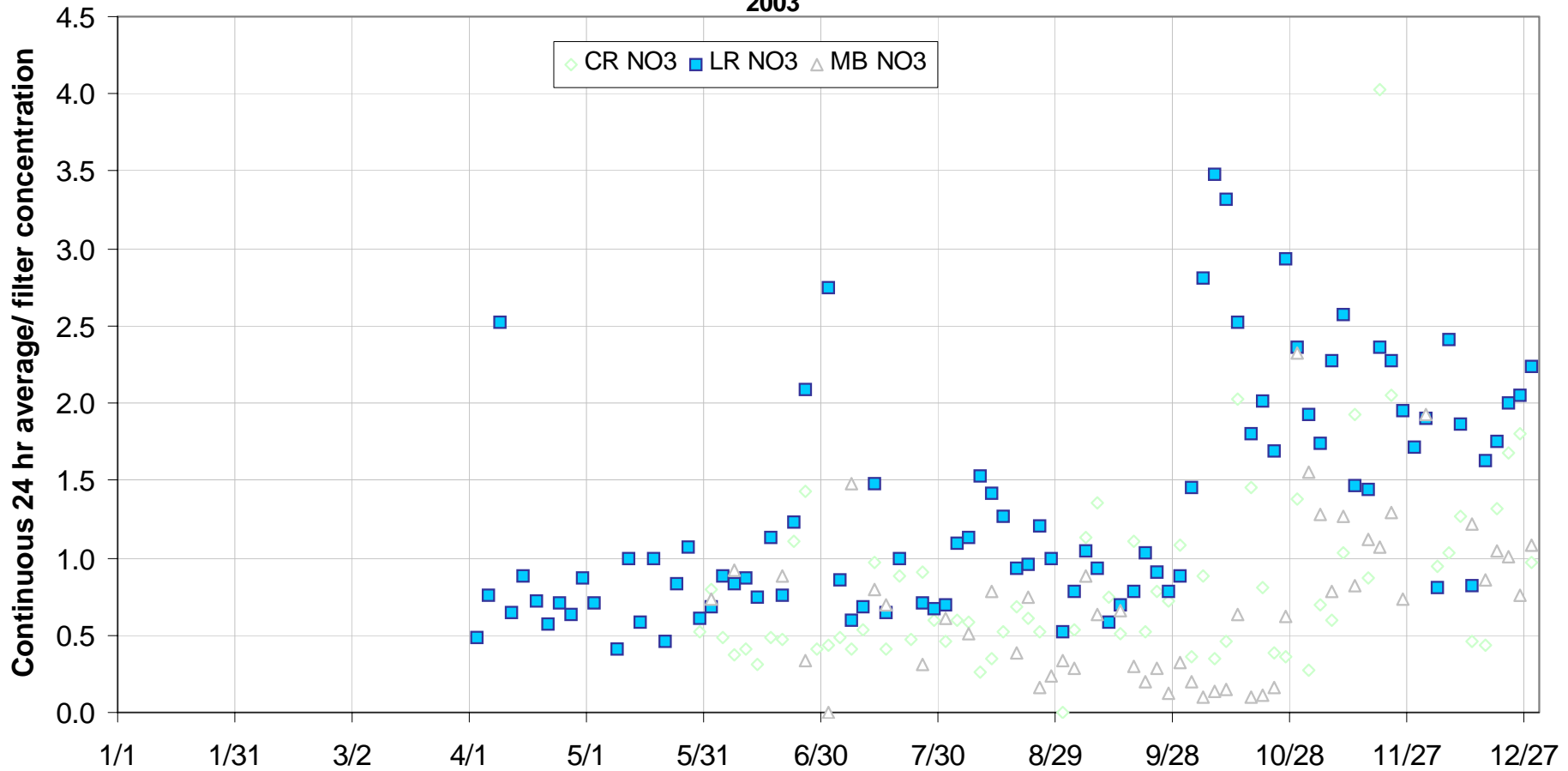
Continuous Sulfate - IMPROVE / STN Filter Sulfate Ratio
2003





Continuous to Filter ratio Nitrate

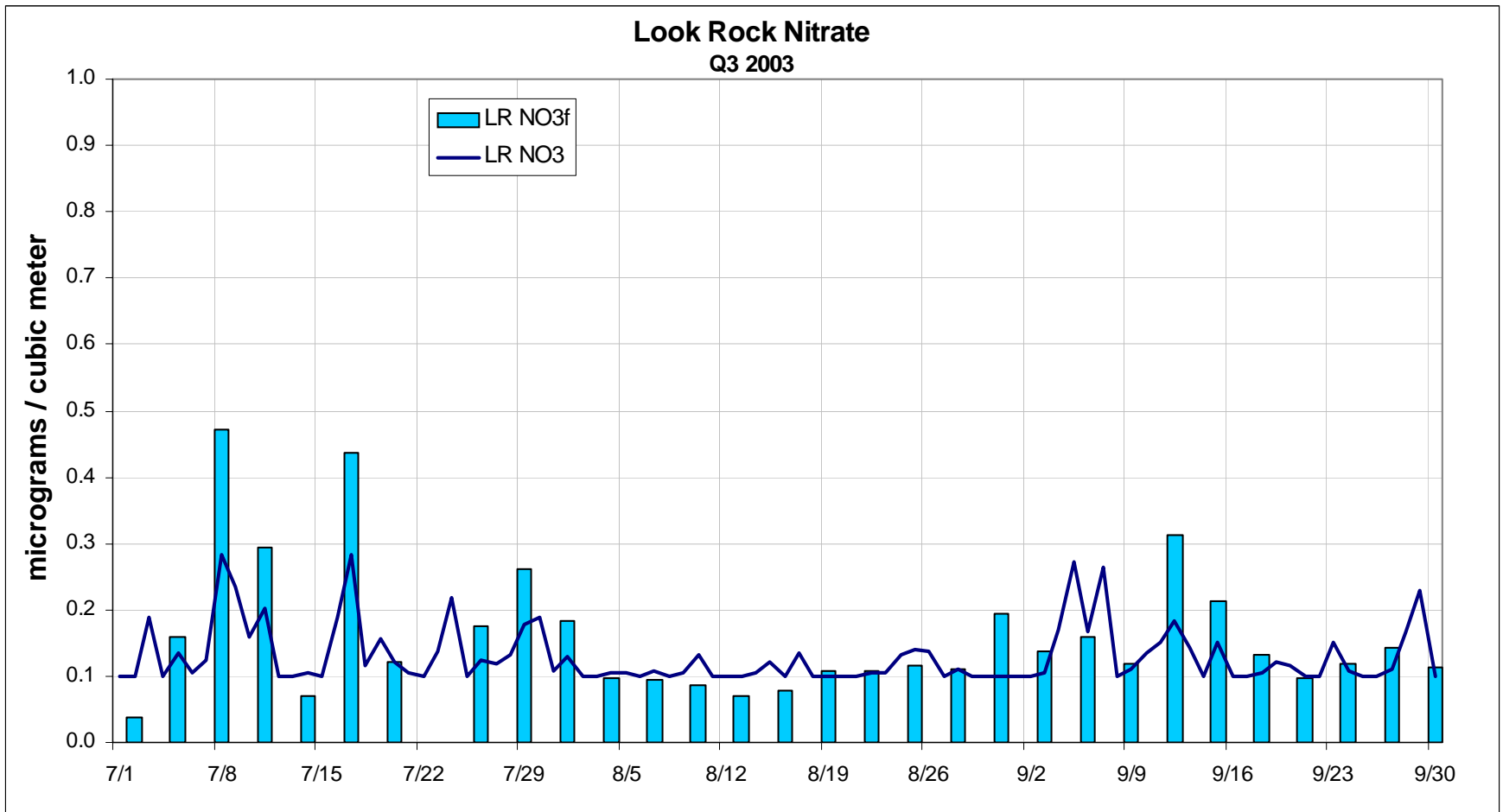
Continuous Nitrate - IMPROVE /STN Filter Nitrate Ratio
2003





Filter comparisons

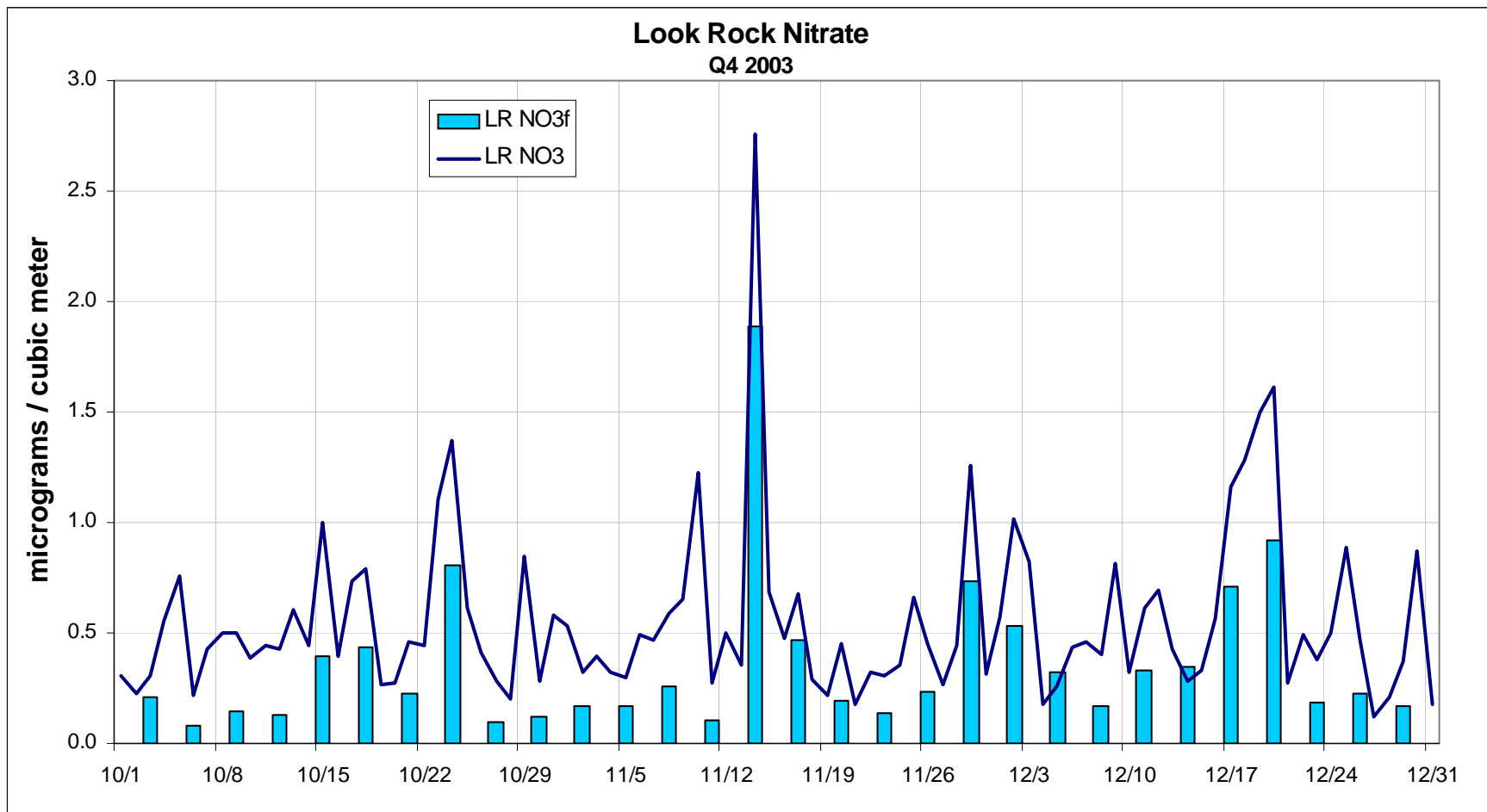
Nitrate - IMPROVE





Filter comparisons

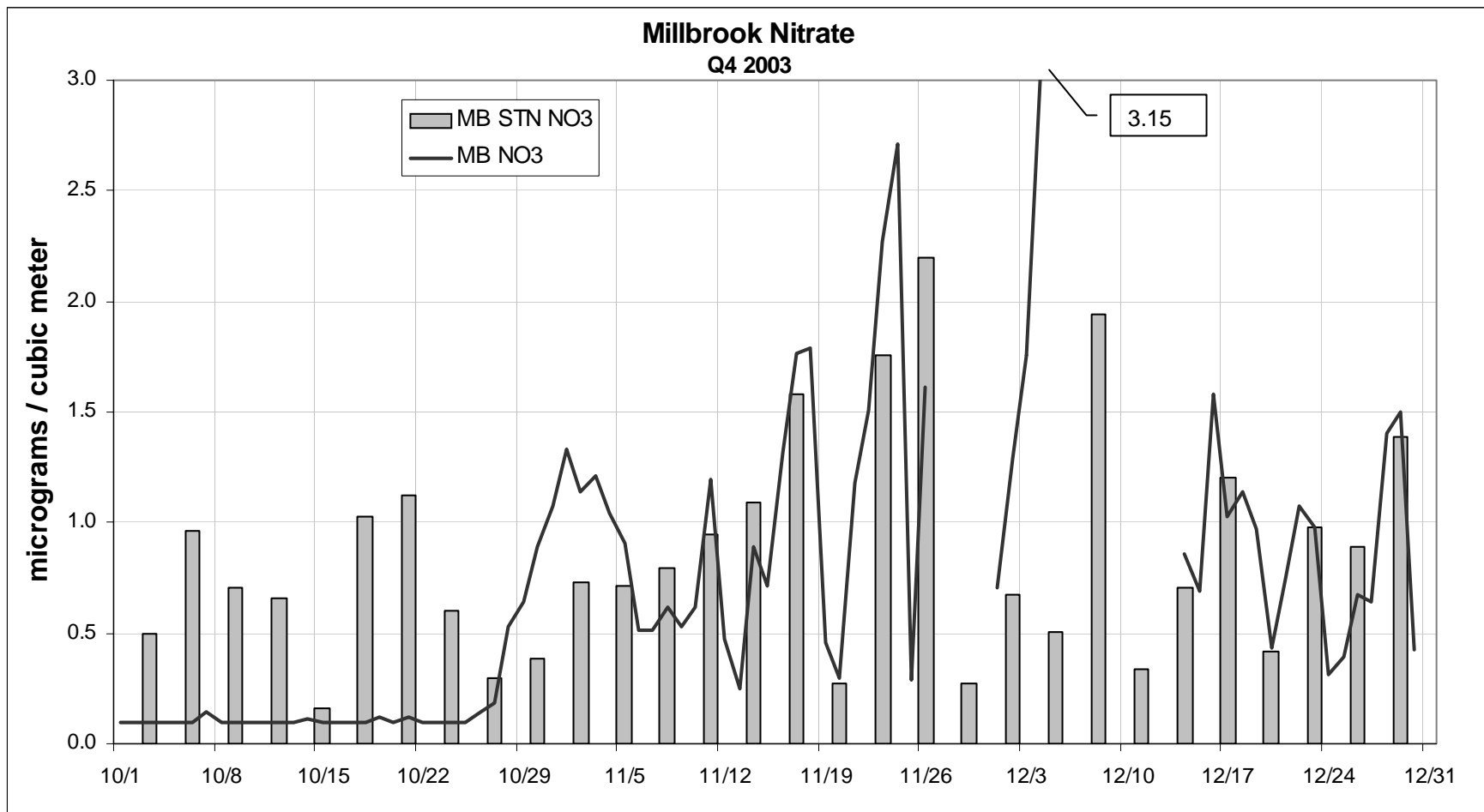
Nitrate - IMPROVE





Filter comparisons

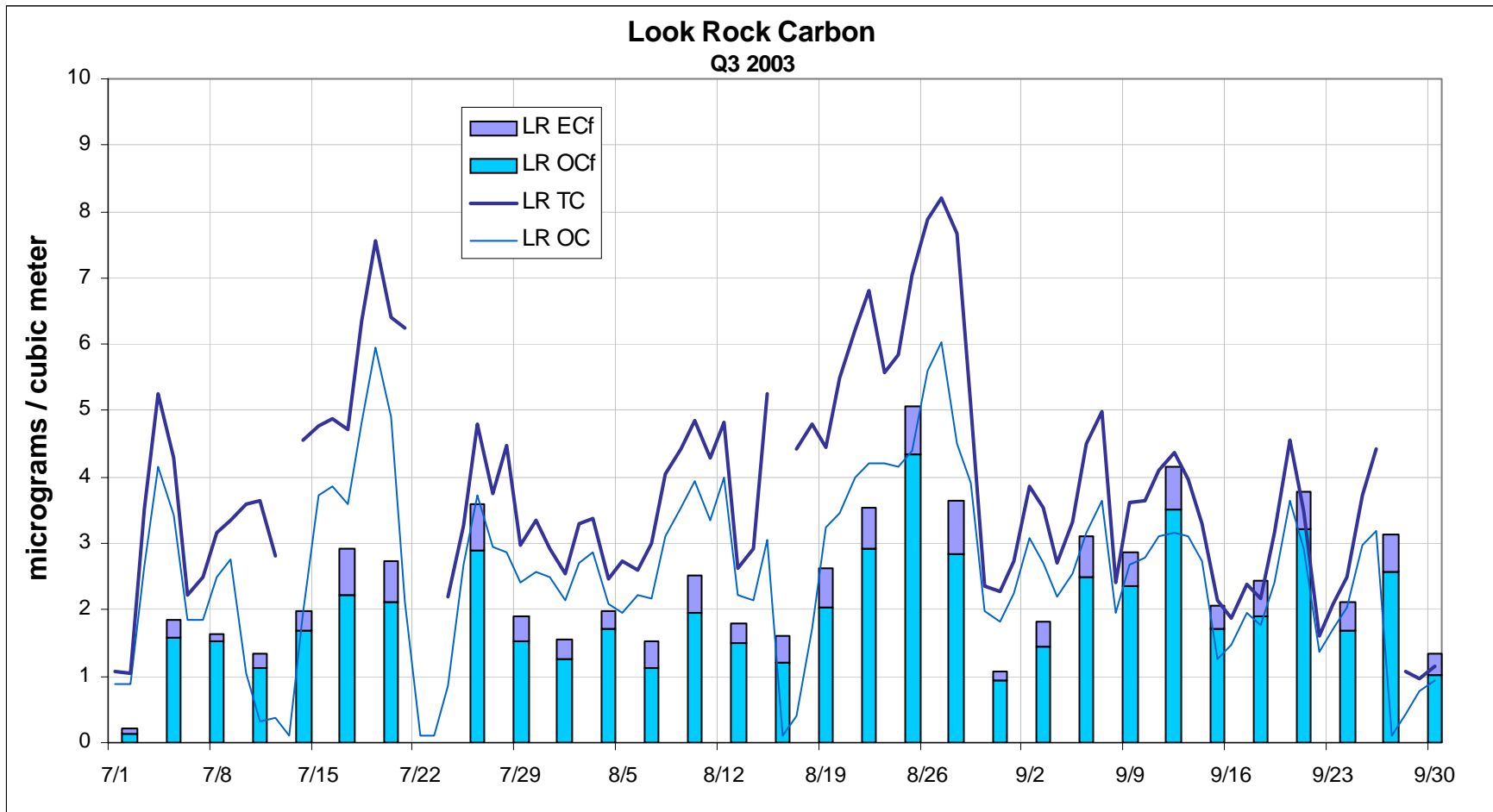
Nitrate - STN





Filter comparisons

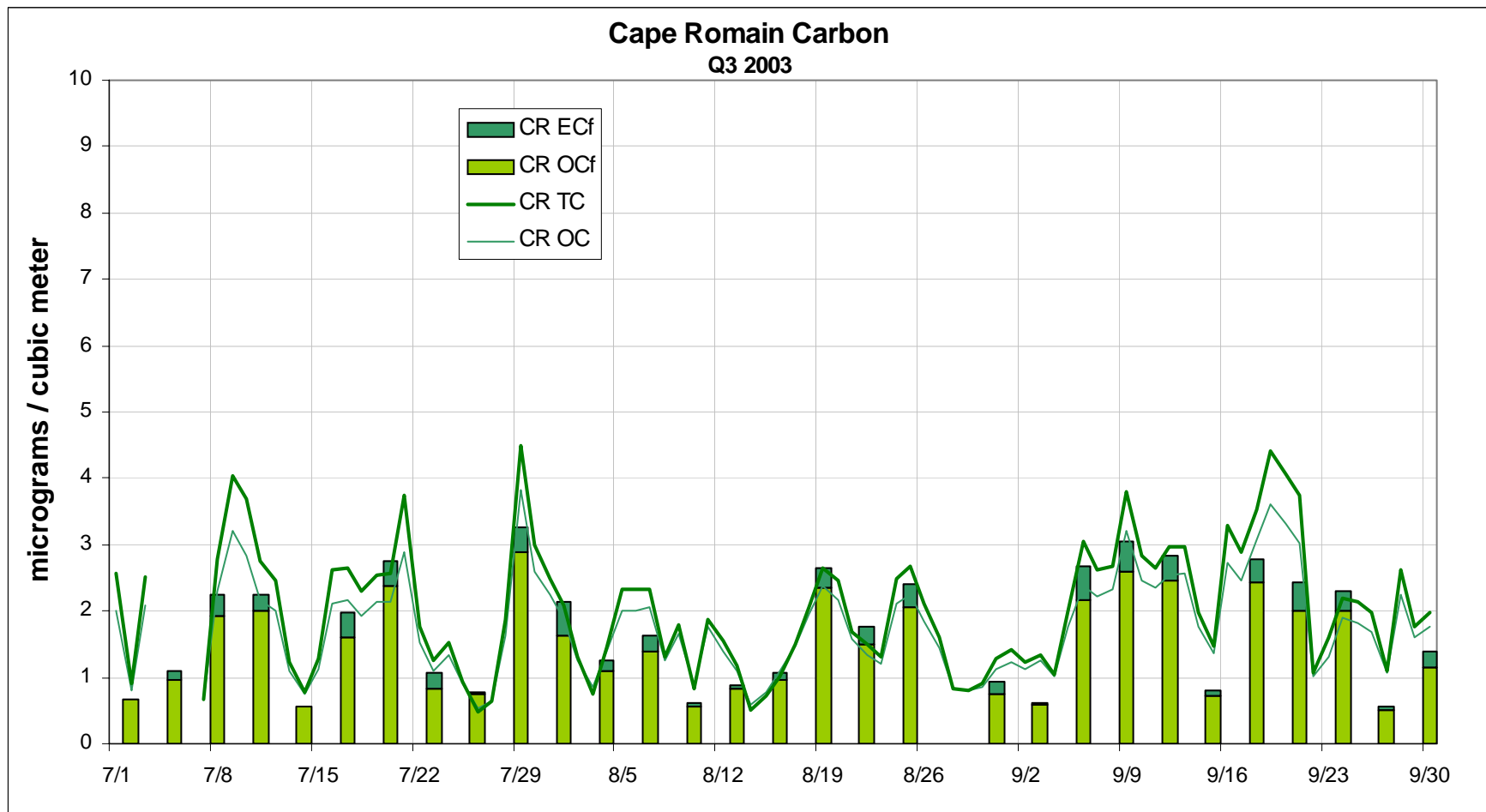
Carbon - IMPROVE





Filter comparisons

Carbon - IMPROVE





Focus Sites

- Objectives:
 - Make the data available for use in model evaluation.



Data Completeness

2003 Data in AQS

		January-03	February-03	March-03	April-03	May-03	June-03	July-03	August-03	September-03	October-03	November-03	December-03	Year
LOOK ROCK														
Method														
PM25	703	99%	98%	99%	98%	98%	100%	94%	99%	96%	99%	99%	99%	98%
SO4	862				90%	98%	98%	97%	95%	86%	91%	93%	83%	92%
NO3	861				97%	95%	90%	98%	99%	98%	97%	95%	99%	97%
TC	860				43%	32%	80%	75%	86%	92%	95%	94%	95%	77%
LAC	861				100%	91%	76%	97%	96%	100%	100%	100%	83%	94%
OC STN	860				43%	32%	80%	99%	100%	100%	95%	95%	96%	82%
GRSM IMPROVE														
CAPE ROMAIN														
PM25	704			88%	99%	99%	91%	98%	97%	95%	98%	96%	35%	90%
SO4	862			8%	69%	84%	92%	93%	35%	63%	88%	82%	94%	76%
NO3	861					79%	87%	88%	91%	79%	91%	95%	91%	89%
TC	860			72%	84%	90%	87%	79%	90%	95%	93%	93%	93%	89%
LAC	861				50%	100%	100%	100%	99%	99%	96%	99%	99%	99%
OC STN	860			67%	76%	85%	84%	79%	90%	95%	93%	93%	93%	87%
ROMA STN														
ROMA IMPROVE														
MILLBROOK														
PM25	702	99%	98%	99%	99%	98%	94%	97%	99%	78%	99%	99%	77%	95%
SO4	862					0%	91%	72%	80%	86%	95%	91%	68%	73%
NO3	861					7%	97%	59%	72%	93%	100%	80%	65%	71%
TC	860					34%	81%	77%	92%	93%	87%	82%	66%	77%
LAC	861					0%	77%	75%	81%	87%	87%	81%	51%	67%
OC STN	860					34%	81%	78%	92%	93%	87%	82%	66%	77%
STN														
DEKALB														
PM25	0					100%	100%	100%	100%	100%	100%	100%	100%	100%
LAC	861						86%	94%	85%	90%	92%	95%	92%	91%



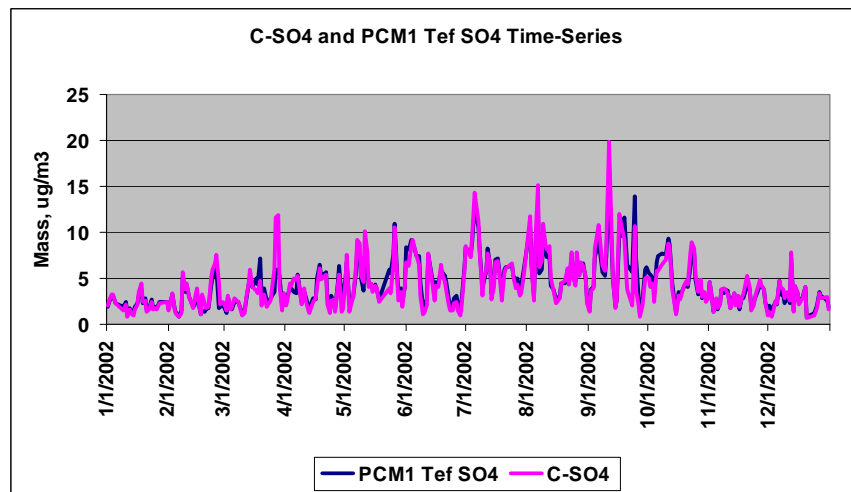
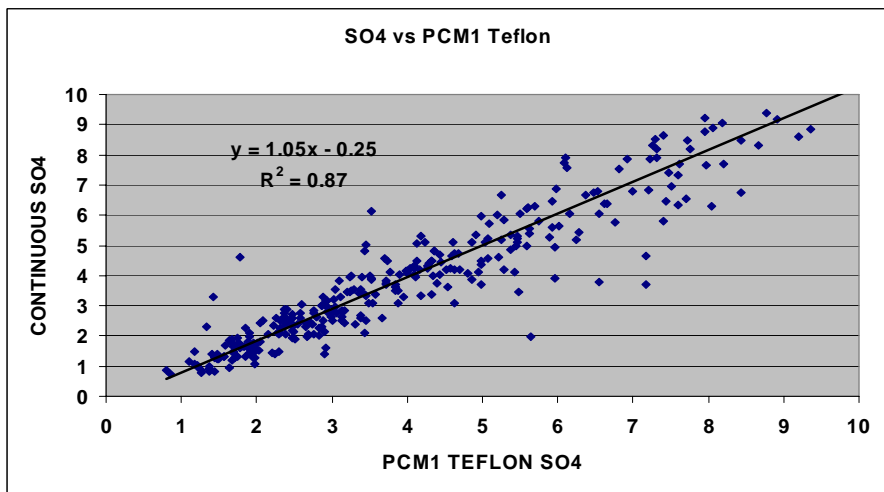
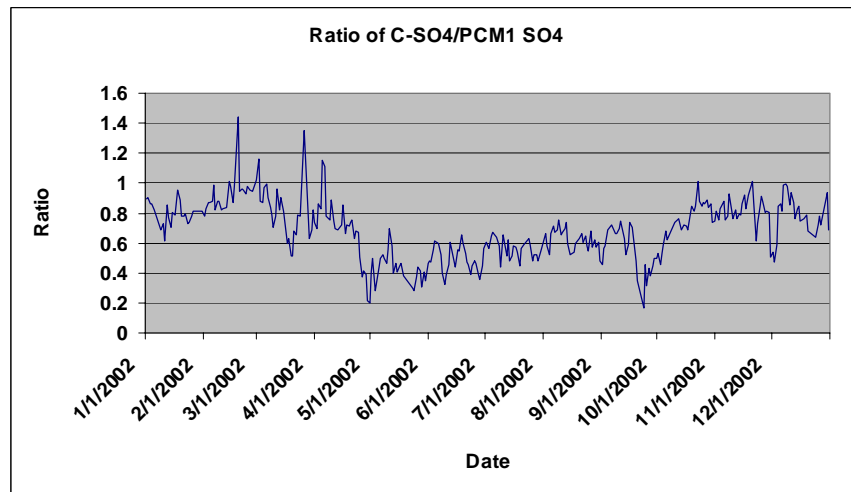
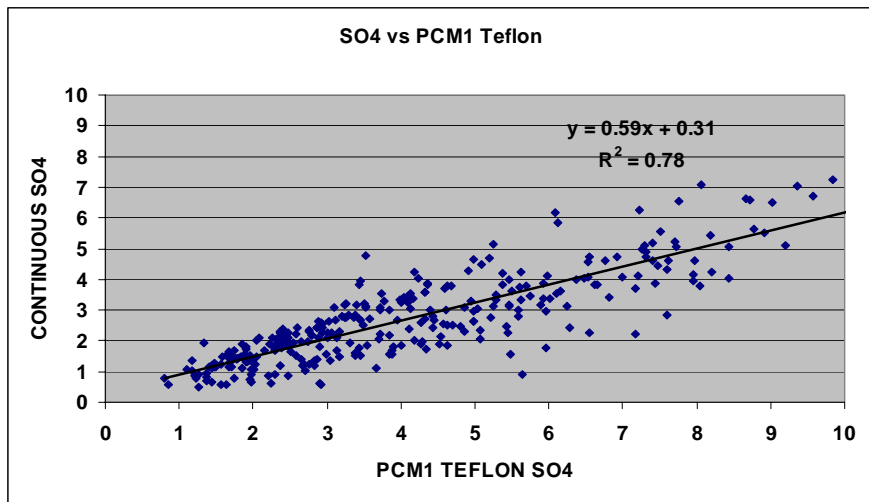
Data Completeness

2004 Data in AQS

		January-04	February-04	March-04	April-04	May-04	June-04	July-04	August-04	September-04	October-04	November-04	December-04	Year	
LOOK ROCK															
Method															
PM25	703	100%	100%	99%	98%	99%	99%	98%	97%	98%	98%	95%	82%	98%	
SO4	862	89%	99%	97%	98%	92%	86%	93%	99%	97%	95%	91%	94%	94%	
NO3	861	98%	97%	98%	99%	97%	44%	99%	99%	93%	98%	95%	92%	93%	
TC	860	97%	94%	90%	78%	92%	97%	81%	94%	90%	96%	93%	87%	91%	
LAC	861	100%	100%	99%	100%	99%	96%	100%	100%	43%	100%	100%	99%	95%	
OC STN	860	98%	94%	93%	88%	92%	97%	82%	94%	90%	96%	93%	87%	92%	
GRSM IMPROVE															
CAPE ROMAIN															
PM25	704	91%	99%	99%	98%	93%	99%	85%	88%	99%	97%	99%	98%	95%	
SO4	862	20%	64%	87%	80%	94%	96%	86%	94%	99%	85%	98%	93%	83%	
NO3	861	91%	93%	86%	94%	88%	25%	18%	60%	99%	82%	99%	98%	78%	
TC	860	87%	86%	60%	72%	88%	28%	0%	37%	84%	57%	10%	32%	53%	
LAC	861	94%	78%	46%	95%	99%	98%	98%	98%	100%	99%	91%	73%	89%	
OC STN	860	87%	87%	60%	72%	88%	28%	0%	37%	84%	57%	10%	32%	53%	
ROMA STN															
ROMA IMPROVE															
MILLBROOK															
PM25	702	96%	87%	94%	97%	99%	98%	96%	92%	99%	99%	98%	100%	96%	
SO4	862	80%	80%	76%	80%	77%	68%	94%	100%	0%	0%	0%	0%	55%	
NO3	861	83%	85%	52%	64%	94%	75%	80%	100%	0%	0%	0%	0%	53%	
TC	860	39%	0%	63%	80%	82%	97%	89%	99%	0%	0%	0%	0%	46%	
LAC	861	87%	89%	82%	88%	100%	100%	94%	100%	0%	0%	0%	0%	62%	
OC STN	860	40%	0%	63%	68%	82%	97%	90%	99%	0%	0%	0%	0%	45%	
DEKALB															
PM25	703	100%	100%	100%	100%	95%	100%	99%	87%	97%	99%	99%	100%	98%	
LAC	861	100%	99%	53%	96%	90%	75%	89%	93%	29%	97%	98%	99%	85%	

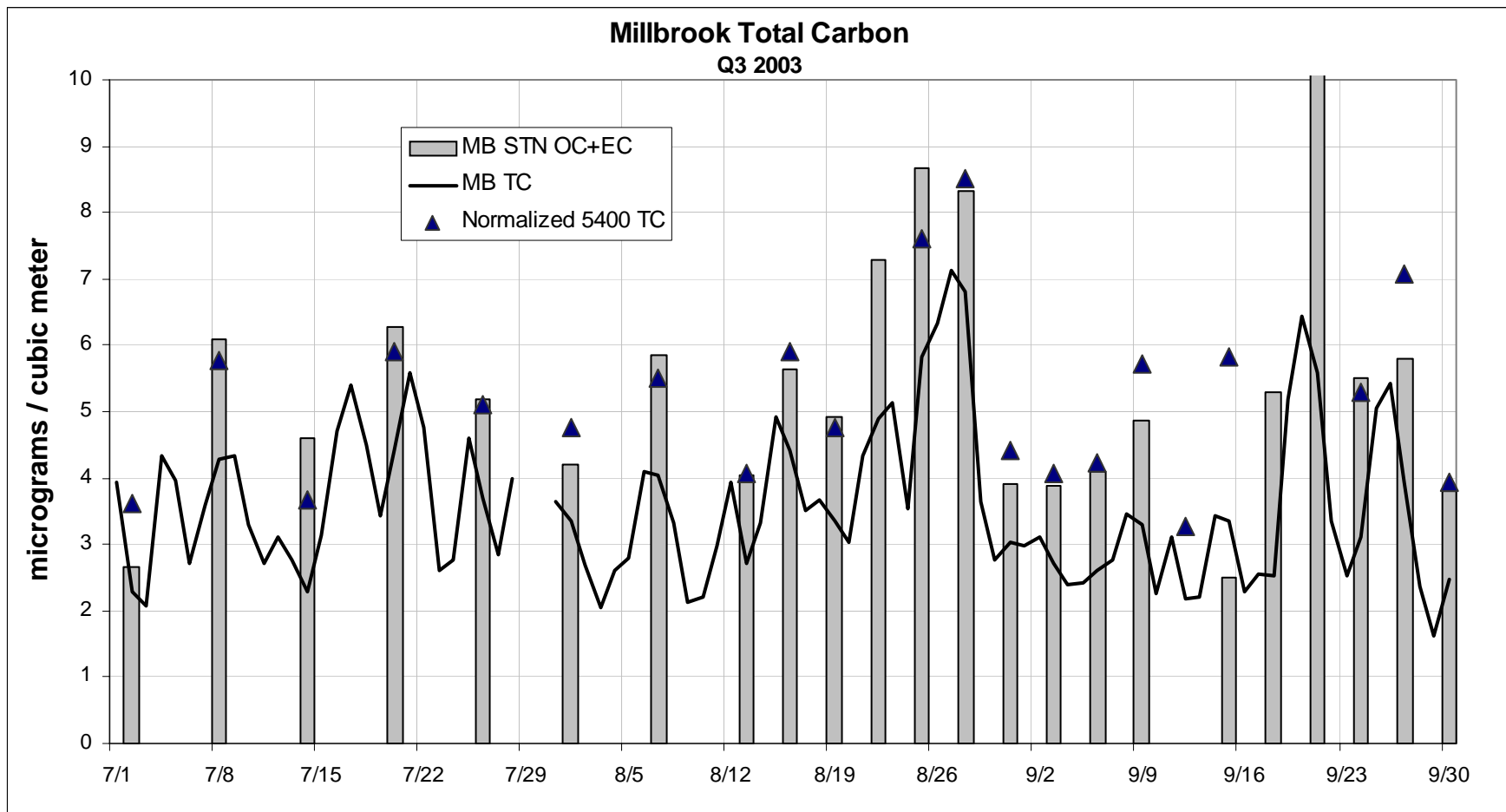


Focus Site Data Normalization





Focus Site Data Normalization

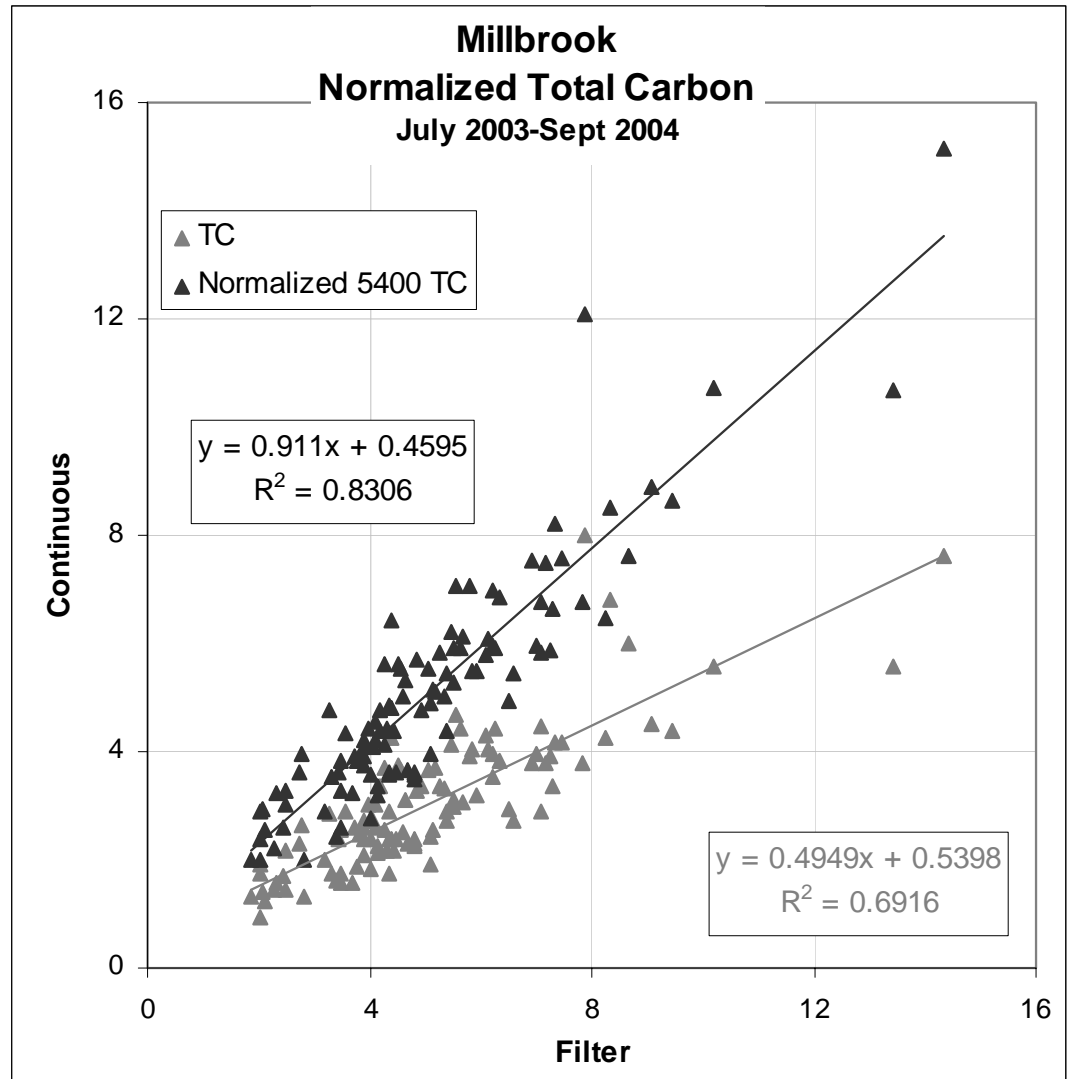




Focus Site Data Normalization

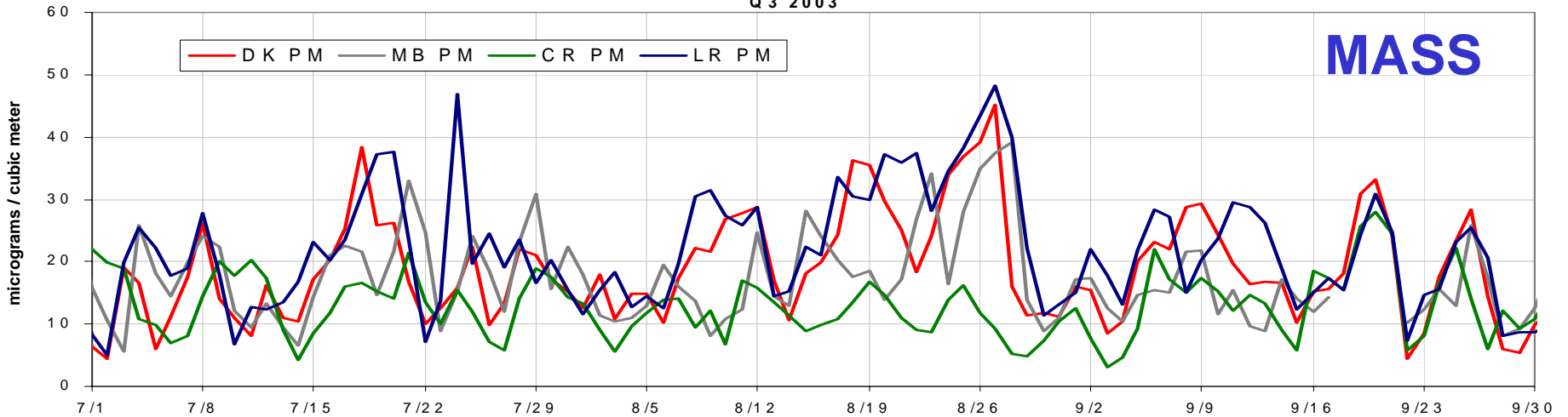
Comparison of Millbrook 'raw' and Normalized data

Provides another opportunity for validation

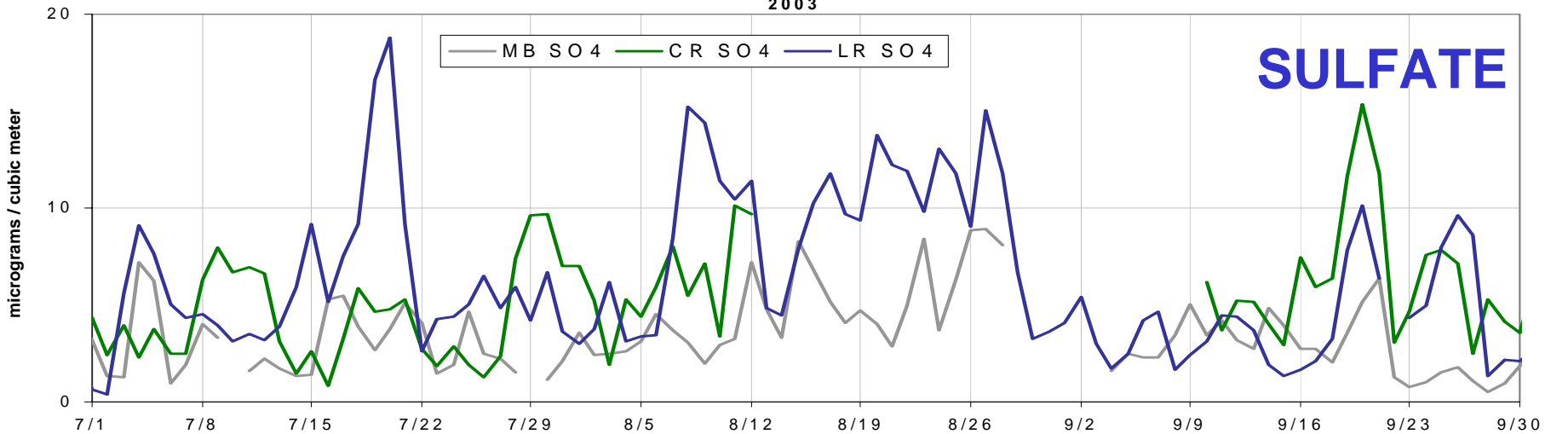


Third Quarter 2003

VISTAS Focus Site TEOM PM_{2.5}
Q3 2003



VISTAS Focus Site Sulfate
2003





Focus Site Data Normalization

- Must have filter data
 - IMPROVE - ~1 year
 - STN- ~4 months

STN protocol sampler added at Cape
Romain Site April 2004

- Comparison of IMPROVE and STN at a rural site



Focus Sites

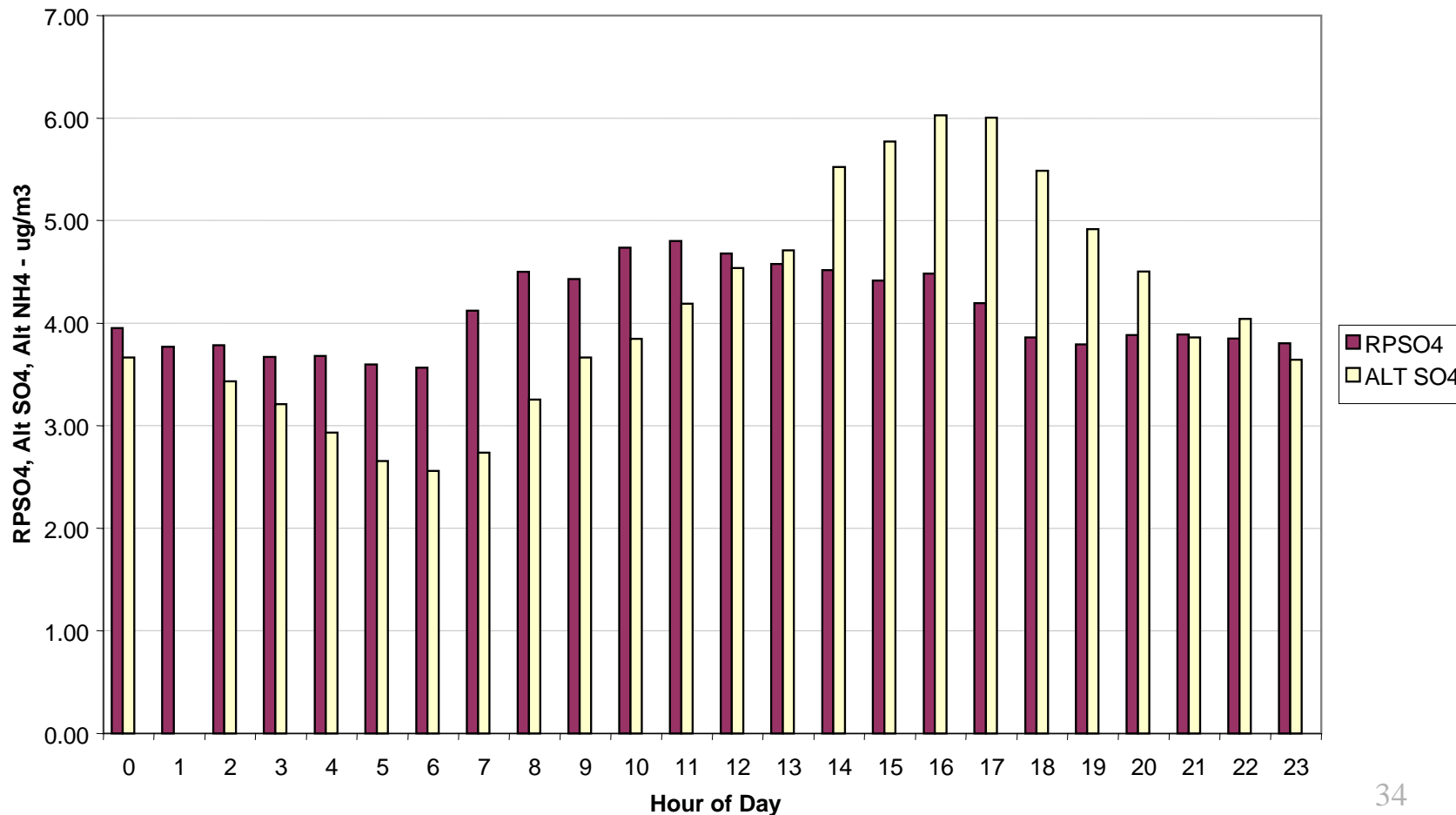
- Objectives:
 - Evaluate the continuous methods used for comparability with existing networks.
 - Collocated with IMPROVE or STN
 - ‘Alternative’ methods at Millbrook
 - SEARCH Sulfate, Nitrate (plus ammonium)
 - TVA/Harvard Sulfate at Look Rock
 - Aethalometers at all sites



Sulfate alternative method

Millbrook

July 2004 Diurnal Sulfate and Ammonium
Raw Unadjusted Data
Millbrook, NC VISTAS Focus Site





Focus Sites

- Objectives:
 - Routine operation in State Networks
 - Monitors require more attention.
 - Heavier data management load than criteria monitors.
 - SC and NC plan to continue to operate to meet specific state or regional objectives.
 - May need collocated filter analysis.



Focus project status

- Data collection phase ended January 1, 2005
- Verification and posting of raw data to AQS
- Normalization...
- Final Reports..

- SC and NC have continued some monitoring
 - Supporting data for VISTAS work at ROMA
 - Investigations of PM composition in NC urban areas



At this point....

- Continuous monitors provide qualitative information
- Comparable between sites and methods

BUT...

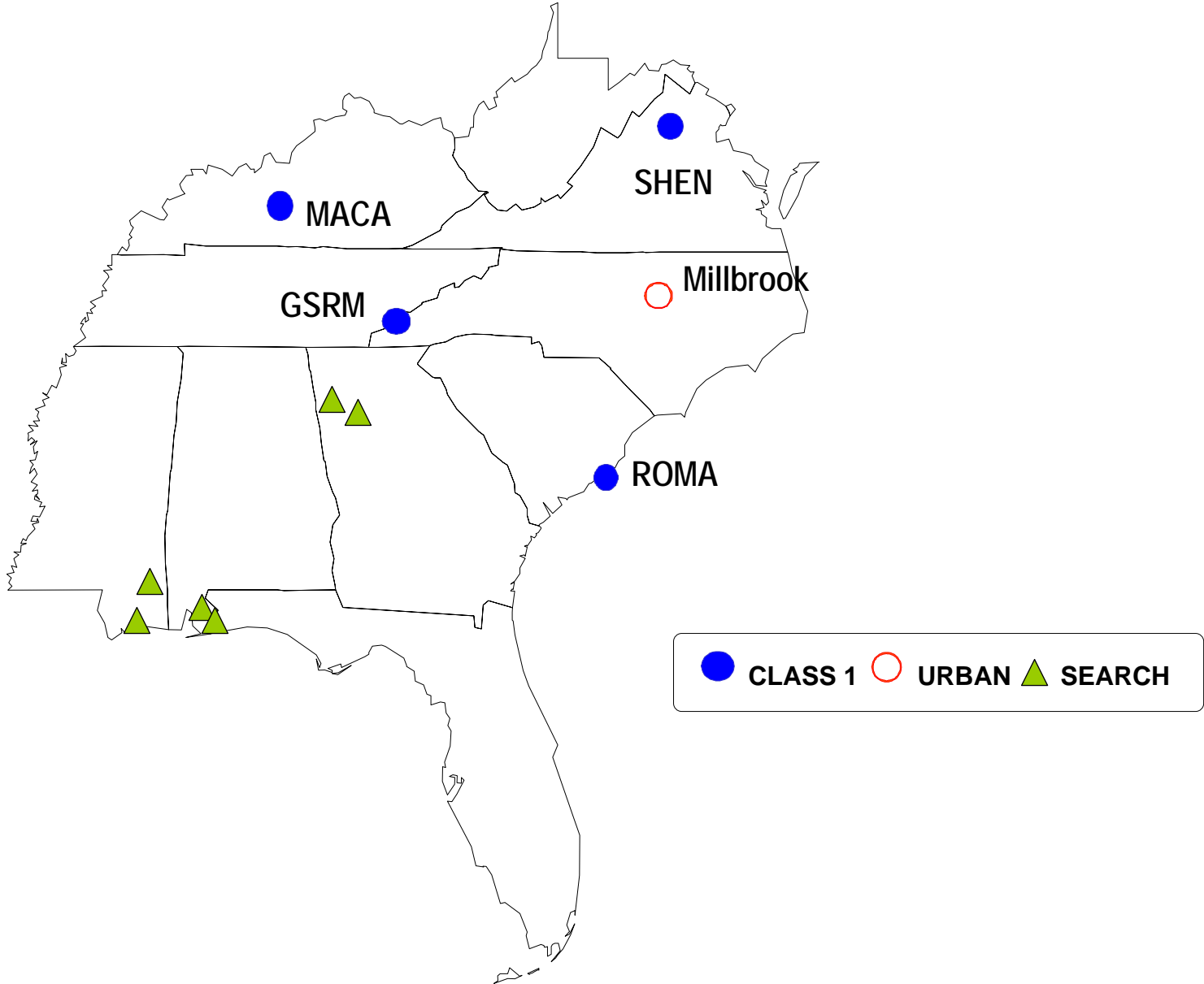
Filter data is needed to improve correlation between the continuous data and the 'Standard' (filter analysis)



Sources of Organic Carbon

- Objectives:
 - Identify sources of primary organic carbon (OC)
 - Estimate relative contributions from source categories to primary OC
 - Infer contribution of secondary OC to total Carbon mass
- Phase 1 – Collection
- Phase 2 – Analysis

VISTAS CMB Sites





Cape Romain- May 2004



Sources of Organic Carbon

- Phase 1 - Collection
- Responsibilities:
 - States, NPS- Install and operate samplers
 - Contractor- Provide filter prep, management and storage.
Perform initial analysis of filters and blanks
- Deliverables:
 - High volume PM2.5 samplers installed at 5 sites
 - Sample collection – May 2004 through May 2005
 - Sample prep and storage – ongoing..
 - Initial analysis



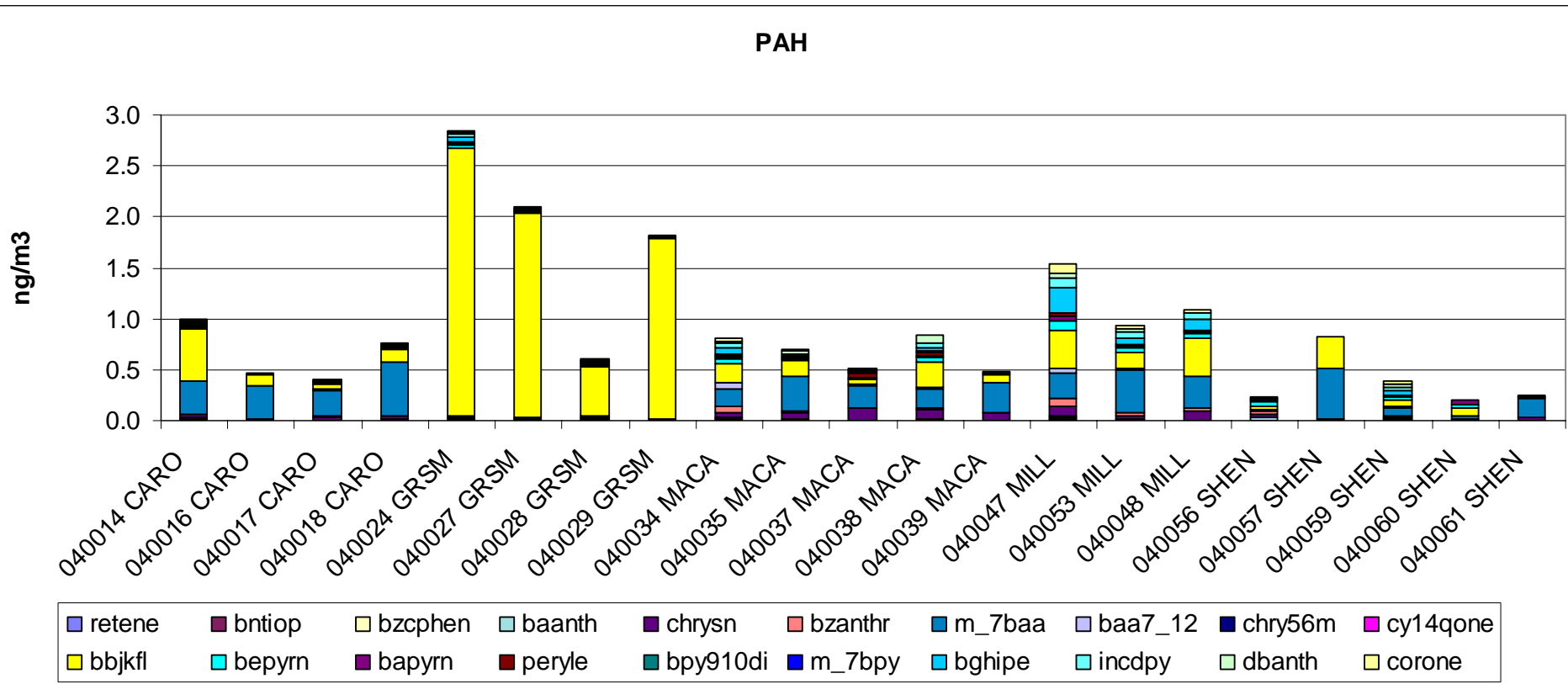
Sources of Organic Carbon

- Initial analysis
 - Blanks OK ?
 - Enough Sample ?
- 34 Alkanes
- 60 Polars
- 37 Hopanes and Steranes
- 20 PAHs



Sources of Organic Carbon

- Initial analysis





Sources of Organic Carbon

- Initial analysis

- Blanks OK ?

Yes, but need to watch filter handling...

- Enough Sample ?

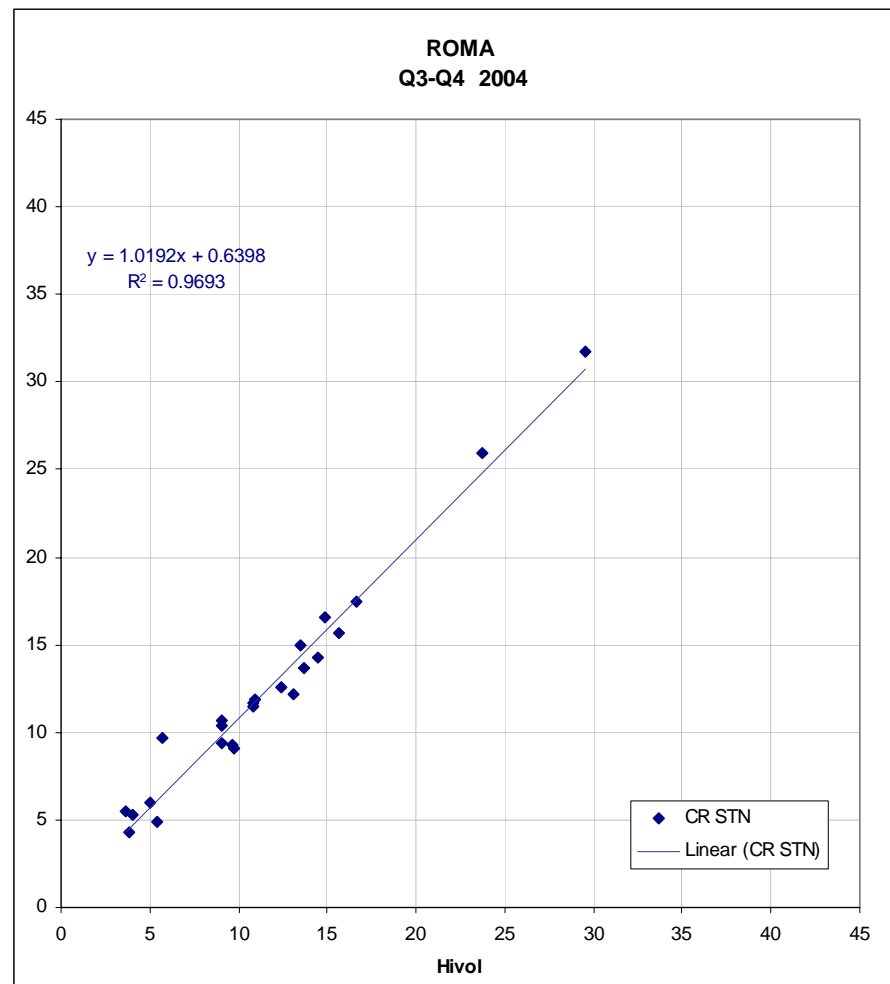
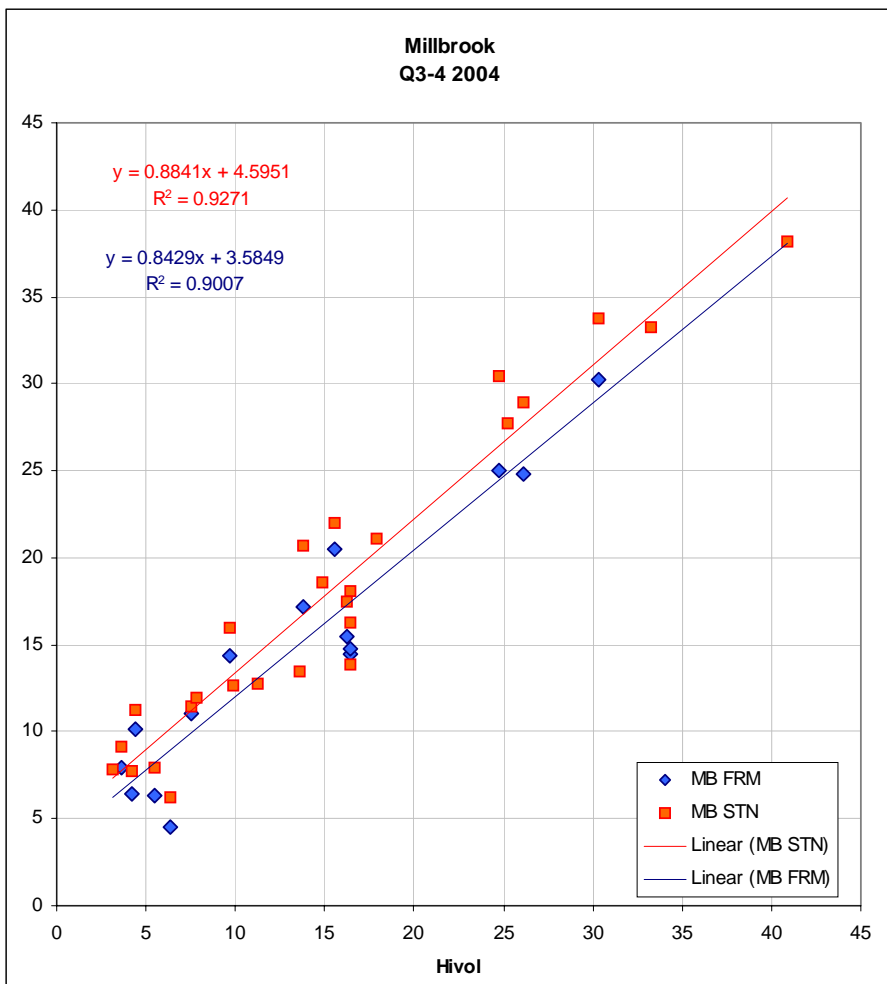
Yes, but more, better..

Increase extracted portion of filter from

1/2 to 3/4.



HiVol comparison - STN





Sources of Organic Carbon

- Phase 2 - Analysis
- Responsibilities: Contractor-
 - Perform analysis of filters and blanks
 - Perform data and source attribution analysis
 - Report
- Deliverables:
 - Quarterly analysis of selected filters
 - Exploratory analysis - Principal Component Analysis, Positive Matrix Factorization, Cluster Analysis
 - Compile source profiles
 - Apply receptor model (CMB)
 - Report Dec 2005



Sources of Organic Carbon

- Phase 2a – Interlab Comparison
 - VISTAS and SEARCH
 - Perform analysis of split filters and blanks



Sources of Organic Carbon

- Phase x – C14 Analysis
 - Approximately 250 of 600 samples cut for chemical analysis
 - Remaining $\frac{1}{4}$ of the filter sufficient for C¹⁴ analysis
 - Planning intercomparison with SEARCH



At this point....

- Most of the collection work is done
- Finalize proces for C14 selection and analysis
- get the data out



Purchase Knob,
Great Smoky Mountains National Park