The Steubenville Comprehensive Air Monitoring Program (SCAMP)

Initial Ambient Air Results

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SCAMP Ambient Air Monitoring Results

May 13 to December 31, 2000

- Background
- Filter-Based Data
- Continuous Monitor Data
- Pollen & Mold Spore Data
- Conclusions & Summary

SCAMP

Comprehensive monitoring program

Sample and analyze fine particulate matter and co-pollutants in:

- **outdoor air**
- **indoor air**
- **personal air**

Program Research Team

CONSOL R&D

Harvard School of Public Health (HSPS)

Franciscan University of Steubenville

Ohio University

Wheeling Jesuit University

St. Vincent's College

Program Funding

U.S. Department of Energy, National Energy Technology Laboratory

Ohio Department of Development, Coal Development Office

Electric Power Research Institute

American Petroleum Institute

American Iron and Steel Institute

National Mining Association

Edison Electric Institute

National Institute of Environmental Health Services

U.S. Environmental Protection Agency

CONSOL Energy Inc.

SCAMP Program Design

INDOOR/PERSONAL

Personal sampling of two different groups (children and cardiovascular-diseased patients)

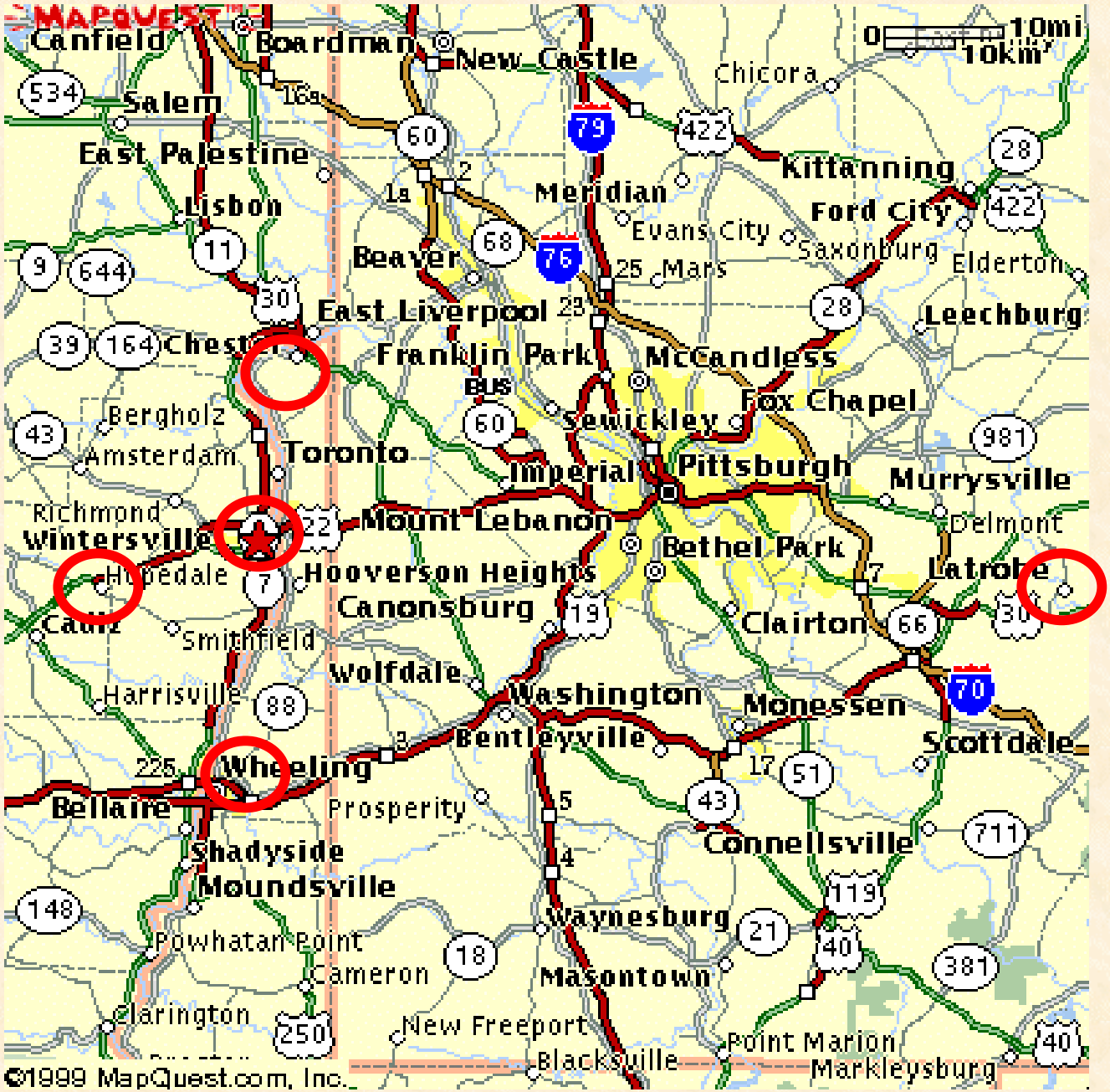
Indoor environment of homes of individuals

OUTDOOR

Outdoor environment at the homes of individuals who will be participants

One central sampling site in Steubenville, OH

Four sites at the compass points around the central site



SCAMP

Outdoor Sites

- Steubenville, OH (Central Site)
- Steubenville, OH (Local Homes)
- New Manchester, WV
- Hopedale, OH
- Wheeling, WV
- Latrobe, PA

Steubenville, OH, Central Site

Outdoor Daily Sampling and Measurement

Urban central site

- Collect $PM_{2.5}$ on Teflon™, quartz and nylon filters
- Collect PM_{10} on Teflon™ filters
- Continuously Monitor SO_2, NO/NO_2/NOx, CO, O_3, NH_3, and THC (calculated from HC CH_4/non-CH_4)
- Collect meteorological data continuously
- Collect pollen and mold spores
- Monitor $PM_{2.5}$ continuously

Four remote sites

- Collect $PM_{2.5}$ on Teflon™ filters

SCAMP Ambient Air Monitoring Results

May 13 to December 31, 2000 (233 Days)

Today's Presentation

Filter-Based Data:

$PM_{2.5}$, PM_{10}, NH_4^+, SO_4^{2-}, NO_3^-, Cl^-

Continuous Data:

NO, SO_2, O_3, CO

Other:

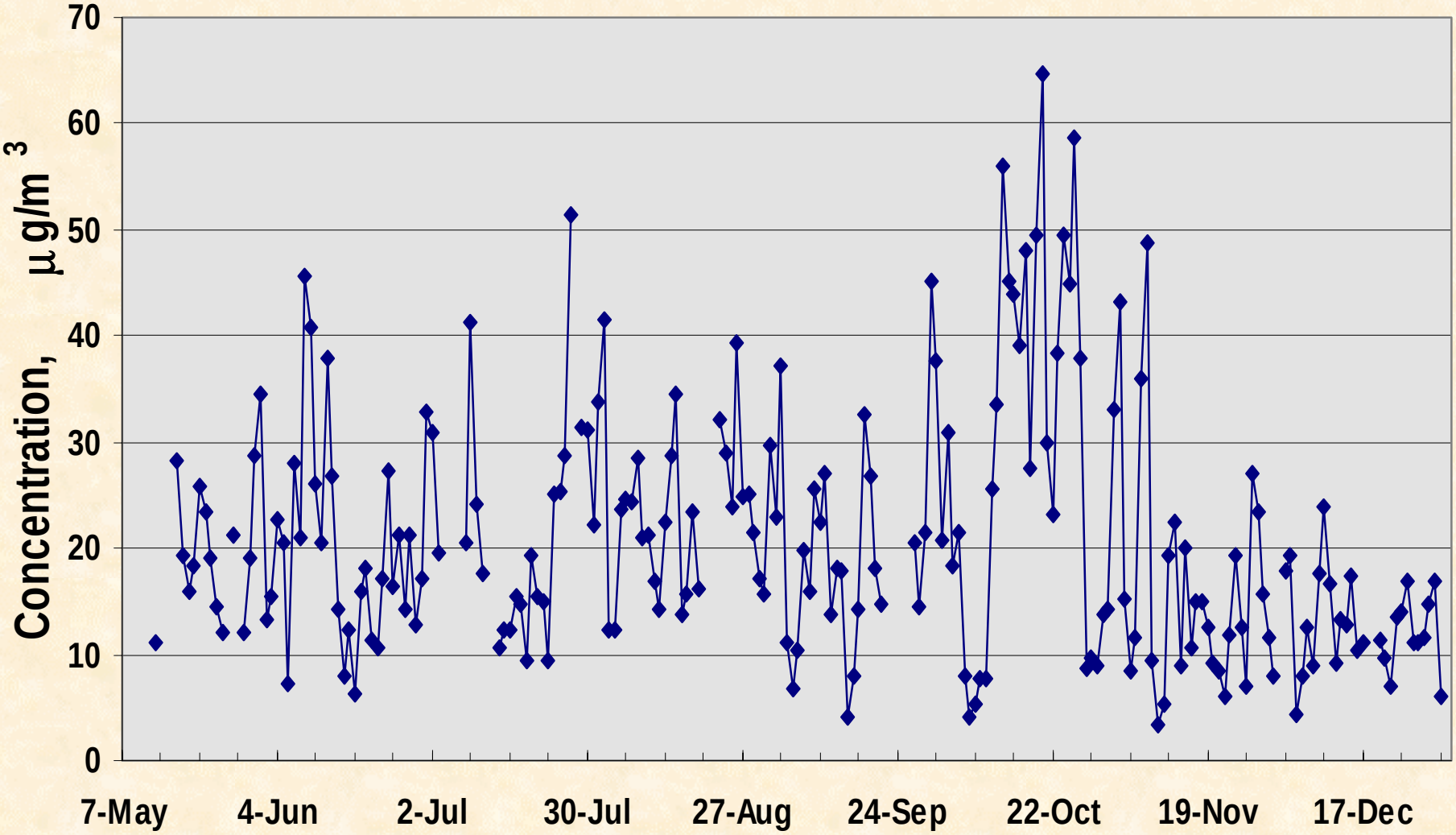
Pollen and Mold Spore

FRM Sampling Results
Steubenville, OH

May 13 to December 31, 2000

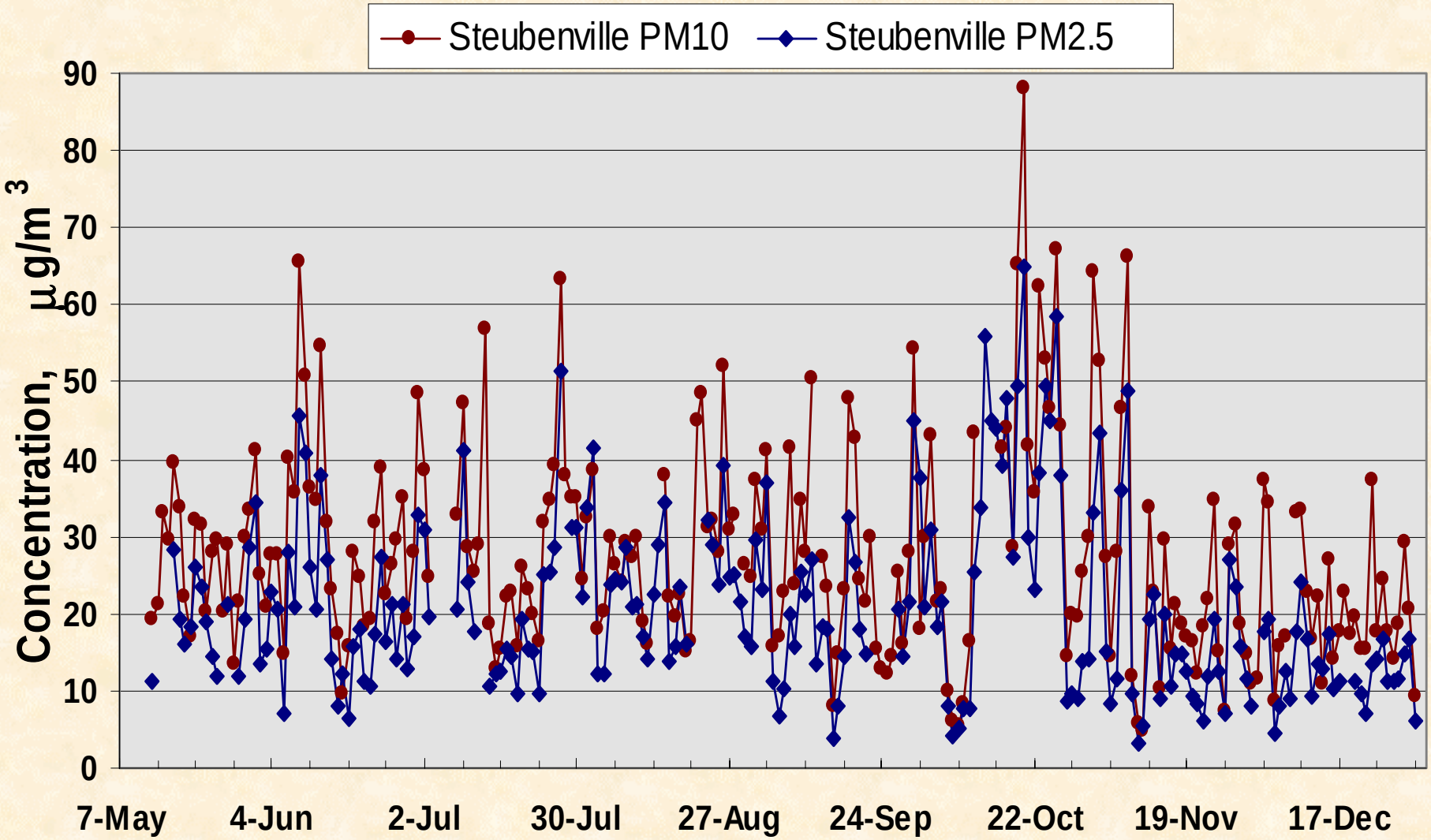
Steubenville $PM_{2.5}$ Concentrations

FRM Data, May 13 to December 31, 2000



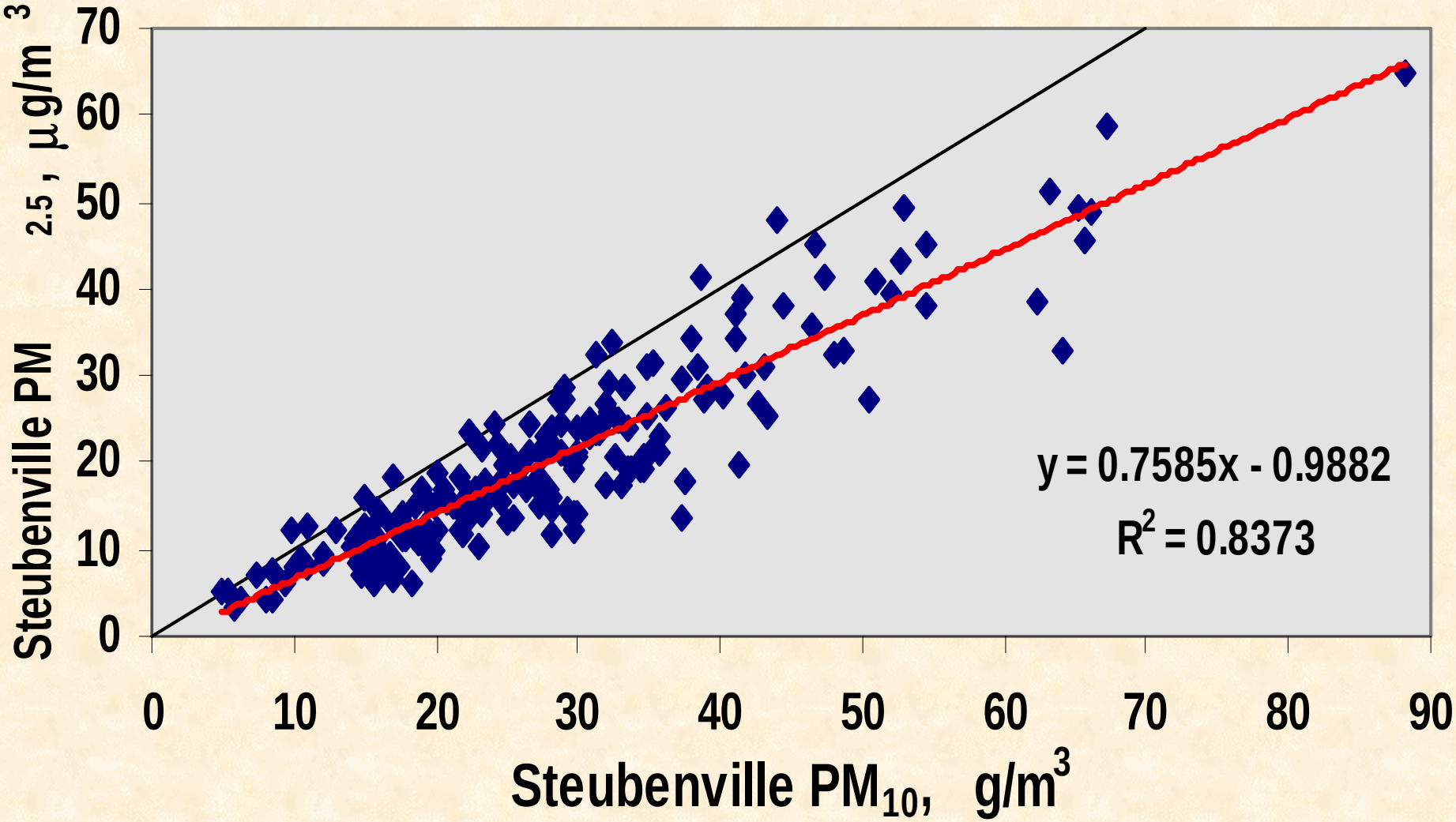
Steubenville PM Concentrations

FRM Data, May 13 to December 31, 2000



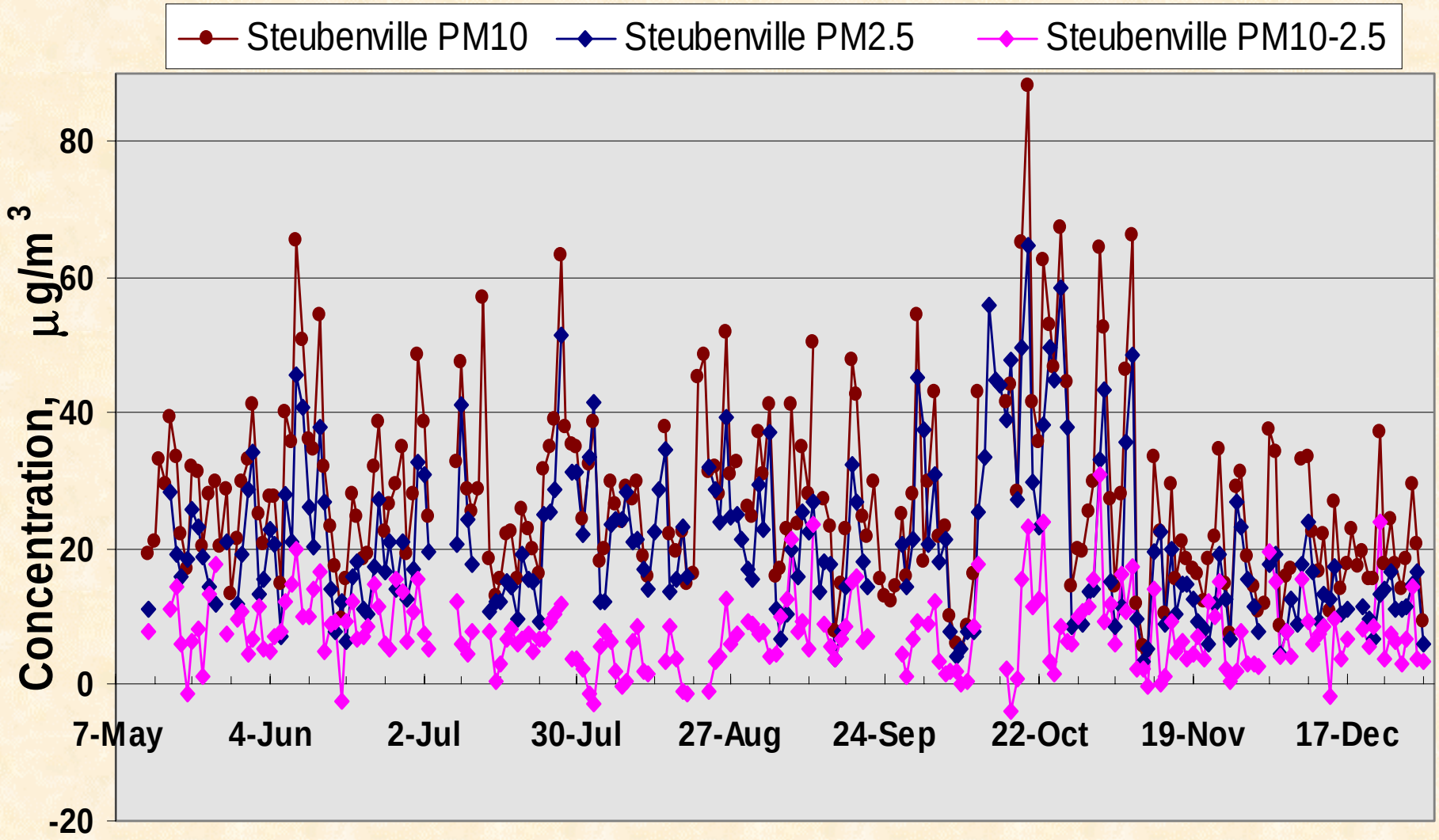
Steubenville $PM_{2.5}$ Comparison With PM_{10}

May 13 to December 31, 2000



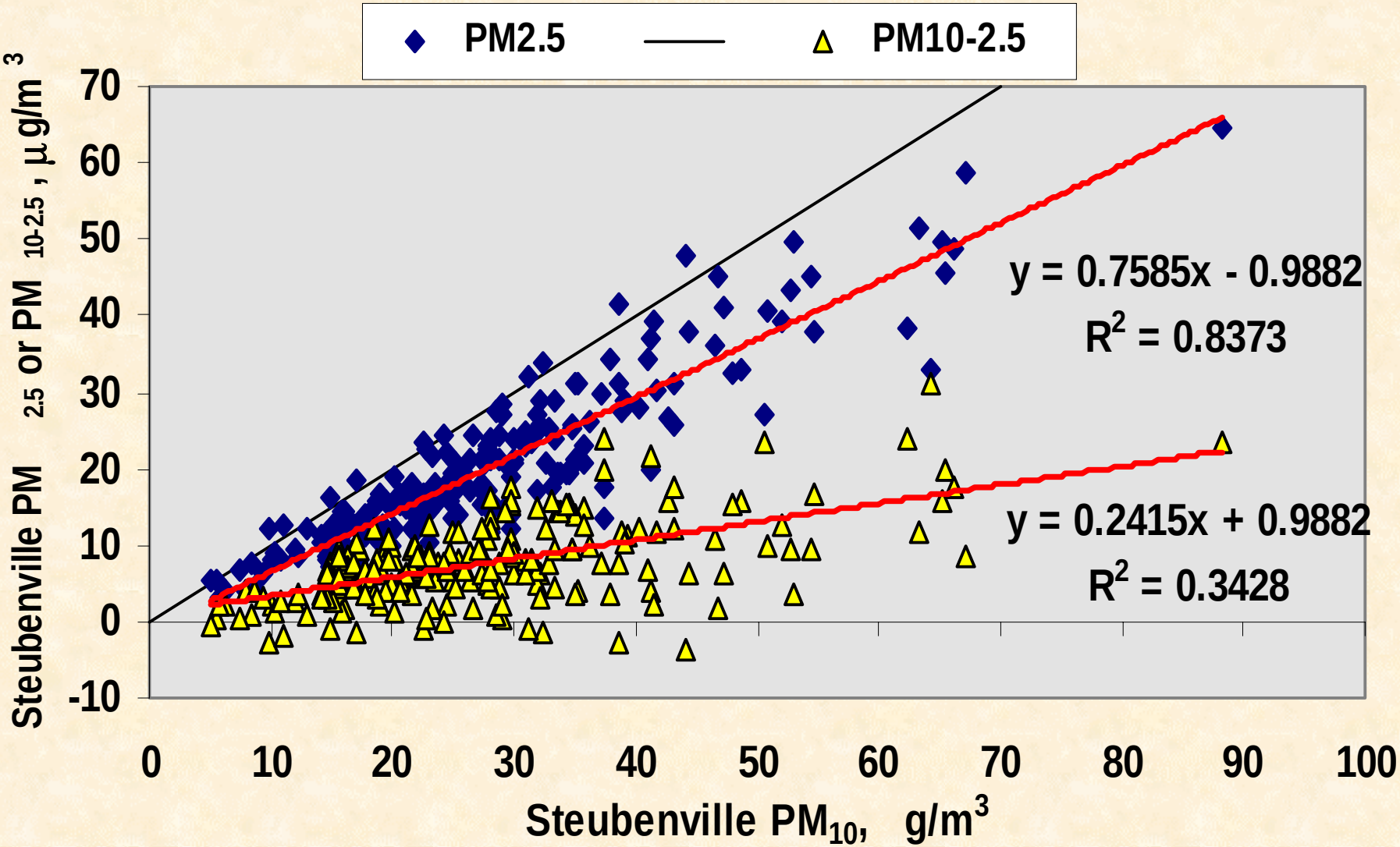
Steubenville PM Concentrations

FRM Data, May 13 to December 31, 2000



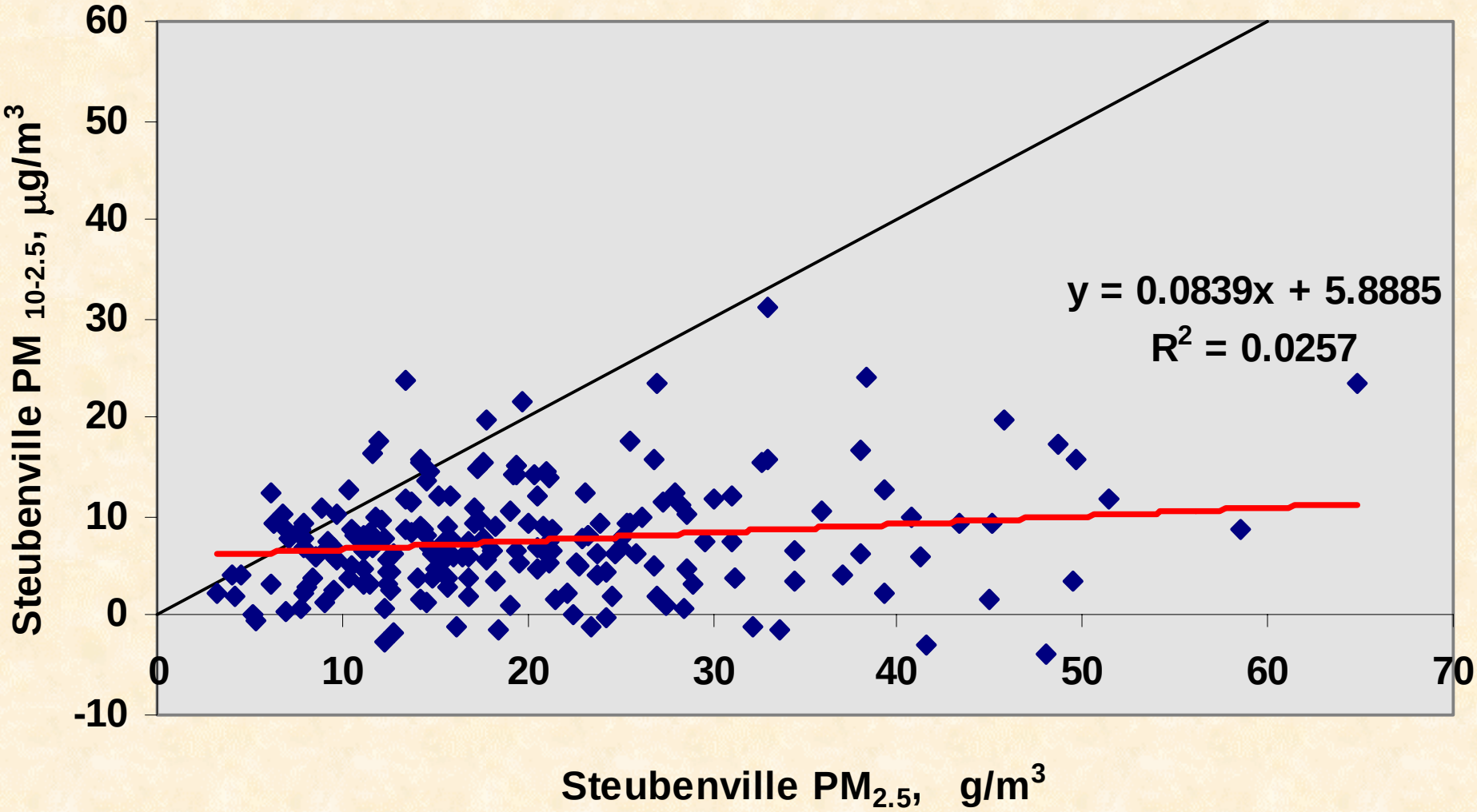
Steubenville $PM_{2.5}$ and $PM_{10-2.5}$ Comparison With PM_{10}

May 13 to December 31, 2000



Steubenville $PM_{10-2.5}$ Comparison With $PM_{2.5}$

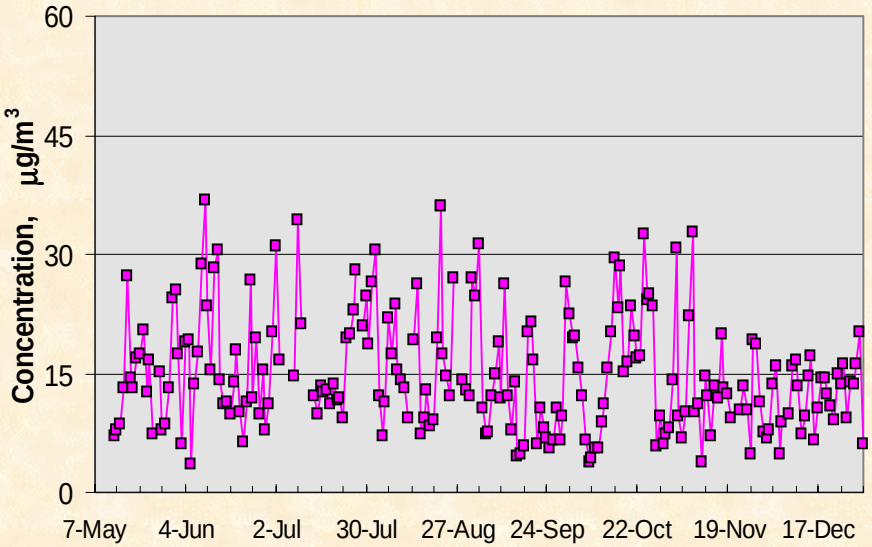
May 13 to December 31, 2000



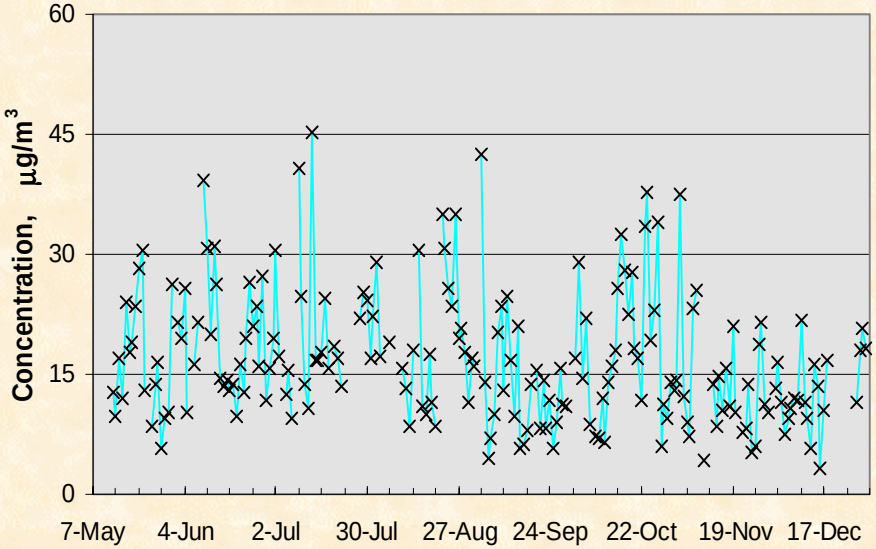
FRM Sampling Results
Satellite Sites

May 13 to December 31, 2000

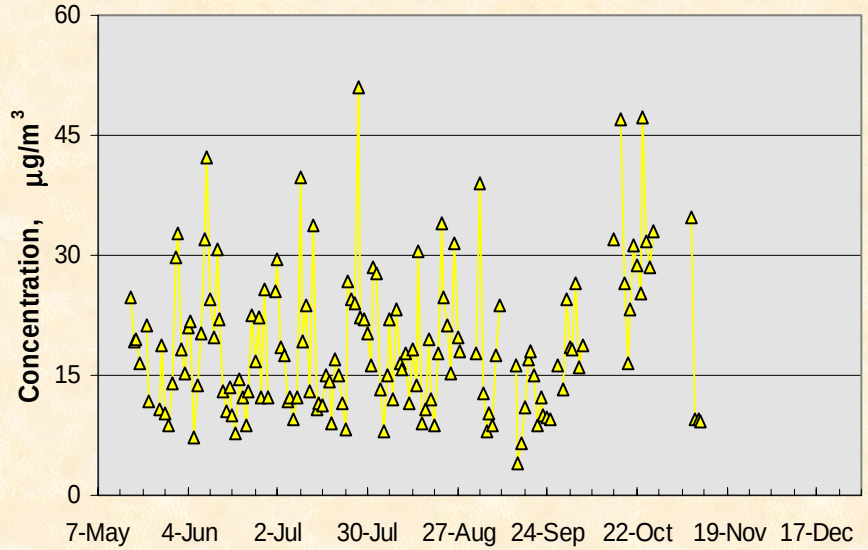
North (TRSP) $PM_{2.5}$ Concentration
May 13 to December 31, 2000



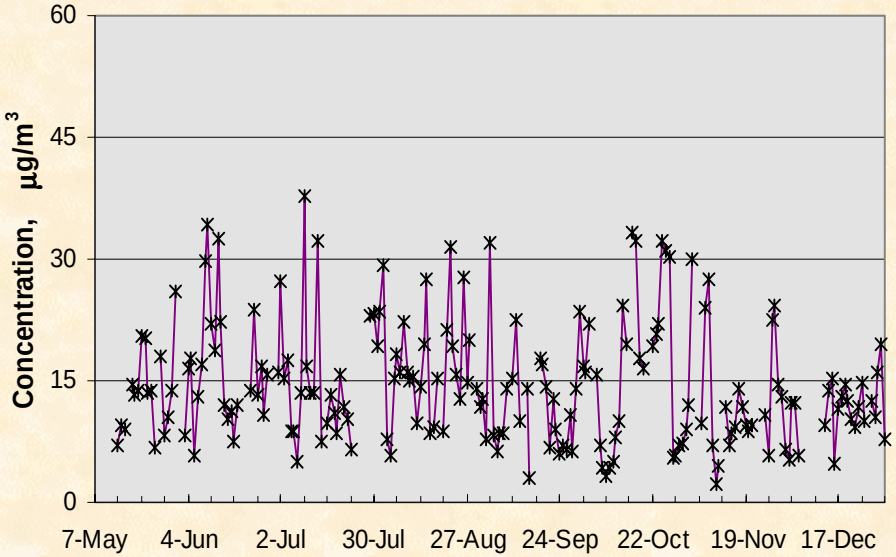
East (SVC) $PM_{2.5}$ Concentration
May 13 to December 31, 2000



South (WJU) $PM_{2.5}$ Concentration
May 13 to December 31, 2000

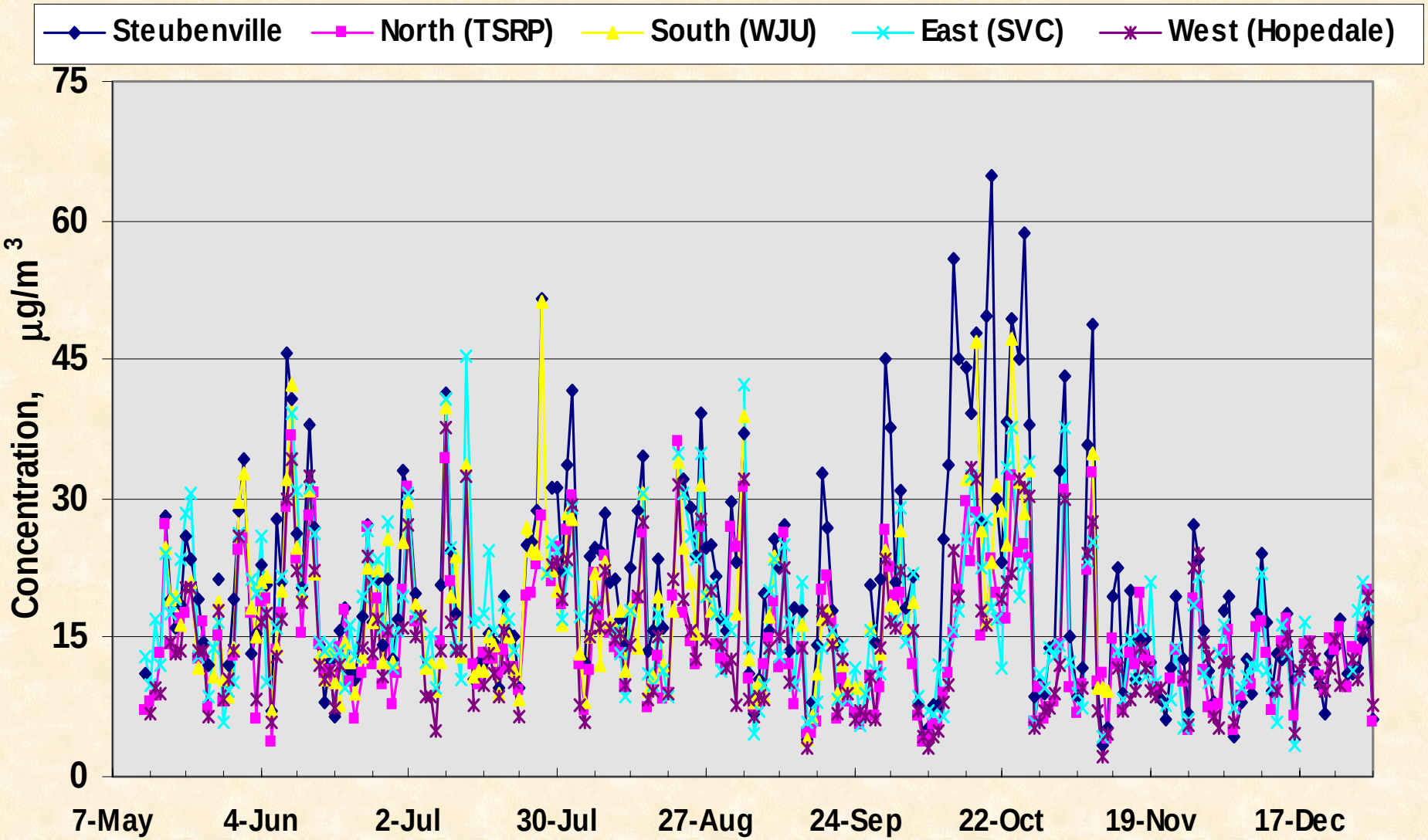


West (Hopedale) $PM_{2.5}$ Concentration
May 13 to December 31, 2000



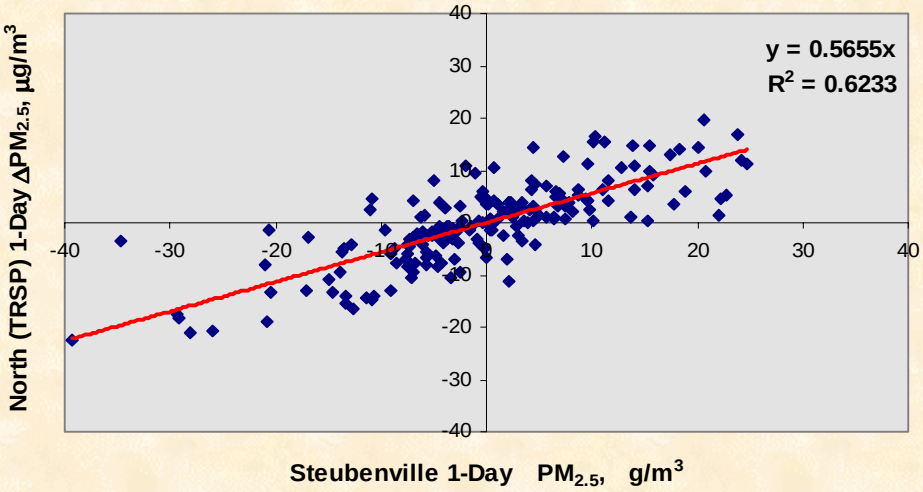
Steubenville $PM_{2.5}$ and Satellite $PM_{2.5}$ Comparison

May 13 to December 31, 2000

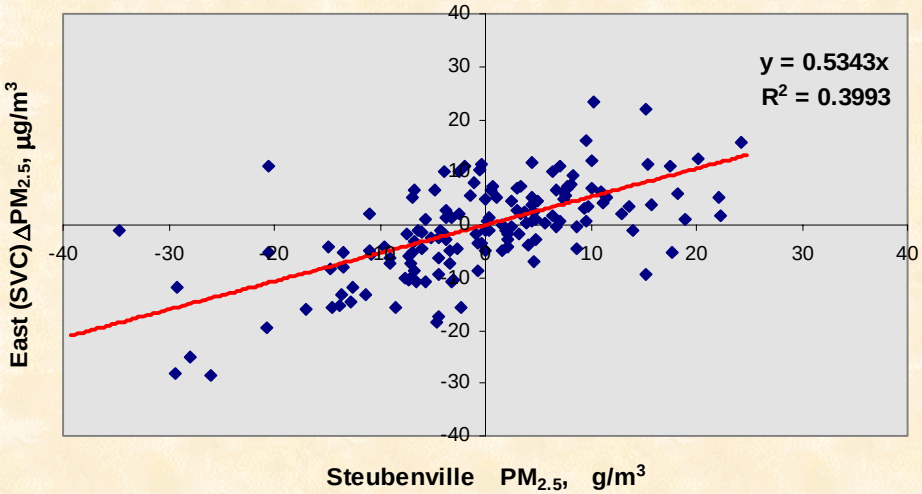


1-Day $PM_{2.5}$ Concentration Change Comparisons

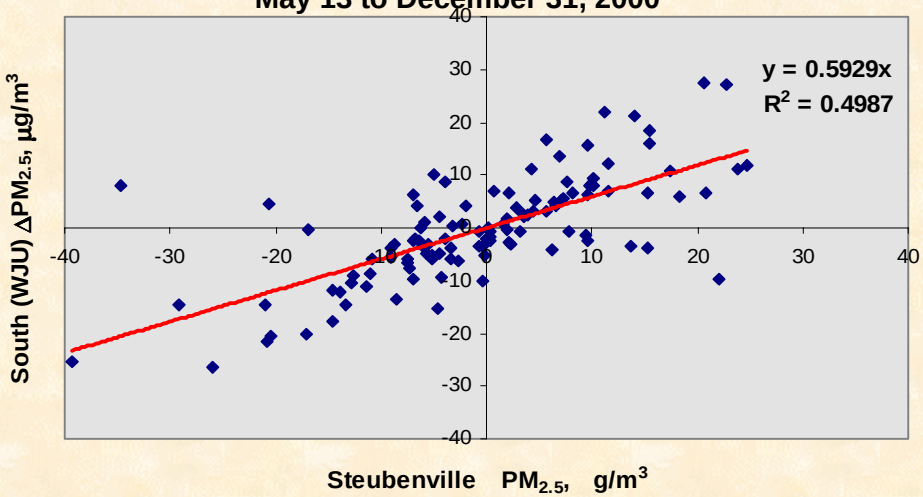
North (TRSP) and Steubenville $PM_{2.5}$
May 13 to December 31, 2000



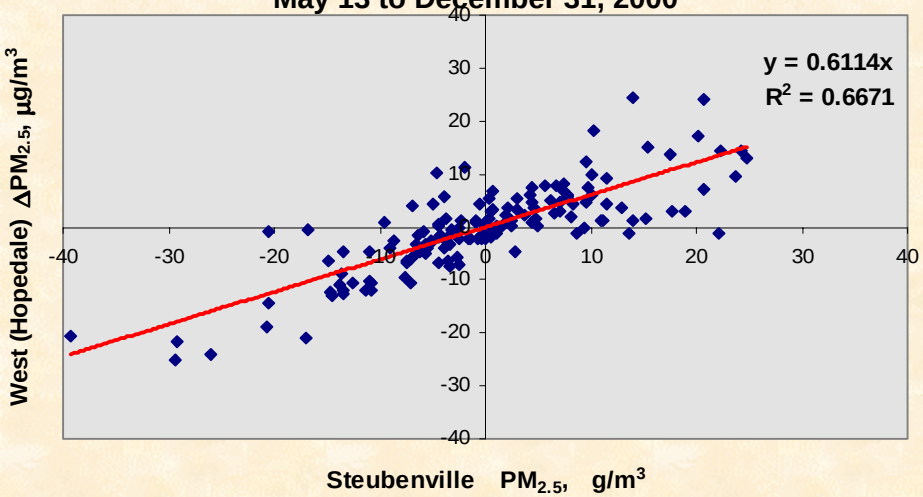
East (SVC) and Steubenville $PM_{2.5}$
May 13 to December 31, 2000



South (WJU) and Steubenville $PM_{2.5}$
May 13 to December 31, 2000



West (Hopedale) and Steubenville $PM_{2.5}$
May 13 to December 31, 2000



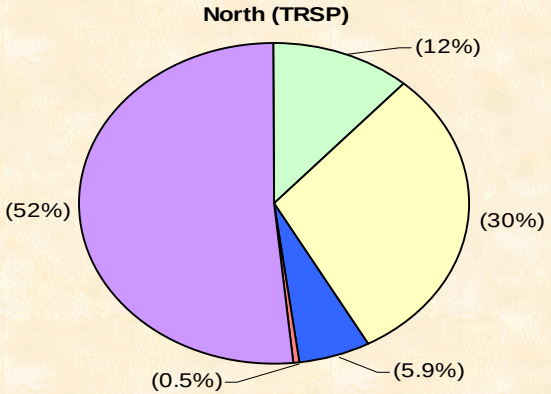
Average FRM Data, $\mu g/m^3$
May 13 to December 31, 2000

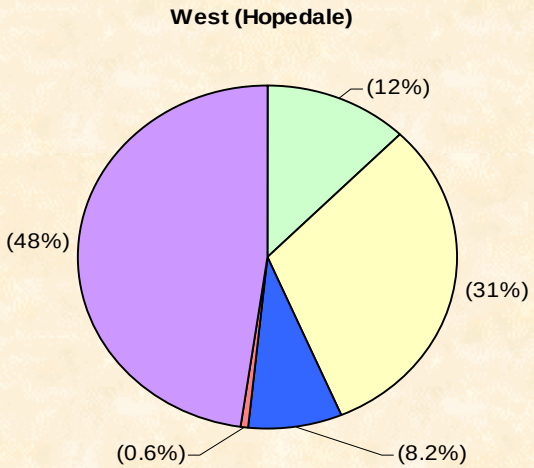
		Average	Standard Deviation	Maximum
$PM_{2.5}$	Steubenville	20.7	11.6	64.8
	North (TRSP)	14.9	7.2	36.8
	South (WJU)	18.9	9.0	51.1
	East (SVC)	16.9	8.2	45.3
	West (Hopedale)	14.4	7.4	37.7
PM_{10}	Steubenville	27.7	13.5	88.2
$PM_{10-2.5}$	Steubenville	7.6	5.9	31.1

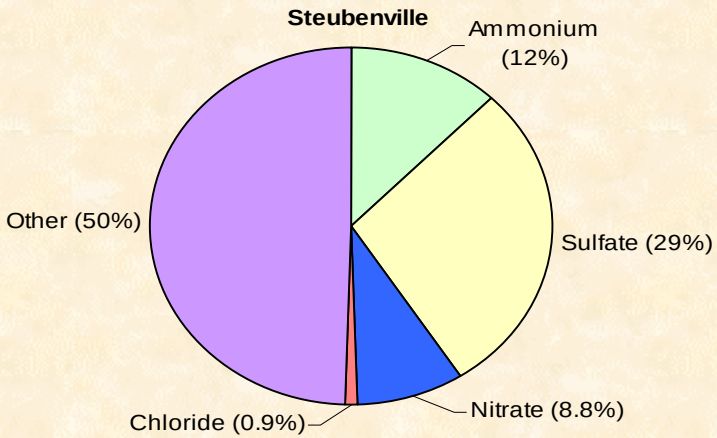
Particulate Matter Composition

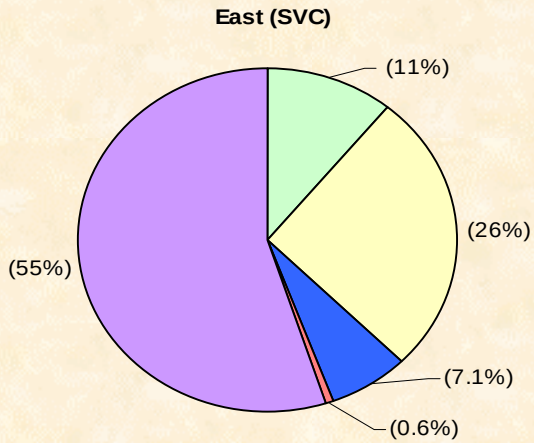
May 13 to December 31, 2000

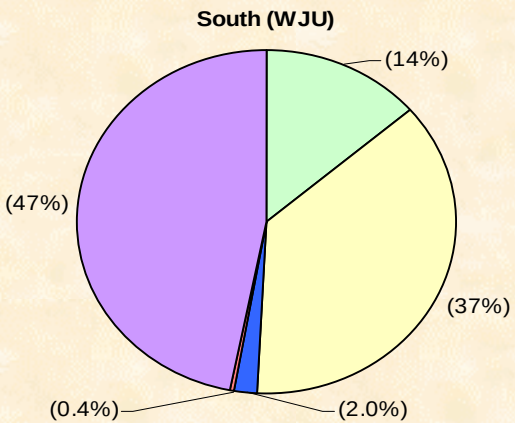
Average $PM_{2.5}$ Composition, wt %











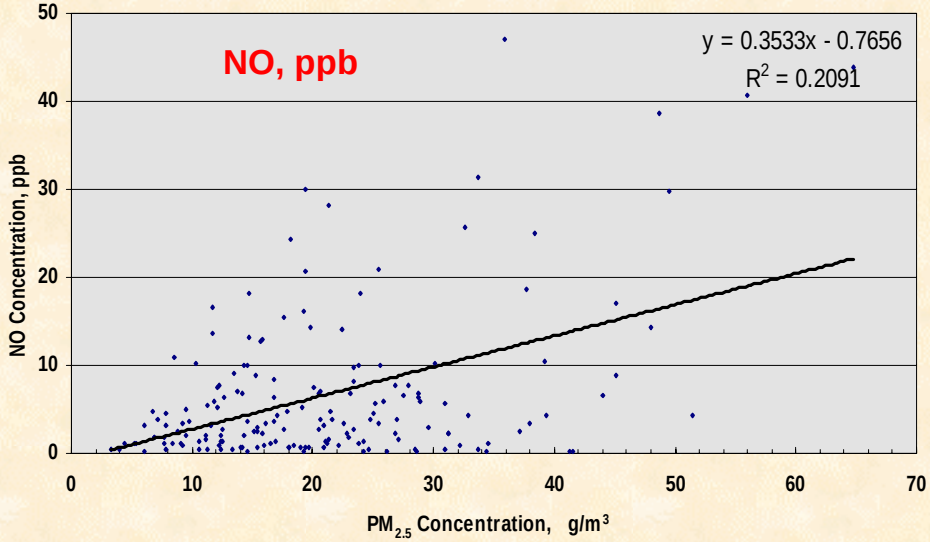
Continuous Monitor Data

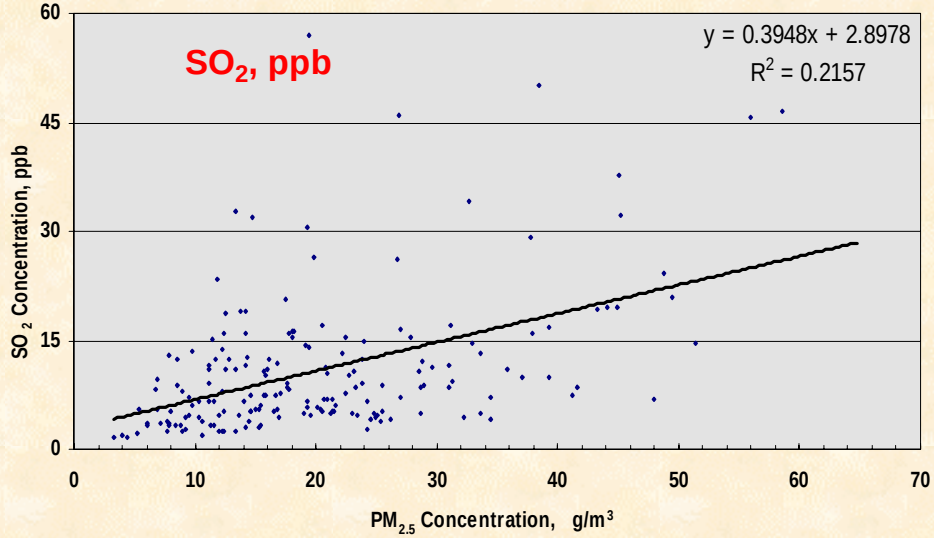
May 13 to December 31, 2000

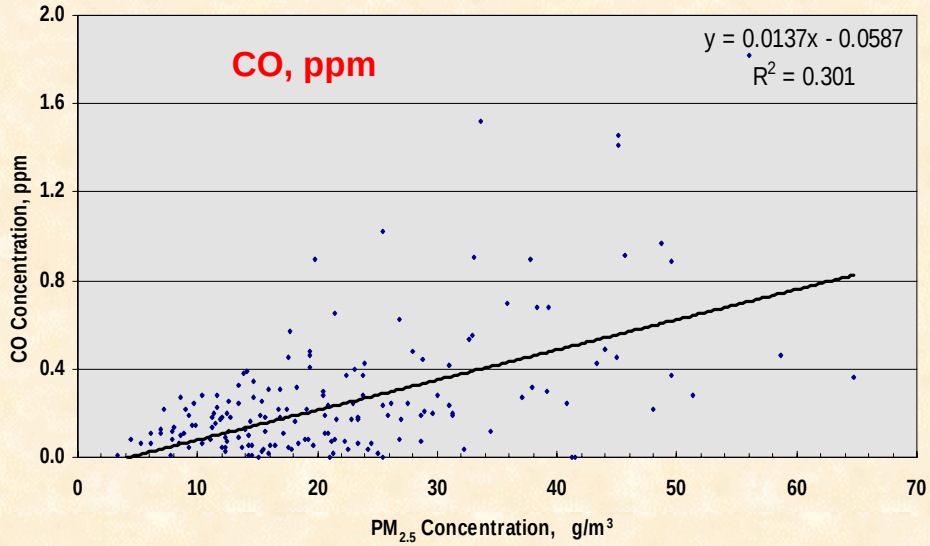
Steubenville Ambient Air $PM_{2.5}$ vs Gases Comparison

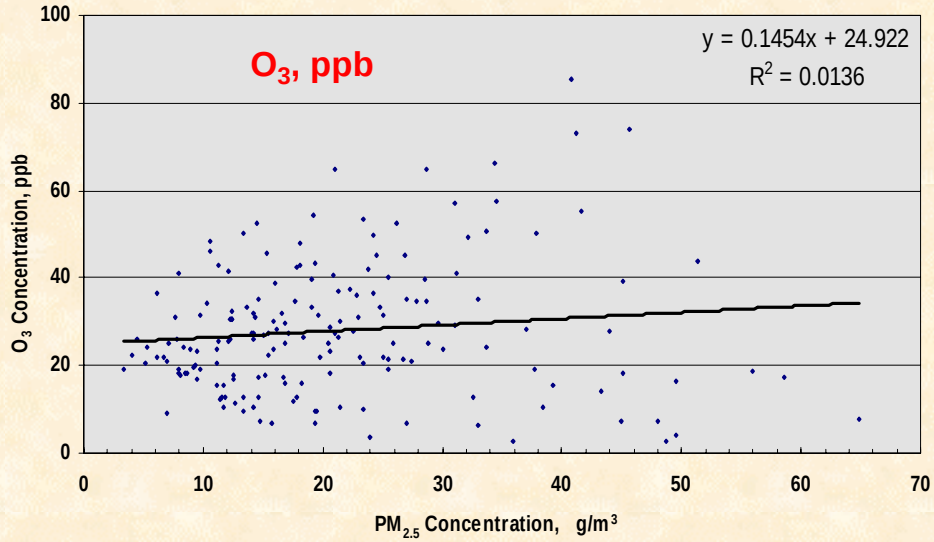
May 13 to December 31, 2000

x-Axes: $PM_{2.5}$, µg/m³ y-Axes: Gas Data



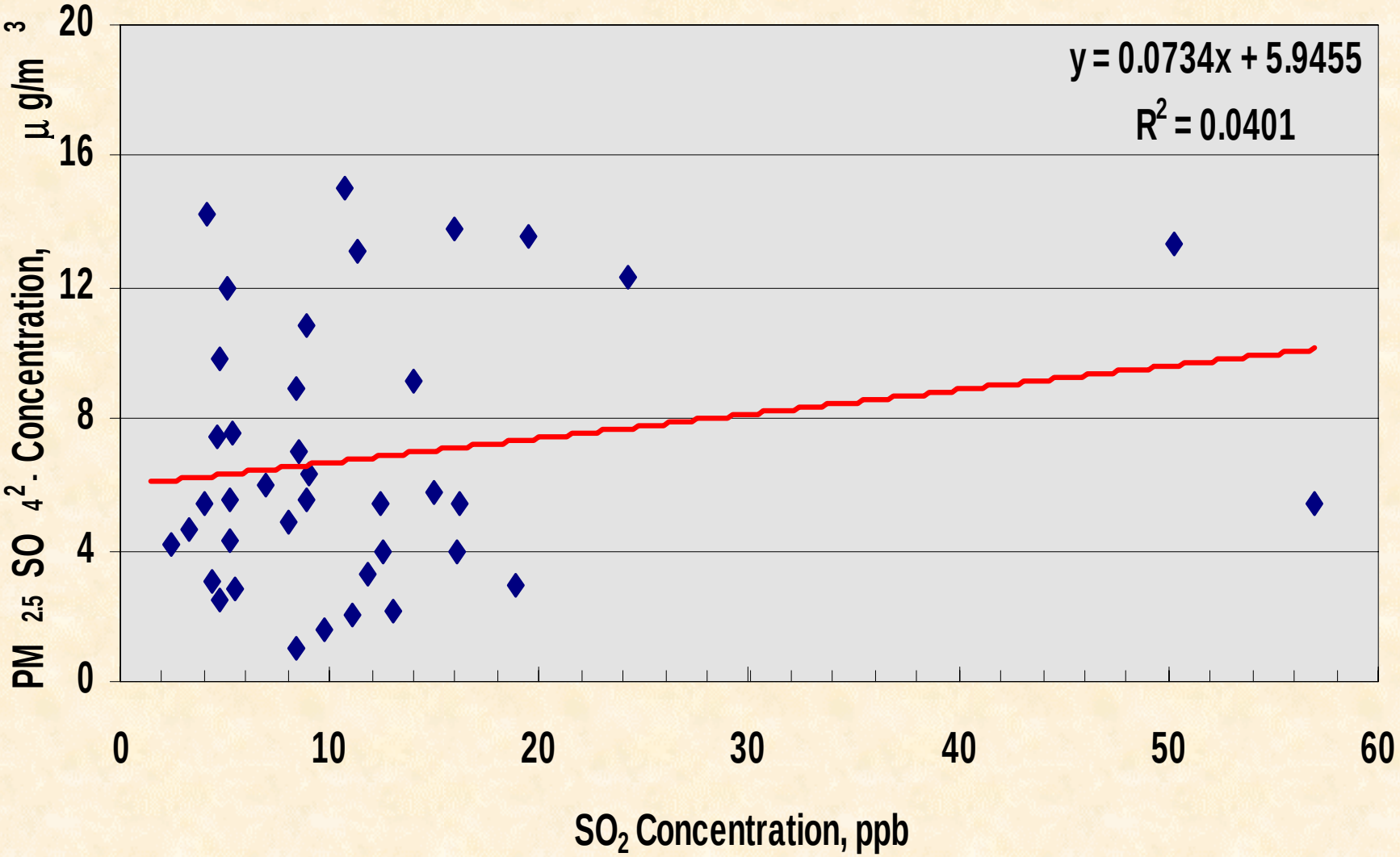






Comparison of SO_4^{2-} Component of $PM_{2.5}$ with SO_2

May 13 to December 31, 2000

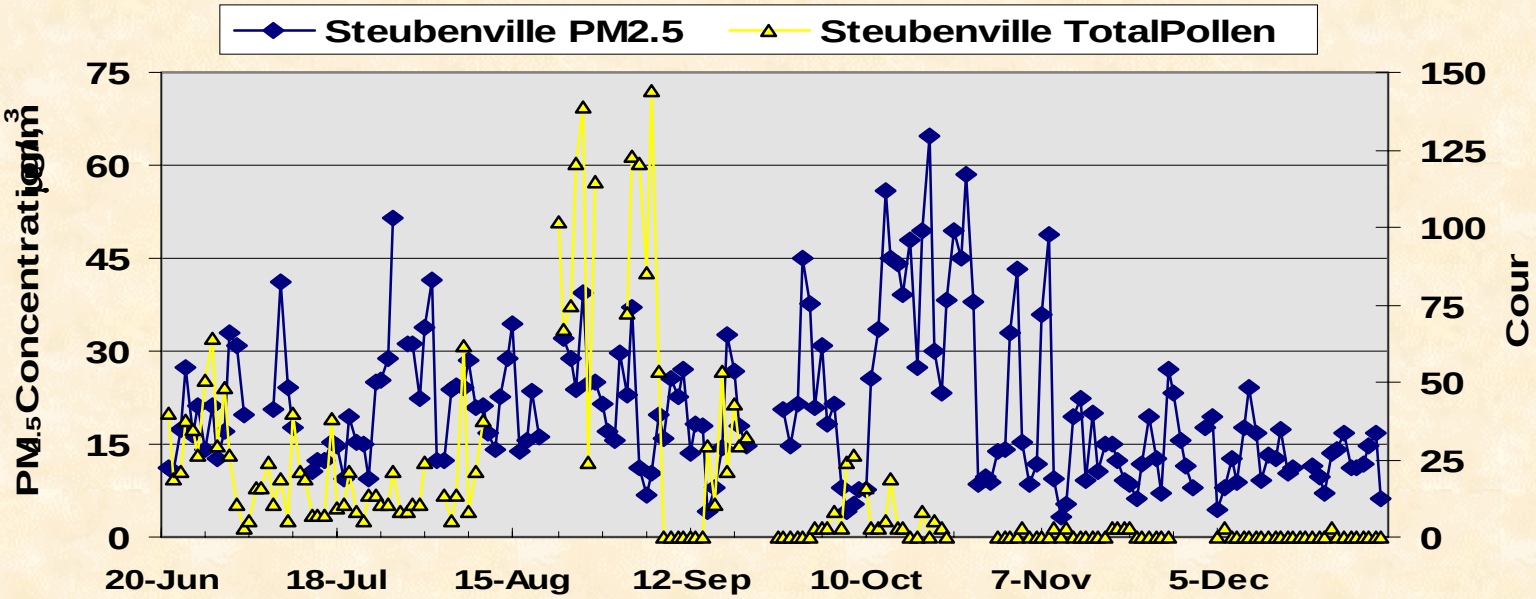


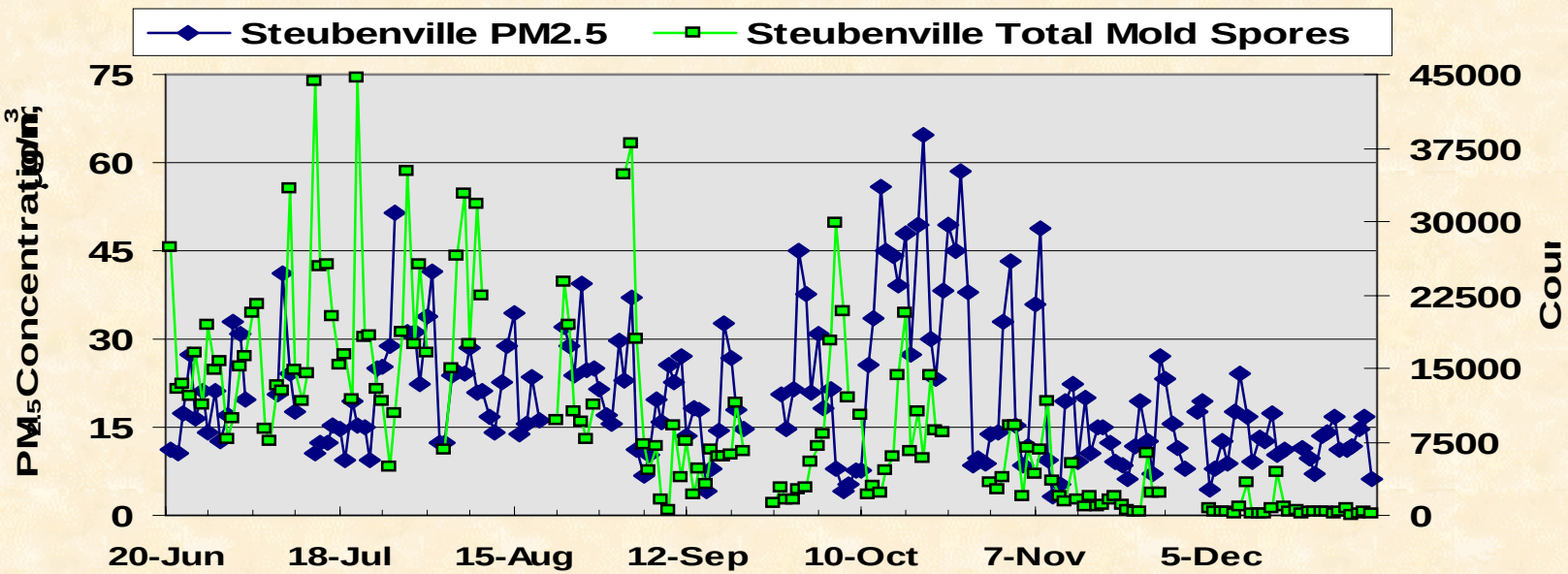
Pollen & Mold Spore Data

June 20 to December 31, 2000

Pollen and Mold Spore Concentrations, with $PM_{2.5}$

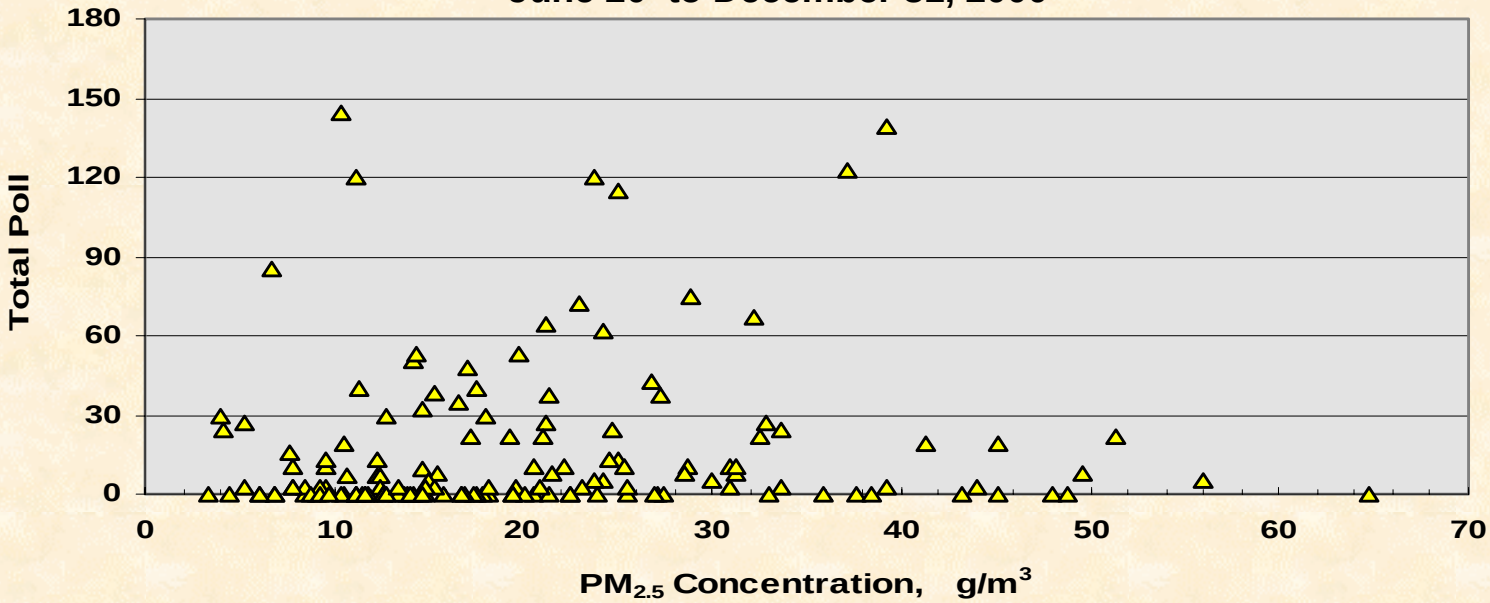
June 20 to December 31, 2000

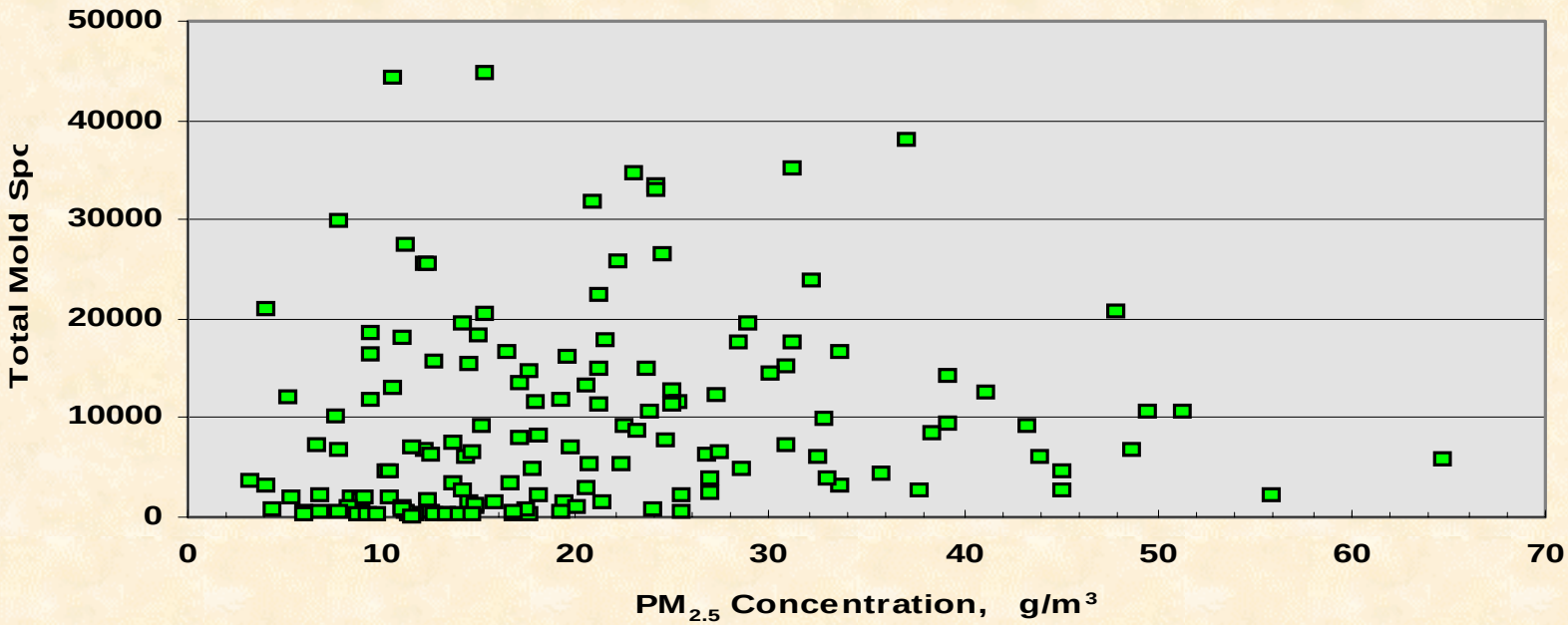




Pollen and Mold Spores vs $PM_{2.5}$ Concentration

June 20 to December 31, 2000





Summary

- **Daily FRM sampling reveals high day-to-day variability in $PM_{2.5}$ and PM_{10} concentrations**
- **For May through December 2000, 3 of the 5 sites averaged greater than 15 $\mu g/m^3$ for $PM_{2.5}$; in Steubenville the average was 20.7 $\mu g/m^3$**
- **The $PM_{2.5}$ concentrations at all five sites were correlated**
- **The $PM_{2.5}$ and PM_{10} concentrations in Steubenville were correlated**

Summary

- **The sulfate ion composition of $PM_{2.5}$ collected in May-December 2000 averaged about 30%**
- **$PM_{2.5}$ concentration showed some correlation (R^2 = ~0.3) with the ambient air gases (except O_3)**
- **No strong correlation between $PM_{2.5}$ and weather data**
- **Pollen and Mold Spore concentrations were not correlated with $PM_{2.5}$**

Acknowledgements

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