Continuous PM2.5 Method and Data Issues:

Data Corrections
&
Instrument Configurations

George Allen, NESCAUM

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Continuous PM Data Correction Mantra:

The best continuous data correction is no correction

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Why? Any correction based on daily FRM data is inherently flawed as we go toward sub-daily PM data metrics... for health standards or AQI

No correction?

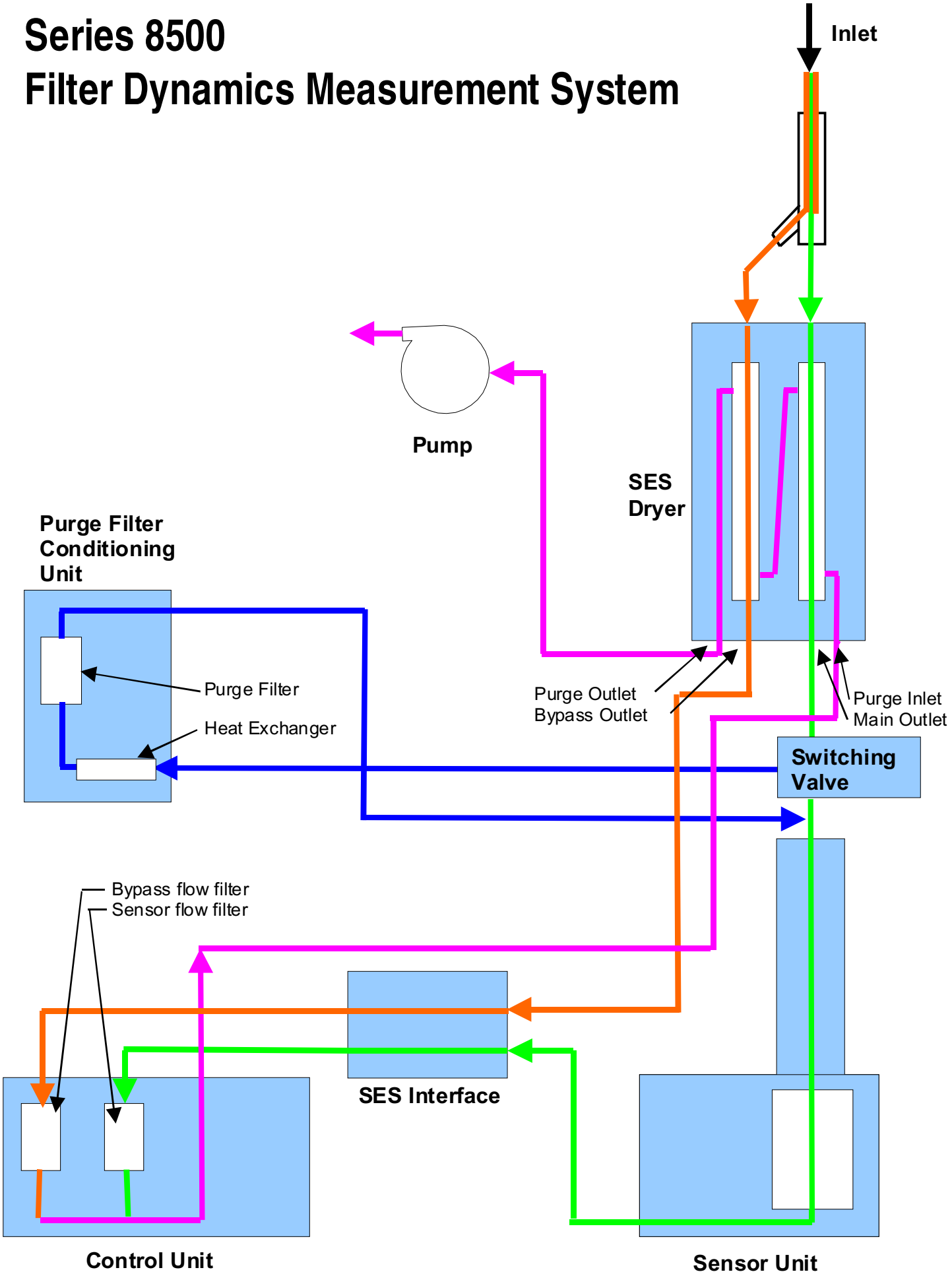
– we’re not quite there yet... but getting closer!

FDMS TEOM®: The best TEOM yet!

But complex...

(Flow diagram credit: from R&P June 2002 newsletter)

Series 8500
Filter Dynamics Measurement System



FDMS TEOM: VT and NY early experiences good

- Does a good job with SVOC aerosols
- Nitrate loss issues in cold weather?? [30C, dry, no nitric acid]
  - Mimics FRM nitrate loss??

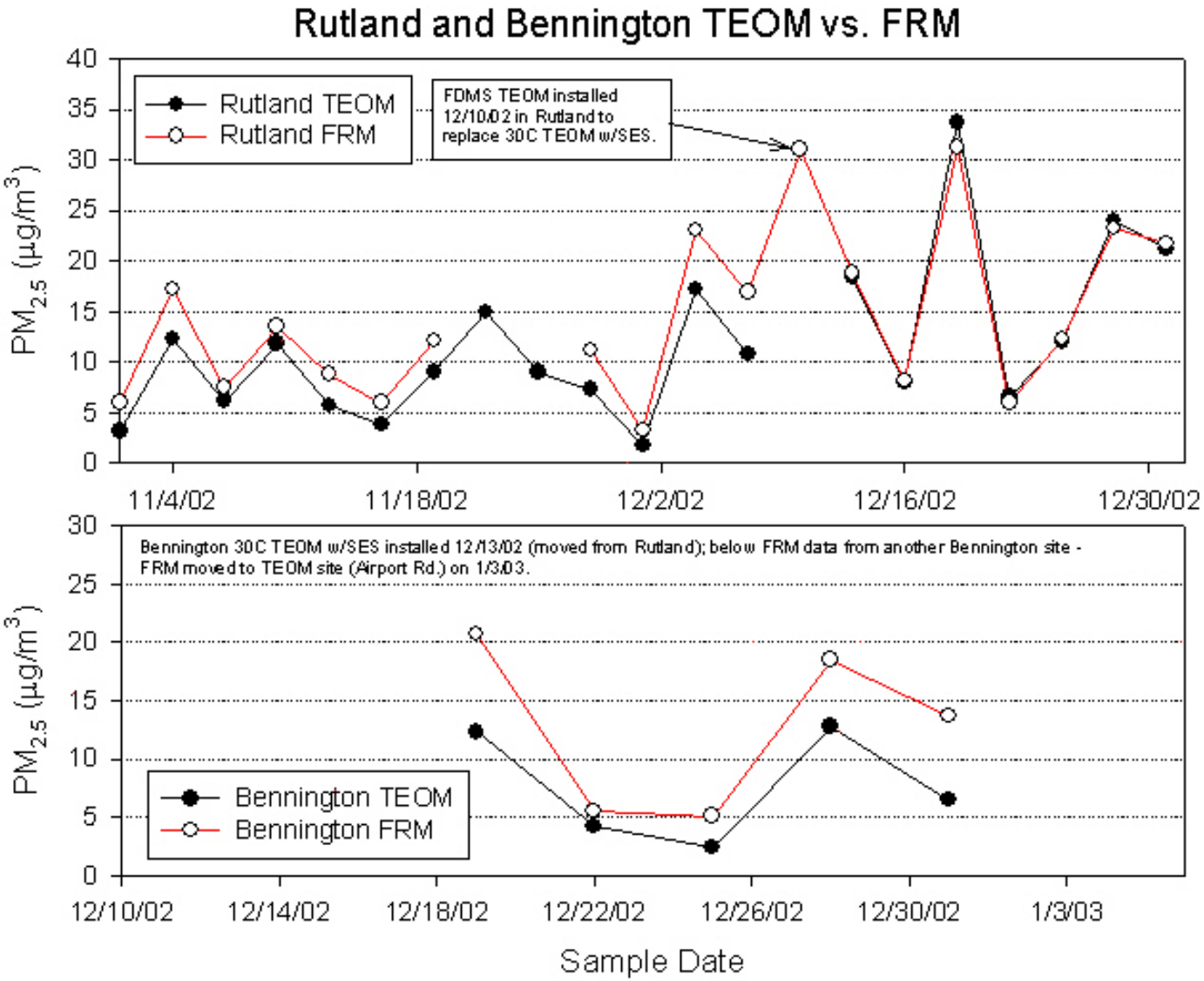
Preferential FDMS deployment in core urban areas

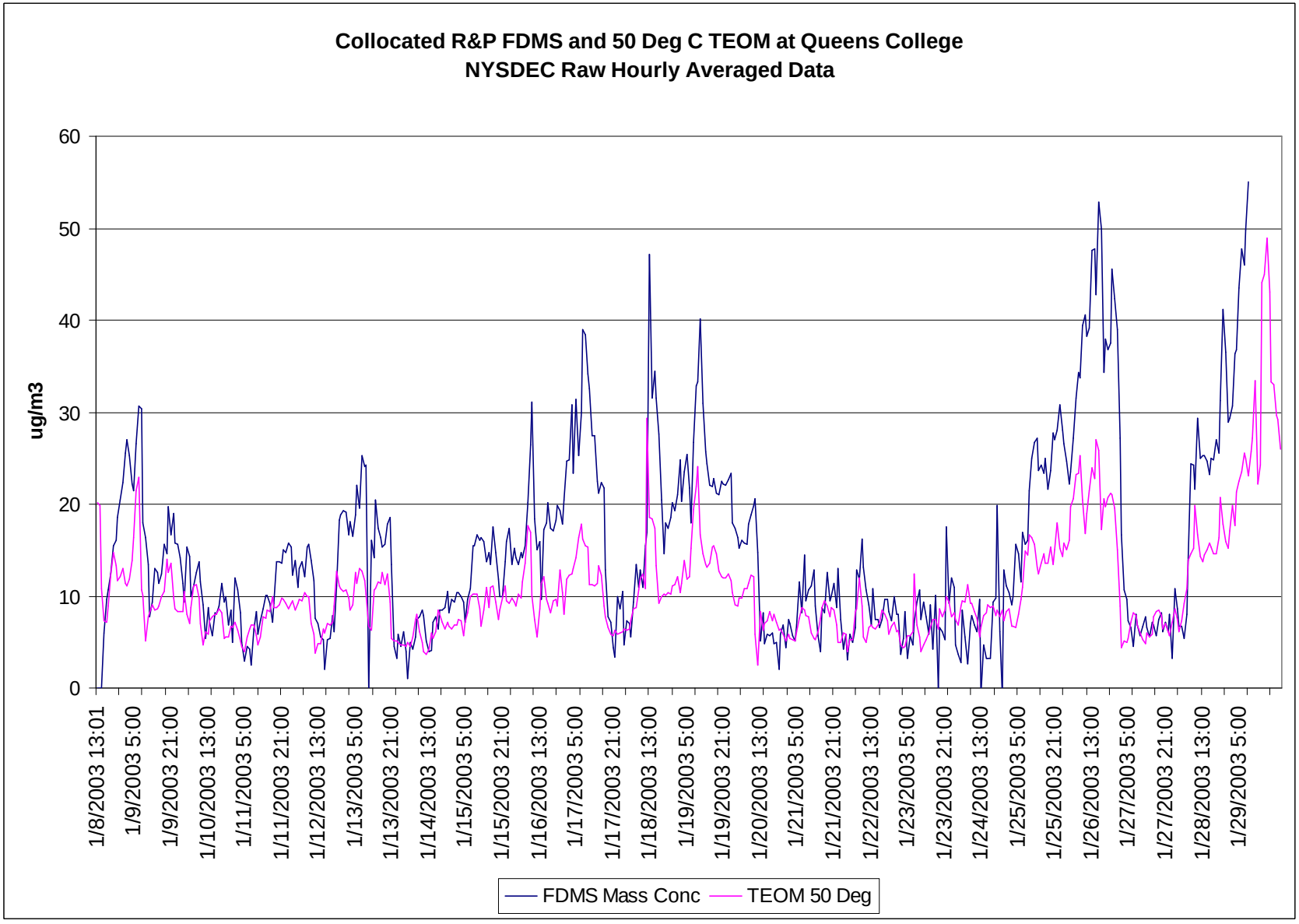
- [or any area with large % SVM in PM2.5]
- Most bang for the monitoring buck in mixed network
- May not need ANY correction to be 'FRM-like' [warts and all]

Retrofit Potential:

- Any "AB" series TEOM [not AA or AT] - Since 1996
- Can use short Ekto shelter w/ mod kit for outdoors installation
- Does not use existing SES add-on

Data Courtesy VT DEC




Collocated R&P FDMS and 50 Deg C TEOM at Queens College
NYSDEC Raw Hourly Averaged Data
ug/m3
60
50
40
30
20
10
0
1/8/2003 13:01
1/9/2003 5:00
1/9/2003 21:00
1/10/2003 13:00
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1/25/2003 21:00
1/26/2003 13:00
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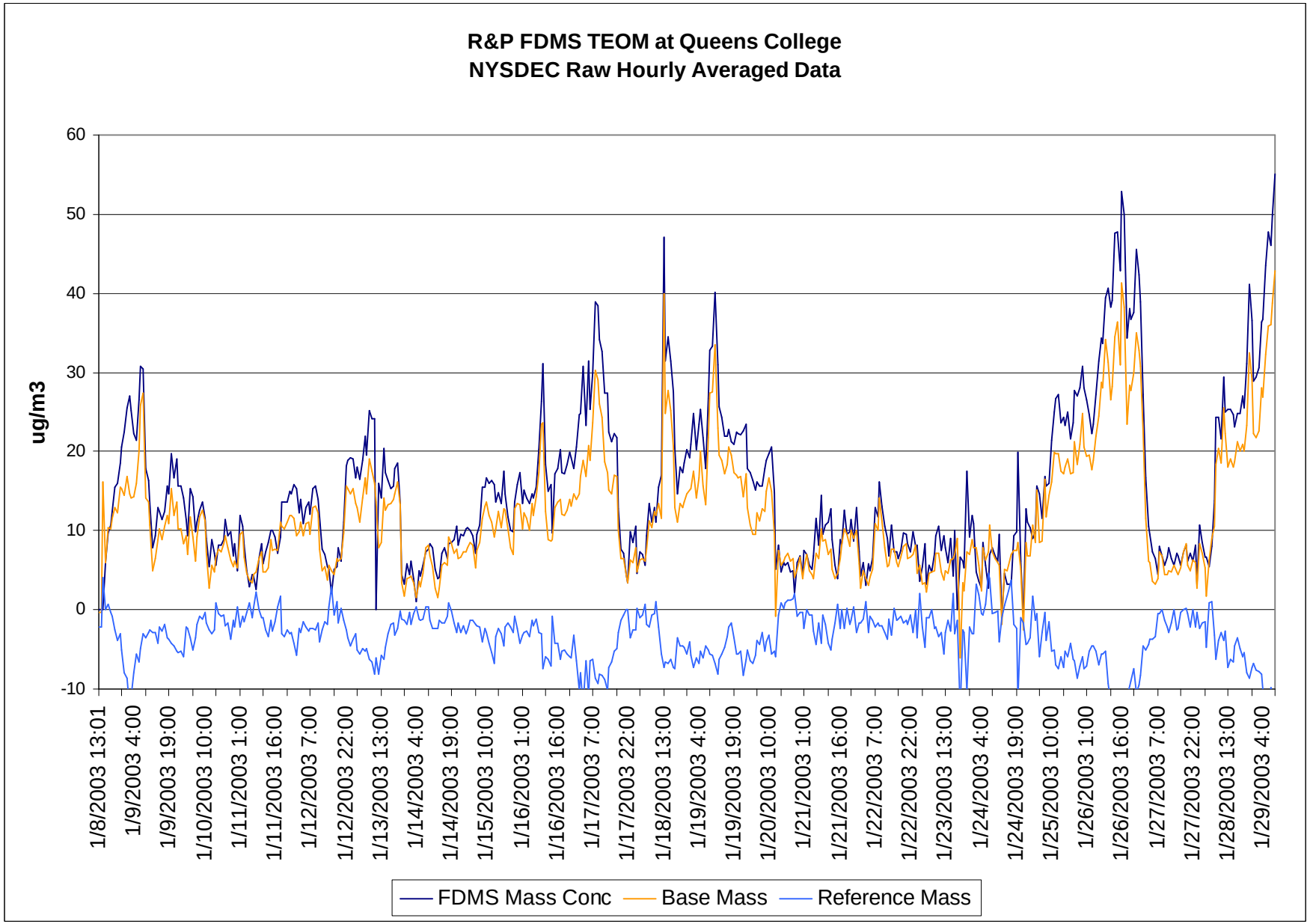
1/27/2003 21:00
1/28/2003 13:00
1/29/2003 5:00
FDMS Mass Conc
TEOM 50 Deg


R&P FDMS TEOM at Queens College
NYSDEC Raw Hourly Averaged Data
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1/9/2003 4:00
1/9/2003 19:00
1/10/2003 10:00
1/11/2003 1:00
1/11/2003 16:00
1/12/2003 7:00
1/12/2003 22:00
1/13/2003 13:00
1/14/2003 4:00
1/14/2003 19:00
1/15/2003 10:00
1/16/2003 1:00
1/16/2003 16:00
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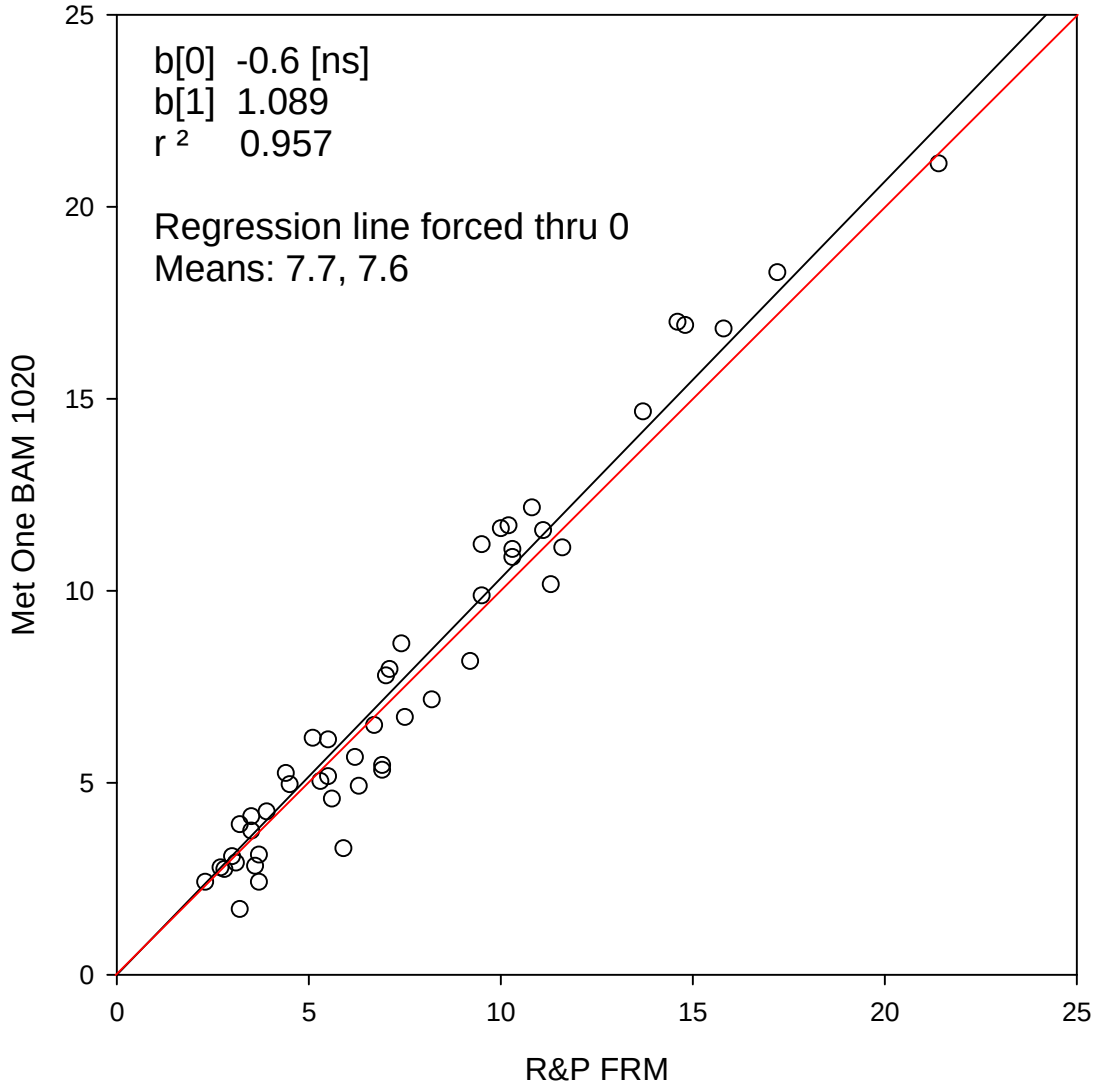
1/26/2003 1:00
1/26/2003 16:00
1/27/2003 7:00
1/27/2003 22:00
1/28/2003 13:00
1/29/2003 4:00
FDMS Mass Conc
Base Mass
Reference Mass

MetOne 1020 BAM vs. R&P FRM
Kent, WA March-April 2002

Data courtesy of Bob Franks, Puget Sound Clean Air Agency



Consensus: SES TEOM not worth the $$; minimal improvement over 50C TEOM

BAMs? Getting Better; stay tuned.

Need ‘next generation’ technologies!!!

Still need 2x better LOD for stable 1-hour means

Generally simpler than FDMS TEOM

MetOne, BGI, TEI

BAMs potential: can run closer to ambient temp; simpler.

MetOne has substantial U.S. and Canada market penetration

Light Scattering? Not for areas with complex aerosol mixtures...

NGN-3, TEI/MIE

TEOM and BAM Instrument Configurations

Need uniformity across U.S. *and* Canada [East and West]

- Mapping and Forecasting (nowcast tool)
- FRM reduction – draft National Monitoring Strategy...

TEOM Configuration Issues:

- Several flavors of TEOMs in use [50C, SES, FDMS]
- Different sensor flows (1 or 3 LPM) and [hopefully] flow splitters
- Different PM2.5 inlets – URG cyclone, SCC, VSCC
- STP vs Local T/P config confusion: A/S= 99 and 9 for both T and P!
  - March 2002 Rev B.003 of TEOM manual gets it right
  - Ships as PM10, with STP and internal factors of 1.03 and +3

Figure 6-7. Set Temps/ Flows screen with additional lines displayed.

SET TEMPS/FLOWS		
T-Case>	50.00	50.00
T-Air	50.00	50.01
T-Cap	50.00	49.98
F-Main	3.00	3.00
F-Aux	10.00	9.98
T-A/S	25.00	25.00
P-A/S	1.000	1.000
Amb Temp		23.4
Amb Pres		0.988
FAdj Main		1.000
FAdj Aux		1.000

Configuration Issues (continued)...

- Default TEOM internal correction factors vs. none?
- Negative data – truncated or not? Analog default is truncated at 0!
  - Both BAM and TEOM; can be changed
  - Important if internal TEOM factors removed
- External correction factors - site/season specific or 'generic'?
- BAMs: Do they need much correction??

First Step – document the details of how they're run:

- Tim Hanley's spreadsheet of continuous pm method configs
  - detailed list of what you might need to know...
- Not just TEOMs... BAMs have config issues too [heaters, 1-h lag]
- MetOne has a solution for the 1-hour data lag for ESC loggers