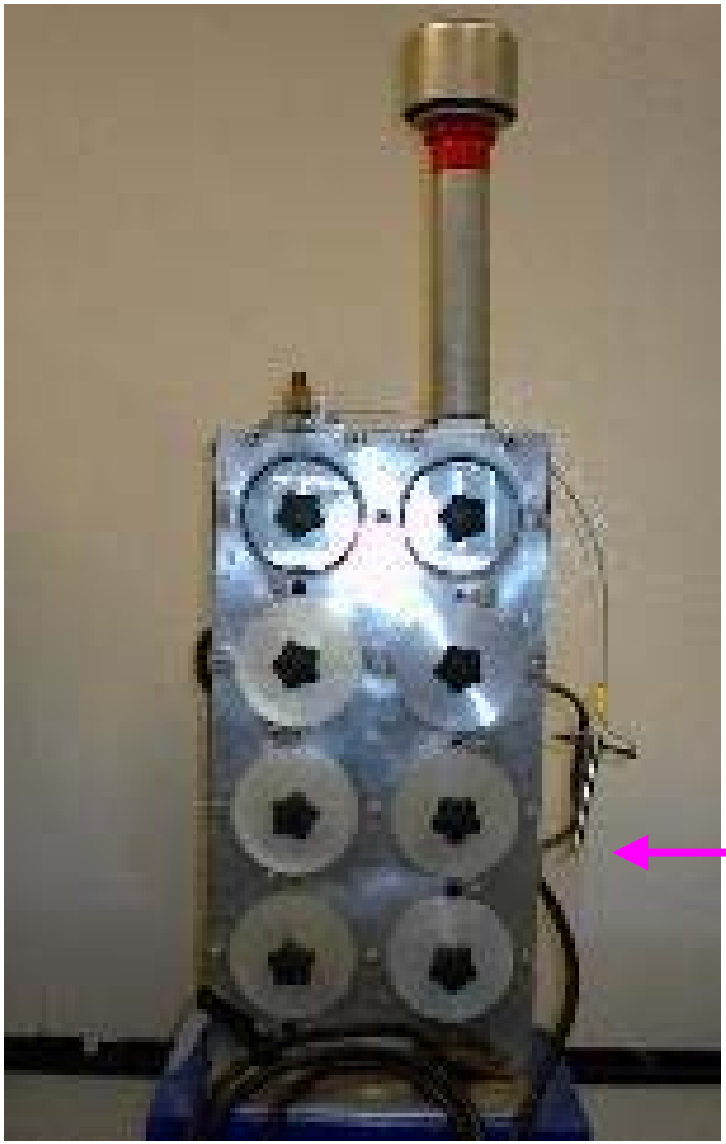
DRUM – Davis Rotating-drum Unit for Monitoring



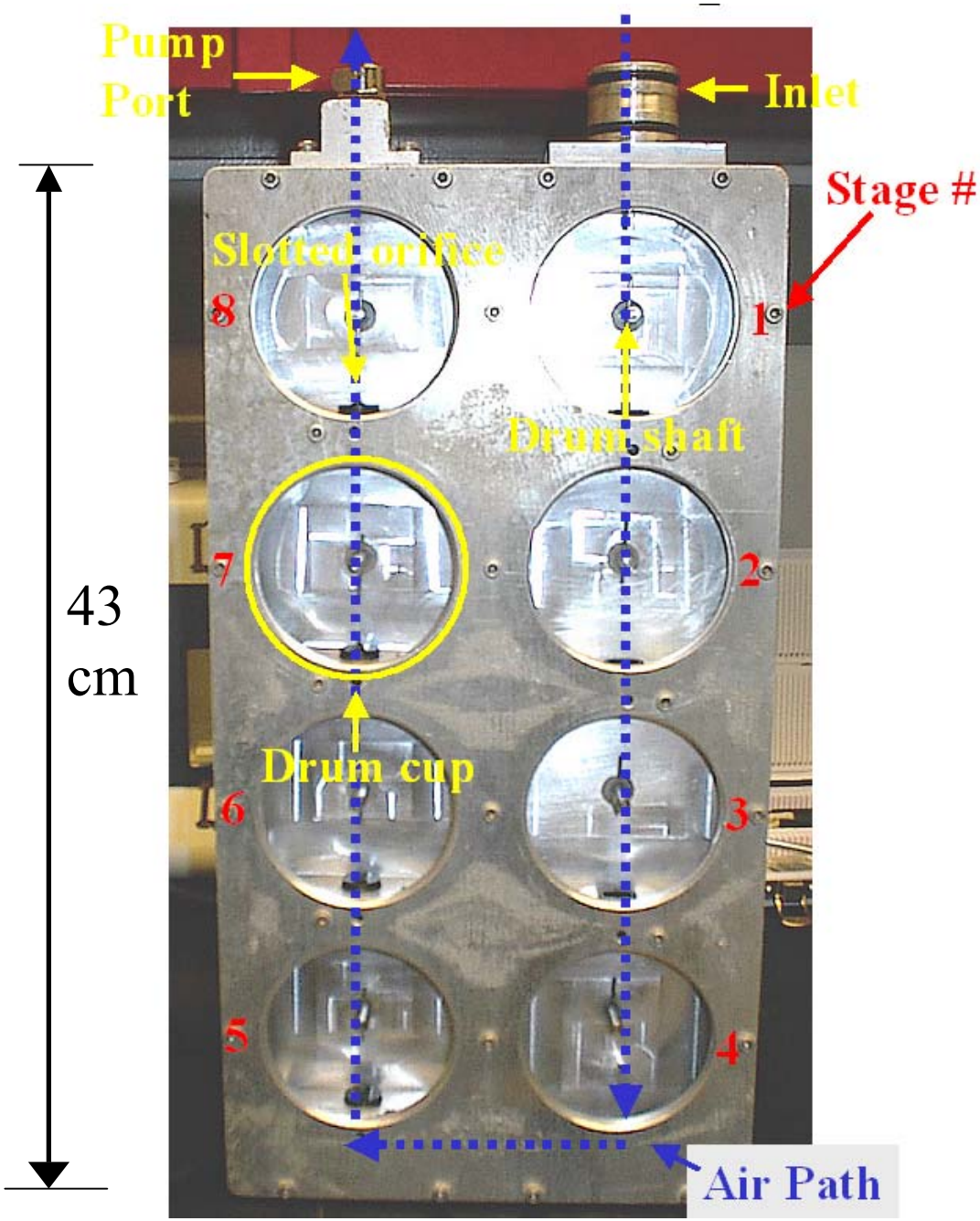
High Resolution Sampling & Analysis

- 1 to 3-hr. Temporal Resolution
- 8 Particle Sizes (10 um to 0.9 um)
- Mass, Optical, Elemental, Hydrogen
- Minimal Operation $
- Low Analytical $

8-Stage DRUM
from VT DEC

3-Stage Units
Available Too

View of IPC from Vermont side of Lake Champlain looking west



DRUM Size Cuts

1. Inlet (10) -5 um
2. 5-2.5 um
3. 2.5-1.15 um
4. 0.75-0.56 um
5. 1.15-0.75 um
6. 0.56-0.34 um
7. 0.34-0.26 um,
8. 0.26-0.09 um

Ultrafine afterfilter (<0.09 um)

SOLA South Lake Tahoe 1·11·02 G 1545 2·15·02 G 1542 Stage 1

Start → 35 - 5 mm

SOLA South Lake Tahoe 1·11·02 G 1545 2·15·02 G 1542 Stage 2

Start → 5 - 2.5 mm

SOLA South Lake Tahoe 1·11·02 G 1545 2·15·02 G 1542 Stage 3

Start → 2.15 mm

SOLA South Lake Tahoe 1·11·02 G 1545 2·15·02 G 1542 Stage 4

Start → 1.15 - .75 mm

SOLA South Lake Tahoe 1·11·02 G 1545 2·15·02 G 1542 Stage 5

Start → .75 - .56 mm

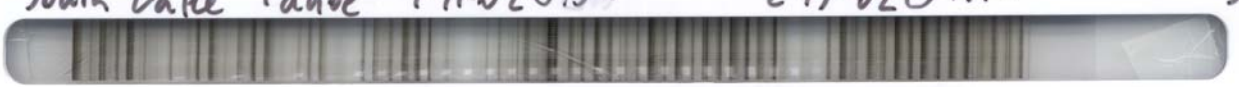
SOLA South Lake tahoe 1·11·02 G 1545 2·15·02 G 1542 Stage 6

Start → .56 - .34

SOLA South Lake Tahoe 1·11·02 G 1545 2·15·02 G 1542 Stage 7

Start → .34 - .26

SOLA South Lake Tahoe 1·11·02 G 1545 2·15·02 G 1542 Stage 8



Start → .26 - .09 mm

DRUM Analytical Options (for 42-day Run)

Mass: (Beta Attenuation) 8 size bins x 3-Hour Resolution, &

Optical: (Transmission) 8 sizes x 1.5 Hr. x 20 wavelength bands of 25 nm each 350 nm through 850 nm

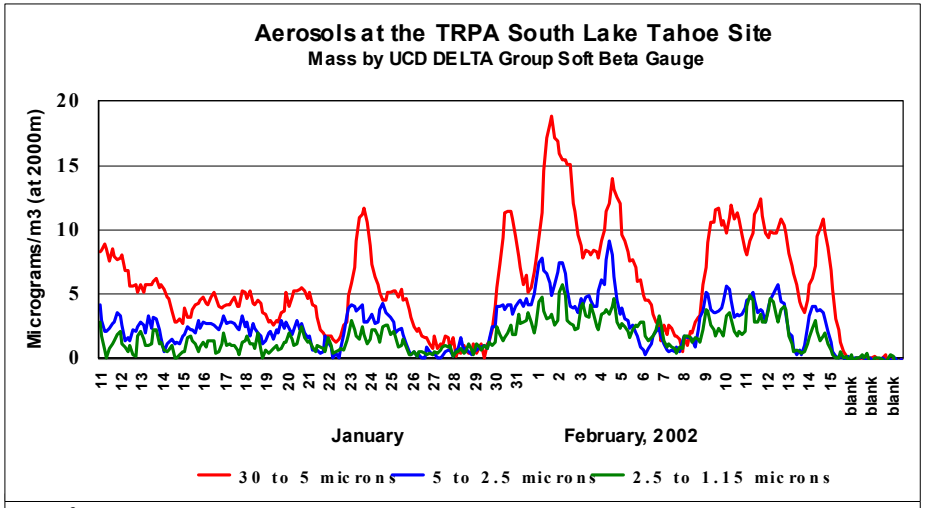
> 100,000 data points at < $2,500

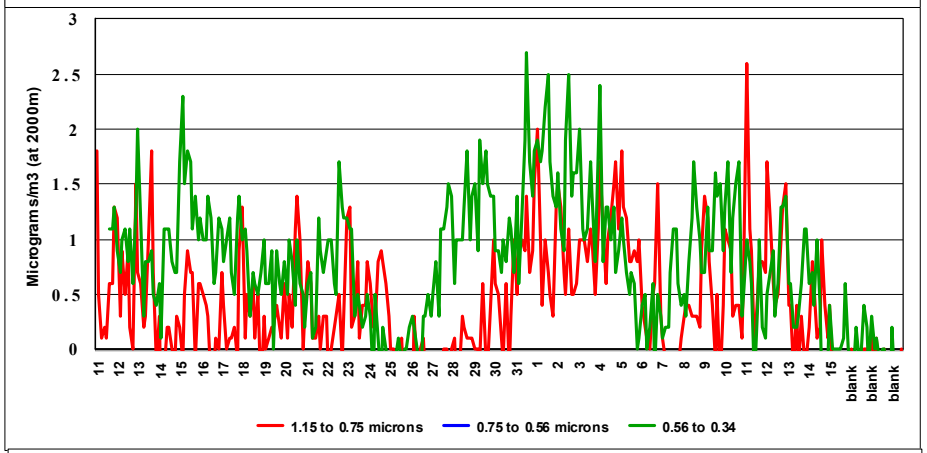
Elements: (Syncratron XRF) 8 sizes x 3 Hr. x 30 Elements

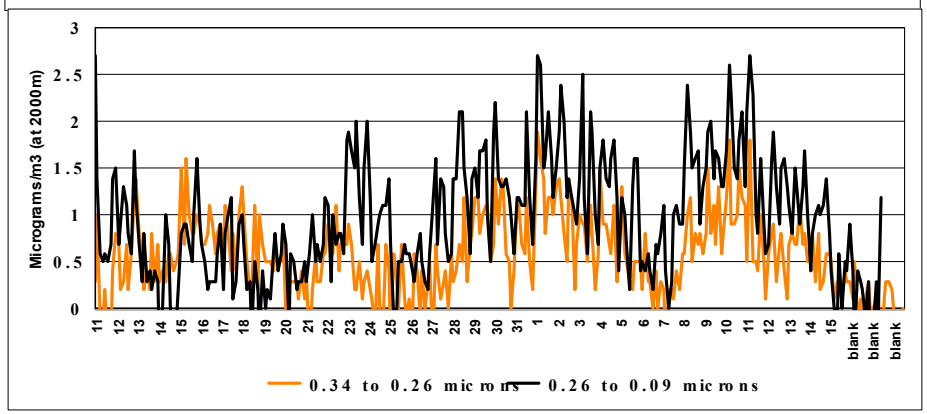
> 80,000 data points at < $10,000

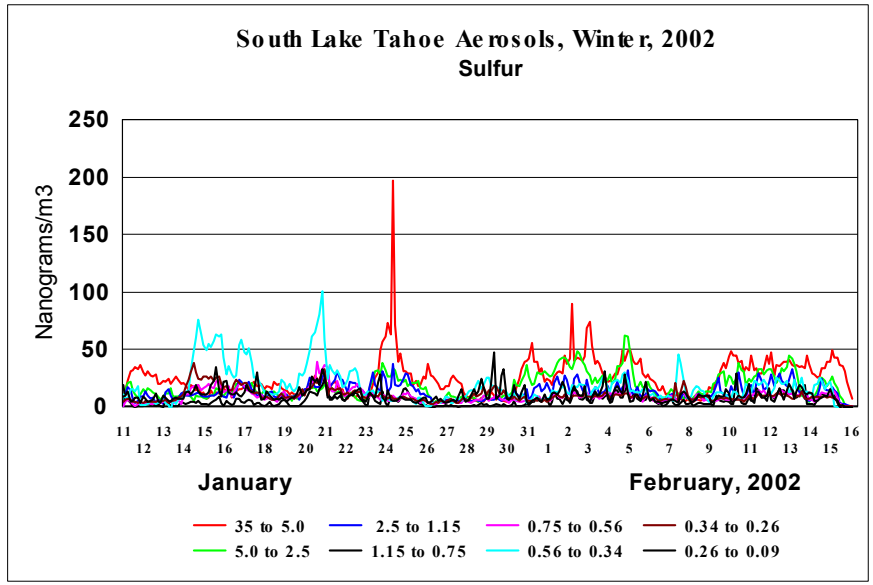
Hydrogen: (PESA) and Mass (STIM) 8 sizes x 1.5 Hr.

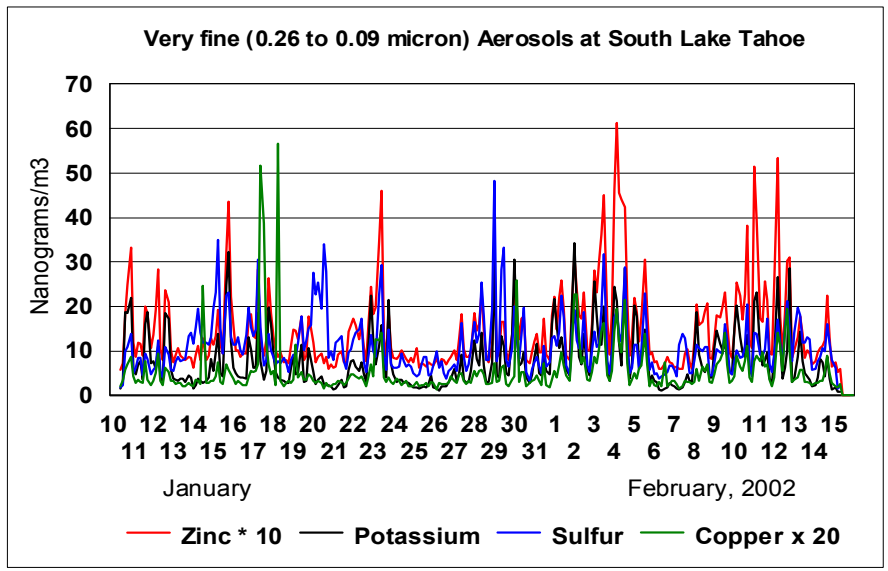
> 10,000 data points at < $5,000

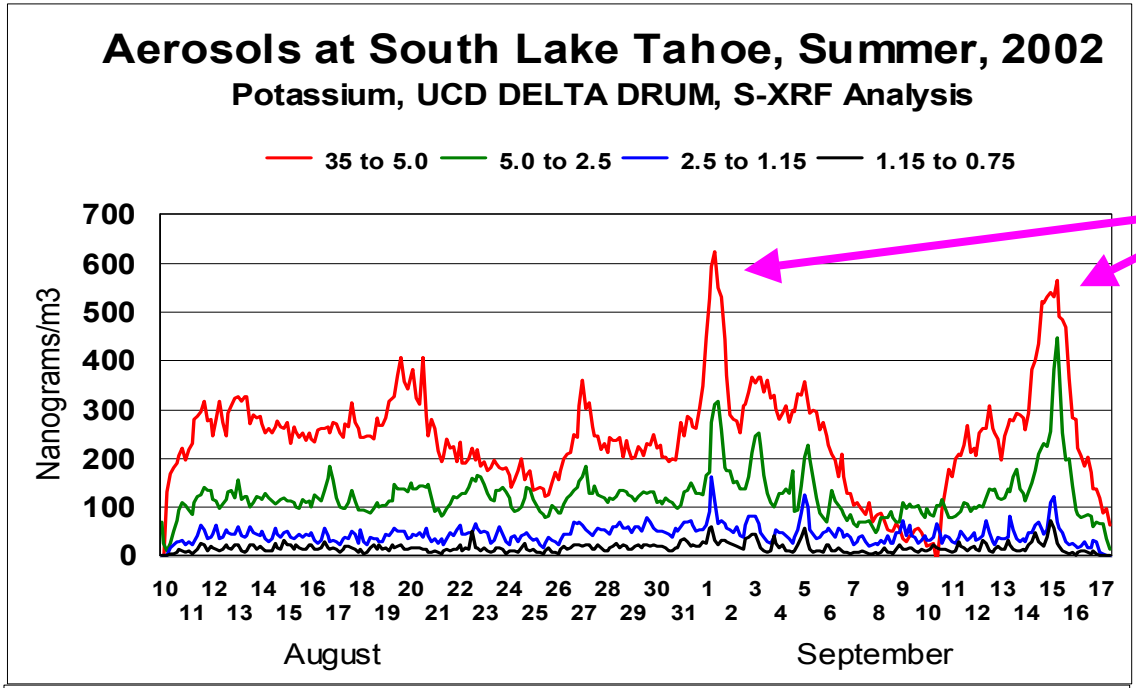

Aerosols at the TRPA South Lake Tahoe Site
Mass by UCD DELTA Group Soft Beta Gauge
Micrograms/m3 (at 2000m)
January
February, 2002
30 to 5 microns
5 to 2.5 microns
2.5 to 1.15 microns


Micrograms/m3 (at 2000m)
1.15 to 0.75 microns
0.75 to 0.56 microns
0.56 to 0.34


Micrograms/m3 (at 2000m)
0.34 to 0.26 microns
0.26 to 0.09 microns

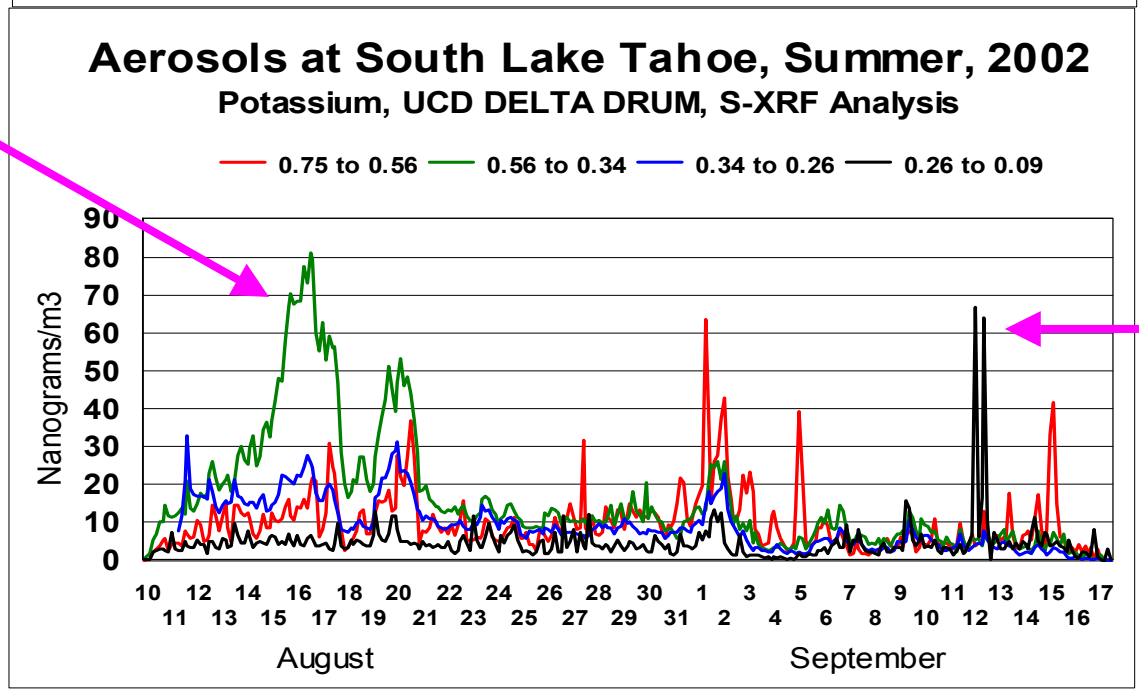

South Lake Tahoe Aerosols, Winter, 2002
Sulfur
Nanograms/m3
January
February, 2002
35 to 5.0
5.0 to 2.5
2.5 to 1.15
1.15 to 0.75
0.75 to 0.56
0.56 to 0.34
0.34 to 0.26
0.26 to 0.09


Very fine (0.26 to 0.09 micron) Aerosols at South Lake Tahoe
Nanograms/m3
January
February, 2002
Zinc * 10
Potassium
Sulfur
Copper x 20

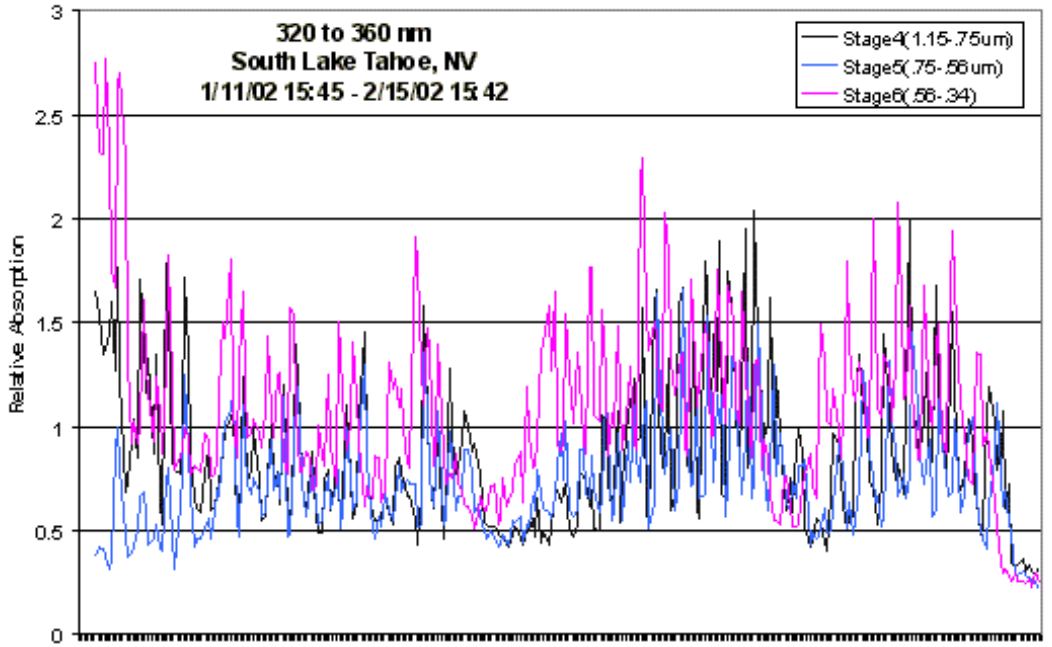


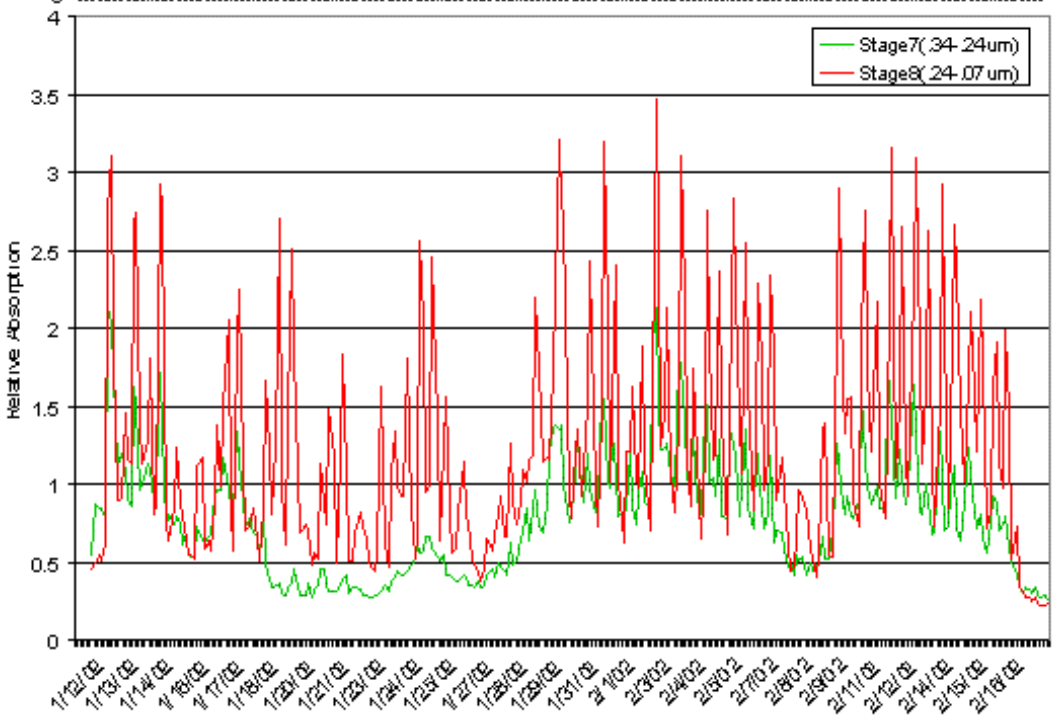
Soil

Wood Smoke



Diesel





UV Optical Attenuation (320-360 nm) at South Lake Tahoe, Winter 02.

Stage 6 (0.34-0.56 um) is likely size of most Wood Smoke Particles.

Little Attenuation for **Stage 7** (0.24-0.34 um), but Large response for Stage 8 (0.09-0.24 um)

Very Fine Particles May be more indicative of Diesel Exhaust.

DRUM Options For MANE-VU?

- VT DEC will Loan our 8-Stage DRUM to Others in MANE-VU
- Costs for 1 6-week Run With All Analyses about $15-20K
- Costs for 6-Week Run with Minimal Initial Analyses - $2.5K
- 3-Stage DRUMs Available for Nominal Rental ($500) & incur 3/8 the analytical costs
- Applications for Regional Haze (RAIN or other IMPROVE)
- Applications for Urban PM-2.5, PM 10-2.5, Air Toxics, Aircraft
- Large Data Would Benefit from “Professional” Data Analysis

Additional Details Available at:

http://www.anr.state.vt.us/air/Planning/PublicDocs/DRUMSUM3.pdf