

Optical and Scene Networks

Mammoth Cave NP, Kentucky

September 26, 2006

Current Optical Networks: 9/26/2006

(Change from 2005 IMPROVE meeting in parentheses)

NETWORK		Transmissometers		Nephelometers	
		Remote	Urban	Remote	Urban
Arizona	17	-	3	11	3
NPS	13 (-10)	2 (-9)	-	10 (-1)	1
Wyoming	5 (+1)	2	-	3 (+1)	-
USFS	4 (-1)	1 (-1)	-	3	-
CENRAP	4 (+1)	-	-	4 (+1)	-
Colorado	4	-	2	-	2
Nevada (Clark County)	3 (+1)	-	3 (+1)	-	-
LADCO	1 (-1)	-	-	1	0 (-1)
VISTAS	1	-	-	1	-
Wisconsin	1 (-1)	-	-	1	0 (-1)
TRPA	0 (-2)	-	-	0 (-1)	0 (-1)
Totals	53 (-12)	5 (-10)	8 (+1)	34	6 (-3)

SOPs/TIs

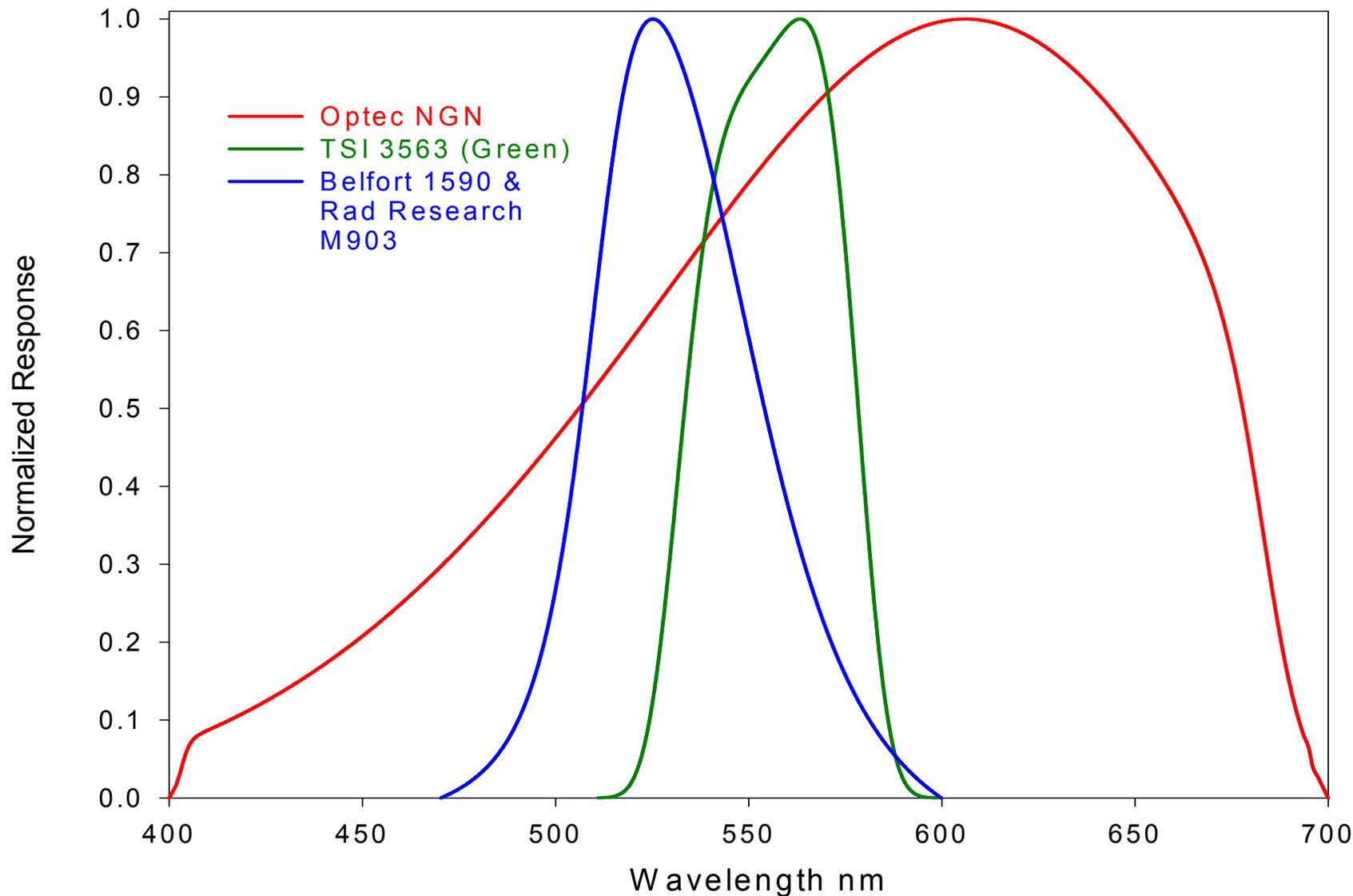
- All Nephelometer, Transmissometer, and Scene SOPs and TIs have been updated and delivered to CIRA.

Optical Data

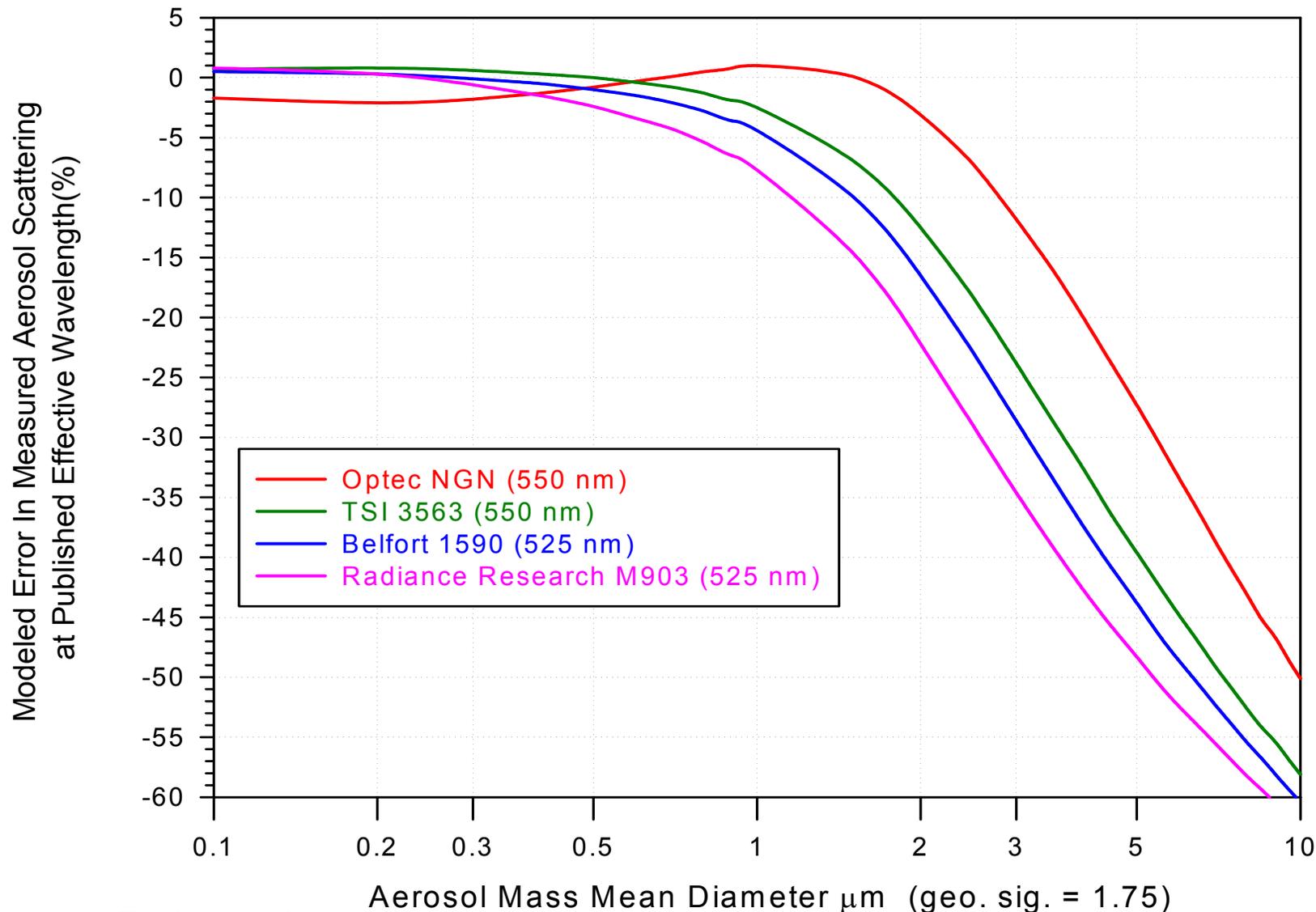
- All transmissometer data from 1986-2004 was reprocessed and delivered to NPS/CIRA on 8/22/06
- Transmissometer data from 1/1 - 12/31/2005 was delivered to NPS/CIRA on 9/5/06
- Nephelometer data through 03/31/2006 delivered to NPS/CIRA on 6/30/2006
- Nephelometer data through 06/30/2006 to be delivered to NPS/CIRA on 9/30/2006

Development of Ambient PM_{2.5} NGN-2

- Wide band wavelength response
- NGN-2 open air – unknown size cut
- Incandescent lamp - heating

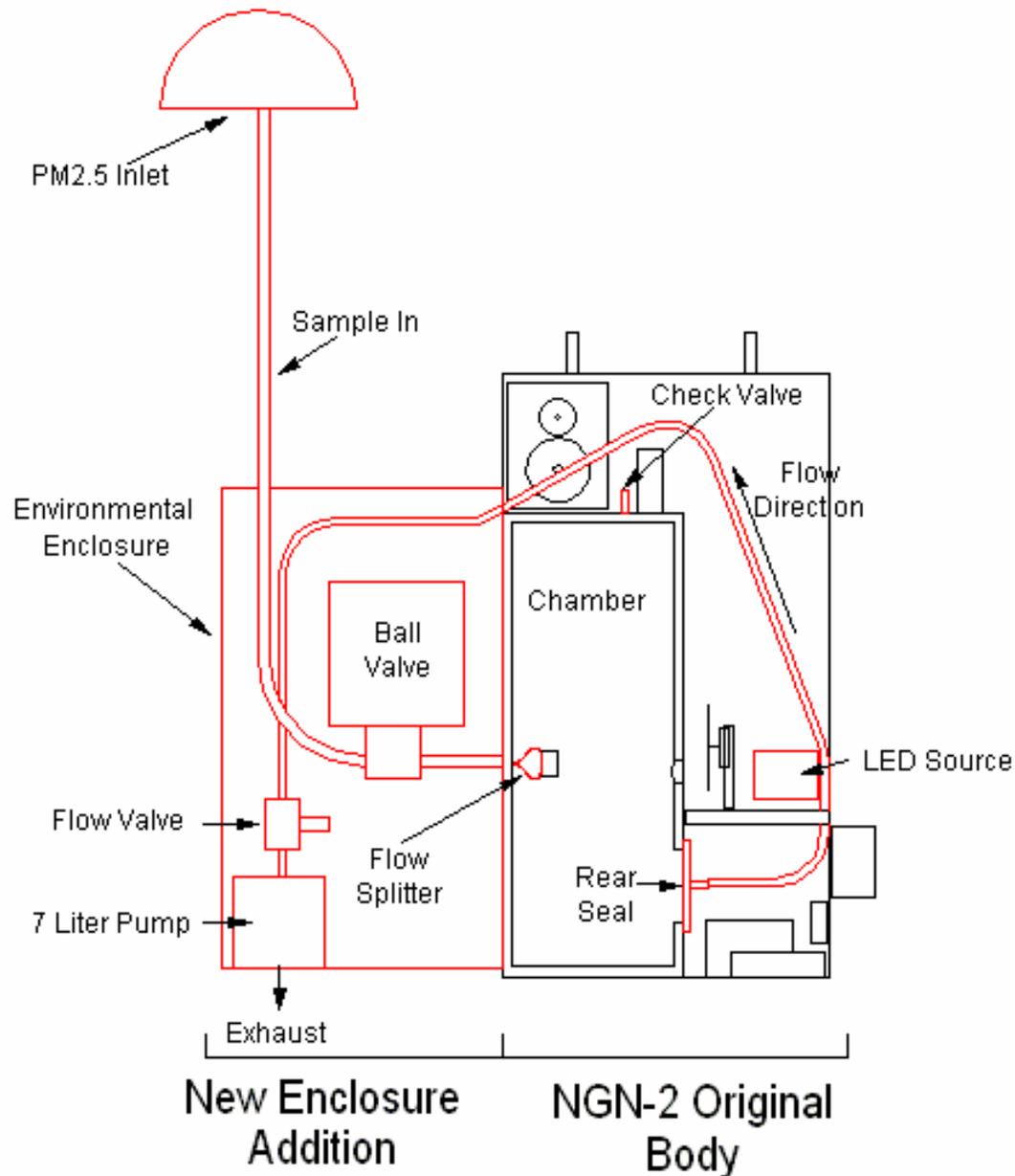


Normalized wavelength dependent response of Optec NGN, TSI 3563 (green), Belfort 1590 and Radiance Research M903 integrating nephelometers.



Aerosol Mass Mean Diameter μm (geo. sig. = 1.75)
 Estimated error in measured scattering at published effective wavelength for Optec NGN-2, TSI 3563 (green), Belfort 1590 and Radiance Research M903 integrating nephelometers as a function of aerosol mass mean diameter; including spectral response and truncation error.

PM2.5 "Hybrid" NGN-2 Nephelometer Modifications in Red



Standard IMPROVE Protocol NGN-2
Hangar

PM_{2.5} inlet

AT/RH Sensor

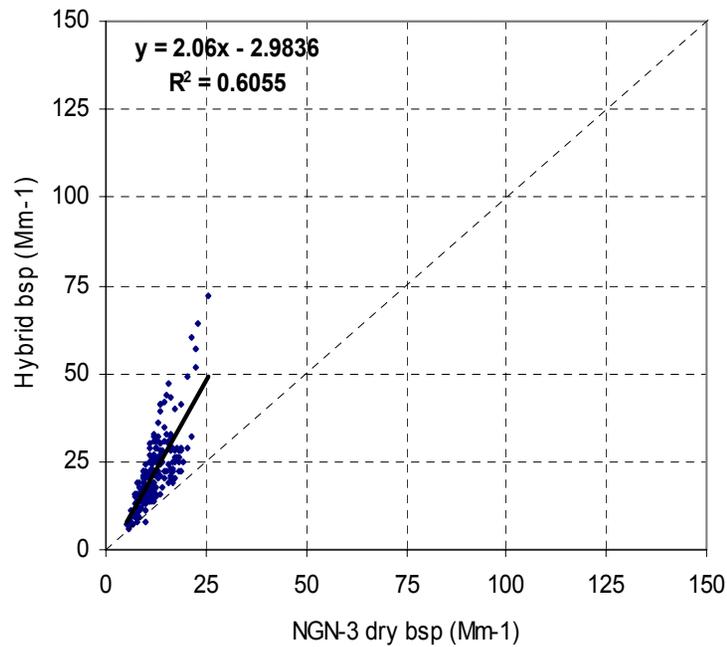
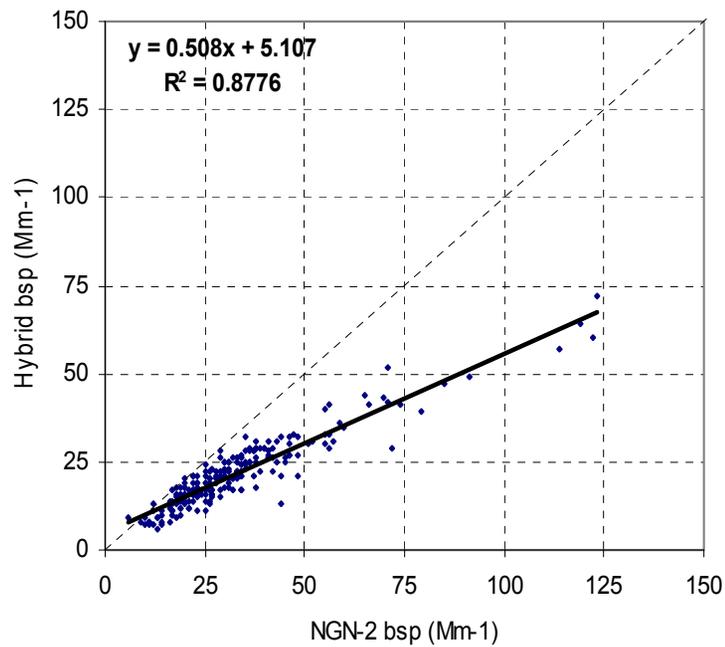
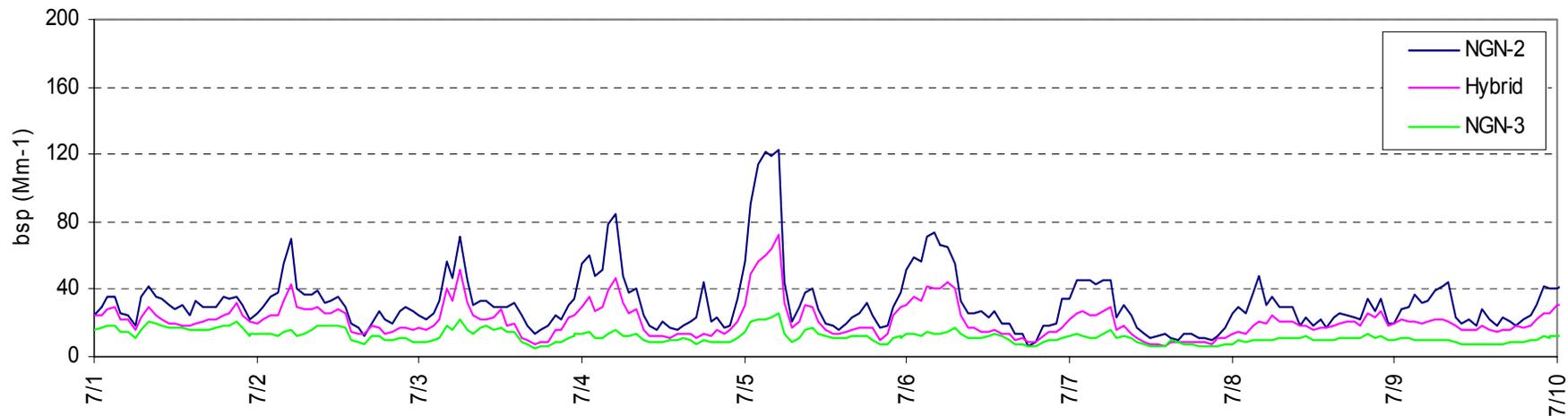
Auxiliary environmental
enclosure



NGN-2, NGN-Hybrid and NGN-3 Preliminary Nephelometer Comparison

7/1/06-7/10/06

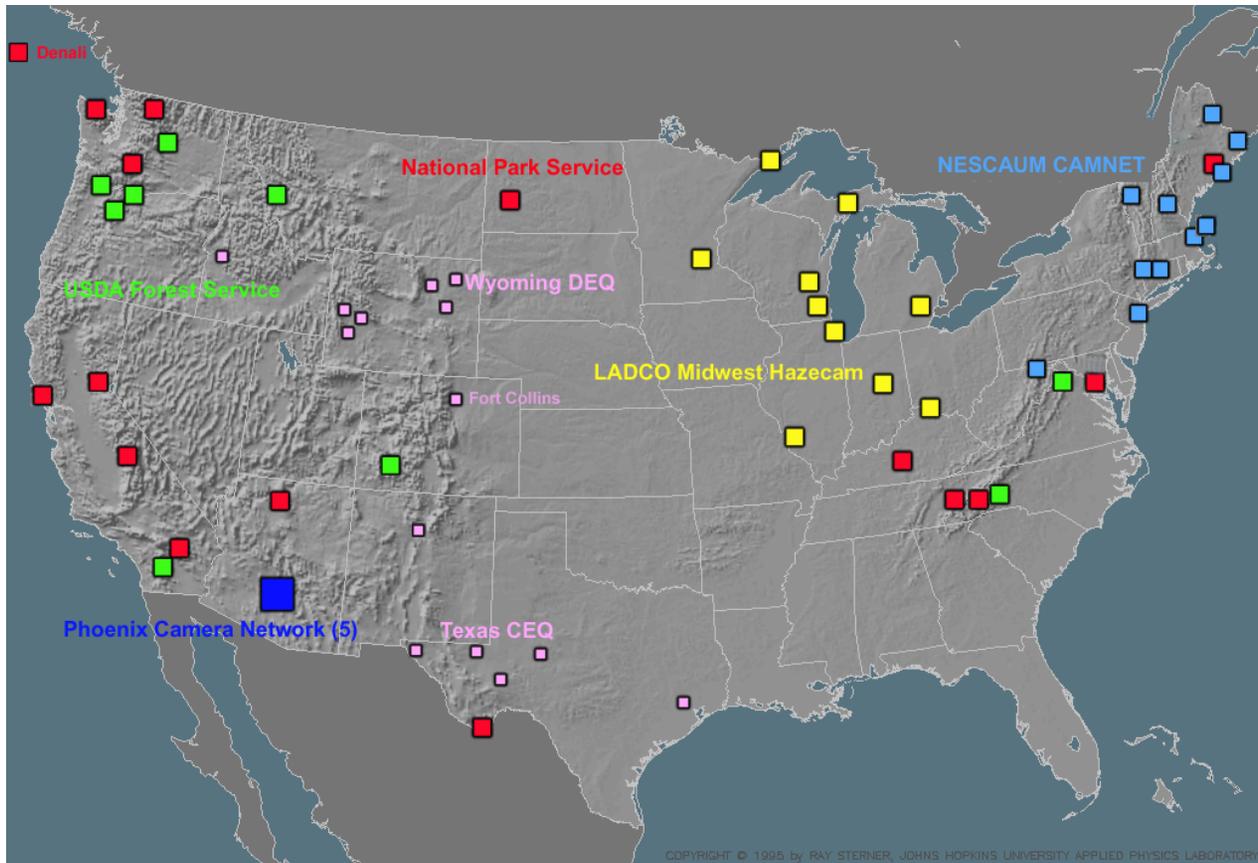
Unfiltered Data



NGN-2 PM_{2.5} vs. NGN-3 PM_{2.5}

Item	NGN-2 PM _{2.5}	NGN-3 PM _{2.5}
Flow Control	The NGN-2 flow control will not be active.	The NGN-3 has a differential pressure sensor flow sensor and a feedback controlled motor speed controller.
Chamber Temperature	The NGN-2 will be modified to continue to hang outdoors in ambient temperature conditions.	The NGN-3 must be located indoors; it has a chamber heater and the b_{sp} measurement will not include the affects of higher RH.
Instrument Age	Most of the NPS-owned NGN-2s are 13 years old. Lifetime of the instrument may be limited.	The NGN-3s are new.
Lamp Life	The green LED life expectancy is expected to be 10 times that of the halogen lamps.	The NGN-3 currently uses the halogen lamps.

Digital Camera Networks



IMPROVE Channel C at STN Sites

- URG 3000N Sampler
- ARS Installing at 50+ STN Sites –
Fall/Winter 2006-7
- RTI handing filters
- DRI Carbon IMPROVE Analysis

Preliminary Differences between IMPROVE Module C and the URG 3000N

Module C

URG 3000N

1. Adjustable Critical Orifice Flow Control	1. Mass Flow Controller (MFC)
2. IMPROVE Version user interface	2. ARS/URG developed user interface
3. Calibration a calibrated magnehelic using multiple orifice on cassette cartridge.	3. Three point, menu driven MFC calibration using a flow standard (ie. BGI Trical etc.)
4. Flow recorded by Vacuum and Delta Mag. Output.	4. Flow recorded in volumetric liters per minute.
5. Manual audits using orifice plate on cassette cartridge.	5. Menu-driven audit of MFC, temperature and pressure with Pass/Fail status.
6. Supported on side of building or similar stand.	6. Mounted on a self-supporting stand.
7. Manual leak test	7. Menu-driven leak test with Pass/Fail status

IMPROVE Module C "Stand-Alone" Platform Concept
Illustration Only, Not to Scale
Submitted by ARS 4/4/06

