

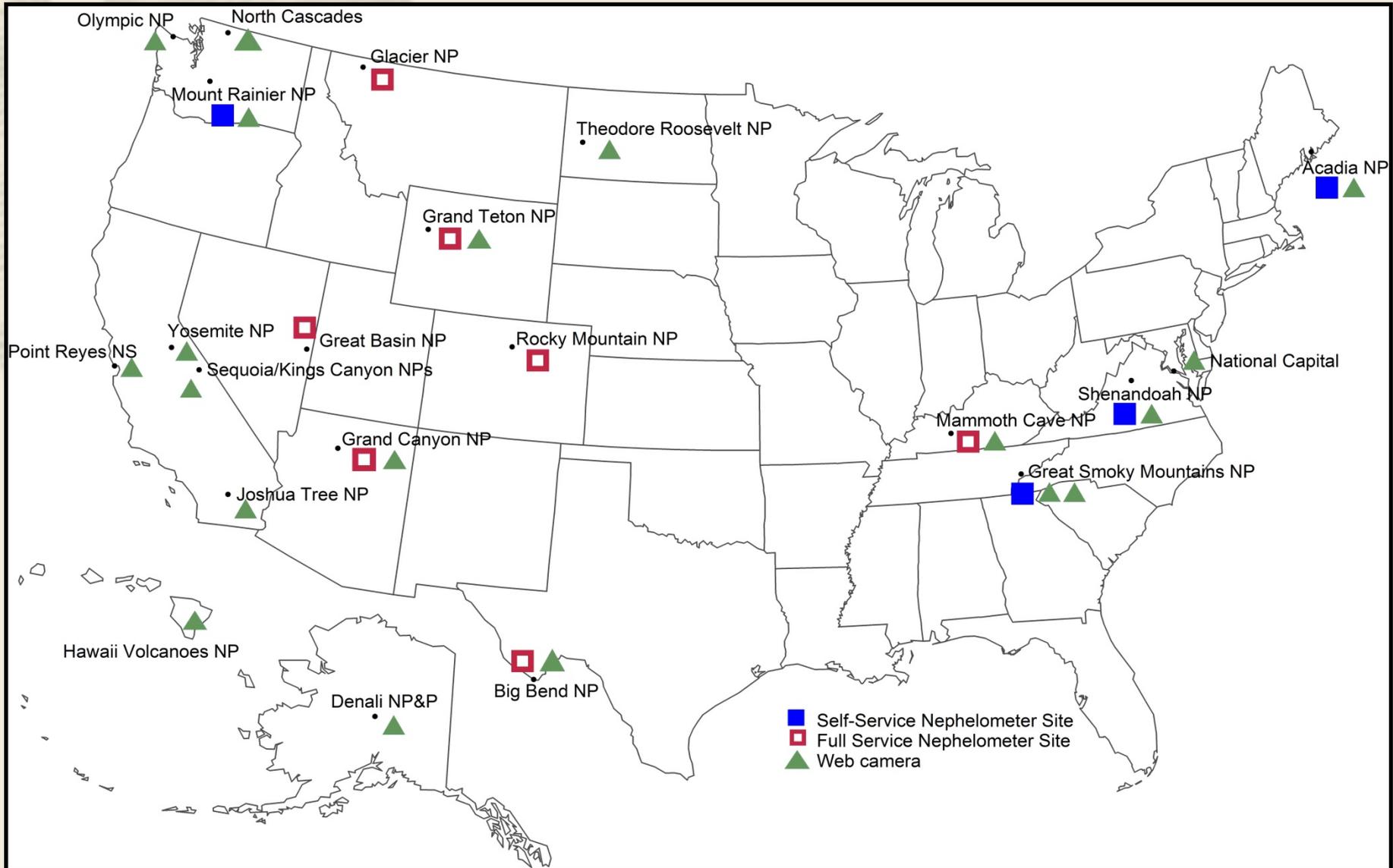
National Park Service Visibility Monitoring Network



**IMPROVE Steering Committee Meeting
October 16, 2018 – Fort Collins, Colorado**

Mark Tigges, Scott Cismoski, Joe Adlhoch
Air Resource Specialists

Nephelometer & Web Camera Locations

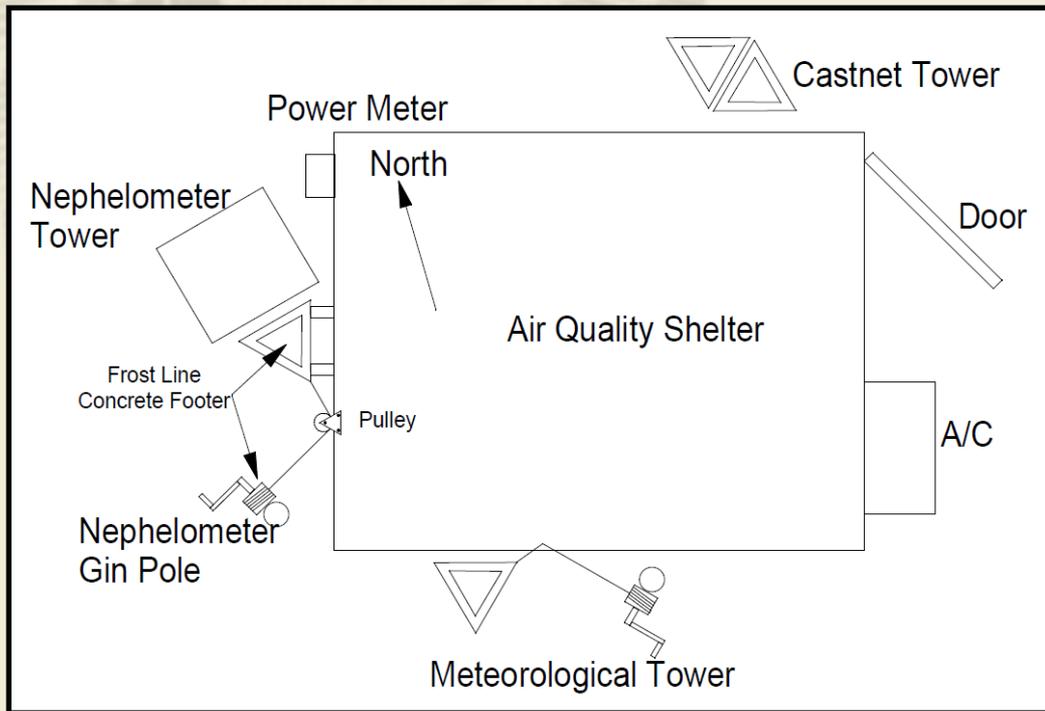


Neph Data Collection Statistics (Oct '17 – Sep '18)

Site	Percent Data Collected
Acadia	98.5
Big Bend	89.8*
Glacier	97.0
Great Basin	97.8
Great Smoky Mountains	97.3
Grand Teton	97.3
Grand Canyon (Hance)	97.5
Mammoth Cave	99.0
Mount Rainier	100.0
Rocky Mountain	99.5
Shenandoah	95.0
* Multiple power outages	
Bridger Transmissometer	96.9

Neph Network Enhancements

- All cell modems have been upgraded to 4G due to the planned discontinuation of 3G by major carriers in late 2019
- Funding allowed us to build up 2 refurbished neph/datalogging systems using donated Arizona DEQ equipment
- Glacier will receive a tipping tower this month at the request of the park



Schematic for Glacier tipping tower with gin pole



Webcam Network

Aurora at Denali NP

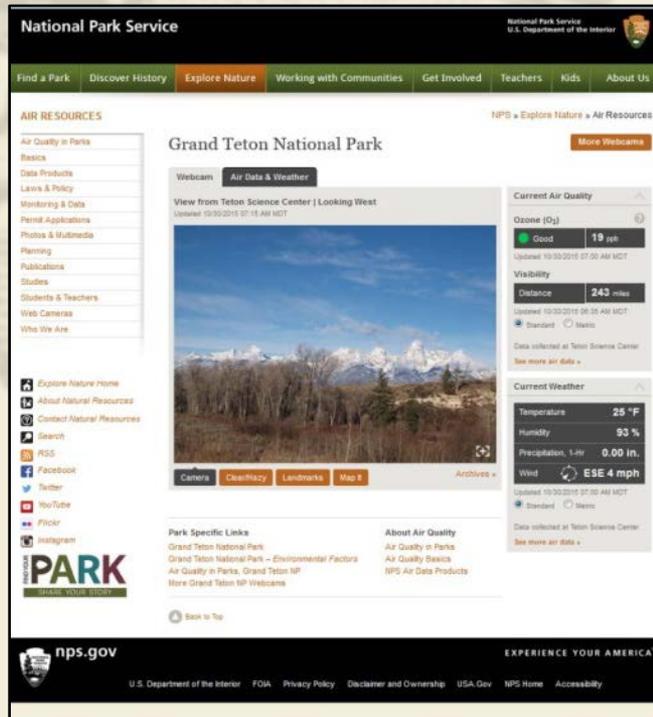
Webcams – Recent Work (1)

Top 5 camera sites:

- Great Smoky Mtns NP - Look Rock
- Great Smoky Mtns NP - Purchase Knob
- Grand Canyon NP
- Shenandoah NP
- Point Reyes NS

> Network began in 1998 at Great Smoky Mountains National Park
20 years and running!

> Web site logs more than 8 million visits annually; > 40% from mobile devices



Website views
← Desktop and Mobile →



<https://www.nps.gov/subjects/air/webcams.htm>

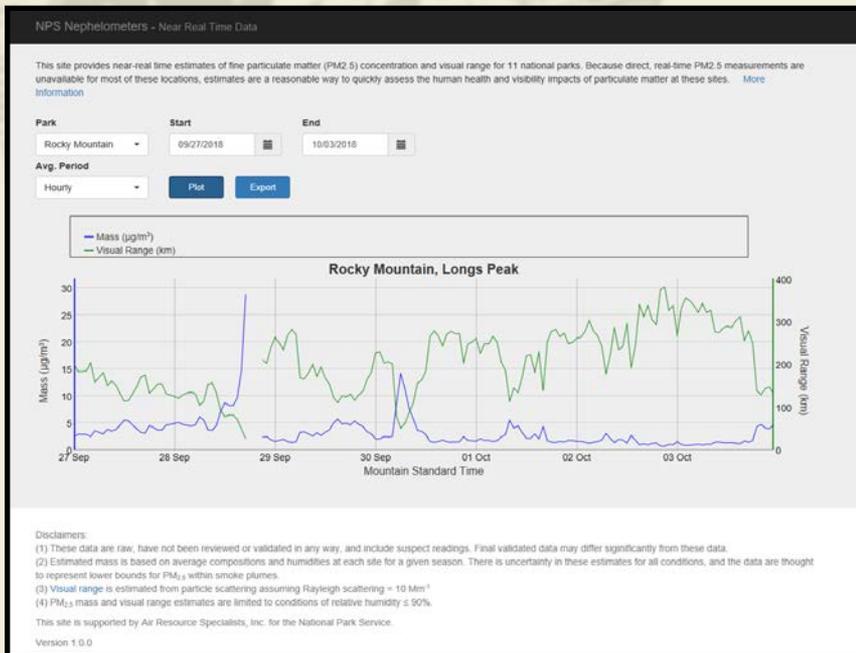
Recent Work (2)

Web cam archive site >>>>

- Standard resolution images added shortly following image capture
- High resolution images added twice annually

<https://npgallery.nps.gov/AirWebCams/>

The screenshot shows the National Park Service website for Mammoth Cave National Park's Air Quality Webcam Archives. The page features a header with the National Park Service logo and the text "Air Quality Webcam Archives" and "Mammoth Cave National Park". Below the header, there are navigation links: "View all Air Quality Webcams", "About", "Contact", and "Live Air Webcam". The main content area is titled "View from Hiking trail near Earth House" and includes a date selector set to "10/18/2017" and a "Show Nighttime Images" checkbox. There are navigation buttons for "Previous Week", "Previous Day", "Today", "Next Day", and "Next Week". A grid of 11 thumbnail images shows the webcam feed at various times: 7:30 AM, 7:45 AM, 8:00 AM, 8:15 AM, 8:30 AM, 8:45 AM, 9:00 AM, 9:15 AM, 9:30 AM, 9:45 AM, and 10:00 AM. The footer contains the slogan "EXPERIENCE YOUR AMERICA™" and links for "FREQUENTLY ASKED QUESTIONS", "WEBSITE POLICIES", "CONTACT US", and "USA.GOV". It also includes the National Park Service logo and the text "National Park Service U.S. Department of the Interior".



<<<<< Raw nephelometer data web site

- Near real time assessment of air quality during smoke events
- Visual Range and estimated PM_{2.5} concentration

<https://www.air-resource.net/NPSnephdata/>

WinHaze Web Site

- Replaces standalone PC WinHaze software developed by John Molenaar
- Enter concentrations manually, use aerosol species , or use regional haze metrics
- Mobile friendly
- Work in 2018 focused on enhancing new image upload functionality

WinHaze - Visual Air Quality Modeler

Select a site type:

National Parks and Monuments
 National Wildlife Refuges
 US Forest Service Wilderness Areas
 Urban Areas

Select a site:

Great Smoky Mountains National Park



Rayleigh scattering: 11 Mm^{-1}

Select an extinction input method:

Extinction Visual Range [[kilometers](#)] Deciview

Enter base image extinction:

228.59 Mm^{-1} (11 to 10000)

[Use Aerosol Species](#) [Use Regional Haze Metrics](#)

Enter modeled image extinction:

67.89 Mm^{-1} (11 to 10000)

[Use Aerosol Species](#) [Use Regional Haze Metrics](#)

Split Image:
50 %

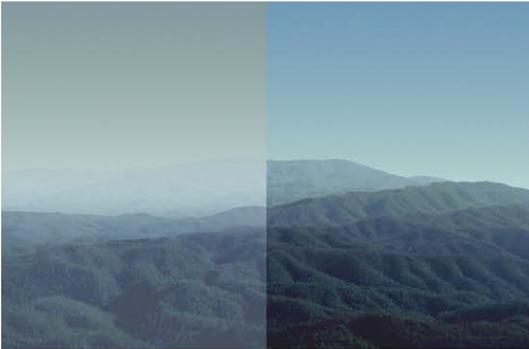
[Model Images](#)

Great Smoky Mountains National Park, TN
Visibility: 228.59 Mm^{-1} / 17.11 km / 31.29 dv



[Download Base Image](#)

Great Smoky Mountains National Park, TN
Visibility: 228.59 Mm^{-1} / 17.11 km / 31.29 dv Visibility: 67.89 Mm^{-1} / 57.62 km / 19.15 dv



[Download Modeled Image](#)

ARS Involvement with the Western Regional Air Partnership (WRAP)

- Evaluation of IMPROVE data set
 - Work with Scott Copeland to document several Regional Haze data processes
 - Identify which WRAP IMPROVE sites have moved since the baseline period
 - Identify which WRAP site-years do not meet data completeness (years of interest are: 2008, 2011, 2013-16)
 - Prepare data substitutions for identified site-years, using statistical comparisons between recipient and selected donor sites
- Support Natural Conditions analyses
 - The WRAP Monitoring Data and Glide Path Subcommittee has this topic on their plate, but has not yet defined what ARS will do for them
- Support Technical Support System (TSS) website version 2
 - Prepare documents for CIRA programmers to support coding the new Regional Haze metric on the TSS ver. 2



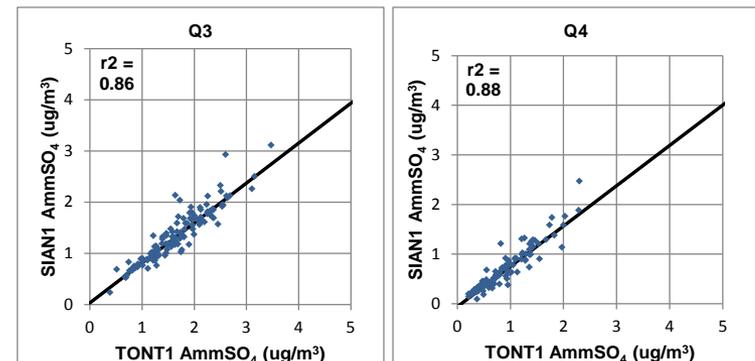
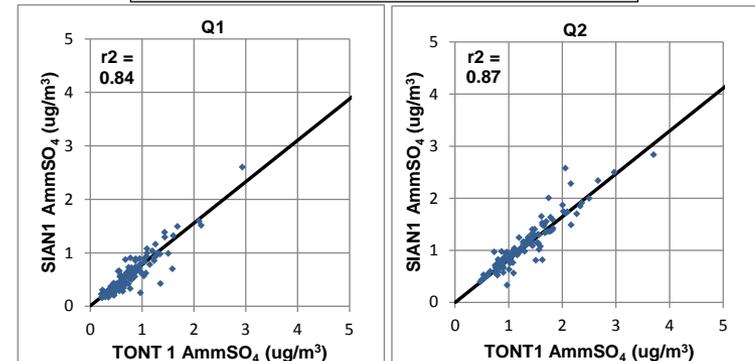
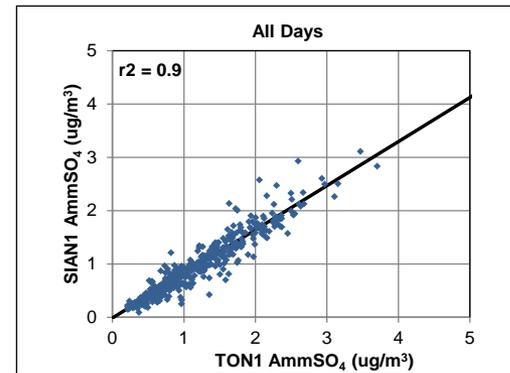
List of Incomplete Site Years

State	SiteCode	2008	2009	2010	2011	2012	2013	2014	2015	2016
AK	TUXE1	1	1	1	1	1	1	1		
AZ	BALD1	1	1	1		1	1	1	1	1
AZ	SAGU1	1	1	1		1	1	1	1	1
AZ	SIAN1	1	1	1		1	1			
AZ	SYCA1	1	1	1	1	1	1	1		
AZ	SYCA2									1
CA	PORE1	1	1	1	1	1	1	1	1	
CA	SAGA1	1				1	1	1	1	1
CA	TRIN1	1	1	1	1	1	1	1		
HI	HACR1	1	1	1	1	1		1	1	1
ID	SAWT1		1	1	1	1	1	1	1	1
MT	FOPE1	1	1	1		1	1	1	1	1
MT	GAMO1	1	1				1	1	1	1
MT	SULA1		1	1	1	1	1	1		1
ND	LOST1	1	1	1				1	1	1
NM	BOAP1	1	1	1	1	1	1		1	1
NM	GICL1	1	1	1		1	1	1	1	1
NM	SAPE1	1	1	1	1	1		1	1	1
NM	WHPE1		1		1	1	1	1		
OR	CRLA1	1	1	1	1	1		1	1	1
UT	BRCA1	1	1	1	1	1	1	1	1	
UT	ZICA1	1	1			1	1	1	1	1
WA	SNPA1	1	1	1	1	1		1	1	1
WA	SPOK1									
WY	NOAB1	1				1	1	1	1	1

Correlations: SIAN1 and Candidate Donor Sites

		TONT1	IKBA1	BALD1	PEFO1
AmmSO4	Slope=	0.83	0.89	1.01	1.07
	Intercept=	-0.01	0.06	0.10	0.01
	r2=	0.90	0.85	0.72	0.56
AmmNO3	Slope=	0.81	0.71	1.04	0.88
	Intercept=	-0.02	0.01	0.03	0.01
	r2=	0.66	0.46	0.40	0.35
EC	Slope=	0.76	0.78	0.41	0.38
	Intercept=	0.03	0.04	0.08	0.05
	r2=	0.04	0.05	0.00	0.08
OC	Slope=	0.78	0.79	0.44	0.67
	Intercept=	0.15	0.19	0.38	0.27
	r2=	0.04	0.05	0.00	0.08
SOIL	Slope=	0.73	0.85	1.07	0.88
	Intercept=	-0.01	-0.04	0.11	0.01
	r2=	0.72	0.54	0.66	0.56
CM	Slope=	0.61	0.77	0.98	0.69
	Intercept=	0.24	0.57	0.99	0.92
	r2=	0.65	0.38	0.42	0.35
SeaSalt	Slope=	0.65	0.65	1.17	1.12
	Intercept=	0.00	0.01	0.02	0.01
	r2=	0.87	0.82	0.53	0.86

SIAN1 (Recipient) vs. TONT1 (Donor)
Ammonium Sulfate





Questions?



Kilauea light show at Hawaii Volcanoes NP