

2023 October IMPROVE Steering Committee Meeting

Visibility Monitoring Contract Updates

By Mark Tigges –ARS

Tony Prenni – NPS ARD

October 17, 2023

Ambilabs Two Wavelength Integrating Nephelometer (2WIN)

- After 30 years (1993 - 2023), the 10 Remaining Optec NGN2 Ambient Nephelometers shut down on July 12, 2023.*
- The network funds were redirected to purchase, integrate and install the Ambilabs Dual Wavelength Integrating Nephelometer at 9** sites.
- Great Basin will be decommissioned.
- Shenandoah was able to find funding to purchase a 2WIN system. System was ordered and will install spring 2024 bringing the total site count to 10.

*Optec Nephels are no longer supported, but data is collected as long as they are functional. Resulting data is not processed or reviewed. All raw Optec Neph data will be sent to NPS when the last Optec is nonfunctioning.

**Tenth site will be Shenandoah

2 Liter/min Inlet

DC Power Distribution

Ethernet LAN Switch

Fan Thermostat

Campbell Scientific Datalogger

PM2.5 Cyclone

Ambilabs 2WIN

Fan into Chamber

CO2 Span Gas 2-stage regulator

Fan out of Chamber

CO2 Span Gas Flow Meter

Span Gas HEPA Filter

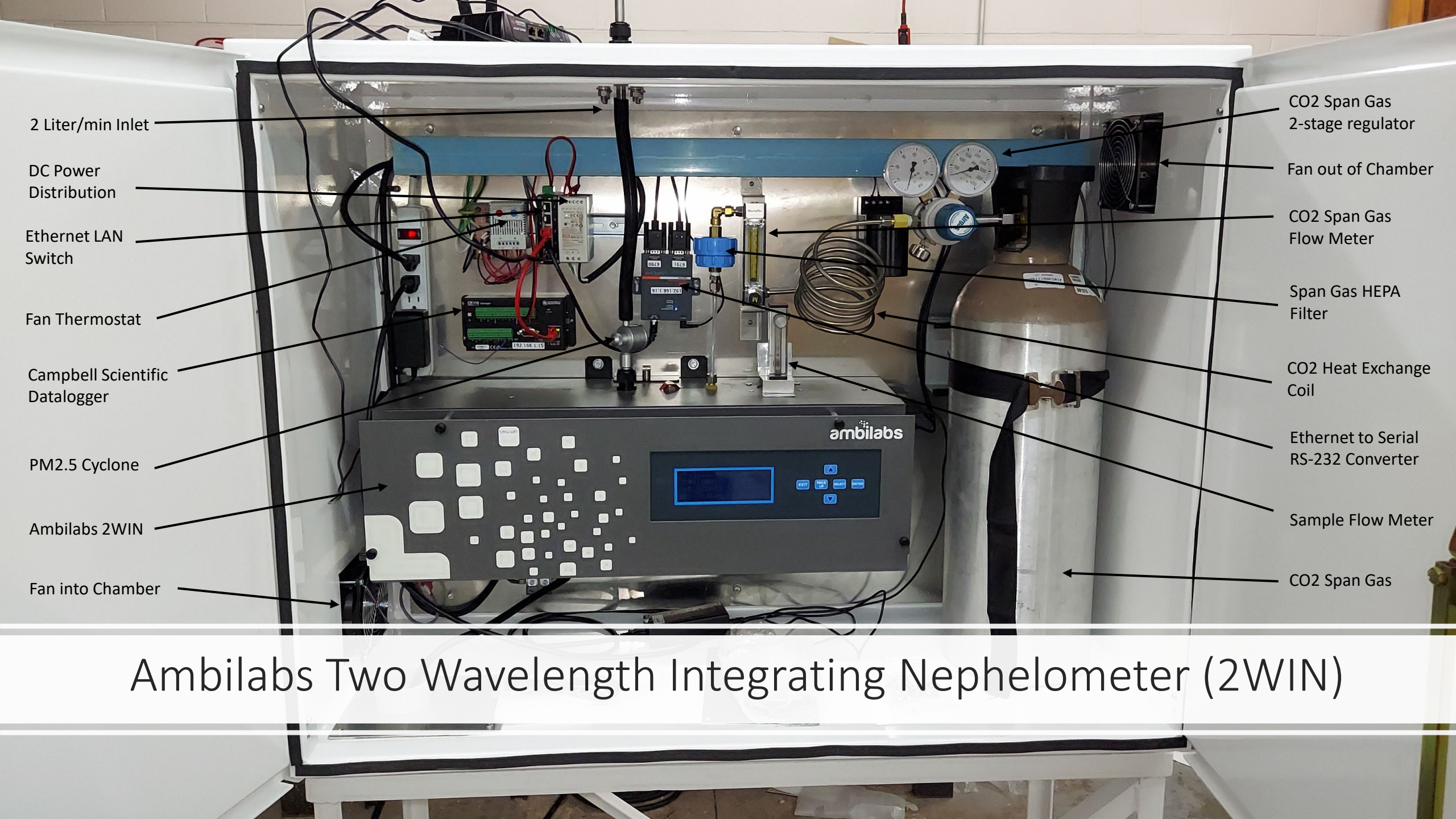
CO2 Heat Exchange Coil

Ethernet to Serial RS-232 Converter

Sample Flow Meter

CO2 Span Gas

Ambilabs Two Wavelength Integrating Nephelometer (2WIN)



2WIN Heat Mitigation

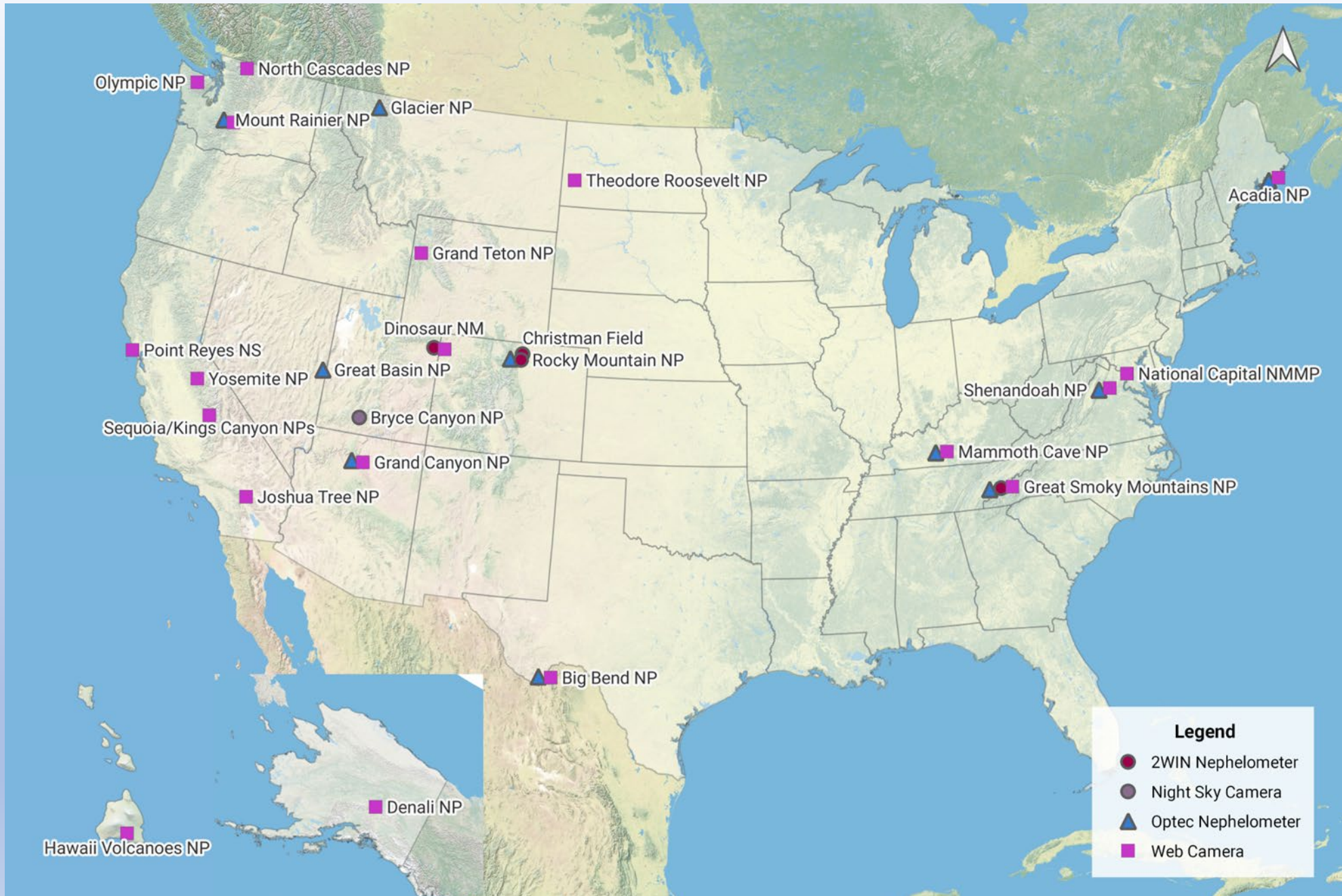


- Left Side Panel modified to allow for a cooling fan to push enclosure air into neph electronics.
- Front Panel remounted with two-inch standoffs to allow air and heat to escape.
- Filters on environmental enclosure fans were swapped for porous media improving air flow.
- Sites tested through today are not the dustiest in network (BIBE).
- Experience will help uncover issues with this initial heat mitigation approach.

COOL AIR

WARM AIR





Visibility Contract Year Schedule

July 12, 2023 – July 11, 2024

Ambilabs 2WIN Site Status

- | | |
|--------------------------|--------------------------------|
| 1. Rocky Mountain, CO* | Installed September 2021 |
| 2. Dinosaur, CO* | Installed November 2021 |
| 3. Great Smoky Mtns, TN* | Installed May 2022 |
| 4. Glacier, MT* | Installed Yesterday (Oct 2023) |
| 5. Big Bend, TX | Scheduled January 2024 |
| 6. Grand Canyon, AZ | Scheduled February 2024 |
| 7. Mammoth Cave, KY | Scheduled March 2024 |
| 8. Acadia, ME | Scheduled April 2024 |
| 9. Shenandoah, VA | Scheduled May 2024 |
| 10. Mount Rainier, WA | Scheduled November 2024 |

2WIN Installation in West Glacier

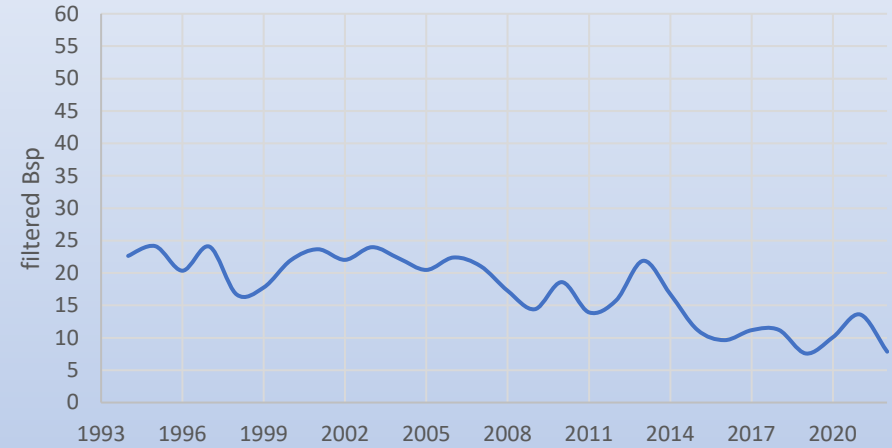


30 Years of Optec Data: Acadia Snapshot

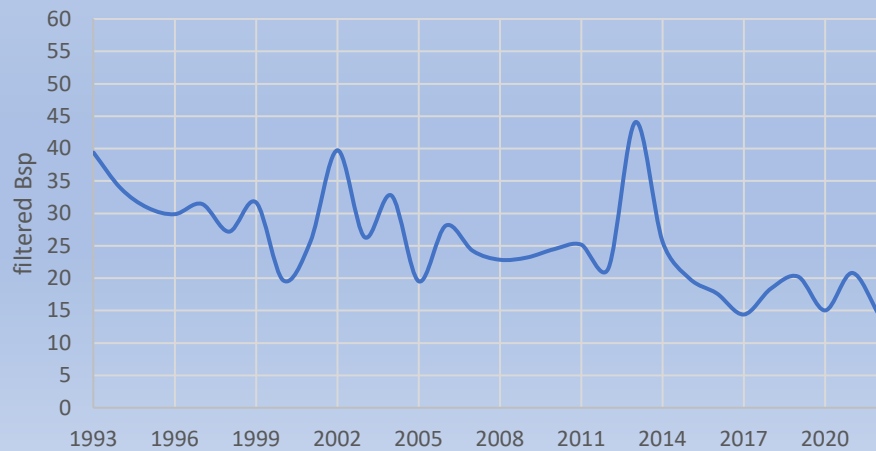
Acadia NP - ACAD1/2 Site
Winter



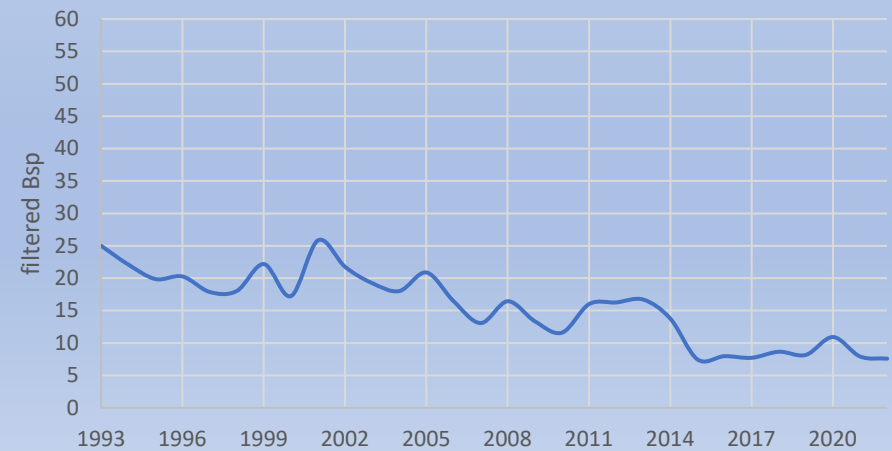
Acadia NP - ACAD1/2 Site
Spring



Acadia NP - ACAD1/2 Site
Summer



Acadia NP - ACAD1/2 Site
Fall

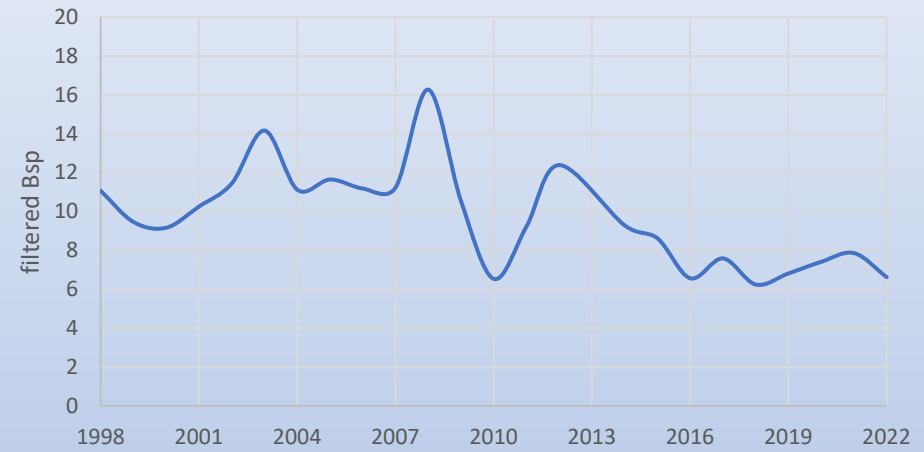


25 Years of Optec Data: Grand Canyon Snapshot

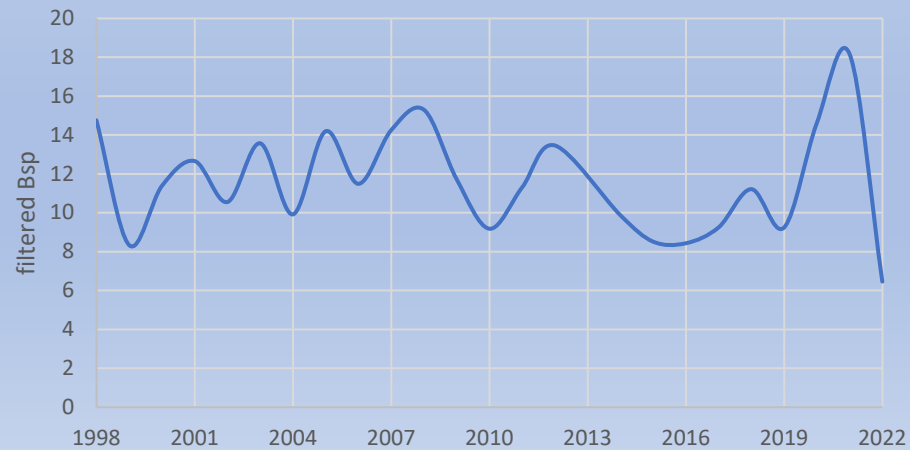
Grand Canyon - HANC1 Site
Winter



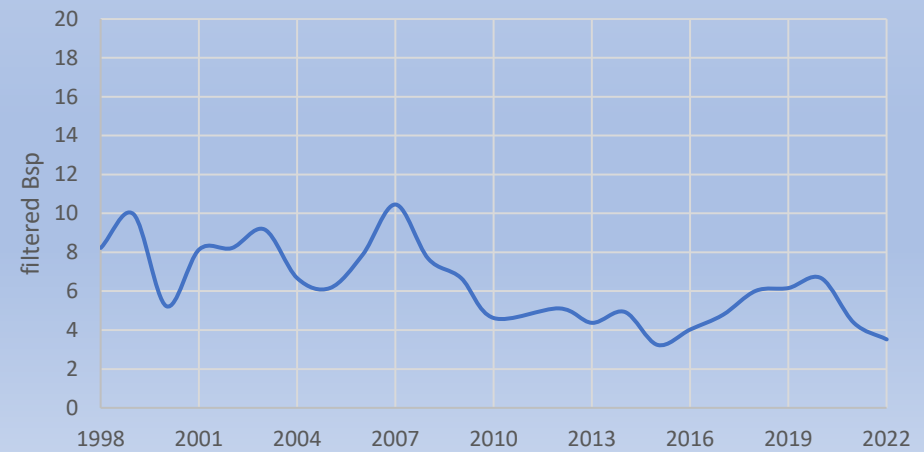
Grand Canyon - HANC1 Site
Spring



Grand Canyon - HANC1 Site
Summer

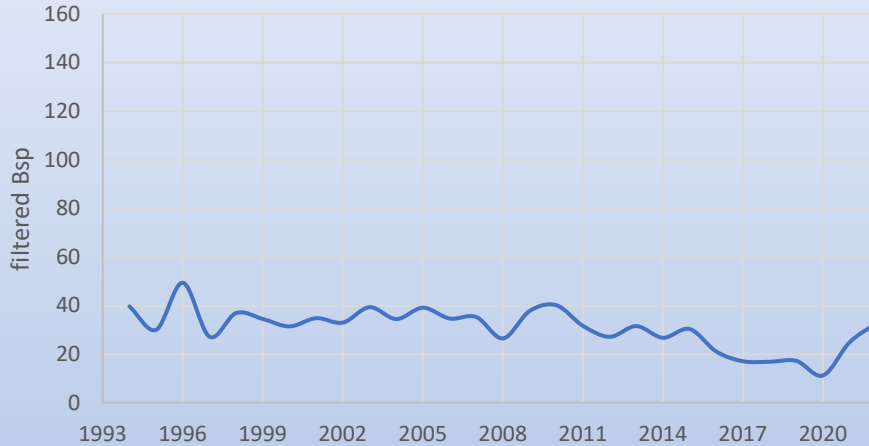


Grand Canyon - HANC1 Site
Fall



30 Years of Optec Data: Great Smoky Mtns Snapshot

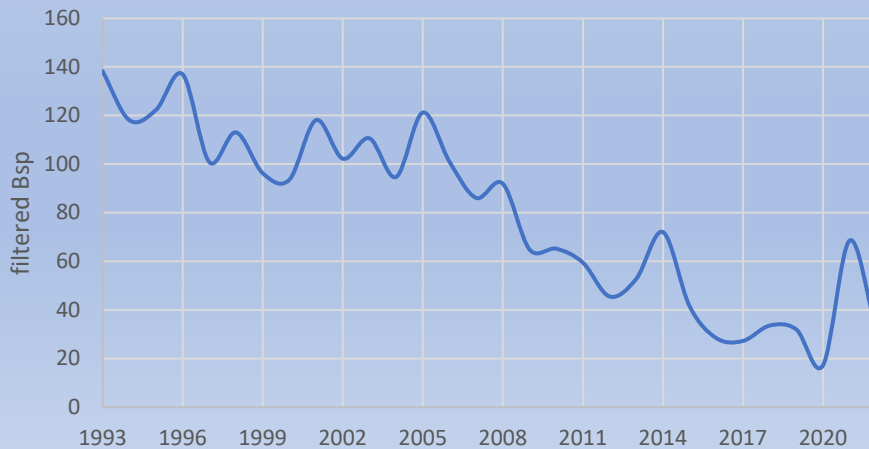
Great Smoky Mtns NP - GRSM1/2 Site
Winter



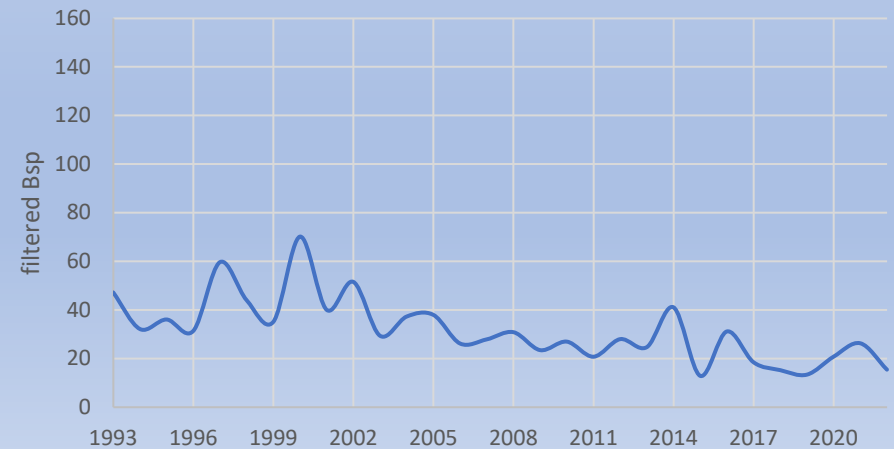
Great Smoky Mtns - GRSM1/2 Site
Spring



Great Smoky Mtns - GRSM1/2 Site
Summer



Great Smoky Mtns - GRSM1/2 Site
Fall



- New Scene Monitoring & Web Camera Deployment

Description

- Bosch Ultra 8000MP with 4-13mm Varifocal lens

Old Cannon SLR 12 megapixel



New Bosch Ultra 8000MP 8 to 12 MP



• New Scene Monitoring & Web Camera Deployment

Description

- Bosch Ultra 8000 MP with 4-13mm Varifocal lens

Advantages

- Significantly cheaper to acquire than digital SLR system (computer, camera, support hardware).
- No on-site computer required as is needed with digital SLR.
- Motorized back focus for remote focus adjustment.
- Bosch enclosure available with Power-Over-Ethernet for simplified wiring.
- Significantly lower maintenance expected.
- Easier to install

Disadvantages

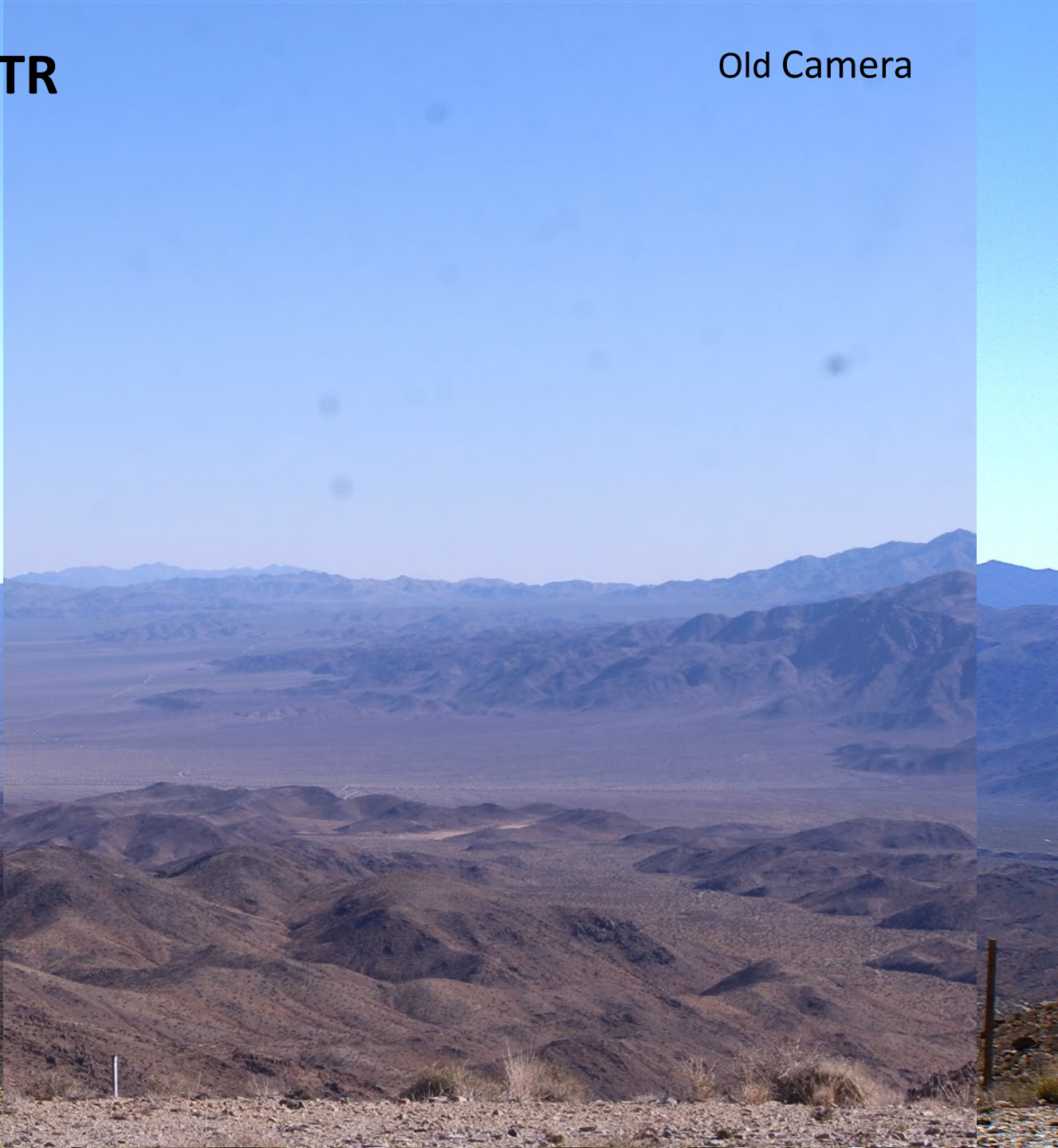
- Primitive color balance technology compared with digital SLR.
- Poor night performance (high gain image noise) compared with digital SLR. Not suitable for urban sites requiring night images.
- Smaller image sensor and lenses mean lower sensitivity and more distortion, especially at wide angles.
- Limited lens selection (limited fields of view) compare to digital SLR lenses.
- Still images cannot be saved on the camera. Images must be polled and saved remotely. No image backup in the event of onsite internet or remote polling failure.
- JPEG only, no raw output.

New Camera



JOTR

Old Camera



New Camera



PORE

Old Camera



Thank you