Air Resource Specialists, Inc.

National Park Service Visibility Monitoring Network

IMPROVE Steering Committee Meeting

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Nephelometer & Web Camera Locations

Nephelometer Network Changes 2020 – 2021

- The every two-year nephelometer full-service site visit scheduling has become more challenging due to GPMP contract cuts from twice-annual visits to one annual visit.
- The Teton National Park nephelometer was decommissioned and removed on October 4, 2021.
- Generally, NPS operator support has improved since last year during and after the pandemic lockdown.
- Testing for the Optec NGN2 nephelometer replacement continues.

Reasons to Replace the Optec NGN2 Ambient Air Nephelometer

The Optec 2, and associated support infrastructure, has been in service for over 25 years!

- Many parts are no longer available
- The manufacturer no longer supports the instrument
- The supply of instruments to cannibalize for parts is dwindling
- Data storage capability is low (2.5 days) compared to modern electronic instrumentation (months to years).
- The open-air inlet concept has chamber high RH limitations. Wall scattering climb is also rapid and episodic. Spiderwebs cause frequent noise and require cleaning. Precipitation can enter the chamber in the right conditions.
- The Optec power supply, data logging and user interface are not integrated.
- New technology and capabilities beckon.

Optec Nephelometer Replacement Candidate: Airphoton IN102

PROS

- 450 nm, 532 nm and 632 nm
- 7 to 170 degree integration angle
- Multiple particle size cuts achieved with variable flow rate and size selective inlet
- Chamber near ambient temperatures
- Used in Surface PARTiculate mAtter Network (SPARTAN)

CONS

- Environmental robustness
- Documentation and support
- No data collection software, data storage card
- Support has diminished in since the purchase of the test instrument.

Optec Nephelometer Replacement Candidate: Ambilabs 2 -WIN

PROS

- 525 nm and 635 nm
- $PM_{2.5}$ size selective inlet.
- 10 to 170 degree integration angle.
- Manufacturer has been anxious to help NPS test and reach operational goals

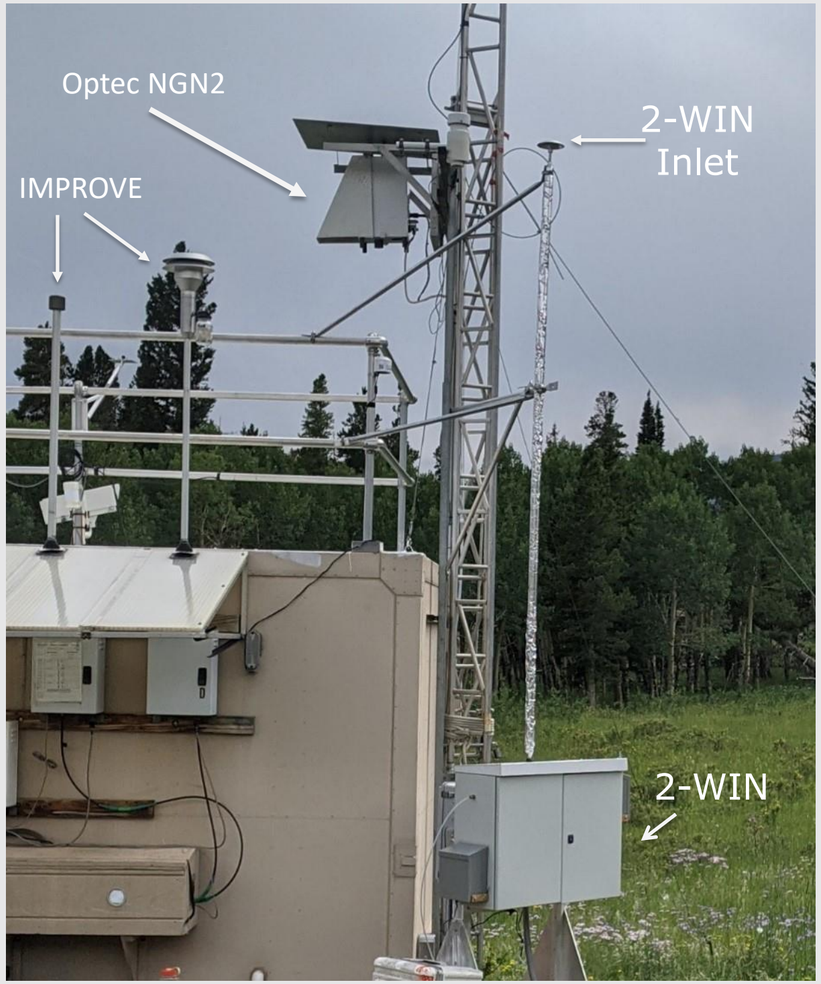
CONS

- Chamber temperature heated actively and passively
- Remote control changes are in manufacturer development.

Ambilabs 2 -WIN Testing

Summer 2021 testing found the primary chamber heat source to be the electronics.

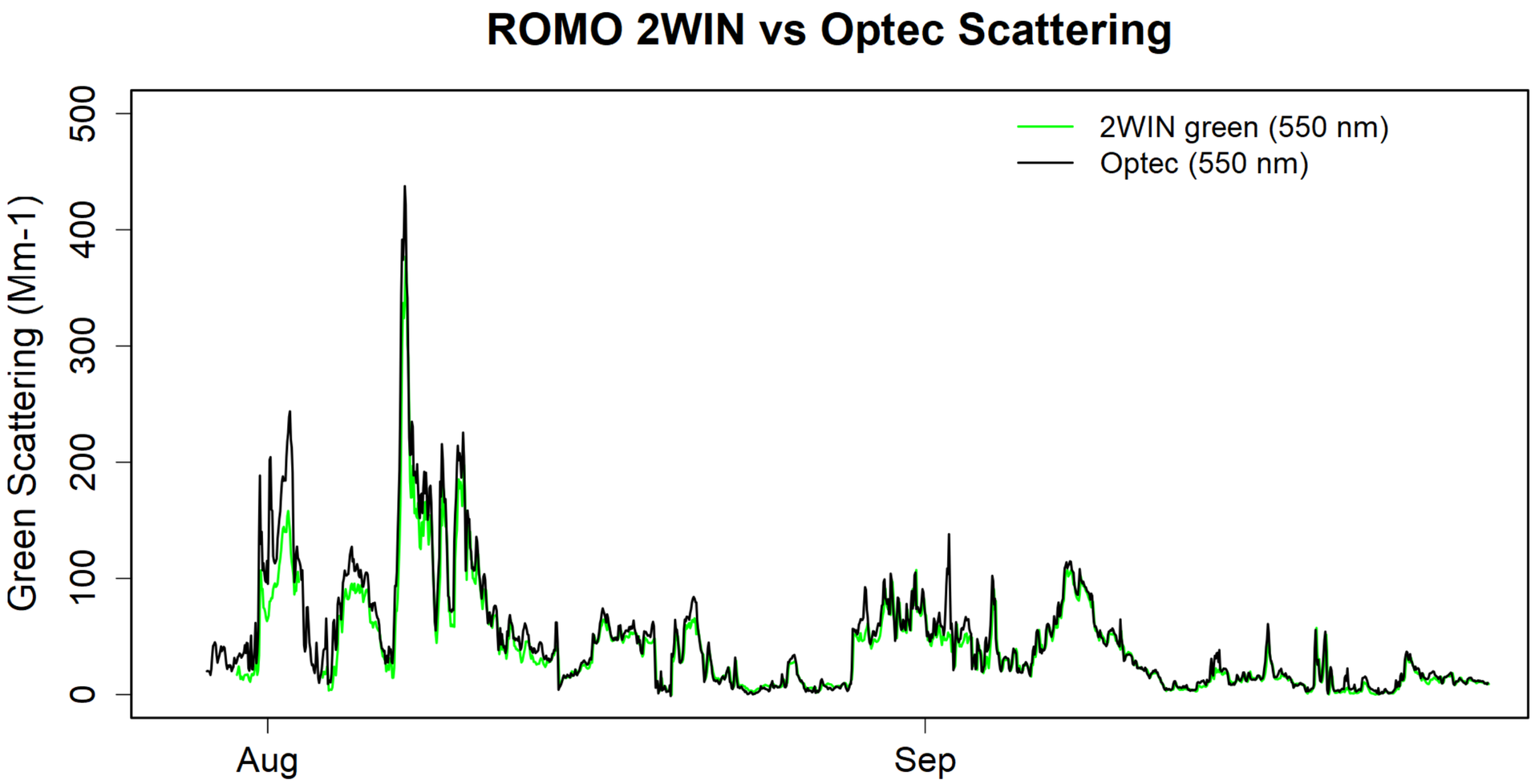
Rocky Mountain NP Nephelometer Comparison



AMBILABS 2 -WIN

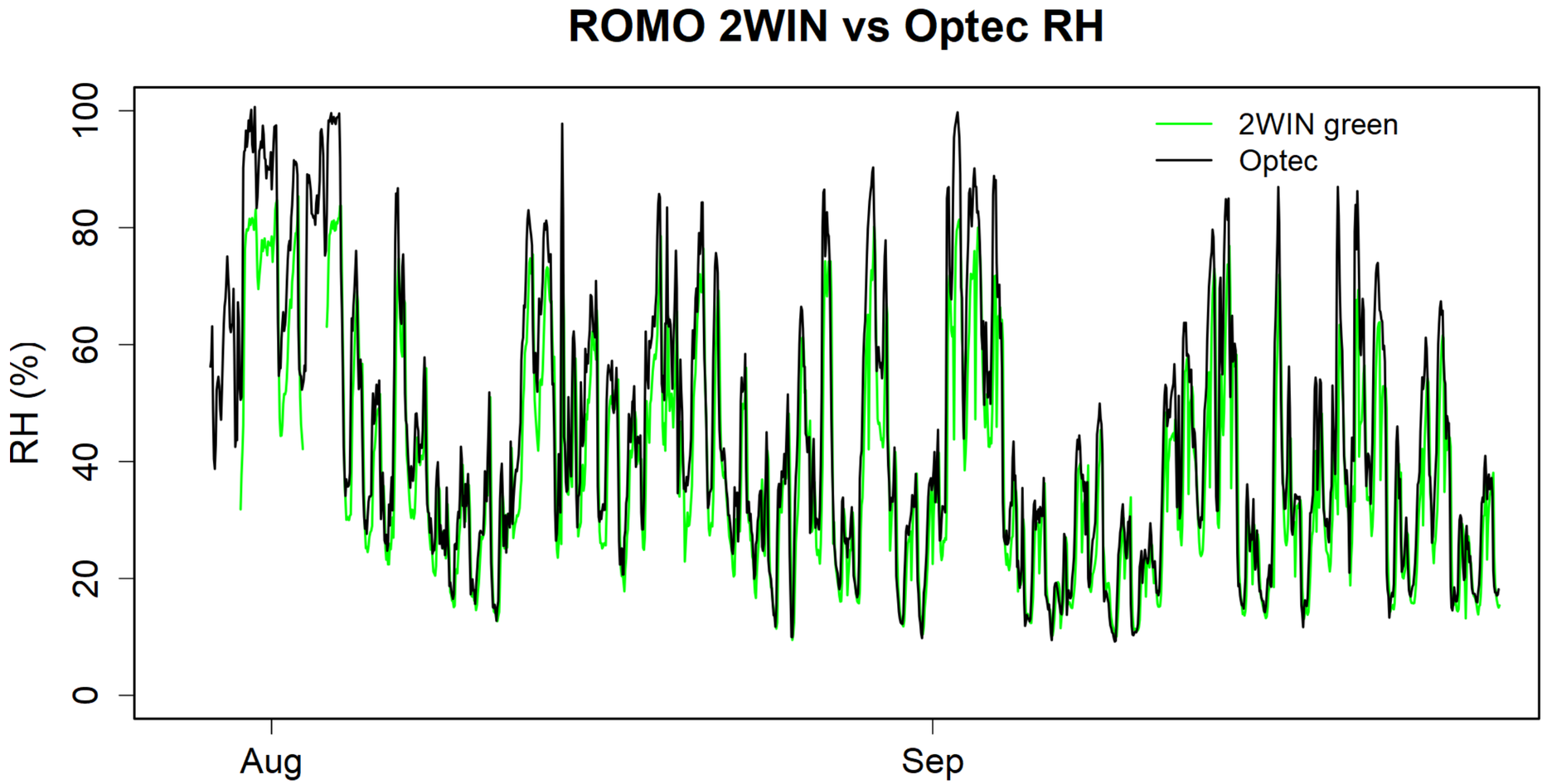
- 2-WIN was installed in July 2021
- Environmental enclosure and inlet installed near Optec and IMPROVE Sampler inlet height
- 2-WIN inlet insulated and reflective tape covered to mitigate temperature change
- Both 25 CFM enclosure fans replaced with 115 CFM fans
- 2-WIN inlet heater off for RH< 90
- 2-WIN instrument case opened to assist in removing waste heat

2-WIN Data Plot

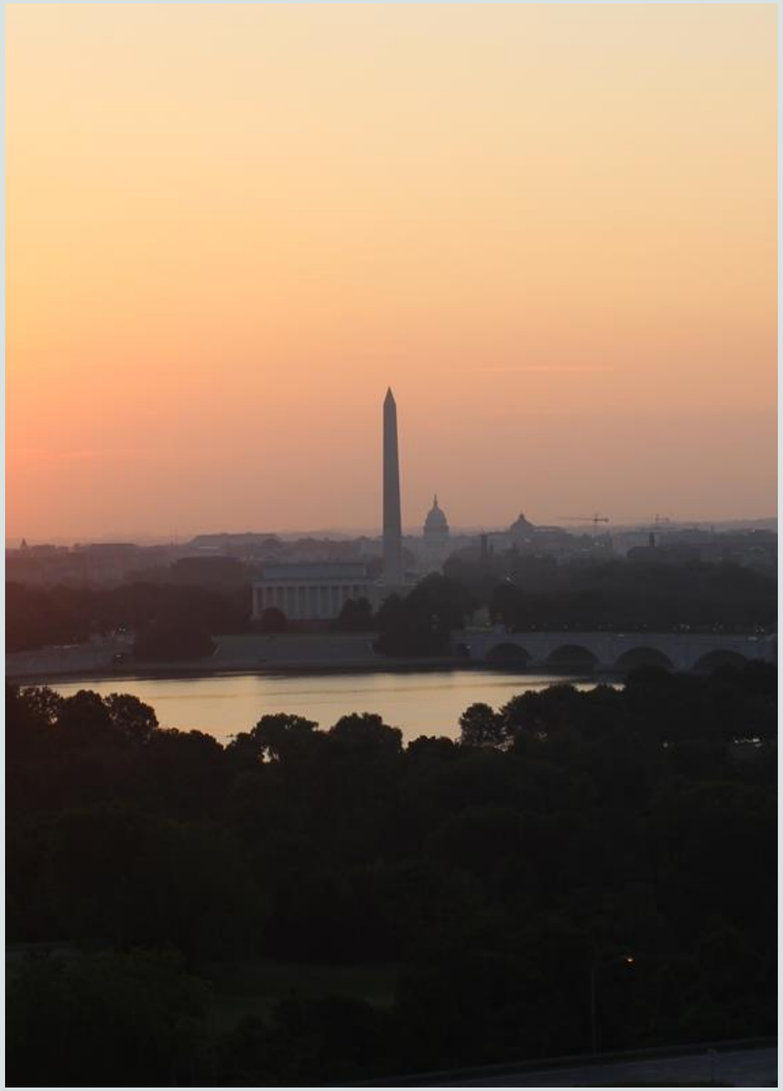


2-WIN compares well with Optec. Both are corrected to 550 nm. Optec is slightly higher, particularly in earlier time period.

2-WIN Data Plot



2-WIN is near ambient, but below Optec RH, likely accounting for small offset, but 2-WIN RH is well-known, and an upper threshold can be set (<90% RH) so we don't lose data.

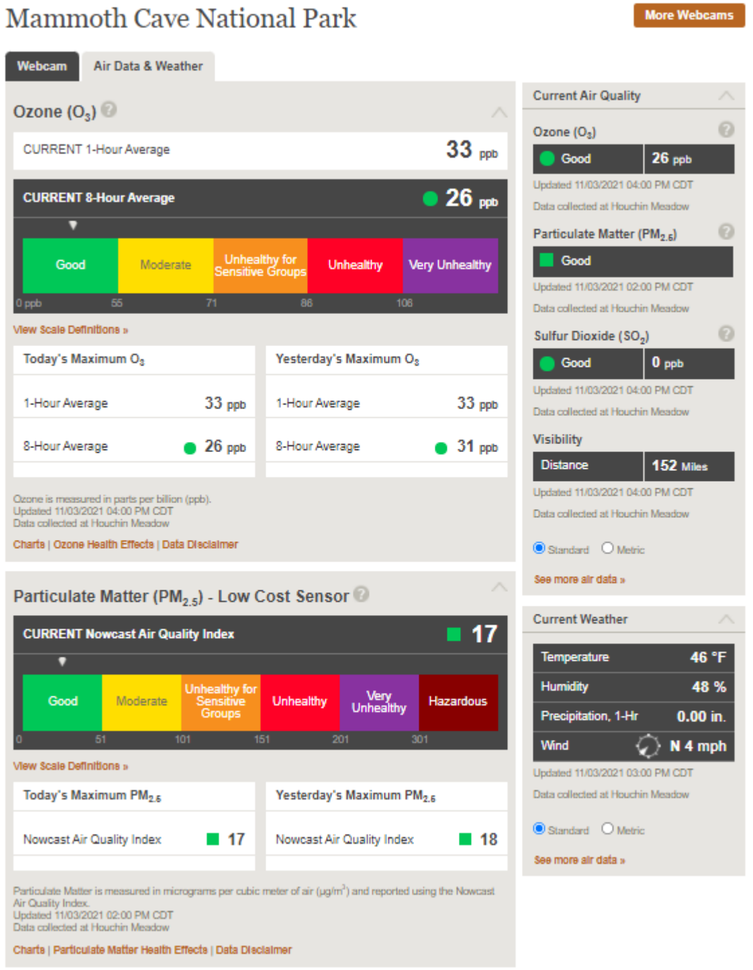


Webcam Network Operations

- The National Capital webcam system was rebuilt and re -installed in the newly reconstructed Netherlands Carillon at Arlington in August 2021.
- NPS Operator site visits remained curtailed in 2021 due to the pandemic and widespread wildfires.
- The Sequoia/Kings Canyon Lower Kaweah webcam system is back in operation wildfire in September 2021.
- NPS data and webcam sites moved from DOI servers in Denver to Amazon Web Services platform in September 2021.
- New image and data elements are now available for embedding in individual park pages at:

https://www.nps.gov/grca/learn/nature/airquality.htm

Low -Cost PM Sensor Data Integrated into Webcam and Live Data Websites



Questions?