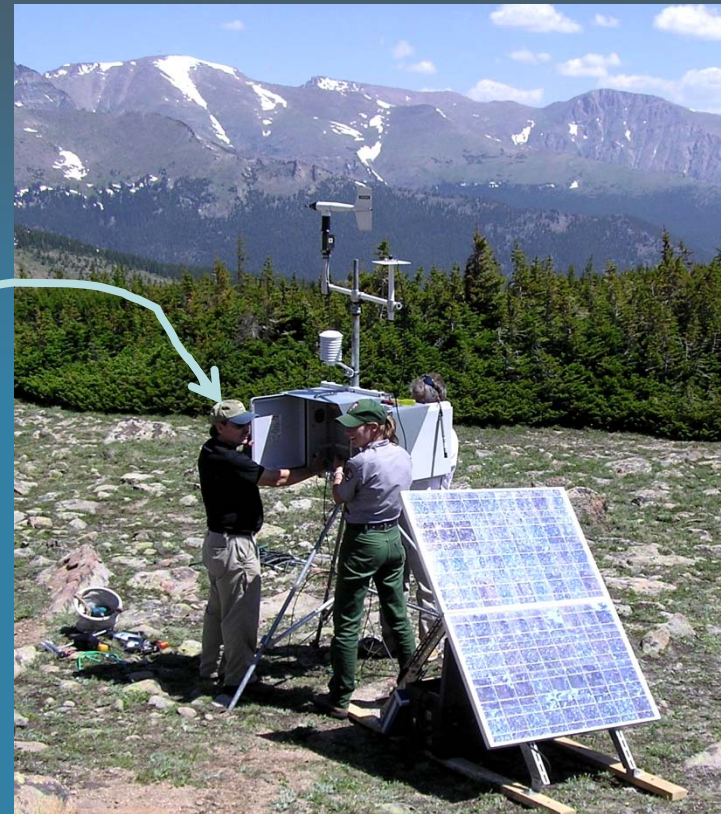


# Portable Ozone Systems for Survey Monitoring (POMS)

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## Topics to cover:

- Introduction
- Portable O<sub>3</sub> system basics
- QA/QC and performance



Rocky Mountain National Park at 11,500 ft



National Park Service  
Air Resources Division

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# NPS Portable Ozone - Basics

**The challenge** – measure ozone in remote park locations.

**Answer** – NPS Portable Ozone Monitoring System (**POMS**)

Self-contained system with:

- low-power ozone analyzer (*model 202, 2B Tech*)
- stand-alone weatherproof unit
- data logger / satellite communications
- weather parameters plus add-ons
- solar-powered
- stacked filter-pack option

Luggable - Unit can be carried short distances and assembled in the field.



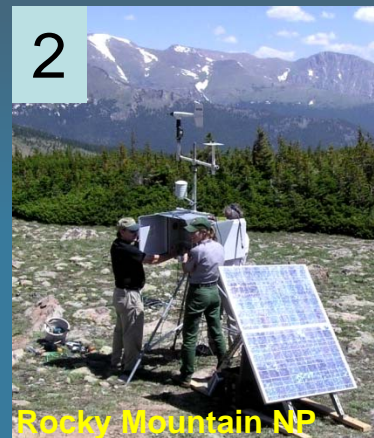
# Portable Ozone Monitor Configurations

Increasing cost, flexibility

More portable, fewer sensors



1. O<sub>3</sub> analyzer and calibrator, met sensors, **filter pack sampler**, satellite communication, supports added sensors



2. **Lighter tripod**, one analyzer, met sensors, Satellite communication, break down and carry in

3. **All in one box**, no Met, carry in, no data communication, limited solar power





# Examples: Adaptable Configurations



Latest version of the POMS II - -  
Sonic wind sensor plus  
ambient T and RH.



Inside the Mark I version of  
portable - -

- dual analyzers or
- analyzer plus calibrator



Inside the  
Instrument box

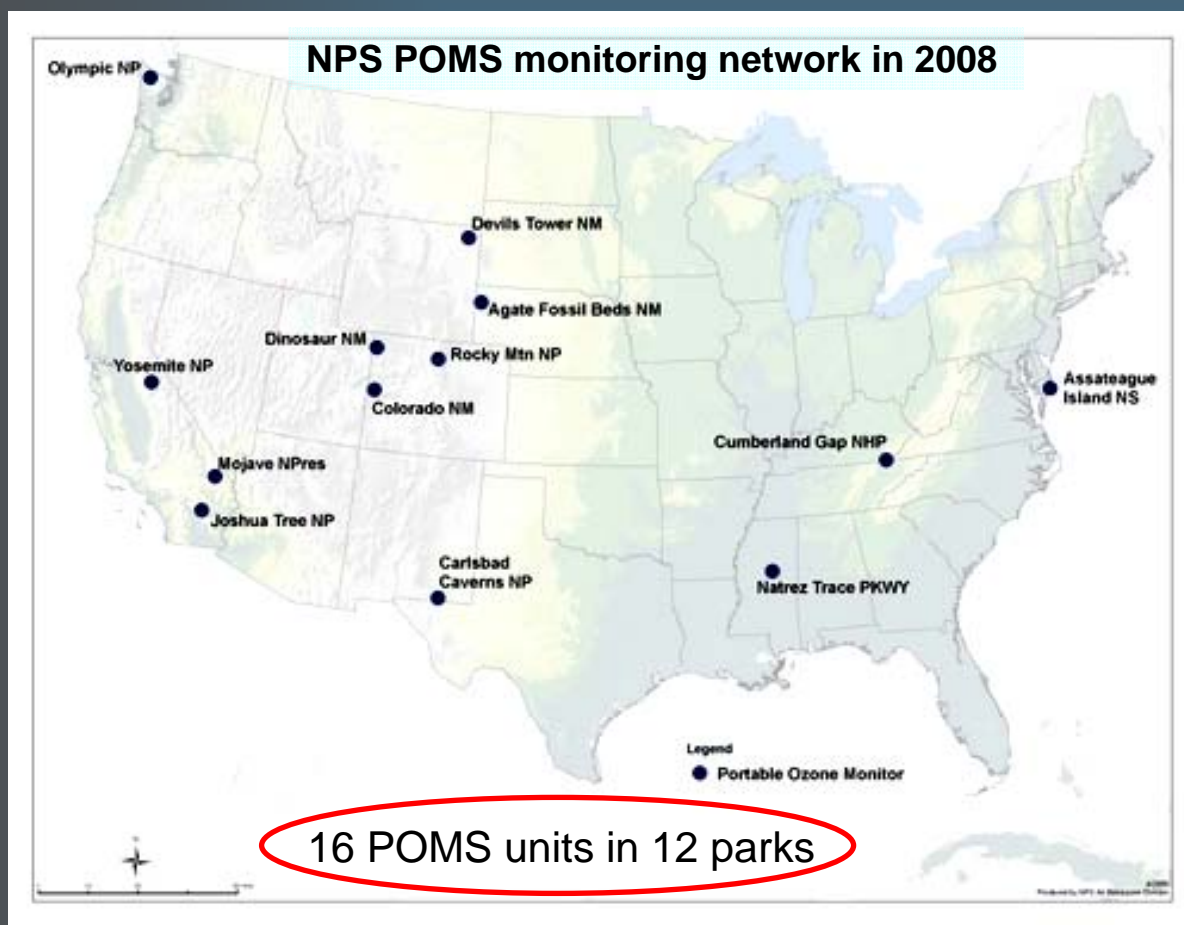
Single analyzer version - -

- Campbell datalogger
- solar power control
- satellite modem
- auto zero function
- fan, inside temp sensors

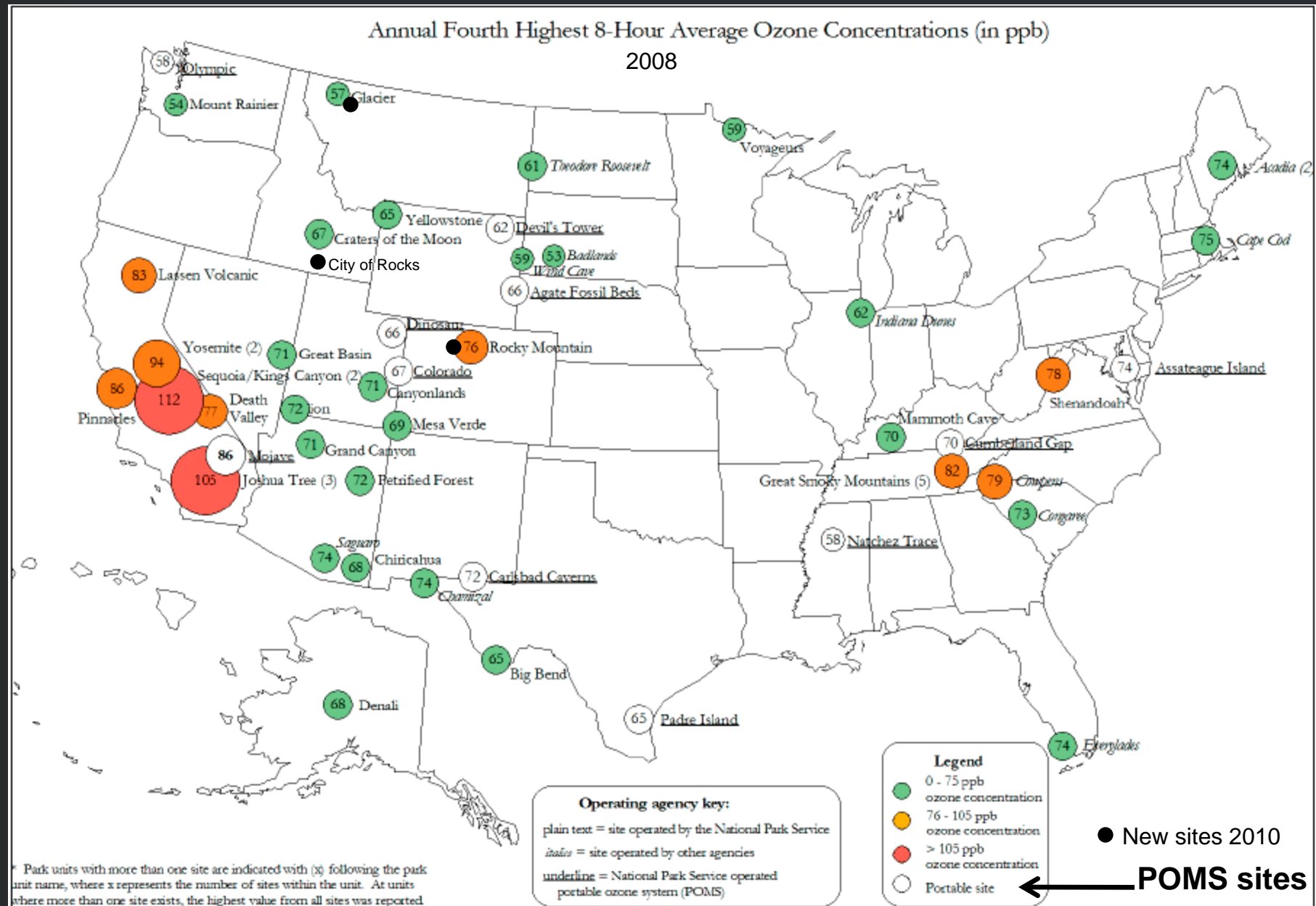


## Typical Uses of POMS

- Research projects, vegetation injury
- Survey monitoring – short-term
- Spatial distribution – multiple locations within a park
- Pre-regulatory monitoring (survey)

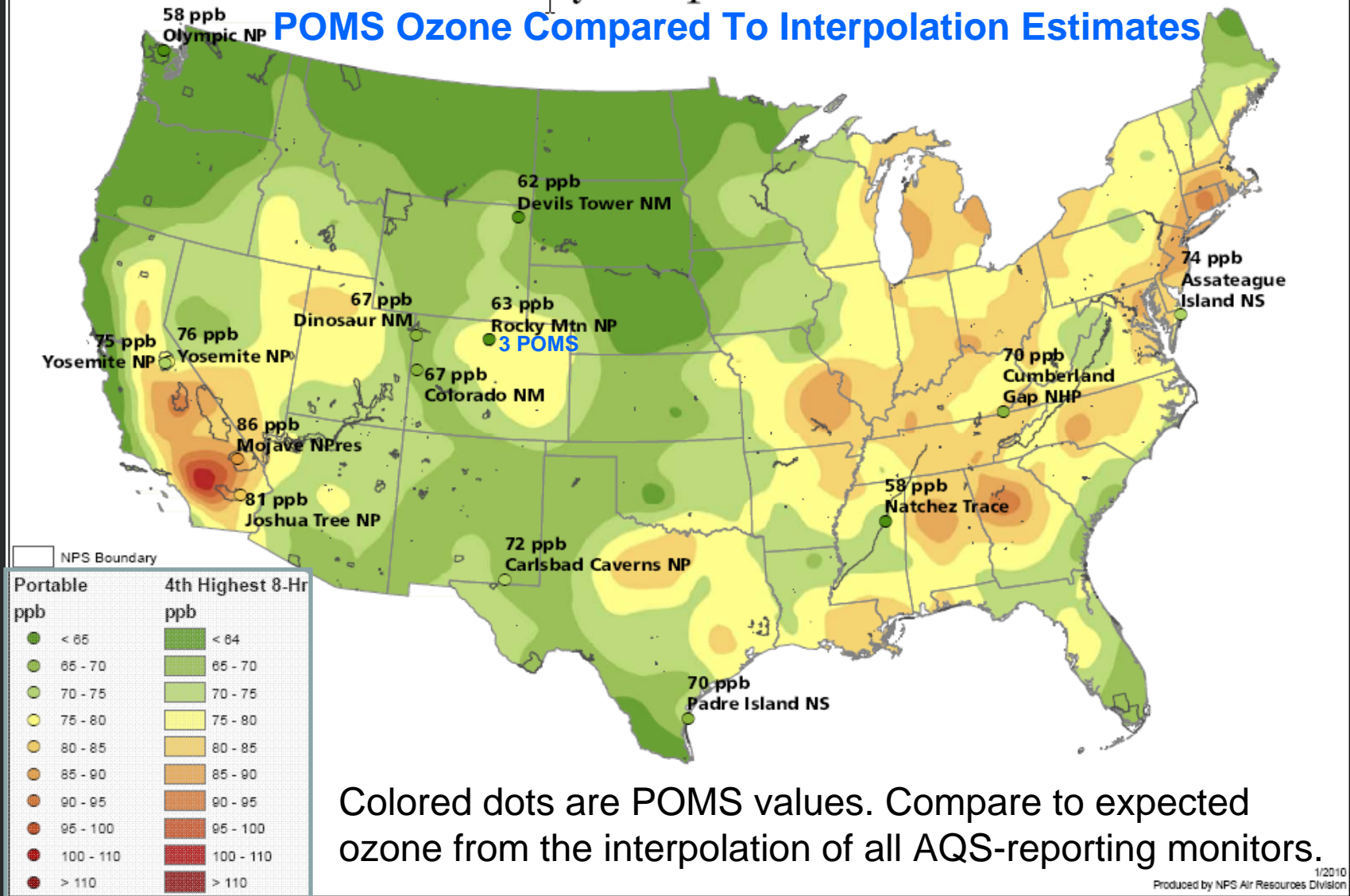


# Ozone Monitors – NPS Network and POMS



# 4th Highest 8-Hr Ozone May - Sept. 2008

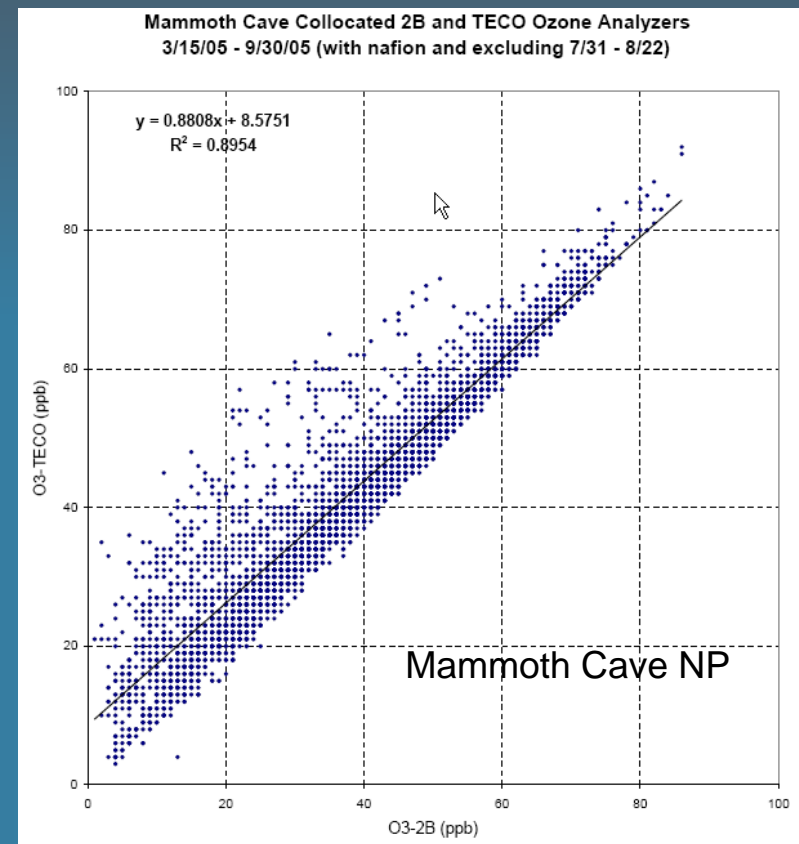
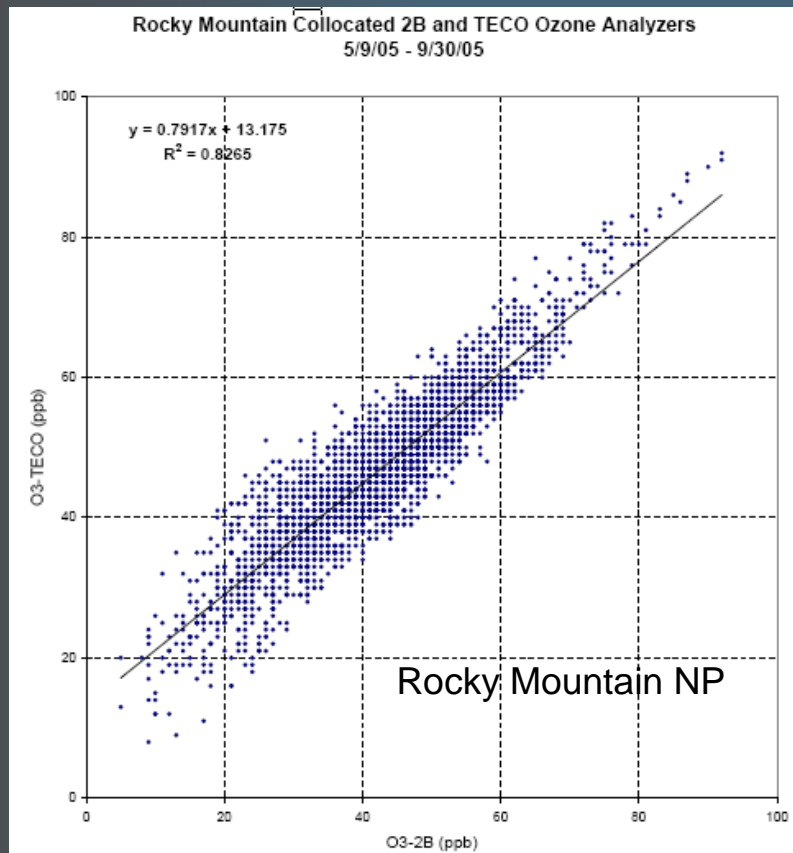
## POMS Ozone Compared To Interpolation Estimates





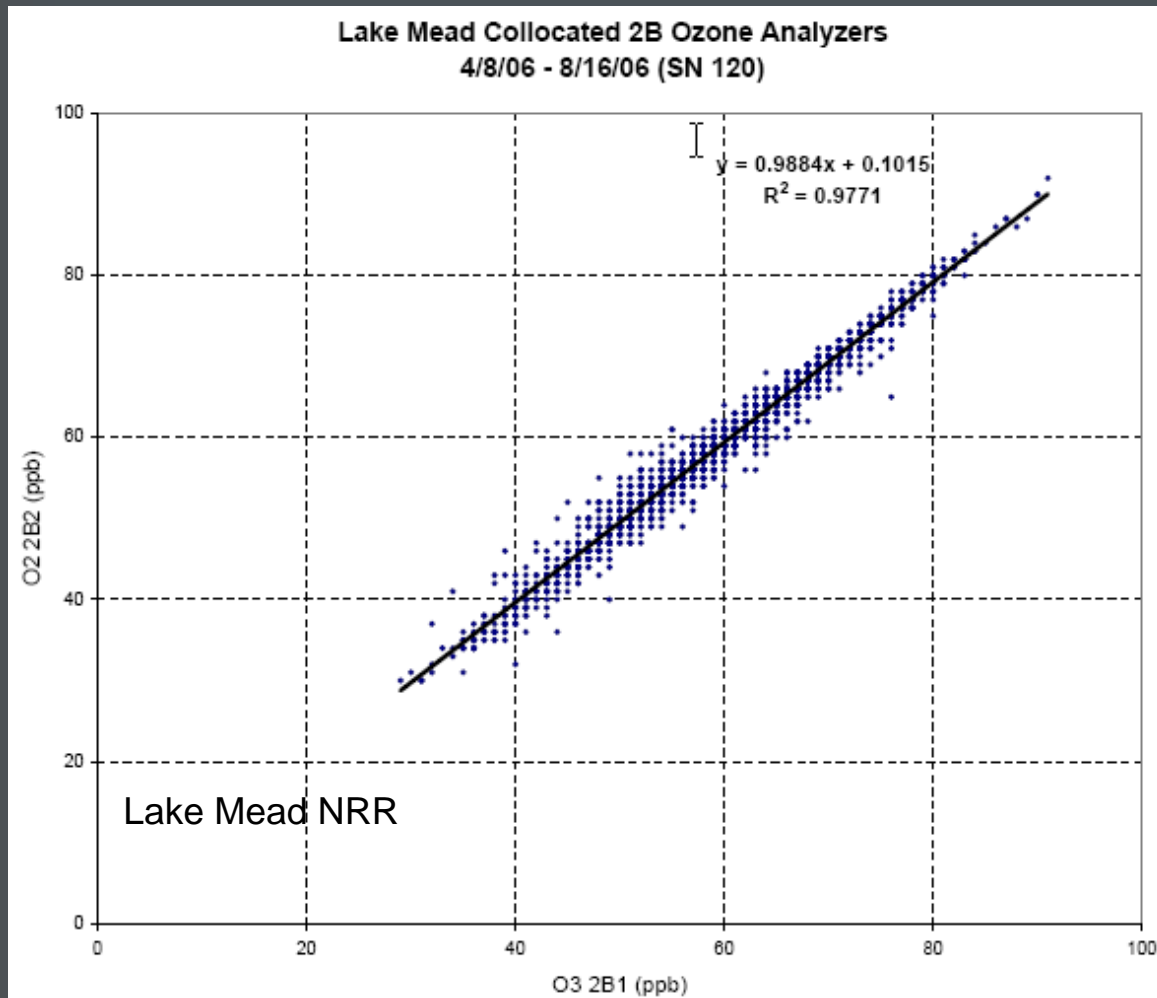
# Comparison with Certified Analyzers

**Co-located** portable ozone analyzers were compared to EPA equivalent method analyzers at field locations. Some differences due to inlet height observed.





# Comparison of Side-by-side Analyzers



Two analyzers run from the same shelter give repeatable results.



# POMS Quality

## Assurance

### Careful Operation and Documentation

- Quality Assurance Project Plan (QAPP)
- POMS Standard Operation Procedures (SOPs)
- POMS Operator's Guide Manual
- Station operation check list
- Wiring and setup diagrams
- Data Collection and Validation SOPs



Web page: <http://www.nature.nps.gov/air/studies/portO3.cfm>

# POMS Quality Assurance

## Quality Control

- Operator training
- Daily review of data and error codes
- Weekly operator checks
- Pre- and post- season multi-point calibrations
- Automated zero checks daily
- Calibration checks depend on site and configuration:
  - ♦ on-site calibrator with auto checks daily
  - ♦ side-by-side analyzers
  - ♦ field checks with a portable calibrator
- Instrument diagnostics daily review (remotely)
- Audits by independent agencies (some)
  
- Rigorous data validation
- Instrument swap-out when problems



# Experiences with the Analyzer

## Problem

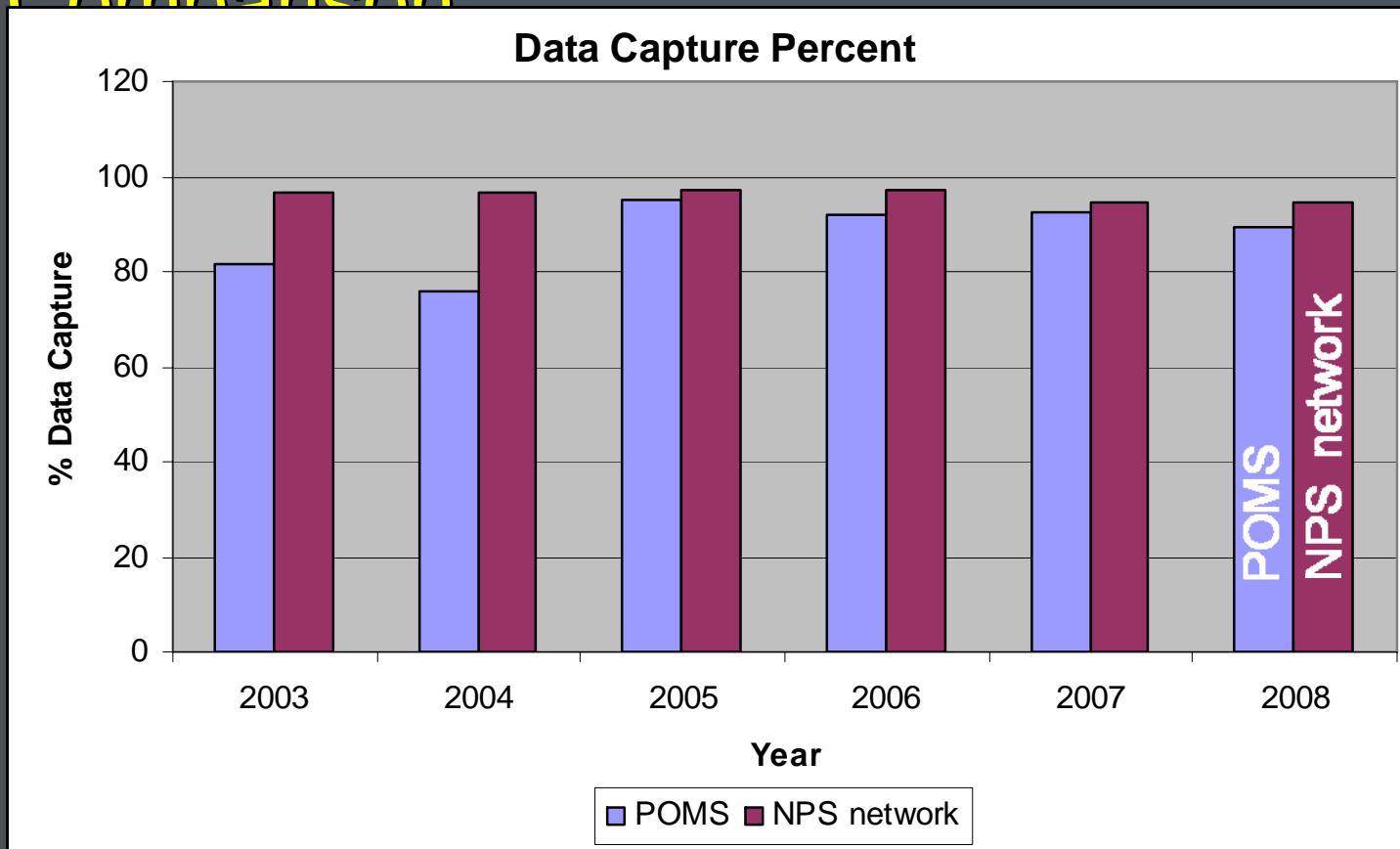
## Solution

Some RH sensitivity (only some analyzers)	Design of ozone killer changed; Nafion tube evens out RH changes
Pump failures (no air flow)	Swap out instruments; routine pump replacement based on hours of operation; dual pumps installed with automatic switch over.
Poor zero values on checks	Replace ozone killer annually; check for leaks; replace charcoal filter
Noisy ozone record	Replace UV lamps; routine replacement schedule, track noise on ozone signal





# Valid Data Capture Comparison



Data collection rates for the POMS network are good and have gotten better with experience. Slightly less reliable than regular network.



Data Access: <http://ard-request.air-resource.com/>

# Deciding what to use



## Portable ozone systems

### Advantages

- Flexible use and configurations
- Less expensive stations to install
- Less expensive to operate
- Can operate in remote locations
- Good choice for short periods

### Disadvantages

- Lack EPA certification
- Less robust than full-size analyzers
- Analyzer packaging not ideal
- Hard to do transfer standard checks currently (possible with a cost and power-use penalty)

