Meeting of the NADP Joint Subcommittees
Spring 2007 Agenda v2
(3-15-07)

Wednesday, April 11, 2007 8:00 – 12:00 AM

8:00 Welcome and introductions, Marty Risch
Old business:
Approval of minutes from Fall 2006 meeting, Norfolk, VA
Status of motions

Standing reports:
8:10 Program Office, Van Bowersox
8:40 Quality Assurance, Chris Lehmann
9:00 Mercury Deposition Network, David Gay
9:30 Mercury Analytical Laboratory, Bob Brunette
10:00 Break
10:30 Central Analytical Laboratory, Karen Harlin

New business:
11:00 Ammonia monitoring network, Gary Lear, Van Bowersox
11:45 Preview of subcommittee agendas
Network Operations Subcommittee, Marty Risch
Data Management and Analysis Subcommittee, John Ingrum
Ecological Response and Outreach Subcommittee, Pam Padgett
12:00 Lunch

Thursday, April 12, 2007 1:30 – 5:30 PM

Special briefings:
1:30 NAPAP, Doug Burns
1:40 NARSTO Multi-Pollutant Assessment, Rich Scheffe

Reports of the subcommittees and work groups
2:00 Network Operations Subcommittee, Marty Risch
2:30 Data Management and Analysis Subcommittee, John Ingrum
3:00 Ecological Response and Outreach Subcommittee, Pam Padgett
3:45 Break
4:00 Quality Assurance Advisory Group, Chris Lehmann
4:20 Critical Loads Work Group, Rick Haeuber
4:35 Mercury Dry Deposition Work Group, Eric Prestbo

Upcoming meetings discussion and announcements
5:00 Executive and Budget Committees, June 2007, Maggie Kirchner
5:10 Fall Technical Committee, September 2007, Van Bowersox for Tom Butler
5:20 Spring 2008 Joint Session Location Straw Poll, Greg Wetherbee

NADP FALL MEETING

10-13 September 2007
Millenium Harvest House, Boulder, CO

Wet and Dry Deposition Measurements

Do We Have the Total Picture?

Abstracts due Friday July 20

See http://nadp.sws.uiuc.edu/announce/boulder/

11 Sep Sessions	Possible Speakers
Greenhouse Gas Mitigation	Jeff Logan on carbon capture and sequestration
Angela Zahniser	Speaker on "Wedges Theory" of mitigation (see recent TIME magazine cover article)
	Possibly someone from Heinz Center
	Sally Greenberg from Future Gen
Total Nitrogen Deposition	Canadians will speak about NH3 network & maybe also NO2 deposition
Tom Butler	Kathy Weathers topic to be announced
	Bruce Hicks on perils of dry deposition measurement
	Jeff Welker topic involving isotopes
Ecological Impacts	Pam Padgett

Evening Poster Session & BBQ will occur in outdoor pavilion (Wx permitting)
[Tom says, "tofu-fed beef will be available for people who don't eat meat."]

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12 Sep Sessions	Possible Speakers
Deposition in Alpine Ecosystems	Several talks on research in Rocky Mountain NP
Jill Baron	vegetation fertilization effects, ecosystem modeling, source attribution, and atmospheric modeling
Critical Loads	Ellen Porter
Total Mercury Deposition	**Eric Miller**
David Gay and Eric Presbo	**Eric Edgerton**
	Steve Lindberg
	Diane Orihel (Metallicus)
	Tom Atkison
	Winston Luke

(The sessions are flexible at this point and hopefully we will get a fair number of people submitting abstracts. Twenty-minute talks are planned, though this could be reduced to 15 minutes, if we get a large number of speakers.)

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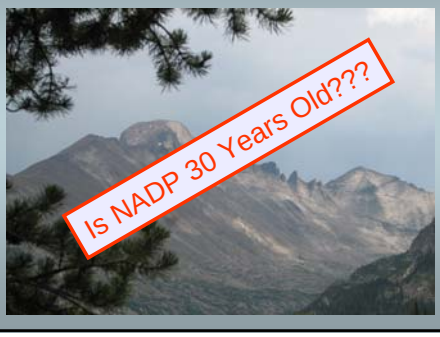
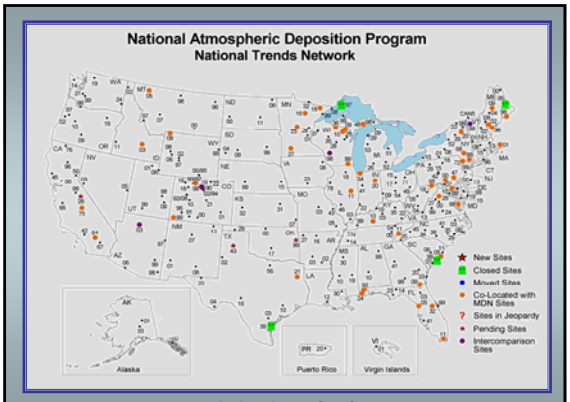
13 September, Optional Field Trip ($40)

Kristi Morris is organizing a field trip to Rocky Mountain National Park: one-hour bus ride, guided hikes in the alpine areas, picnic lunch, and talks on air quality, ecosystem research and wildlife issues in the Park.





250 + 6 study sites

Movin' On Up

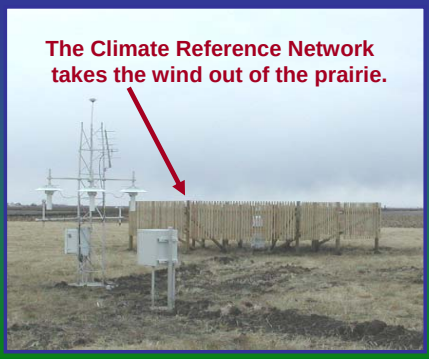
For year-round operations at NTN sites with frozen precipitation comprising 60% or more of the annual total, install the new linear actuator drive mechanism designed by NED staff and install a taller collection container.

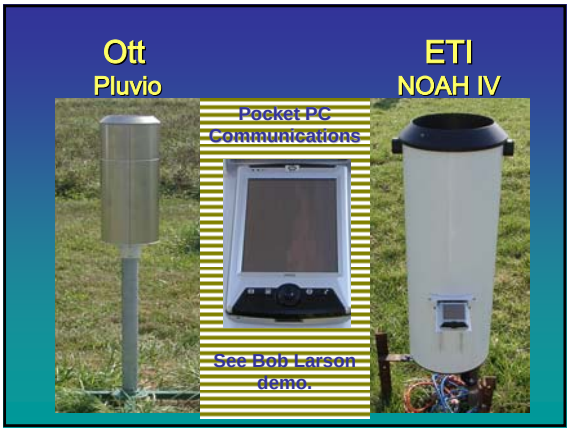
- **year 1- sites with >70% fzn precipitation**
- **year 2- sites ≥ 2,000 m elevation, pending success of year 1 modifications**

High Elevation Sites

Site ID	Site Name	Elevation	Funding Agency
CO02	Niwot Saddle	3520	NSF/INSTAAR-Univ of Colorado
12-year record with 232 snow weeks: *Eff* = 10%			USFS
			USFS
CO96	Molas Pass	3249	USFS
CO97	Buffalo Pass - Summit Lake	3234	USFS
12-year record with 233 snow weeks: *Eff* = 31%			USFS
			EPA
CO98	Rocky Mountain NP - Loch Vale	3159	USGS-BRD
13-year record with 203 snow weeks: *Eff* = 22%			UC - InstAAR
			Air Sciences Inc.

David Gay will report on status and plans.





Action – Change NADP Subcommittee structure by having Subcommittees report only to the Executive Committee and eliminating the Technical Committee in this reporting structure and as a decision-making body.
> Moved. Seconded. Carried.

The NADP *Quality Management Plan* needs to be changed to reflect this decision, as well as changes in subcommittee charges. Draft changes to be submitted for Executive Committee review by 10 May.

The NADP Vision

- Remain one of the nation's premier research support projects
- Serve scientists and educators
- Support informed decisions on air quality issues related to precipitation chemistry
- Respond to emerging issues
- Efficient measurement system
- **Meet data quality objectives**
- **Chris Lehmann and QAAG are finalizing new QAPP**

NADP Quality Management Status Report

Christopher Lehmann,
NADP QA Manager

NADP Interim Subcommittee Meeting
April 2007

Quality System Documents

- Network Quality Assurance Plan in progress
  - Quality Assurance Advisory Group (QAAG) finalizing Data Quality Objectives document
  - Draft of QAPP in progress
  - Archiving of Site Selection & Installation Manual
- Revisions to Quality Management Plan (QMP)
  - Revising "Guidelines Governing the NADP" to reflecting changes in NADP governance
  - Minor revisions to QMP needed
    - Changes in how SOPs are reviewed/approved by committees
    - Changes in how laboratory review findings are addressed

Quality System Documents

- Mercury Analytical Laboratory (HAL) QA Plan received in draft form
  - QA Manager & MDN Coordinator will compile comments for HAL by April 30
  - Anticipate approval by Exec. Committee meeting
- Proposed Central Analytical Laboratory (CAL) QA Plan revisions received
  - Anticipate approval by Exec. Committee meeting

Quality Systems Review

- Evaluates "adequacy of the Quality System" (NADP QMP)
  - Is the NADP's QS documented and fully implemented?
  - Do NADP activities comply with the QMP?
  - Are procedures outlined in the QMP implemented effectively?
  - Does the NADP's QS ensure data of sufficient quality to meet DQOs?
- First review in 2004, next review in 2007?
- Discussed by QAAG today…

Laboratory Reviews

- CAL Review (June 2006)
  - Team members
    - Mike Kolian (EPA) – Team Leader
    - Greg Wetherbee (USGS)
    - Lara Autry (EPA)
    - David Maxwell (NPS)
    - Mary LeFaivre (ISWS)
    - Chris Lehmann (ISWS)
  - CAL written response received
    - Approval on tomorrow's agenda for NOS/DMAS
    - Follow-up action items discussed by QAAG today
  - Review 1-yr follow-up report by EC meeting

Laboratory Reviews

- HAL Review (November 2006)
  - Team members
    - Greg Wetherbee (USGS) – Team Leader
    - Steve Brooks (NOAA)
    - Sean Lawson (VT Monitoring Cooperative)
    - Andrew Heyes (Univ MD)
    - Chris Lehmann (ISWS)
    - Bob Larson (ISWS)
  - Review findings on tomorrow's NOS/DMAS agenda
  - Written response anticipated soon

Laboratory QA Reports

- HAL 2005 QA Report
  - Anticipate approval by QAAG today at lunch
  - 2006 QA report in progress
- CAL 2003-2004 QA Report
  - Draft received at Program Office
  - Format streamlined to facilitate data processing
  - All reports through 2006 anticipated by Fall Technical Committee meeting

External QA Programs

- USGS Sponsored QA
  - Collocated sampling (new equipment)
  - Field audit / system blank samples (NTN/MDN)
  - CAL & HAL Laboratory Blind Samples
  - Interlaboratory Comparison
  - Come to NOS this afternoon…
- EPA Sponsored QA
  - Site Systems and Performance Surveys
  - Come to NOS this afternoon....

Field Operations Manuals

- Revisions to NTN and MDN site operations manuals in progress
- Should we restructure our field manuals?
  - Need flexibility to incorporate new equipment
  - Need flexibility in operator training
  - Come to NOS this afternoon….

Quality Assurance Advisory Group

- Meeting over lunch today (others invited)
  - CAL review follow-up
    - Use of MDLs to flag NTN data
    - Procedures for documenting corrective actions
  - Quality Systems review
  - Data Quality Objectives document
  - Approval of QA Reports
  - AIRMoN stick gage bias
  - Electronic precipitation gage checks

General Activities

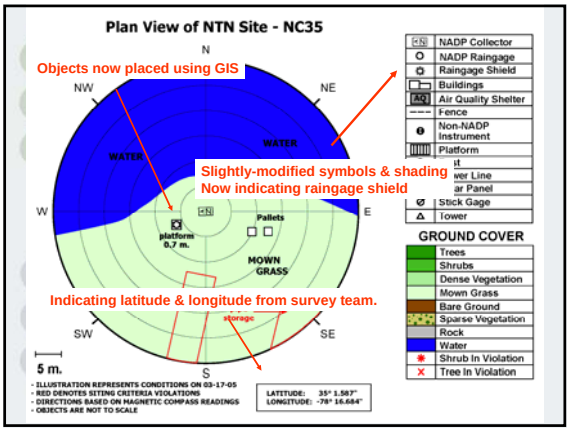
- *WASP:Focus* manuscript in press (ammonium / sulfate trends)
- Jane Rothert and Chris Lehmann working with UIUC statistics students to evaluate impact of laboratory methodology and equipment changes on chemistry trends
  - Change in FIA instrument standard
  - Change from AAS to ICP-OES

Site Surveys

- U.S. EPA-supported Site Systems and Performance Surveys
  - All 2004 reports received at PO and issued to sites (102 surveys)
  - 2005 reports received through April (28 received/4 issued)
  - Changes made to survey program

Site Survey Changes

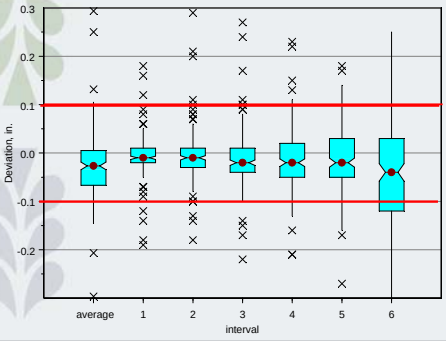
- Clarified review of operator maintenance procedures
- Modified site observations
  - WAAS-enabled GPS readings; siting compass for site objects
  - Identify/photograph collocated non-NADP instruments
- Instruct site operator in performance of maintenance tasks to collector & raingage



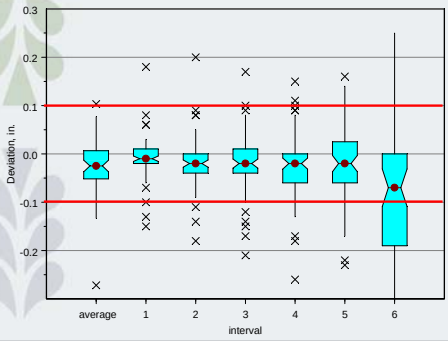
NTN & MDN Raingage Performance

- ATS verifies calibration of raingages using standardized weights at each 1" interval
- Gage tolerance = 0.1"
- Raingage performance, 2002-
  - 47% of NTN gages pass 0-6"
  - 33% of MDN gages pass 0-6"

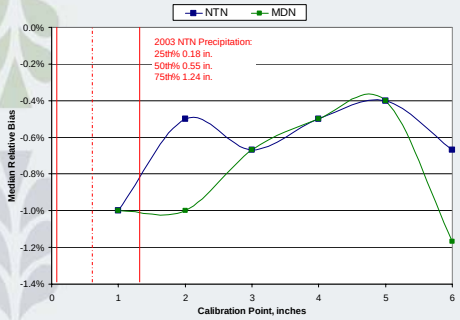
NTN Raingage Performance



MDN Raingage Performance



Median Bias



Response to July 2004 Quality Systems Review

- Reviews occur every 3 years. This was the first review.
- Purpose of review:
  - Ensures that NADP activities comply with the NADP Quality Management Plan.
  - Ensure that the NADP's Quality System is documented and fully implemented.
  - Ensures that NADP data is of sufficient quality to meet Data Quality Objectives (DQOs).

Review Details

- Review team:
  - Terry Schertz, USGS
  - Richard Grant, Purdue University
  - Martin Risch, USGS
- Review occurred on July 14-15 at NADP Program Office in Champaign, IL
- Review team's report presented at Fall 2004 NADP meeting

Review Findings and Response

- QMP was deemed adequate and "thorough in scope." Additional QA documents in preparation.
- Revised network QA Plan (completed draft by Fall 2005)
- Complete data management SOPs (completed in 2005)
- HAL QA Plan (draft in review)

Findings and Response, cont.

- "The typical approach is to keep adding requirements and details in the documentation, but the danger is that it will become too unwieldy to be useful. The difference will be critical to keeping the QMP in a role of supporting the work of NADP instead of eventually becoming more work than it is worth."
  - QA programs support NADP science

Findings and Response, cont.

- Procedures needed for phasing in new field equipment and evaluating changes in data quality for data users
  - Final decision on field equipment has not been made.
  - QAAG will assist in evaluating changes in data quality

Findings and Response, cont.

Development of Data Quality Objectives (DQOs)

- "If a DQO is established, there should be a reason why it must be met by NADP and a corrective action plan if it is not met.
- Given the wide ranging end-user objectives for the NADP data, the more appropriate approach may be to use available QC data to estimate the variability in the results and provide that information to the users.
  - The review team could not find a compelling reason for the NADP to do more than quantify the quality of the data.
  - That information would be a valuable addition to the available datasets and of great value to the data users.
- If the quality of the data is shifting significantly over time, then some corrective actions may be required, but the existing external QC programs have not indicated any such problem."

Findings and Response, cont.

- Data quality will be assessed and communicated in a format that meets needs of data users
- Benchmarks set to evaluate trends in data quality over time

Review Findings and Response

- Draft response reviewed by QAAG at 2005 Interim Subcommittee Meeting, recommended to Executive Committee that report be approved with minor changes

Field Calibration of Belfort Raingages

- Issue raised to address calibration/verification of Belfort Raingages between ~3-yr on-site Surveys
- Spring 2004 NADP Meeting:
  - A task group formed to develop site operator procedures and SOPs for calibrating rain gages and maintenance and to report these findings to NOS at the 2004 Fall Technical Meeting.

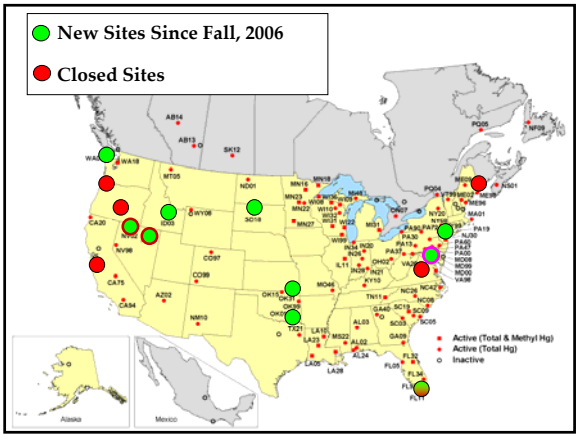
Mercury Deposition Network Update

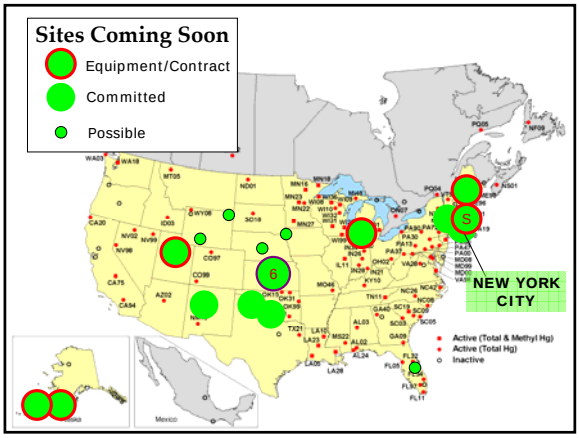
David Gay
Program Office

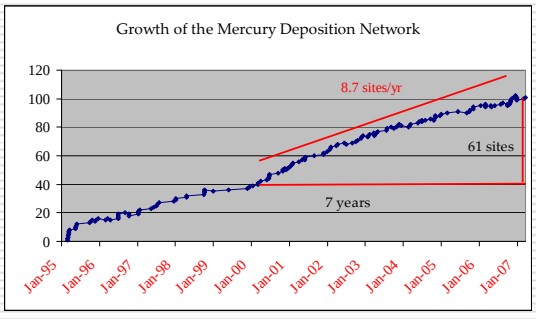
Spring 2007

Current Network

- **101** Active Sites Total Mercury Sites
- 21 Methyl Mercury Sites
  - 5 daily (LA, WI)
  - 16 four-week composite
- 3 Inter-comparison Sites
  - WA18, VT99, WI36
- 6 Urban Sites
  - Reno, Portland, Milwaukee, Orlando, Jersey, Indianapolis
- 47 Co-located with NTN Sites

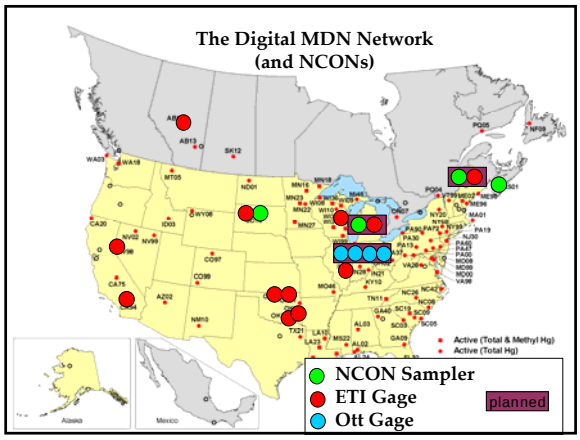






Interesting Possibility

- State of Kansas
  - Legislation Passed Friday
  - Six across the state
- Large Addition in Florida,
  - "daily" sampling possible
- Two, three in Nebraska
  - 1 for sure, 2 likely



Web Data Update

- I have said this before, but the Methyl Data
  - Really really really almost there
  - For 2002 and beyond, attend DMAS for last motion, then turn it on when we get home
  - Delay with HAL audit requirement
- <2002 data is being processed at PO now
- 2006 data
  - Coming in now with total mercury data
  - Incorporated into the same data base
  - B. Larson is happy with format.

Data To Program Office

- HAL is processing data much faster than required
  - i.e. January data at PO by the end of March
  - Since Jan 2006 measurements
  - With fewer problems and in correct format

Other: Service Above and Beyond WA 03

QC Highlights

- 2006 HAL Audit Complete
  - Report here at the Spring Meeting
  - Response coming
  - Plan to Complete Quickly

News

- LODA Sampler Cost Decrease
  - LODA Price decrease
  - MDN Sampler is now $4545 (NTN= $3145)
- 3rd MDN Site Operator's Training
  - Seattle, Oct 2006.

MD00 Operating

- At 250 feet, on top of a Tower
- "Research Site" and will not go into contouring routine.

Coming Next……..

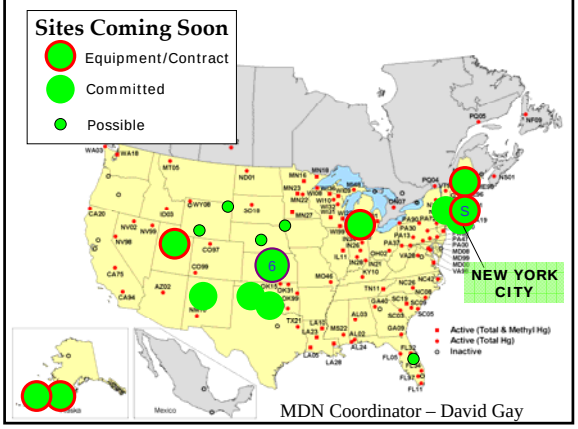
- ME00 on or about May 1
- MI29 June
- UTxx (Salt Lake) July

Mercury Deposition Network
Hg Analytical Laboratory (HAL)

HAL/NOC Report
NADP Spring Meeting

Robert C. Brunette
HAL Director

Burlington, Vermont
April 11, 2007



MDN Coordinator – David Gay

HAL Capacity And Preparation For Network Growth

- Frontier – HAL/NOC Now For 12 Years = 101 Official Sites
- HAL Total Hg Wet Dep Samples To Date: ~ 50,000
- HAL Methyl Hg Wet Dep Samples To Date: ~ 5,000
- HAL Annual THg Analysis Load ~ 5000 Samples/Year
- HAL Analytical Capacity – 1800 Sample/Month (21,000/Year)
- Currently - 8.0 HAL Staff
- 5 Additional Frontier Staff In Support Positions
  - > Data Review
  - > Quality Assurance
  - > Trace Metals Analysis
  - > Methyl Analysis
- Purchased Supplies To Support 10 New Sites

MDN Site Start-Up Program
CA20 Klamath, California (Aug 2006)

MDN Site Start Up Program

- MDN Sponsor $500 Fee
- Equipment Set-Up
- Equipment Performance Test
- Site Operator Training

MDN Site Start-Up Program

Advantages Of MDN Site Start-Up Program:

- Site Operators Get:
  - 1:1 Hands On Training
  - Equipment Orientation, Theory, Function
  - Equipment Performance Tested/Ensured Working And Adjusted
  - Full Understanding Of Weekly Sampling Protocol
  - Site Starts Operations At High Level = Good Data Generation
- HAL Performs MDN Site Start-Up Program - West Of The Mississippi
- PO Performs MDN Site Start-Up Program - East Of The Mississippi

Recent and Upcoming MDN HAL Site Start-Ups

- CA20 – Klamath, California
- AB13 – Alberta, Canada
- ID03 – Craters Of The Moon, NP
- WA03 – Makah, Washington
- Alaska Sites (Kodiak Island) – May 2007

MDN Total and Methyl Hg Data Delivery Schedule

Transition To Monthly Data Delivery Schedule – 4th Qtr 2005

December 2006 Data Delivery
- ***Feb 12, 2007 – Released To Site Ops***
- ***March 1, 2007 – Site Op Review Due***
- ***March 6, 2007 – MDN Final Date Released To PO***

January 2007 Data Delivery
- ***March 5, 2007 – Released To Site Ops***
- ***March 26, 2007 – Site Op Review Due***
- ***March 30, 2007 – MDN Final Data Released To PO***

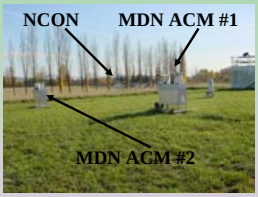
February 2007 Data Delivery Schedule
- ***April 2, 2007 – Release To Site Ops***
- ***April 24, 2007 – Site Op Review Due***
- ***April 30, 2007 – MDN Final Data To Be Released To PO***

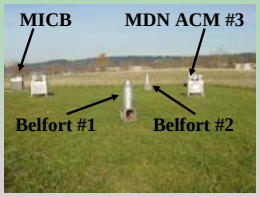
MDN HAL Data Base Update

- **MMHg Data Base Merged W/Total Hg DB:**
  - > Incorporated Into MDN Total Hg DB – Q4: 2002
  - > Quality Code System Incorporated – Q4: 2002
  - > MMHg Data Follows All Aspects Of THg Data
  - > MMHg Data Reported With Quarterly Total Hg Data
- **Trace Metals Data Base – Completed June 2005**
  - > Integrated into MDN THg and MMHg DB
  - > Follows All Aspects Of Total/Methyl Data
  - > Data will start the quarterly report schedule

HAL/PO Collocated Intercomparison

NOAA Sand Point, Washington (WA18)





- ➢3 MDN ACMS
- ➢1 NCON
- ➢1 MICB
- ➢2 Belfort Rain Gauge

- ➢ Stick Gauge
- ➢ Gas Phase Hg (7 Day)
- ➢ Particulate Phase Hg (7 Day)
- ➢ All Collectors Data Logged

MDN WA18 Collector Intercomparison

- 2nd Year Of Operation
- Suggested Changes Incorporated From Fall 2007
- MICB Sensor Slaved To 1 MDN ACM
- Potential Publication W/Teaming Partners
  - – NADP, USGS, Other?

HAL 2006/7 Site Operator Training Course

3rd Annual HAL Training Course

- October 10-12, 2007
- 15 Site Operators
- 1 Day Classroom + 1 Day Field Instruction
- Course Held @ NOAA-NRC (WA18)

4th Annual HAL Training Course

- October 9-11, 2007

HAL Audit Review Team November 14-16, 2006

Team Leader, Health and Safety, and Data Management
Greg Wetherbee
U.S. Geological Survey / Branch of Quality Systems

Chemical Analysis and Quality Assurance
Steve Brooks
NOAA / Atmospheric Turbulence and Diffusion Division

Andrew Heyes
University of Maryland / Chesapeake Biological Laboratory

Field Operations and Site Liaison
Sean Lawson
University of Vermont / Vermont Monitoring Cooperative

Observer
Christopher Lehmann
Illinois State Water Survey / NADP Program Offic

NADP HAL Audit Summary

- **98% of HAL/NOC 2003 Audit Items Closed**
  - – NADP MDN Site Operations Manual (v3)
  - – NADP MDN Unified QA Project Plan (v3)
  - – HAL MDN Data Base Users Manual (v2)
- **2006 Audit Results: 43 Recommendations (Rec #)**
  - – Physical Plant: 1-13
  - – Operation Of WA18: 14-17
  - – MDN Site Operations: 18-19
  - – MDN Site Liaison: 20-26
  - – HAL Mini Network Equipment Depot: 27
  - – Health & Safety: 28
  - – Chemical Analysis and Quality Control: 29-36
  - – Data Management: 37-43

HAL 2006 Audit Report

- HAL Draft Audit Response – Available NOS
- Audit Team / PO Review Of HAL Response
- Discussion / Changes / Edits Final Audit Report
- HAL Audit Presentation – Thursday NOS
  - Point / Counterpoint (Wetherbee/Brunette)

HAL Proposed Audit Response

In order to aid in the audit review process, these organizations typically utilize standard language that greatly helps communicate to the organization being audited, to understand which areas need immediate attention, recommendations for consideration for improvement and observations requiring no action, only feedback.

In order to facilitate the audit response:

1) Findings: Areas identified by the audit team that need immediate attention and should be the highest priority for corrective action.

2) Recommendations: Areas that the audit team found that could be improved through recommendations for change, however requiring no immediate corrective action.

3) Observations: Areas where the audit team made observations and provided feedback on operations, not requiring any action.

MDN Methyl Mercury Changes

- **One Sample Train For Both Total & MMHg Analysis**
- **Low Sample Volume Samples – Very Little For THg/MMHg**
  - Low Sample Volume – Minimal MMHg Signal
  - Minimal MMHg Signal – US EPA 1630 Detection Limit Challenge
- **Potential Solution: Discussion In NOS**
  - Maximize Sample Volume For Both Total and Methyl Hg Samples
  - Two Separate Total Hg and Methyl Hg Sample Trains
  - Two Sample Chimneys – Two Sample Trains
  - MDN ACM Has Two Sample Chimney
  - 2nd MDN ACM Sample Chimney Modification Required

MDN HAL Move Update

- Extension On Lease Through June 2008
- Building Search Continues
- Candidate Location – South Seattle
  (Near Safeco Field)
- Expected Move Timeframe? – March 2008

Trace Metals In Wet Deposition

MDN Trace Metals Study Sites: 1997 - 2007

MDN Trace Metals Initiative

- As and Se Via ICP-MS-DRC Validation
- Replaced Need For HG-AFS Analysis
- Validation Complete September 2007
- NCON and MDN ACM Trace Metal
  - MDN NCON (Add On Sample Chimney
  - MDN ACM (2nd Chimney Needs Modification)
- Submission Of Trace Metals Concept To NADP 12 Step Process – Fall 2007

USGS Puerto Rico Experimental Site

Pictures Courtesy - USGS

Frontier Geosciences Inc–NADP MDN HAL
www.Frontiergeosciences.com

NADP Mercury Deposition Network
http://nadp.sws.uiuc.edu/mdn/

Hg Wet Deposition Through Fall Puerto Rico Rain Forest

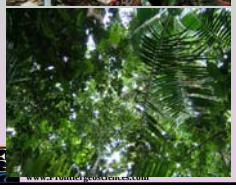
Past/Recent Studies Have Reported Through Fall = 2-10 x Wet Only

Pictures Courtesy - USGS

Frontier Geosciences Inc–NADP MDN HAL
www.Frontiergeosciences.com

NADP Mercury Deposition Network
http://nadp.sws.uiuc.edu/mdn/

Hg Wet Deposition Through Fall Puerto Rico Rain Forest



- Above/Below Canopy Collectors
- Total and Methyl Hg
- Large Canopy Surface Area (Good Surface For Dry Dep?)
- Measuring Potential Variability In
  - Precipitation Volume
  - Total/Methyl Hg Concentrations
- Considering Measurement Of: Cd, Cr, Cu, Pb, Ni, Pb, Zn, Se

Pictures Courtesy - USGS

NADP Mercury Deposition Network
http://nadp.sws.uiuc.edu/mdn/

HAL Report Spring 2007

Picture Courtesy - USGS

Frontier Geosciences Inc–NADP MDN HAL
www.Frontiergeosciences.com

NADP Mercury Deposition Network
http://nadp.sws.uiuc.edu/mdn/

Central Analytical Laboratory (CAL) Report to NADP Joint Session April 2007

Karen Harlin
Director, Central Analytical Laboratory
Illinois State Water Survey
Champaign, IL

Site Operations

Sites

•NTN: **256** active sites
Includes 6 collocated sites (03AZ, 02CO*, 98CO*, 96WI**, 98WI, 99VT*)

Changes since fall 2006 report:

3 Closed: ME95 (12/26/06); TX39 (12/26/06); SC99 (3/20/07)

3 New: 02CO (11/14/06)*; 98CO (11/21/06)*; 96WI (02/23/07)**

• AIRMoN: **7** active sites – no change

*7-gallon bucket (deep bucket) site
** Yankee Environmental Sampler (YES) site

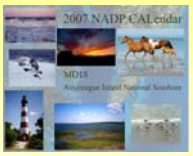
Site Operations (cont)

2008 CALendar

•Accepting pictures and write-ups now.

•Featuring Alpine sites

•http://nadp.sws.uiuc.edu/cal/CALendar_web07.htm



Training

Site Operations Course
June 5-7 Limit of 15 has been achieved

NTN Site Operations manual updates
Dossett and Layden draft
Lehmann coordinating review
to standardize MDL and NTN content

Lab Operations

Equipment updates

•Lachet Flow Injection Analyzer
  •Updating to accommodate NH3 project

•Critical need:
  •New washer for buckets, lids, bottles
    •25 year old dishwasher failing
    •2 new units have been purchased ****
  •Facility redesign **********
    •Shipping/receiving space
    •Sample supply wash/prep room
    •Work scheduled to be completed by Dec 2006
    •Delays by University Facilities and Services Dept
    •Plumbing began April 2, 2007
    •Demolition began April 9, 2007
    •Est. completion date—July 2007

Lab Operations (cont)

Staffing
November 2006 two full-time supply preparation and shipping/receiving staff hired

Archive Samples
1999 NTN and 2002 AIRMoN -- shipped to researchers
2000 NTN and 2003 AIRMoN – requests approved by ad hoc committee and pending shipment to researchers by CAL

LIMS
Recently updated to allow electronic entry of reanalysis data (previously done manually)

QA/QC

CAL June 2006 NOS Review
CAL written response to Mike Kolian (team leader)
Approval pending---Details at NOS

CAL 2006 QAP on web:
http://nadp.sws.uiuc.edu/lib/qaplans/qapCal2006.pdf
2007 plan in preparation

QA report status
2003- 2005 combined report (combined report in 96-97)
  •Revised/reformatted with improved statistical evaluation
  •Fall 2007 target date

SOPs
46 CAL SOPs with yearly updates on target

QA/QC (con't)

2007 MDLs (mg/L) using 2006 QC data

Ca	0.002 (no change)
Mg	0.001 (no change)
Na	0.001 (was 0.002)
K	0.001 (was 0.002)
NH4	0.004 (was 0.003)
ortho-P	0.004 (was 0.005)
Cl	0.003 (was 0.005)
NO3	0.017 (was 0.015)
SO4	0.010 (was 0.015)

Procedure: compute MDLs quarterly
- Unfiltered internal blind QC sample
- Approximates the 10th percentile NTN data
- Samples is blind to the analysts
- Sample submission @ 2 week intervals
- MDL=SD * Student's t @ 99% confidence interval for n analytes

Data Management Operations

- Data transfer to PO
  - NTN behind due to staff changes and procedural restructuring
    - transferred data through September 2006 (behind schedule)
    - back on schedule by June 2006
  - AIRMoN on schedule
    - transferred data through mid-January 2007

- Staff
  - New Data Specialist hired (April 25th start date)
  - John Ingrum moving
  - Data group restructured again???
  - New reviewers tools incorporated into printouts/programs for reviewers
    color-coding, reformatting, streamlined
    Implemented this spring

Questions from my first NADP meeting (1997):

- CAL Capacity
  can CAL handle > 200 sites? upper limit?
- Graying of the CAL
  can CAL handle retirements and continue operations with new staff?

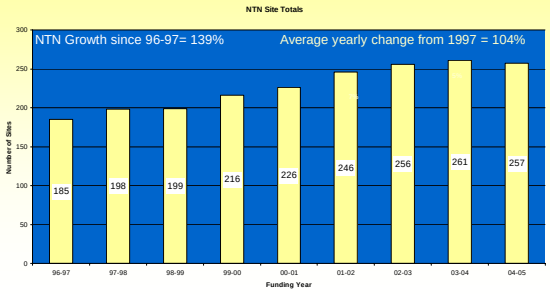
1997

2006

NTN Growth

- 1997
  - FTE = ~13.5 (PO moving to SWS & CAL and PO shared staff)
  - Sites = 194 NTN & 9 AIRMoN
  - Samples to CAL/month = ~950
- 1999 status at NOS review
  - FTE = 14.5
  - Sites = 219 NTN & 10 AIRMoN
  - Samples to CAL/month = ~1100
- 2006 status at NOS review
  - FTE = 16.3
  - Site = 258 NTN & 7 AIRMoN
  - Samples to CAL/month = >1200

NTN Growth
1997 – 194 sites
2007 – 256 sites
max was 261 sites = 135% growth



1997-2007
If those buckets could talk!!

CAL Changes

- 1997
  - began replacing aging equipment
  - Implemented LIMS & data management program upgrades
- As of 2007 -- major accomplishments
  - ICP-AES, new
  - Dionex ion chromatograph, 2 new
  - FIA, second unit acquired & existing unit updated (new autosampler, software, etc.)
  - General laboratory updates, including touch-sensitive screens, facilities upgrades
  - LIMS is now essential and fully functional; includes supplies inventory, bar-coding, control chart viewing, and much more!
  - Data screening programs overhauled, streamlined, and new parameters added (daily precp., comments, etc.)
  - CAL website
  - CAL QAP and ~50 SOPs
  - New NTN shipping protocol

MDL changes

2007 MDLs (mg/L) using robust approach

Ca	0.002	(1997 was 0.009)*
Mg	0.001	(1997 was 0.003)
Na	0.001	(1997 was 0.003)
K	0.001	(1997 was 0.003)
NH4	0.004	(1997 was 0.02)
ortho-P	0.004	(1997 was 0.003)
Cl	0.003	(1997 was 0.03)
NO3	0.017	(1997 was 0.03)
SO4	0.010	(1997 was 0.03)

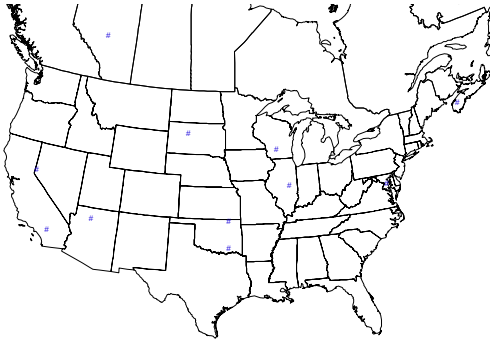
*1997 MDL procedure used ~30 analyses run at end of year (snap shot)

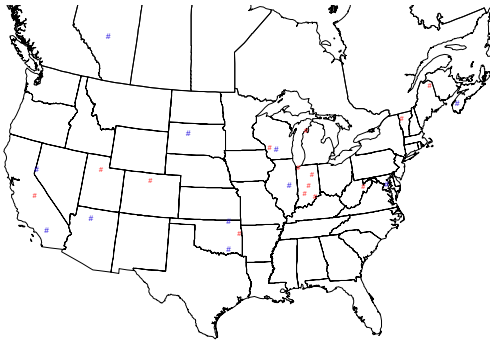
NADP Electronic Rain Gauge Status

ETI Noah IV

Hach OTT Pluvio

- Complete package forthcoming
- Package cost unknown





Developments

- Desktop application for operators
  - View data, identify problems
  - Weekly and daily views
  - Annotate data, specify precipitation type
  - Hardcopy
  - Upload data
- Application for site liaisons and data reviewers
  - Similar functions
  - Network overview
  - Import into lab databases

Collector State Monitoring

ETI Noah optical sensor IV : Aerochem grid sensor
5 seconds

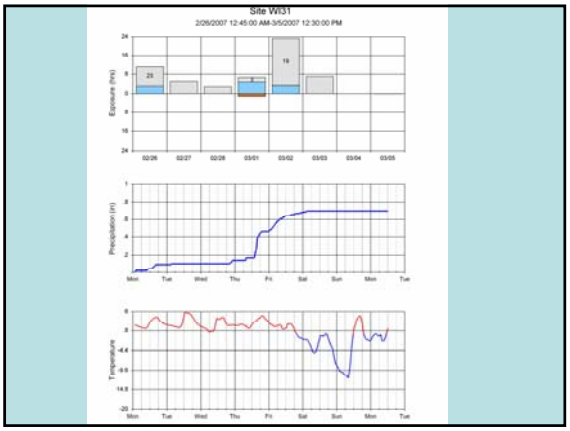
OTT Pluvio Precipitation Depth : Aerochem grid sensor
60 seconds

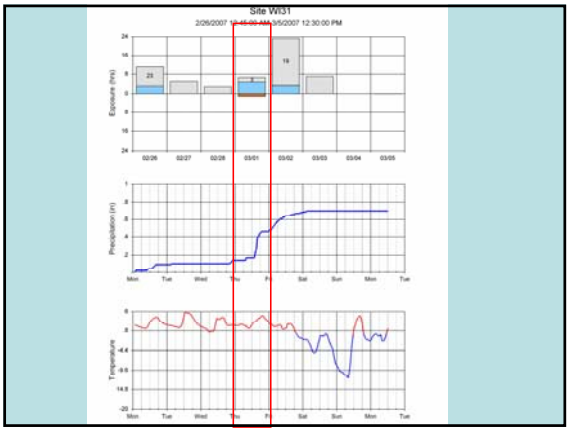
ETI Noah IV optical sensor : N-Con optical sensor
5 seconds

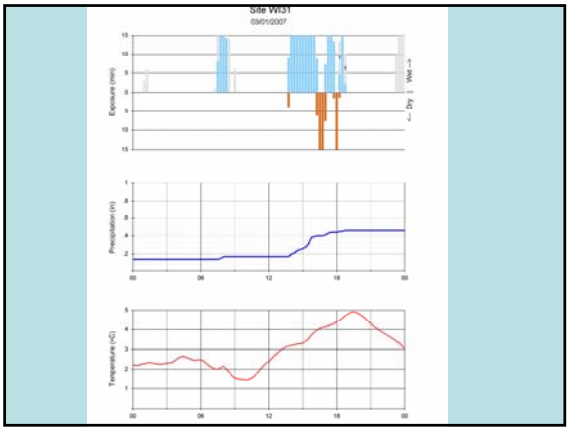
Collector State Monitoring

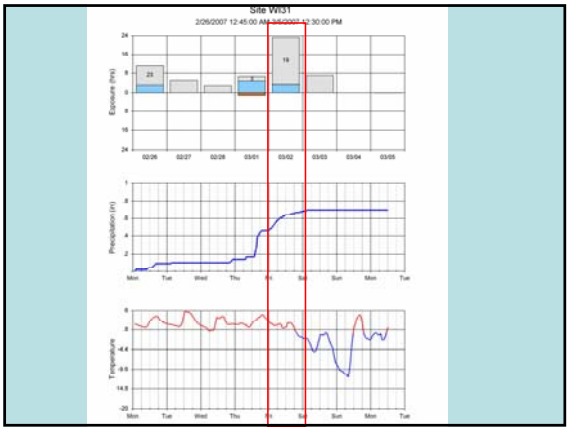
Exposure Type	Precip?	Collector
Wet	Y	Open
Dry	N	Open
Missed	Y	Closed
No	N	Closed

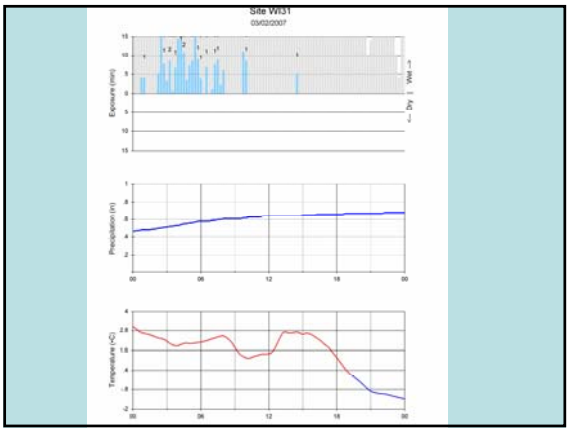
- Quantitative analysis of event recorder
- Identification of undefined samples (> 6 hours dry exposure)
- Identification of equipment malfunction
- Trigger collector?

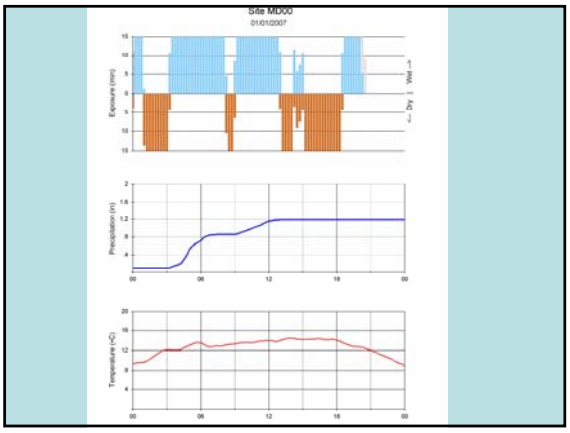


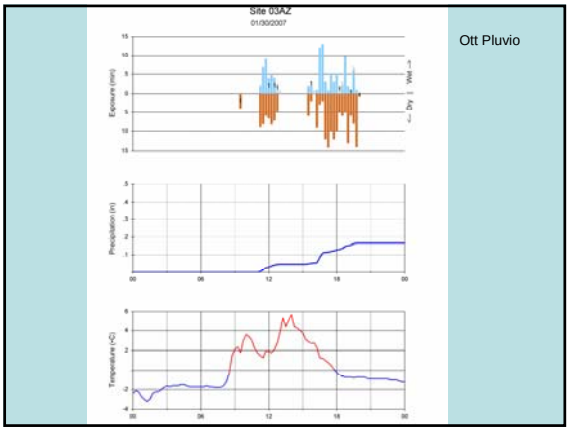








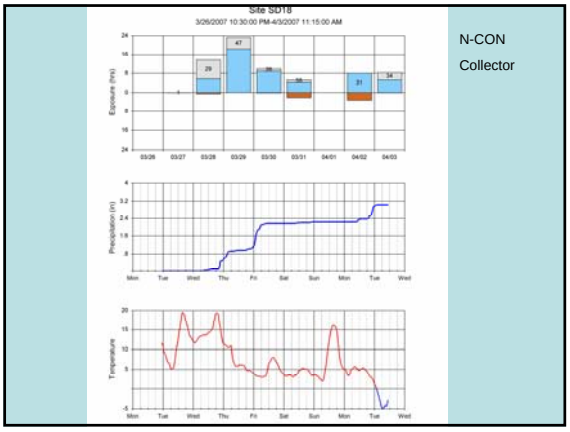




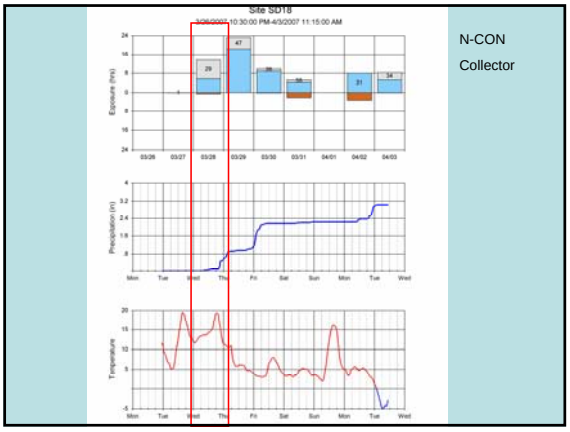
Ott Pluvio

OTT State Monitoring

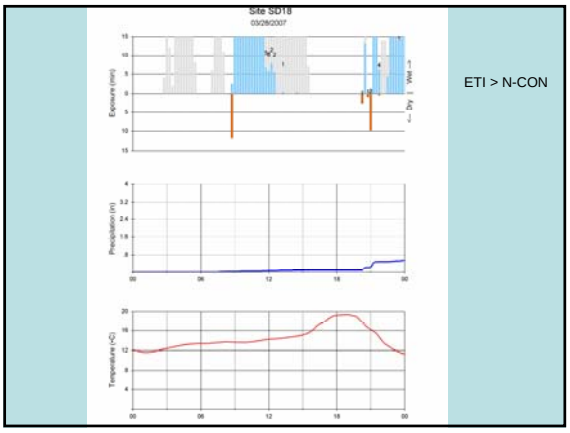
- Summarize opening time every 15 minutes
- Wet exposure: precipitation >= 0.001, collector open open time
- Dry exposure : precipitation = 0, collector open: open time
- Missed exposure: precipitation > 0, collector closed: precipitation time



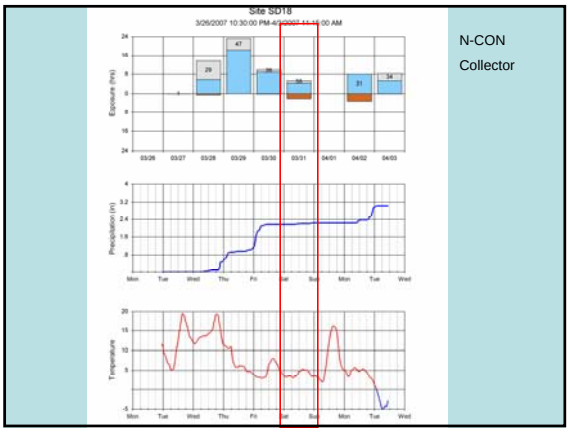
N-CON
Collector



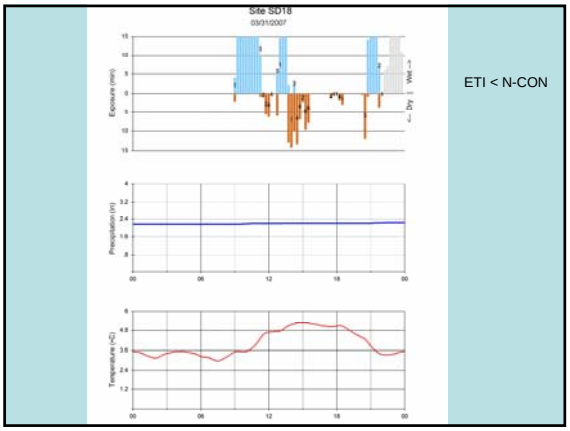
N-CON
Collector



ETI > N-CON



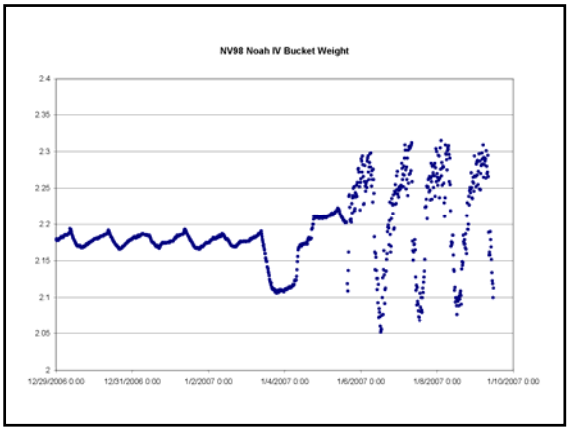
N-CON
Collector



ETI < N-CON

Future Directions

- Version 2 of software ~ June 2007
  - Datalogger
  - PDA
  - Desktop
- Development of formal SOPs and installation instructions
- Incorporation into training courses
- Comparison with Belfort data



Update on CASTNET and Ammonia Monitoring Programs

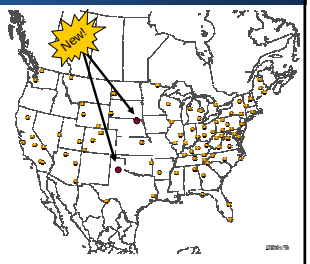
David Gay
Gary Lear
U.S. EPA Office of Air and Radiation
Clean Air Markets Division
11 April 2007
http://www.epa.gov/castnet

EPA United States Environmental Protection Agency

CLEAN AIR MARKET PROGRAMS

Current CASTNET network

- 86 sites
  - 58 EPA sites
  - 28 NPS sites
- Weekly filter packs for
  - Gaseous HNO_3, SO_2
  - Particulate SO_4^{2-}, NO_3^-, NH_4^+, base cations
- Meteorology
- Dry deposition rates inferred from MLM

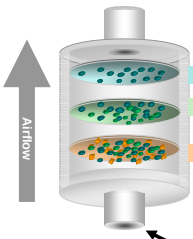


2007 | 2008 | 2009

2

CASTNET 3-Stage Filterpack

Gas and particle concentrations in air are measured by filter packs and then used to estimate daily dry deposition



Whatman	Gaseous • SO_2
Nylon	Gaseous • HNO_3 • SO_2
Teflon	Particulate • SO_4^{2-} • NO_3^- • NH_4^+ • Ca, Na, Mg • Cl

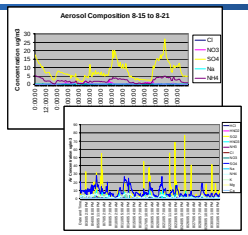
Gases and Particles

Filter packs are open-faced, with no size exclusion

- 20% of S and N deposition can be from coarse particles
- HNO_3 reacts with inlets

3

New Instrumentation



- RFP just issued for multipollutant monitors
  - Gaseous HNO_3, SO_2, **NH_3**
  - Particulate SO_4^{2-}, NO_3^-, NH_4^+, base cations
- Hourly resolution
- Includes R&D phase
- Designated funding that can only be used for this purpose

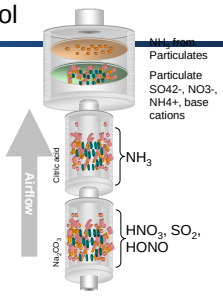
Initial trials | Start R&D | Decision to purchase | Deployment →

2007 | 2008 | 2009

4

Change in sampling protocol

- Being developed as more traditional alternative to multipollutant analyzers
- Replace filterpacks with denuder/ filterpacks for HNO_3 and NH_3
  - Less bias for NO_x and NH_x
- Add daily protocol for better temporal resolution at some sites
- Further reduction in the number of sites due to higher cost of sampling



2007 | 2008 | 2009

5

Passive Ammonia Monitoring Meeting

- Chicago, IL at LADCO Offices
  - February 15, 2007
  - 1 foot of snow and -20C
- In response to US-Canada Workshop on Ammonia
  - Substantial unknowns in atmospheric response of SO2 reductions in an ammonia rich environment
- Purpose: Determine feasibility of establishing an ammonia monitoring network
  - In conjunction with NADP
  - Using $200K seed money from EPA/CAMD

About to set up the telephone conference line for those who couldn't get in to O'hare

6

Participants

- Environment Canada Dave MacTavish
- EPA/CAMD Gary Lear
- EPA/ORD John Walker
- EPA/OAQPS Nealson Watkins
- IES/Cornell Tom Butler (via phone)
- ISWS Van Bowersox, David Gay
- LADCO Donna Kenski, Mike Koerber, Kirk Baker
- NCSU Wayne Robarge
- Purdue Rich Grant
- UDelaware Joe Scudlark (via phone)
- USFS Pam Padgett (via phone)

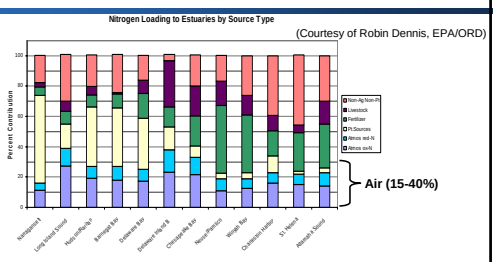
7

Why are we interested in monitoring ammonia?

- Model evaluation
- Help establish rational control programs
- Help to accomplish meeting air quality goals
- Provide basis for defining role of agriculture in air quality and nitrogen saturation problems
- Provide spatial extent of ammonia emissions
- Strengthening the bond between NADP and Agriculture

8

Nitrogen Deposition is an Important Contributor To Coastal Eutrophication



(Courtesy of Robin Dennis, EPA/ORD)

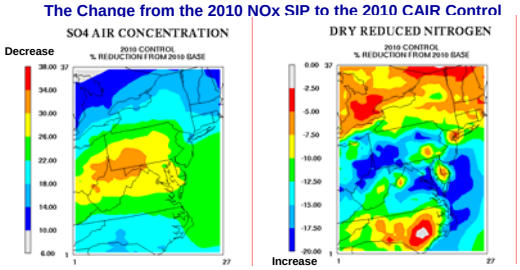
- **Accounts for 15-40% of N loading to estuaries (both indirect and direct)**
- **Atmospheric deposition of N to coastal ocean is approximately equal to riverine input for mid-Atlantic & New England**

9

CMAQ Suggests CAIR Will Make a Difference Because of the Additional SO_2 Reductions by 2010

(Courtesy of Robin Dennis, EPA/ORD)

The Change from the 2010 NOx SIP to the 2010 CAIR Control

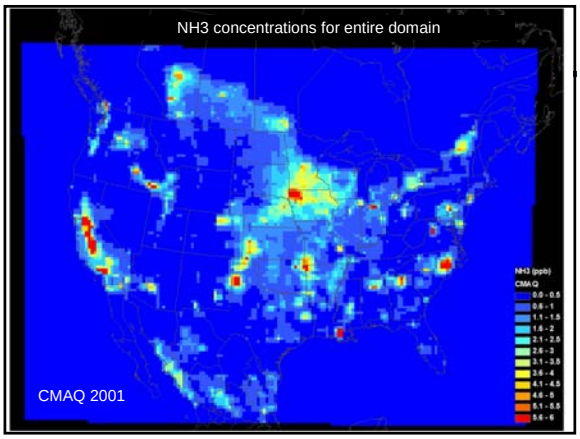


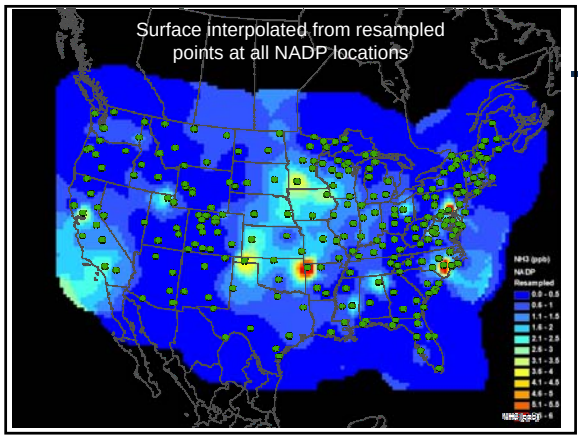
	2001 Base	2010 NOx SIP Call	2010 CAIR	
Reduced-N Dry Dep	42.3 (kg-N x 10^9)	45.1 (kg-N x 10^9)	50.3 (kg-N x 10^9)	
% Change from 2001		7%	19%	**+12%**
Reduced-N Wet Dep	45.8 (kg-N x 10^9)	46.8 (kg-N x 10^9)	44.9 (kg-N x 10^9)	
% Change from 2001		+2%	-2%	**-4%**

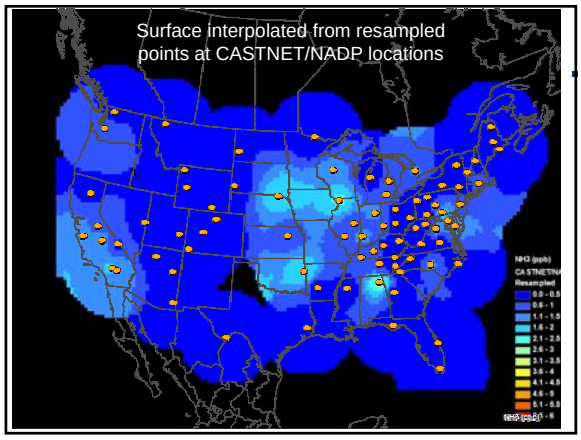
What are our concerns about setting up a network?

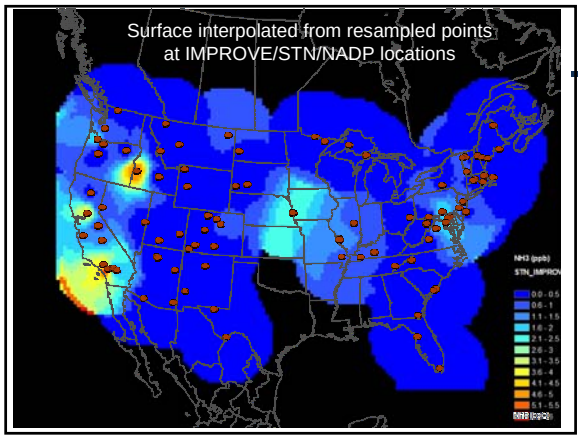
- Are we measuring the right things?
  - We need total NH_x at each location:
    $^{wet}NH_4^+ + {}^{particle}NH_4^+ + {}^{gas}NH_3$
  - Do we know enough about HNO_3 for ammonia measurements to be useful?
- Are other measurement technologies going to quickly supplant a passive network?
- Do we know enough to model deposition of NH3?
  - It's more complicated than SO_2 or HNO_3 because of bidirectional flux
- Are we measuring in the right places?

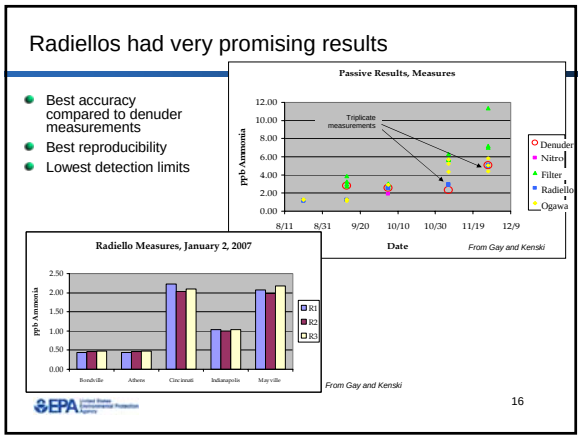
11

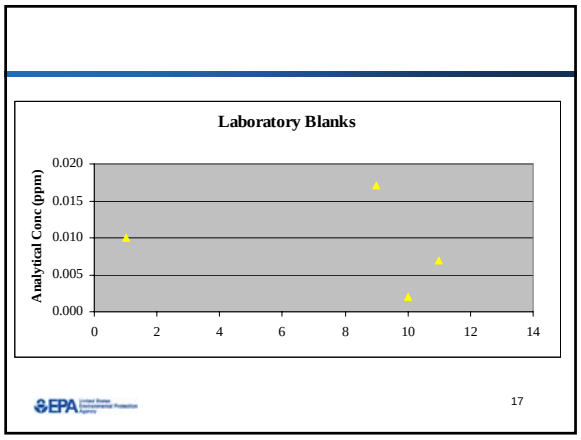


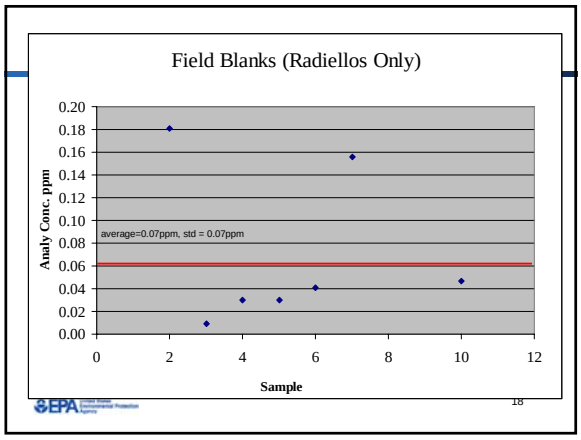

Surface interpolated from resampled points at all NADP locations

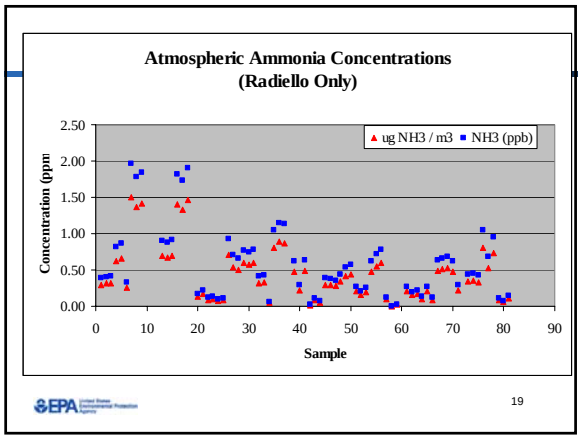

Surface interpolated from resampled points at CASTNET/NADP locations

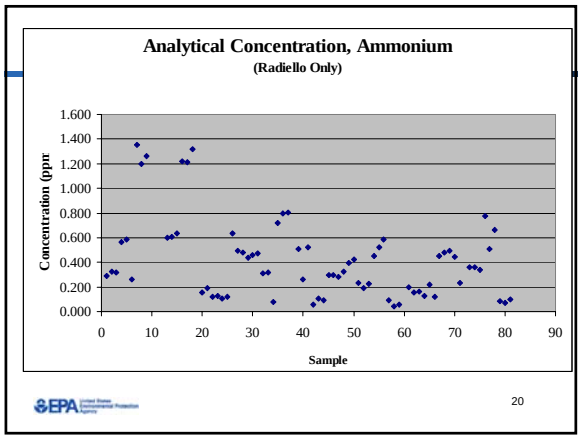

Surface interpolated from resampled points at IMPROVE/STN/NADP locations

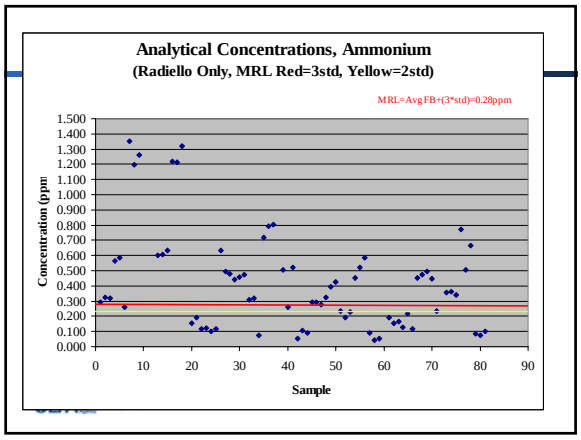

Radiellos had very promising results
Best accuracy compared to denuder measurements
Best reproducibility
Lowest detection limits
Passive Results, Measures
ppb Ammonia
Triplicate measurements
Denuder
Nitro
Filter
Radiello
Ogawa
Date
From Gay and Kenski
Radiello Measures, January 2, 2007
ppb Ammonia
From Gay and Kenski
16

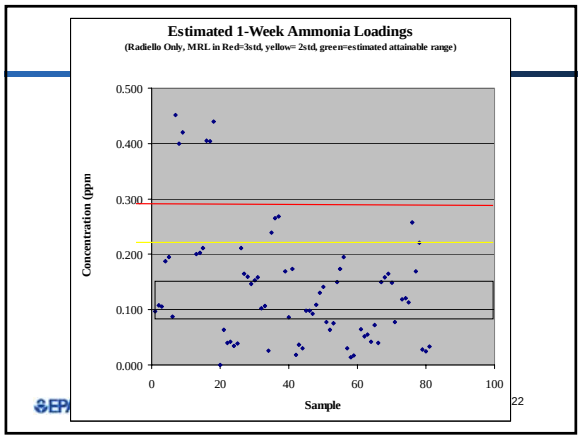

Laboratory Blanks
Analytical Conc (ppm)
17


Field Blanks (Radiellos Only)
Analy Conc. ppm
average=0.07ppm, std = 0.07ppm
Sample
18









Consensus of Participants

- **A passive ammonia network is worthwhile to pursue**, but it will be necessary to have widespread participation to be effective and achieve goals of the network.
- **Participation of Agriculture is critical**
- **A long-term network is preferable to a short-term one**, even if other more quantitative measurements emerge.
- **Radiello devices hold promise** because of low detection limits and high reproducibility, but additional experience and measurements are needed.
- **Weekly sampling is desirable**, but under most ambient conditions only the Radiello devices have a low enough detection limit.
- **NADP should be pursued as a coordinating body**. Gary Lear and Van Bowersox will prepare proposal for NADP spring meeting in Burlington, VT.
- Sites with existing ammonia monitoring measurements should be highest priority for funding. **Fifteen sites were suggested as candidates for the first phase of deployments**.

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Proposed Interim Ammonia Network

- Purpose: To determine actual costs of network, sampling variability and other considerations
- Weekly measurements
- Core network of 20 EPA-sponsored sites
  - Triplicate + field blank
  - Mostly collocated with ongoing denuder or continuous ammonia monitoring
  - Ongoing evaluation of data will be used to determine if frequency of field blanks and replicates may be reduced
  - Laboratory costs estimated to be $38/sample or $8k/site ($160K)
- Program Office
  - $45K
  - QAPP & SOPs
  - Shipping & receiving
  - QA oversight

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Proposed Interim Ammonia Network

- Additional sites may be added
  - Duplicate weekly measurements and one blank per month
  - $5k/site ($4400 analytical + $600 Program Office support)
- Missing:
  - Funding for research on improving methodology, efficiency of sampling
  - Funding for additional denuder/passive comparisons

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Potential Sites

State	Station Name	NTN	CAST	DEN	CONT	Other	Exp. Conc.	Sponsor
CO	Fort Collins			X			Med	NPS
IA	Unknown						High	IADEQ
IL	Unknown						Med	LADCO/ISWS
IL	Unknown						Med	LADCO/ISWS
IL	Unknown						Med	LADCO/ISWS
KS	AQS #20-1225-0006				X		Med	KDHE
NC	Clinton Crops	X		X	TEI 17C	Alpha	High	NCSU/EPA/NCDENR
NC	Jamesville			X	TEI 17C		Med	NCSU/EPA/NCDENR
NC	Lenoir Community College				TEI 17C		Low	NCSU/EPA/NCDENR
SC	Congaree NP, Cape Romain, Longcreek			X			?	SCDHEC

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Discussion: What's Next?

- Does a passive ammonia network fall within the goals and objectives of NADP?
- Is there sufficient interest within current participants of NADP to sustain an ammonia network?
- Is there sufficient interest outside of NADP to bring in funded participants?

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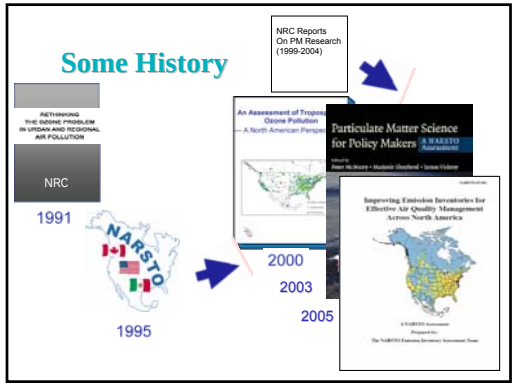
NARSTO and the Multi-Pollutant Accountability Assessment

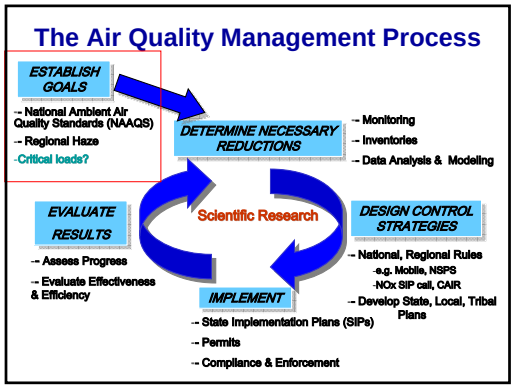
What Is NARSTO?

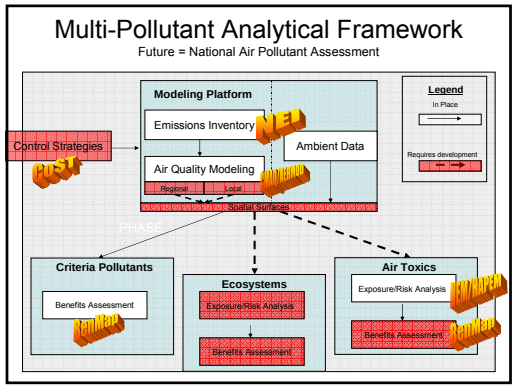
- A multi-stakeholder, public-private partnership among government, the private sector, and academia throughout Canada, Mexico, and the United States that collaborates to improve air quality management science in North America.
- NARSTO's charter enables it to take on a wide variety of activities, but its principal role has been in the production of policy-relevant scientific assessments

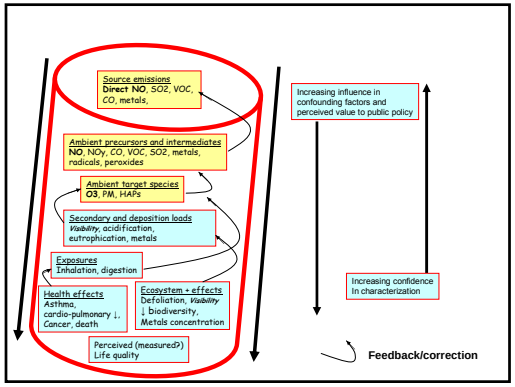


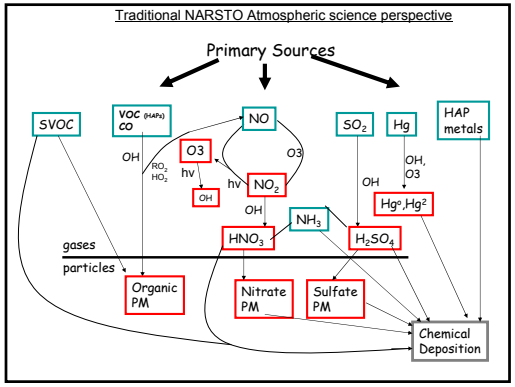
The Current Assessment

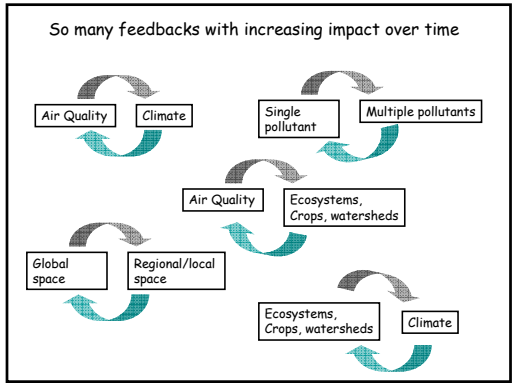
- Motivated by the 2004 NRC report: *Air Quality Management in the United States; themes:*
  - *Mutliple pollutants*
  - *Multiple media – ecosystems*
  - *accountability*
- Scope: Conduct an assessment of the technical challenges of implementing "accountability" within a risk-based, multi-pollutant air quality management framework
- Accountability: The process of evaluating the effectiveness of air quality management actions in terms of their success in achieving air quality management goals.

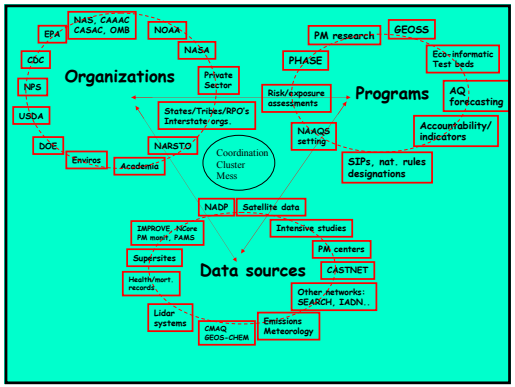












Scope of Pollutants and Effects?

- Largely determined by authors
- Discussion points
  - Emphasis on pollutants related to major air program implementation efforts
    - Nitrogen, sulfur, ozone, mercury
  - Emphasis on pollutants linked through source, atmospheric chemistry, and/or common scaling characteristics

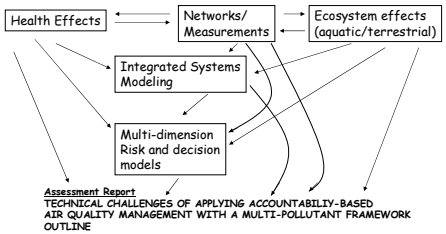
Assessment Outline

TECHNICAL CHALLENGES OF APPLYING ACCOUNTABILIY-BASED AIR QUALITY MANAGEMENT WITH A MULTI-POLLUTANT FRAMEWORK

OUTLINE

1. Introduction
2. Decision framework for air quality management
3. Prospects for Introducing Accountability and Multi-Pollutant Management Practices into the Current Regulatory Structure
4. Case Studies of multi-pollutant issues and interactions
5. Conventional atmospheric science—current directions, practice and prospective changes
6. Measuring progress in mitigating specific air quality related health outcomes
7. Measuring progress in reducing ecological effects
8. Building a comprehensive accountability system
9. Effects of climate change relevant to air pollution exposure
10. Current constraints on multipollutant management approaches
11. Conclusions and Recommendations

Disciplines Feeding Assessment Report



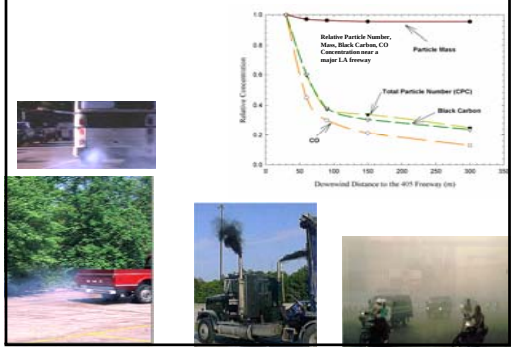
What We Need From You

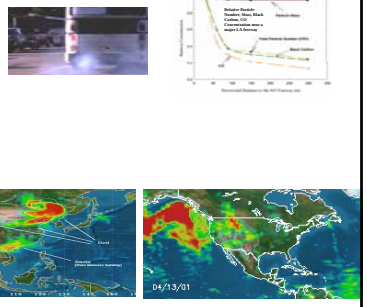
- From a practical point of view, how (or can) we measure or evaluate the effects of air quality management actions on ecosystem health?
- What is possible now and what might be possible in the future?
- What specific research is needed to achieve what is possible?
- What information is missing?
- What specific observations and model products are needed from the atmospheric science; terrestrial and aquatic (physical/chemical and biological) effects communities?

Schedule

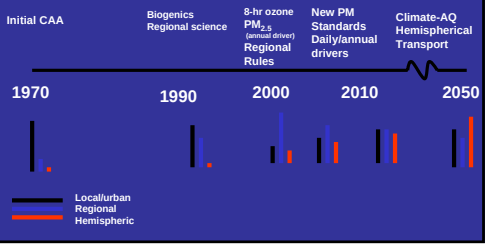
- Health and ecosystem workshops - April 2007
- Guidance to lead authors - May 2007
- Detailed outlines - June 2007
- Prepare draft reports - June - Oct. 2007
- Co-chairs synthesis meeting - Nov. 2007
- Prepare draft synthesis report - Nov. - Feb. 2008
- Final synthesis draft for internal review - March - June 2008
- External peer review - July - Aug. 2008
- Completion of final report - Sept. - Nov. 2008

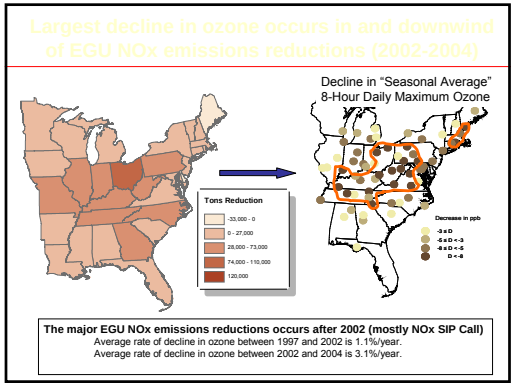
New findings on roadway pollution





Evolutional change in National Air Pollution Management

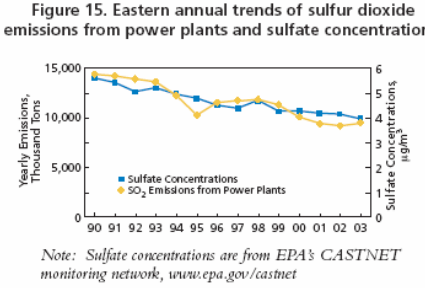


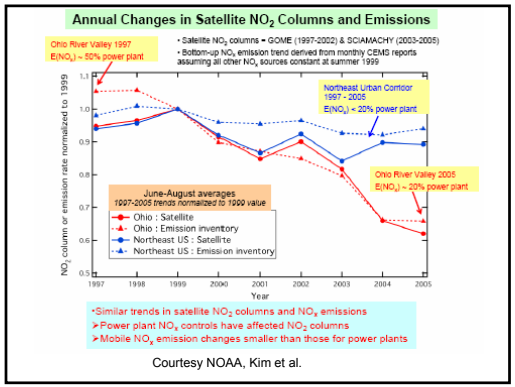


What does accountability mean now?

- Added focus on effects (human health and ecosystems)
  - Linking back to progam implementation
- Major programs to be evaluated
  - Continuation of NOx SIP CALL
  - CAIR: major SOx, NOX and Hg reductions over nex t 2 decades
  - CAMR: continued Hg reductions after CAIR
  - Mobile source rules

….and why?





Courtesy NOAA, Kim et al.