



National Atmospheric
Deposition Program

NADP'S NEW NETWORK: AMON THE PASSIVE AMMONIA MONITORING NETWORK

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ILLINOIS

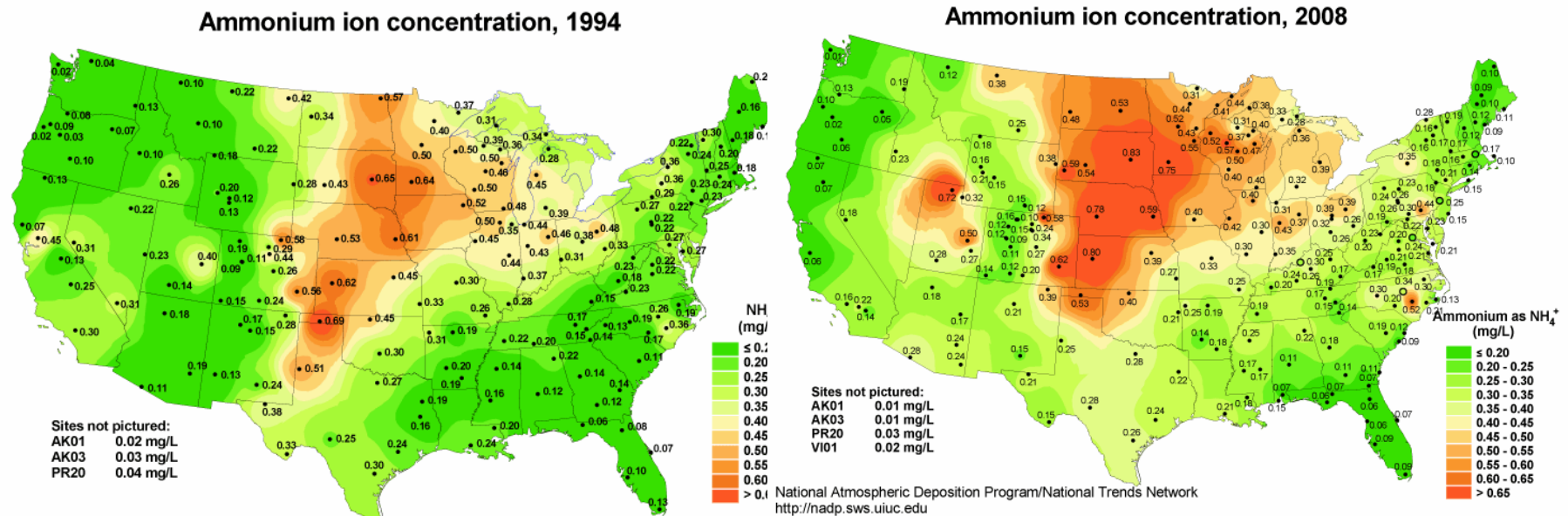


OVERVIEW

- Importance of ammonia measurements
- Status of the network
 - Quality assurance
 - Partners involved in the operation
- Data uses
- Future needs
- Where to go for more information



WHY AMMONIA MEASUREMENTS?



National Atmospheric Deposition Program/National Trends Network
<http://nadp.sws.uiuc.edu>

- NADP shows NH₄⁺ concentrations increasing in many areas of the US
- Ammonia is the primary basic component in PM_{2.5} formation
- Airborne particulate ammonium species contribute to visibility degradation & human health problems
- Wet and dry deposition of ammonium ion can cause eutrophication of natural ecosystems, loss of biodiversity and soil acidification

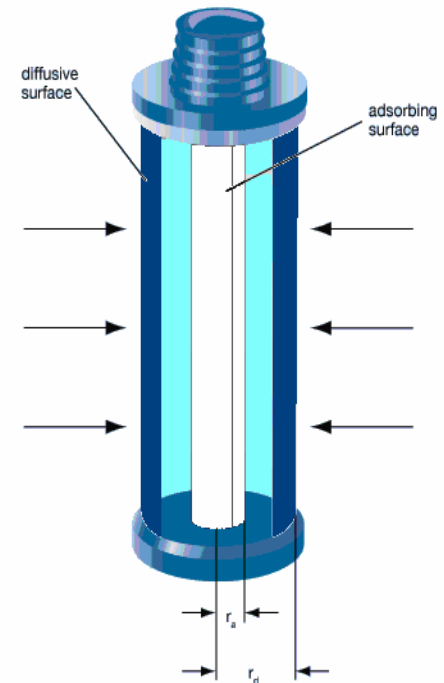
AN AMMONIA NETWORK

- The NADP operates 5 national networks and partners include federal agencies, states, universities, tribes and organizations
- In the past, NADP has focused on wet deposition
 - NTN, MDN and AIRMoN
- Two new networks with goal of estimating dry deposition
 - AMNet and AMoN
- Currently, no baseline for NH_3 concentrations
- AMoN is the only US national NH_3 monitoring network
- Provide land managers, ecologists and policymakers critical data that will allow them to:
 - Assess the long-term trends in ambient NH_3 concentrations and deposition of reduced nitrogen species;
 - Validate atmospheric models;
 - Better estimate total nitrogen inputs to ecosystems; and
 - Assess compliance with $\text{PM}_{2.5}$ standards
 - Changes in atmospheric chemistry due to emission reductions

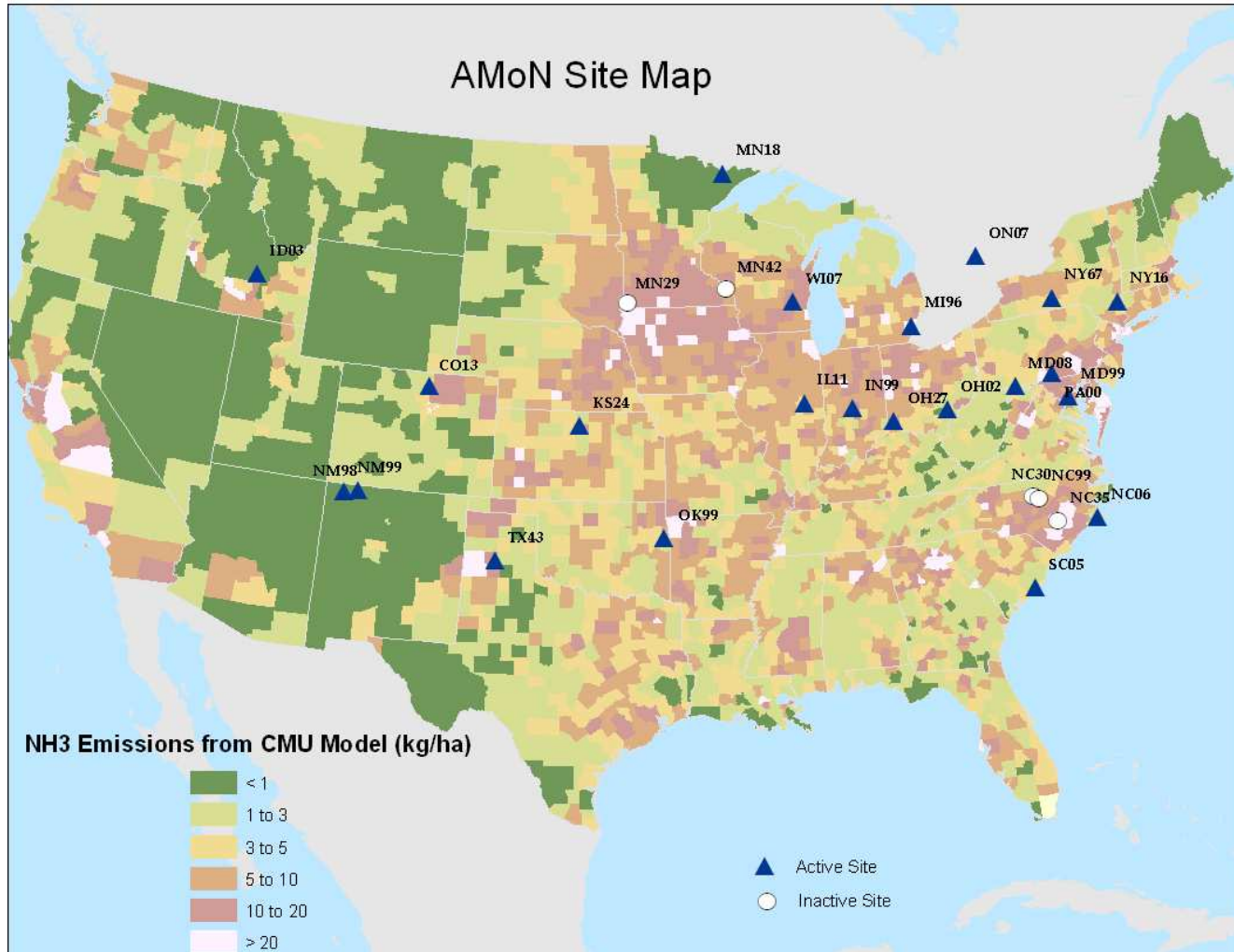


OVERVIEW OF THE NETWORK

- Objective: measure NH in a spatially dense, long-term, cost effective network
- Radiello[®] passive samplers are deployed every two weeks
 - Easy to use
 - Inexpensive
 - Virtually unbreakable
 - *2-week sample*
 - *Accuracy is questioned*
- Initiative began in 2007
 - Over 200 site-weeks of data collected from more than 20 sites
- Accepted as an official NADP network last week



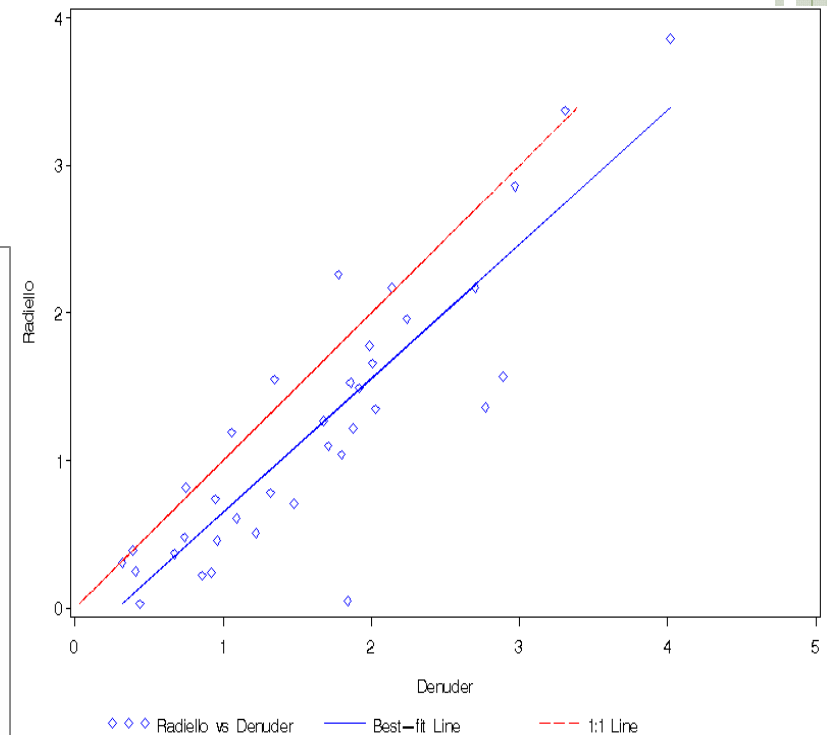
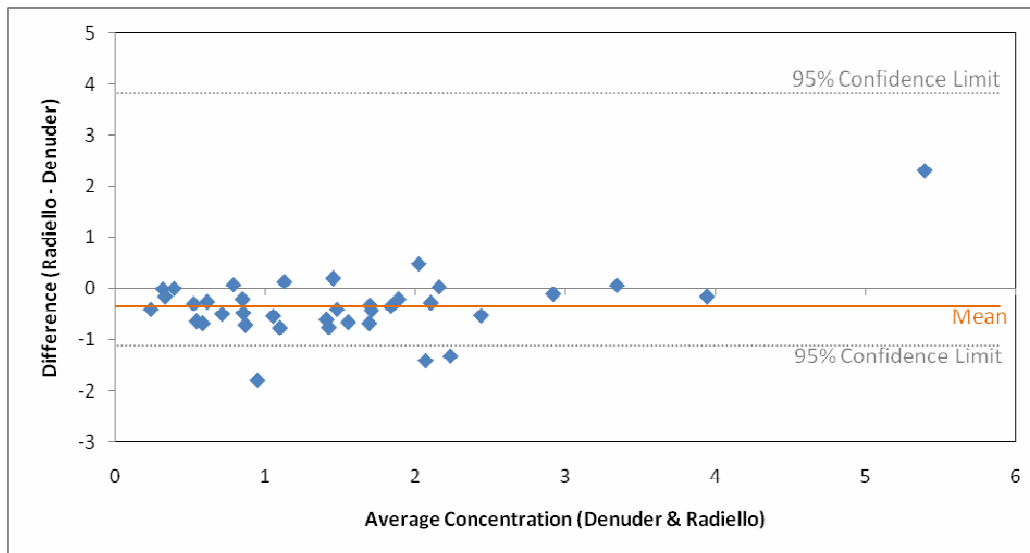
SITE LOCATIONS & MODELED EMISSIONS



QUALITY ASSURANCE

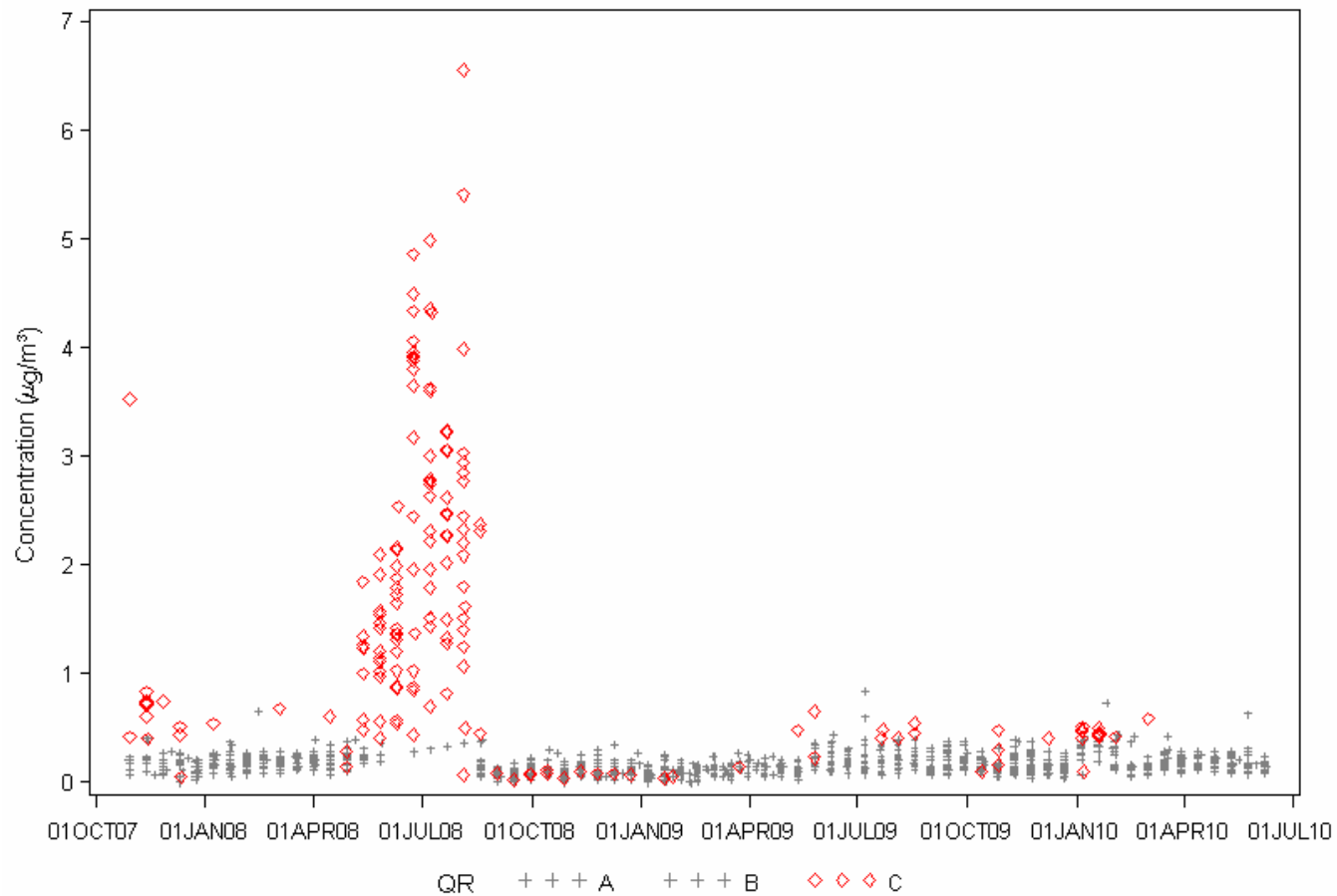
- Precision of triplicate Radiello[®] samplers < 10% (sites with more than 10 samples)
- Accuracy (URG denuders versus Radiello[®] samplers at IL11 and OK99)

N	Slope	Intercept	R ²
36	1.04	-0.47	0.76



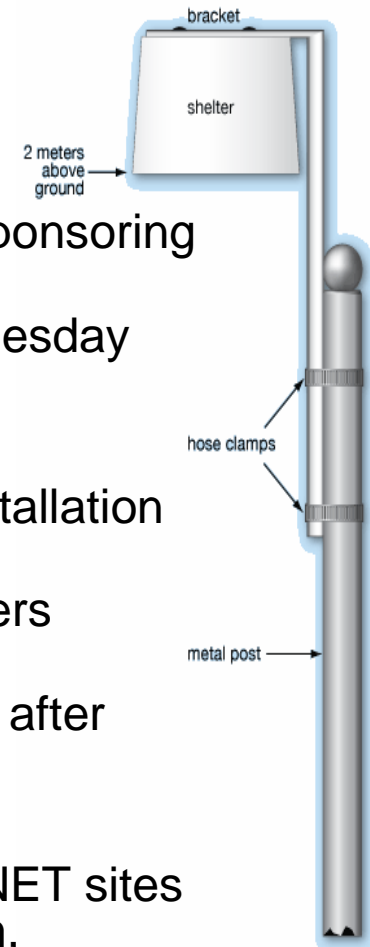
TRAVEL BLANK CONCENTRATIONS

Radiello Travel Blank Concentrations
Includes All AMoN Sites



WHAT IS INVOLVED?

- Sponsoring Agency:
 - An agreement is put in place between NADP and the sponsoring agency of the site (~\$2,700/year + \$250 installation)
 - Site operator removes the used sampler every other Tuesday and replaces with the new sampler
- The Program Office/Laboratory
 - The Central Analytical Laboratory (CAL) will ship an installation kit with the housing unit and field SOPs
 - The CAL ships, receives, coats and analyzes all samplers following the SOPs posted on the NADP website
 - Quality assured data are posted to the website 60 days after sample receipt
- External QA
 - Sites which are already NTN, MDN, AIRMoN or CASTNET sites will be visited as part of the NADP external QA program, however, there is no additional cost or need for a site visit if the site is only an AMoN site – site photographs will be used to determine if changes have occurred



DOCUMENTATION AVAILABLE

NADP Siting Criteria – Ammonia Monitoring Network

≥ 30m from sampler:

- unpaved roads (> 10 vehicles/day, ≤ 50 km/hr)
- walkways (> 100 power vehicle/day)
- maintenance areas (> 5 vehicles/day)
- parking lots (> 5 vehicles/day)

≥ 20m from sampler:

- cultivated fields for fiber use
- herbicide use
- pastures

≥ 10m from sampler:

- access roads (≤ 10 km/hr, ≤ 10 vehicles/day)
- maintenance areas ≤ 5 vehicles/day
- parking lots ≤ 5 vehicles/day

≥ 5m from sampler:

- ditches > 1m tall and > 5m in width or depth

< 5m from sampler:

- avoid local low elevations
- ground cover typical of area
- ground slope ≤ 15%
- vegetation height ≤ 0.5m

≥ 100m from sampler:

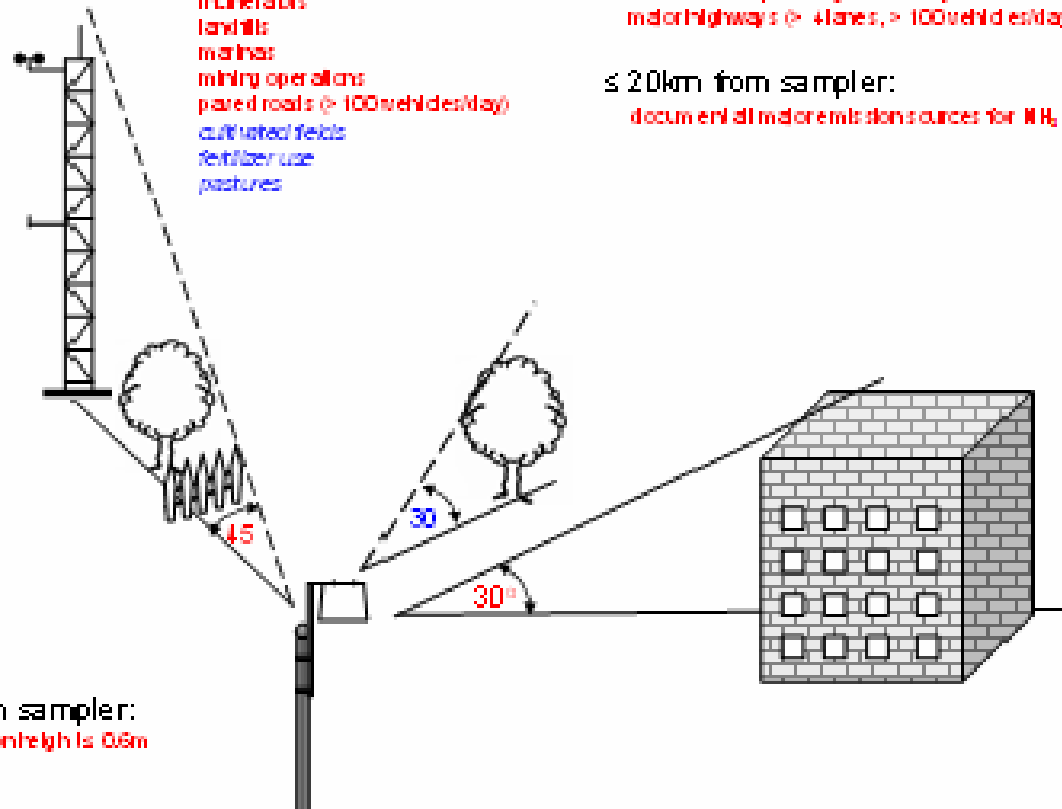
- airports
- chemical manufacturing
- electric utilities
- small feedlot operations
- harbors
- incinerators
- landfills
- marinas
- mining operations
- paved roads (> 100 vehicles/day)
- cultivated fields
- fertilizer use
- pastures

≥ 500m from sampler:

- animal operations (> 250 beef cattle, > 100 dairy cattle, > 350 pigs, or > 10,000 chickens)
- industrial complex/large stationary sources
- major highways (> 4 lanes, > 100 vehicles/day)

≤ 20km from sampler:

- document all major emissions sources for NH₃



- < 2m from sampler:
vegetation height ≤ 0.5m

Rule
Guideline

AMON COLLABORATION

- EPA
 - Clean Air Markets Division
 - ORD – model development, chamber study
- National Park Service
- States (Pennsylvania, Maryland)
- LADCO – model development
- Tribes (Cherokee Nation)
- US Forest Service
- BLM

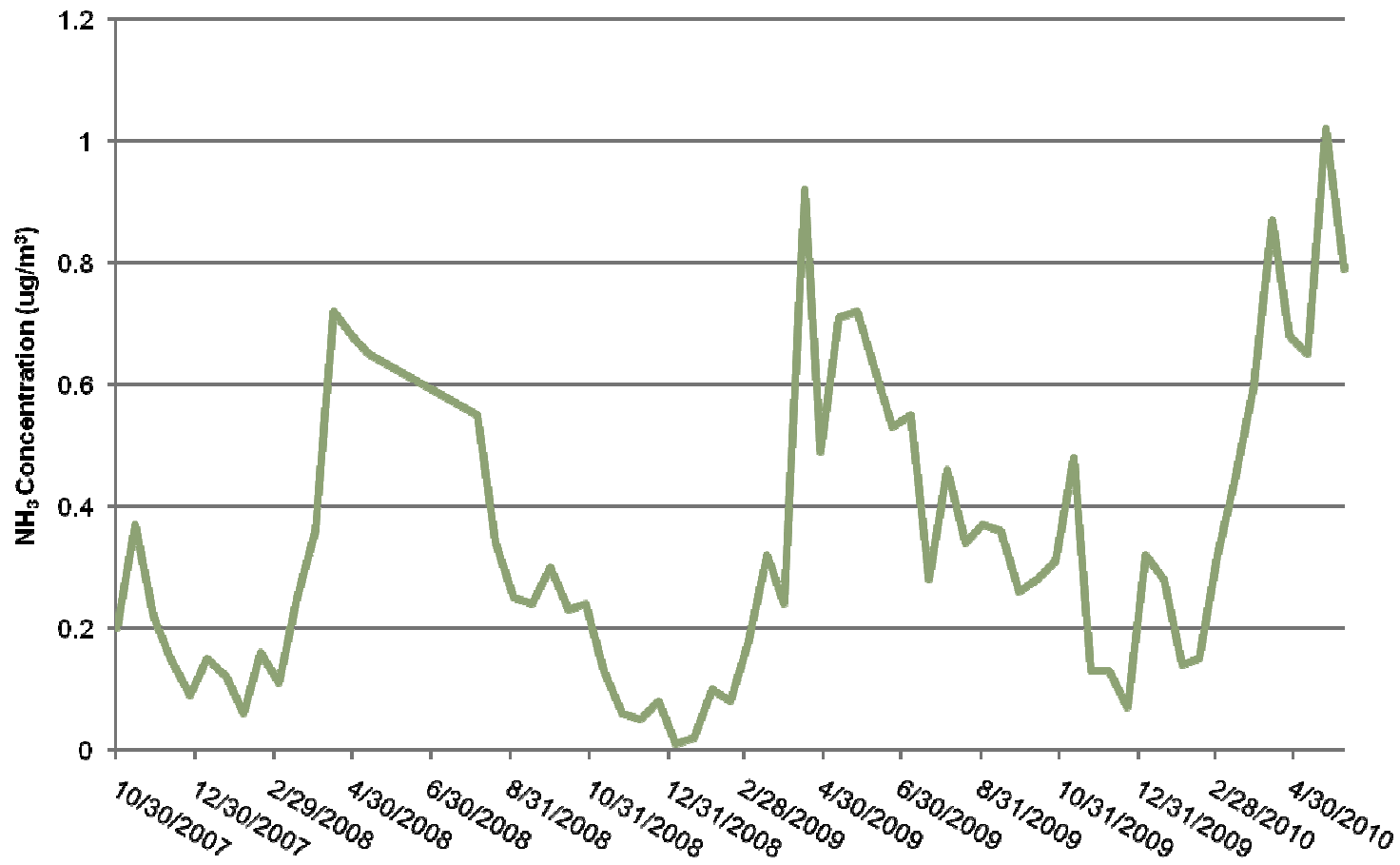


PRELIMINARY DATA ANALYSES

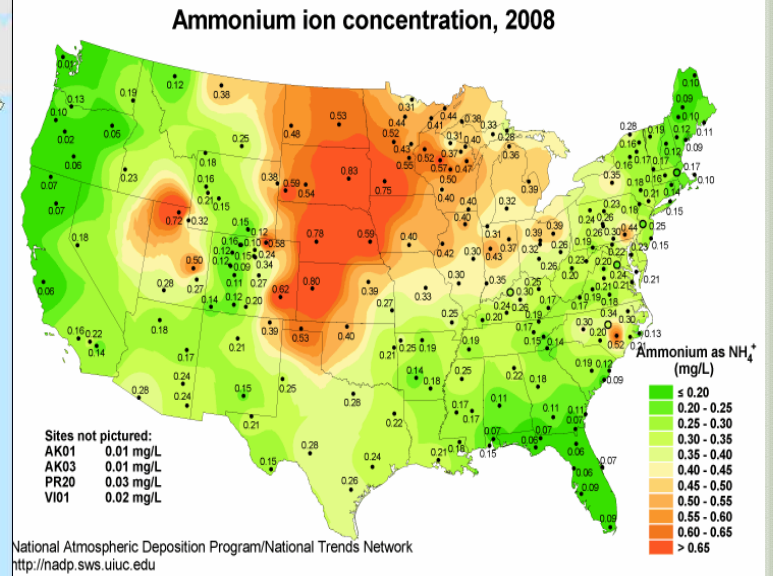
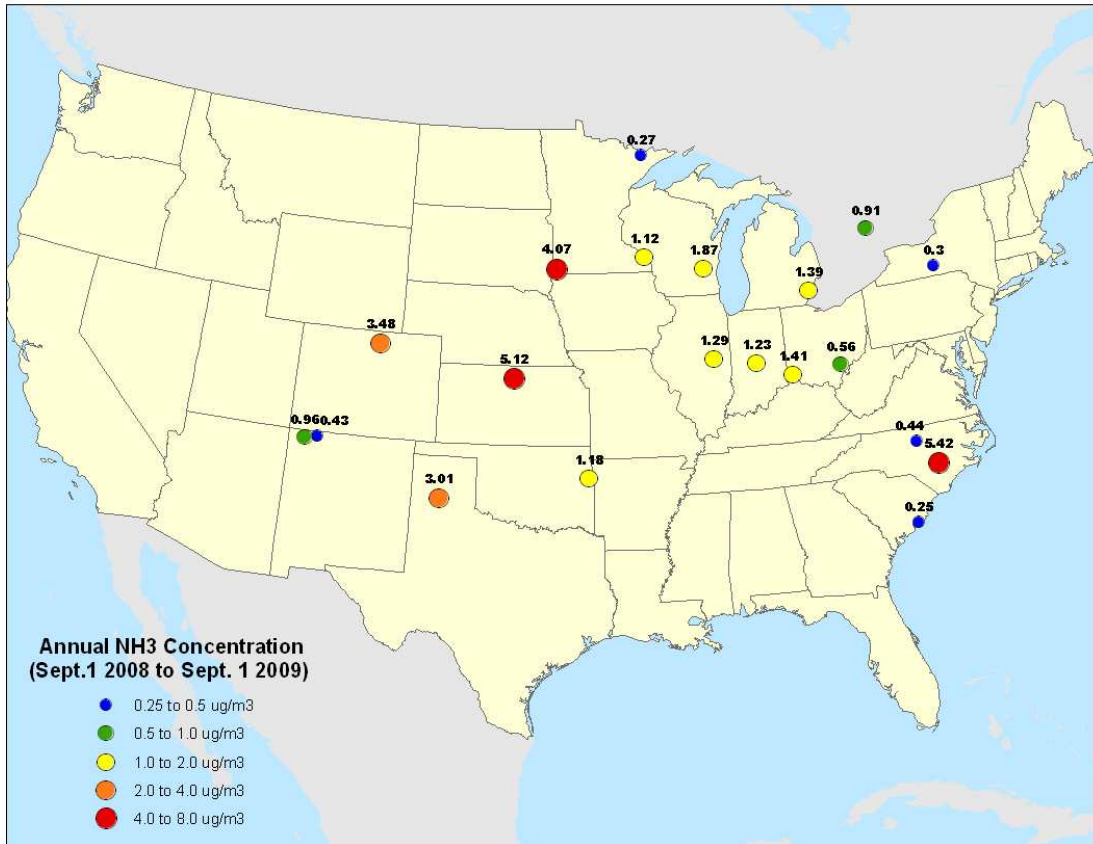


SEASONAL TRENDS

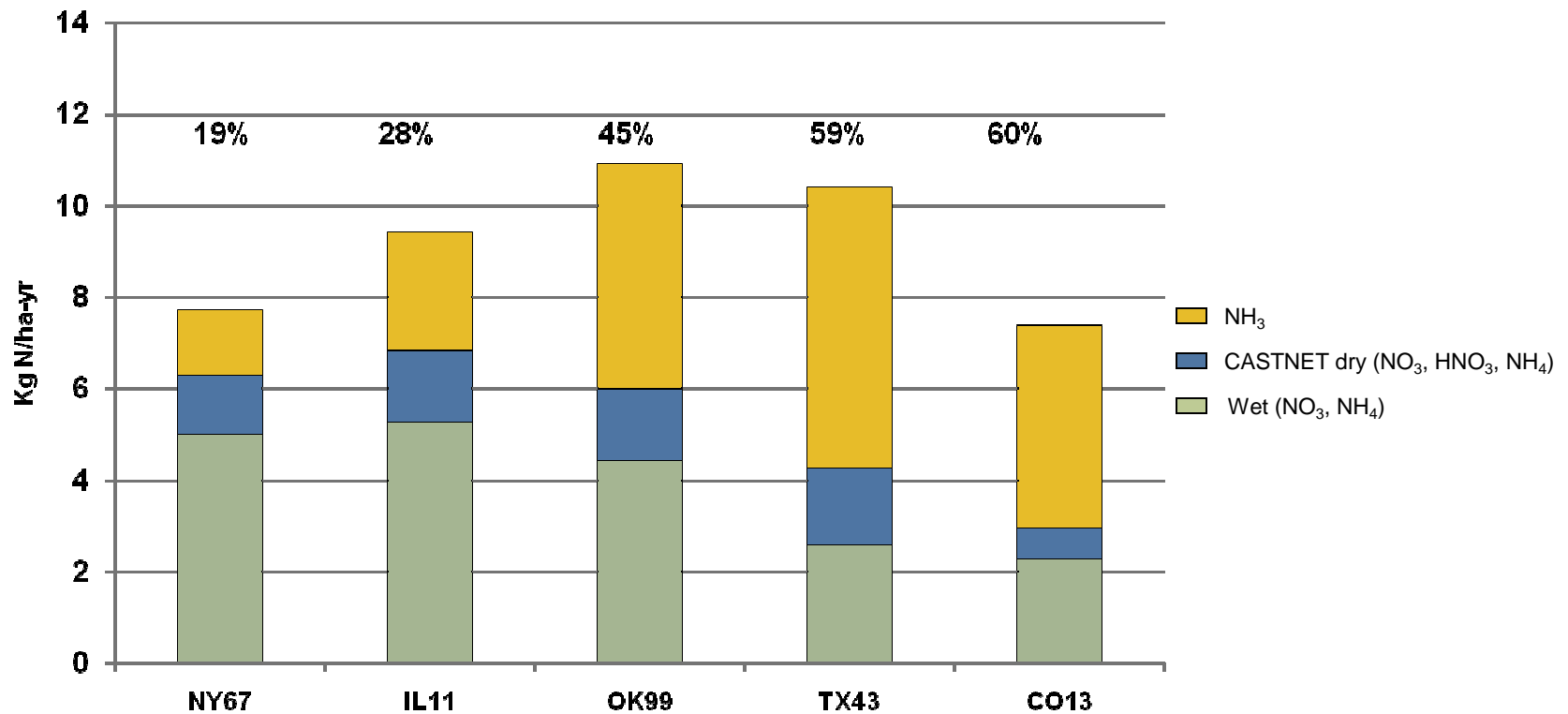
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SPATIAL VARIABILITY



CASTNET, NTN AND AMON – ESTIMATING THE TOTAL N BUDGET



Missing 20-60% of the total nitrogen deposition flux based on CMAQ deposition velocities and measured concentrations



NEXT STEPS

- Provide concentrations to improve models
 - Bi-directional flux model will lower CMAQ deposition velocity
- Assess trends due to new policies (TR, secondary NO_x/SO_x standards)
- Outreach
 - Expand the network – new site sponsors, operators and funding sources
 - Provide educational materials or website to involve schools
- Finalize siting criteria document, SOPs, passive ammonia inter-comparison paper



CONCLUSIONS

- The infrastructure for the network is available and ready to go
- At a time when state and federal monitoring budgets are shrinking, AMoN is an inexpensive way to continue to provide data that is needed by modelers, scientists and policymakers
- Passive samplers are low maintenance and the site installation kit makes it convenient and simple to install
- AMoN provides a more complete N budget at minimal cost to the agency



Questions?

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