Preliminary Results from the CASTNET Ammonia Special Study

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Preliminary Results from the CASTNET Ammonia Special Study

- Key AMEC E&I Participants:
  - Kevin Mishoe (CASTNET Field Operations Manager)
  - Michael Smith (CASTNET Field Coordinator)
  - Garry Price (CASTNET Lab Manager)
- Recognition also to:
  - Kemp Howell (CASTNET Project Manager)
  - Marcus Stewart (CASTNET Project QA Manager)
  - CASTNET Field Site Operators
- Key EPA Participants
  - Ralph Baumgardner: Office of Research and Development
  - Melissa Puchalski & Gary Lear: OAR/OAP/Clean Air Markets Division (CAMD)
  - Nealson Watkins: Office of Air Quality Planning and Standards

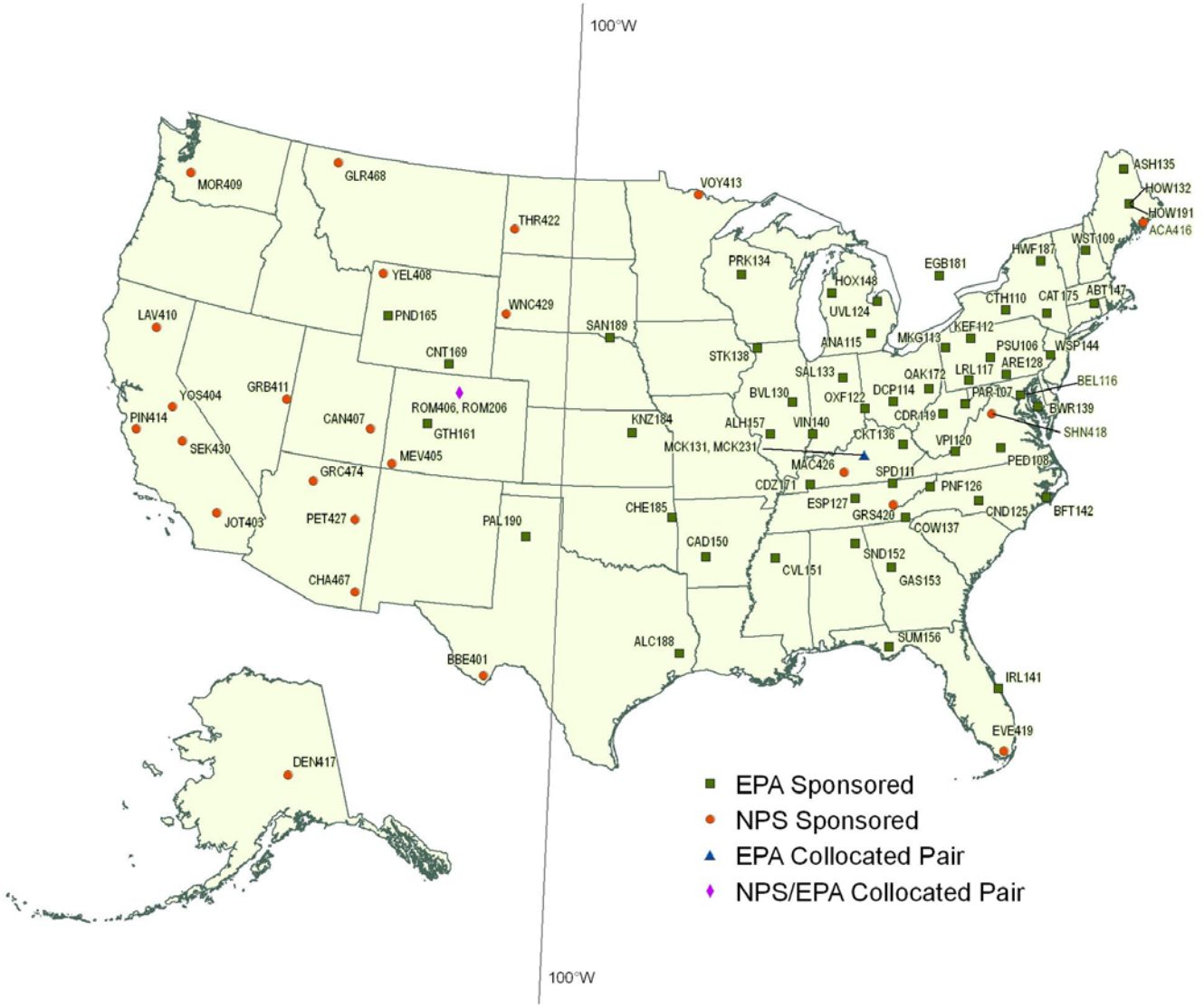
Preliminary Results from the CASTNET Ammonia Special Study

- CASTNET Update
- Evolution of the “Ammonia CASTNET CSN Study”
- Ammonia Comparisons
- Sulfur and Nitrogen Comparisons
- Summary & Next Steps

CASTNET: The Clean Air Status and Trends NETwork

- 20+ years of data available on the EPA web page.
- Currently, there are 81 distinct site locations.
- EPA sponsors 58 sites. NPS sponsors 25 sites.
- All but three sites measure ozone. 40CFR Part 58 ozone measurements at 79 sites, 1 ozone profile system.
- Ameriflux collocation recently started at Howland, ME.
- Oxidized nitrogen study at Beaufort, NC starting in December.
- Two MARGAs operating at Beltsville, MD.
- Updates to total deposition estimates – PRISM for wet dep and missing data replacement for dry dep.
- EPA homepage: http://www.epa.gov/castnet/
  - Sponsors list
  - Bibliography
  - Special Studies web page
  - MADPro data from Clingmans Dome, TN.
- Come to the Total Deposition Science Committee meeting on Friday.

Current CASTNET Sites



Ammonia CASTNET CSN Study

- ACCS started in early 2009 as a much smaller study designed to conduct reference method monitoring in support of the fledgling NADP/AMoN network.
- Early study design was collaboration of AMEC with EPA/ORD.
- EPA/CAMD got involved and expanded the study to include 4-stage, CASTNET-style filter packs.
- AMEC, EPA/CAMD, and EPA/OAQPS worked to include:
  - New SuperSASS mini-parallel plate denuder
  - Comparison with standard Chemical Speciation Network (CSN) ion module for non-NH_3 analytes (RTI International)
  - Equipment loan.
- Jeff Collett and Misha Schurman from Colorado State provided support for MPPD methods

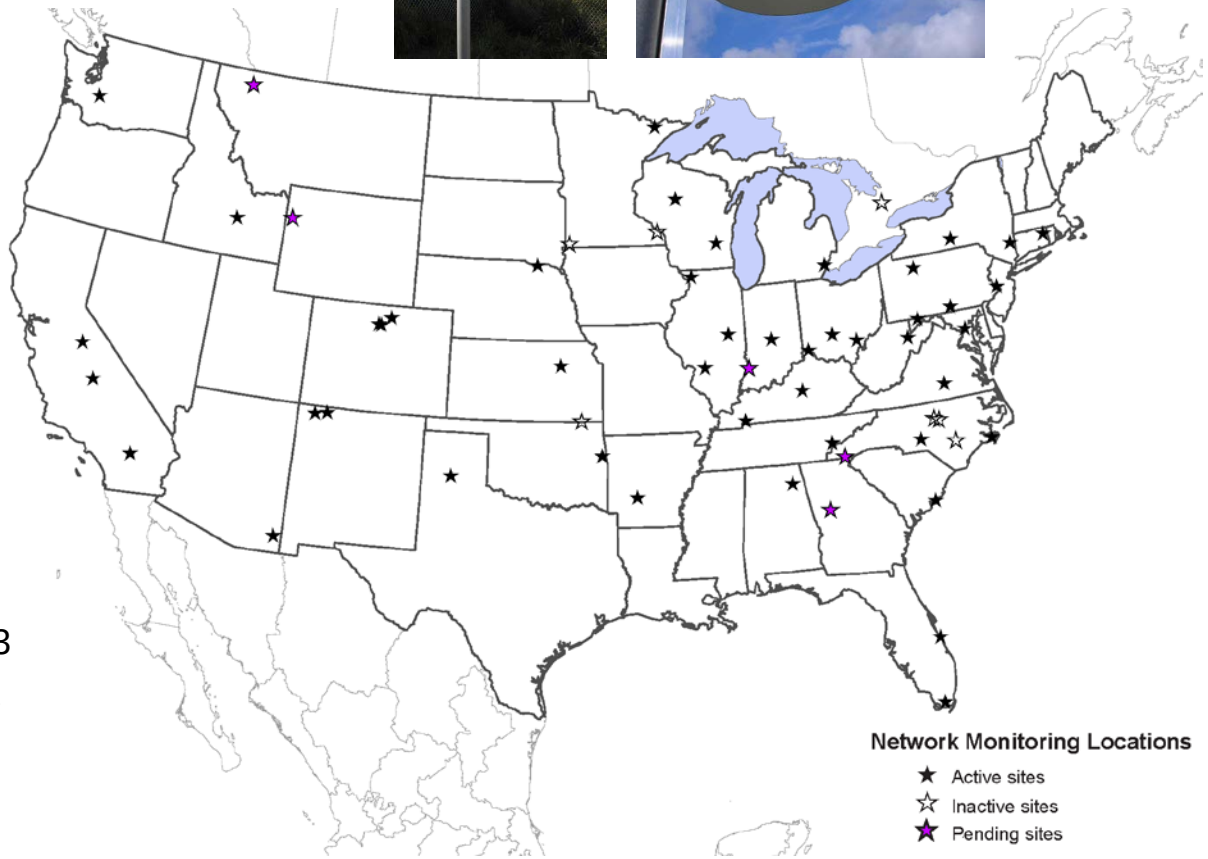
Ammonia CASTNET CSN Study

- Using duplicate annular denuder systems (ADS) with a 2.5 μm size cut as the reference method, the goals of the ACCS are to:

1. Assess the precision, accuracy, and bias of passive NH_3 samplers,
2. Characterize Met One SuperSASS mini-parallel plate denuders for NH_3 collection (2.5 μm size cut), and
3. Compare Met One SuperSASS ion module species collection with traditional CASTNET 3-stage filter pack (2.5 μm size cut).

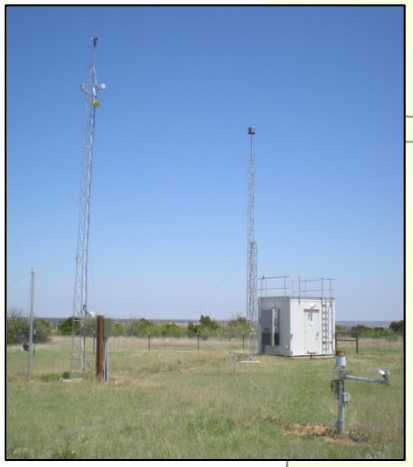
NADP's Ammonia Monitoring Network (AMoN)

- NADP's newest network
- AMEC in support roll for some sites collocated with CASTNET
- Passive sampler (Radiello)
- 2-week exposure
- Used to:
  - Understand long-term trends and spatial distribution of NH_3
  - Validate models (CMAQ)
  - Improve N budget



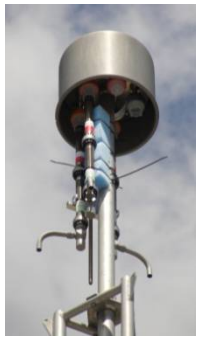
Sites Included in ACCS

CTH110, NY	⇨ AMoN passive sampler ⇨ single denuder ("short") NHx only ADS ⇨ 4-stage CASTNET filter pack
PAL190, TX	
ARE128, PA	⇨ AMoN passive sampler ⇨ two denuder ("long") ADS ⇨ 4-stage CASTNET filter pack ⇨ SuperSASS mini-parallel plate denuder for NHx ⇨ SuperSASS CSN ion module
CHE185, OK	
ROM206, CO	



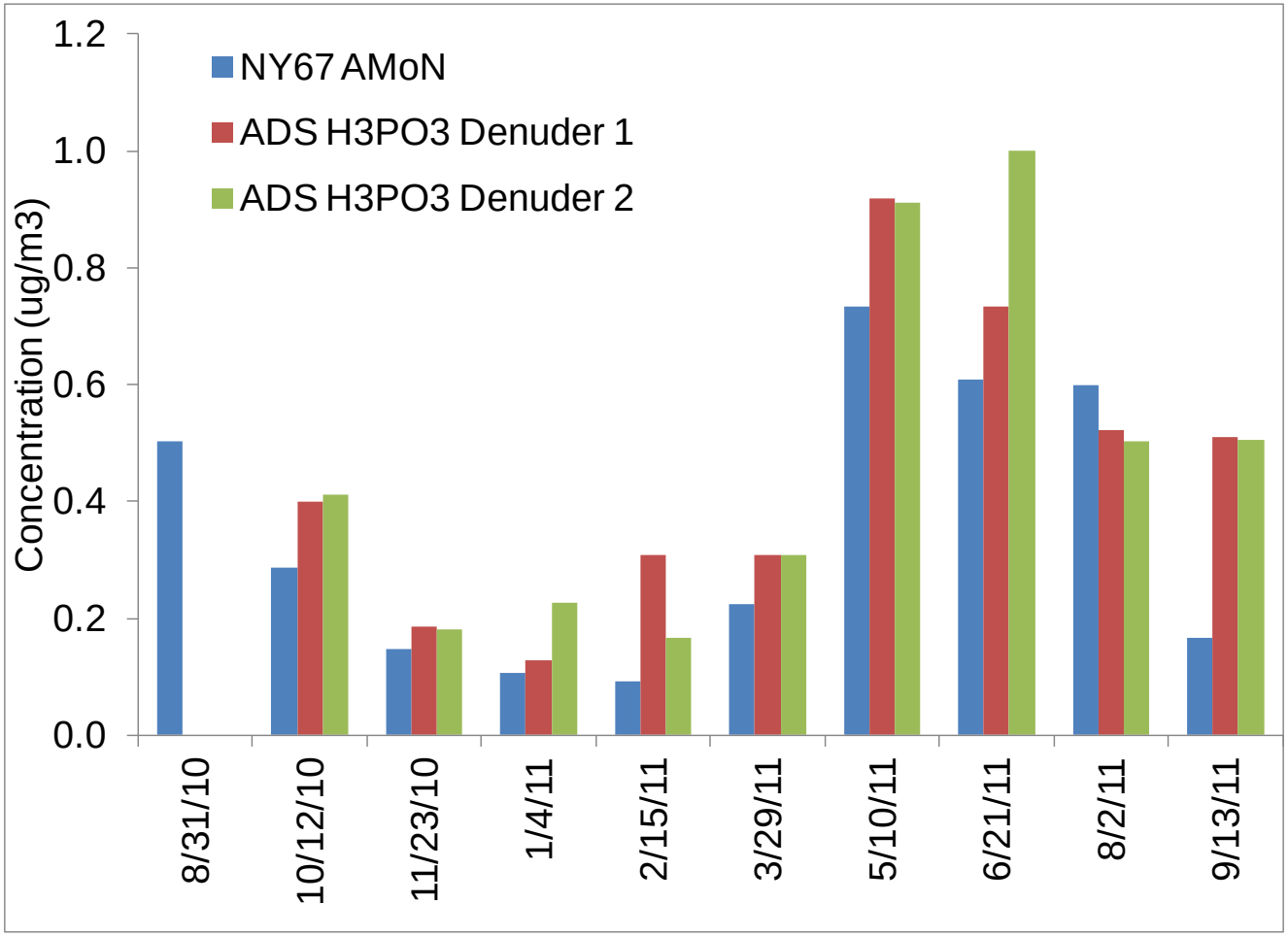
Sampling Schedule

- Testing occurred in Gainesville during April – June 2010.
- Field sampling began at all five sites on August 31, 2010.
- To match the 2-week exposure time of the AMoN passive sampler (which ran throughout the study on the standard AMoN schedule), ACCS samples ran for two sequential 1-week sampling periods every six weeks.
- Sampling was completed in September 2011. In all, there were 10 sampling periods.
- Standard 3-stage CASTNET filter packs ran each week throughout the study.
- The SuperSass “ion” modules also ran for two sequential 1-week sampling periods every six weeks.



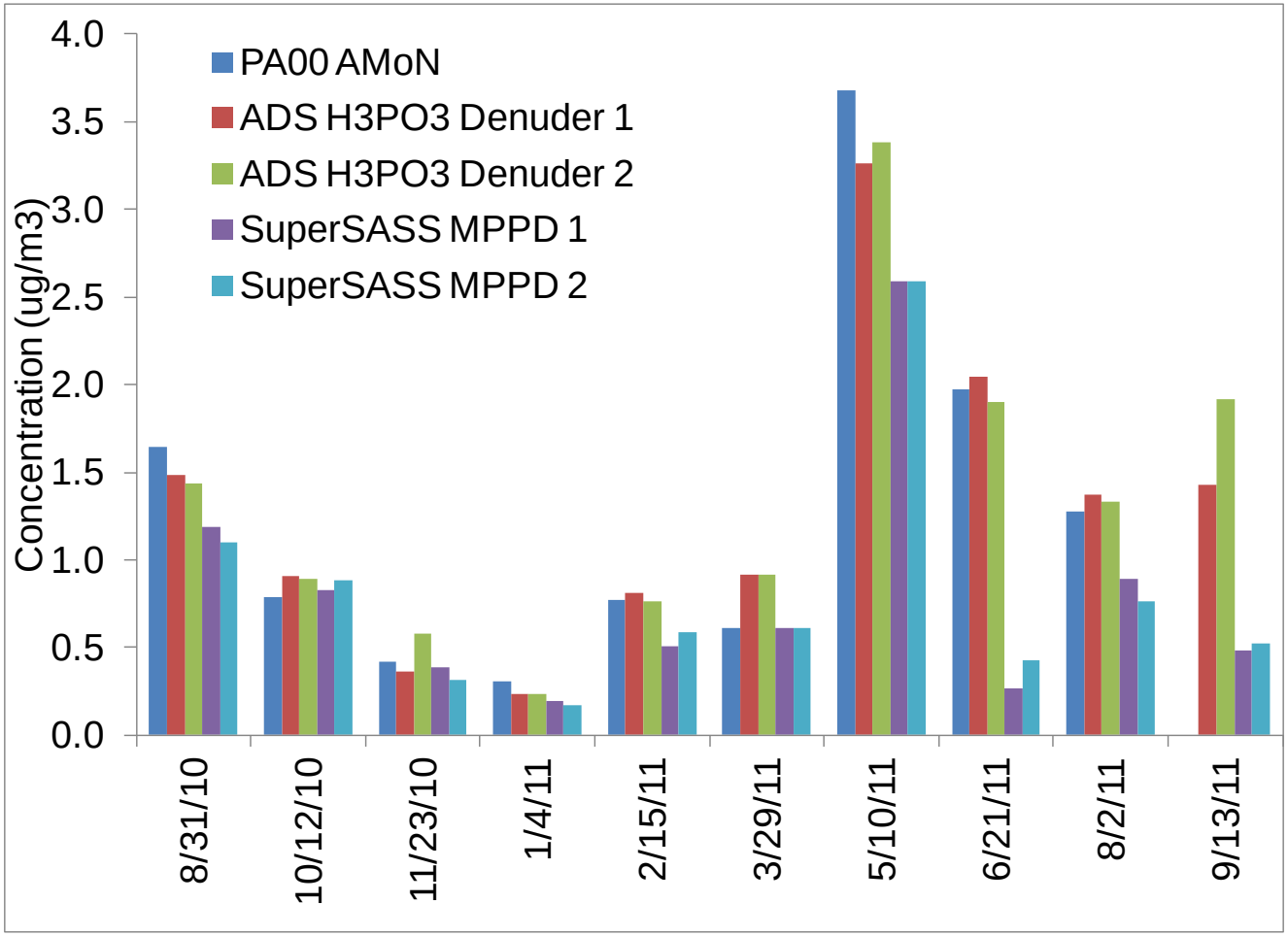
Ammonia Results – Connecticut Hill, NY (CTH110)

Preliminary Results



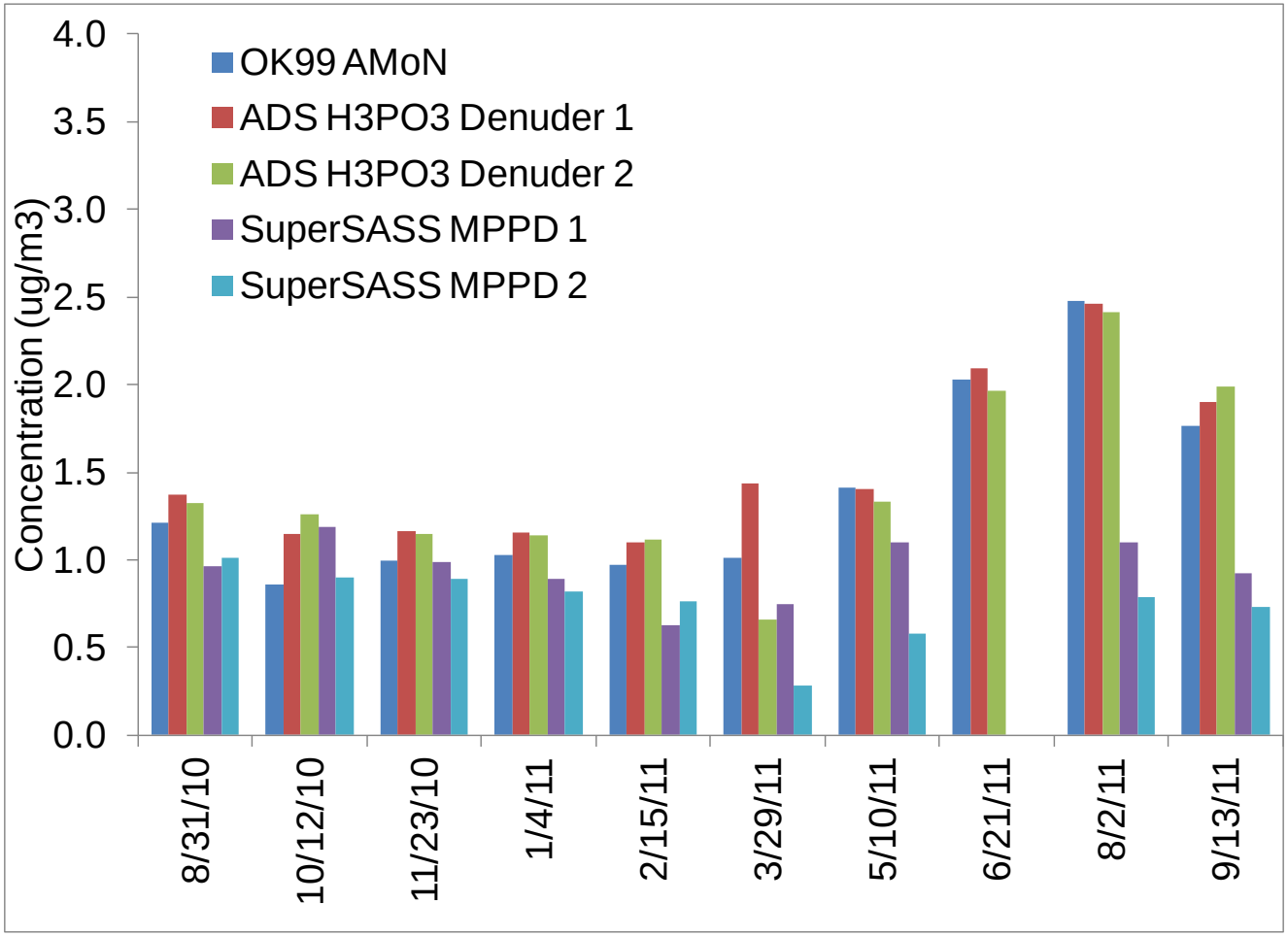
Ammonia Results – Arendtsville, PA (ARE128)

Preliminary Results



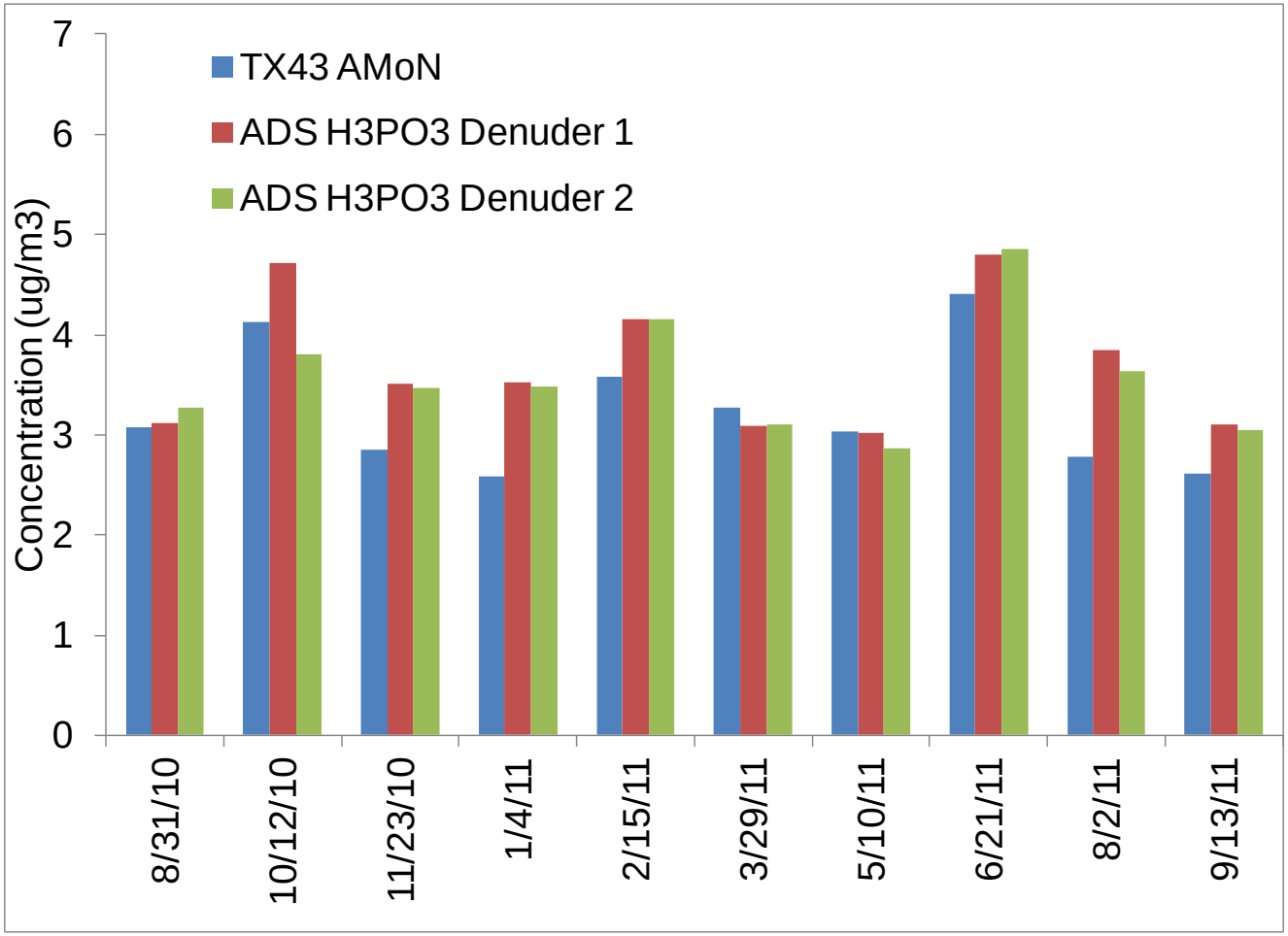
Ammonia Results – Cherokee Nation, OK (CHE185)

Preliminary Results



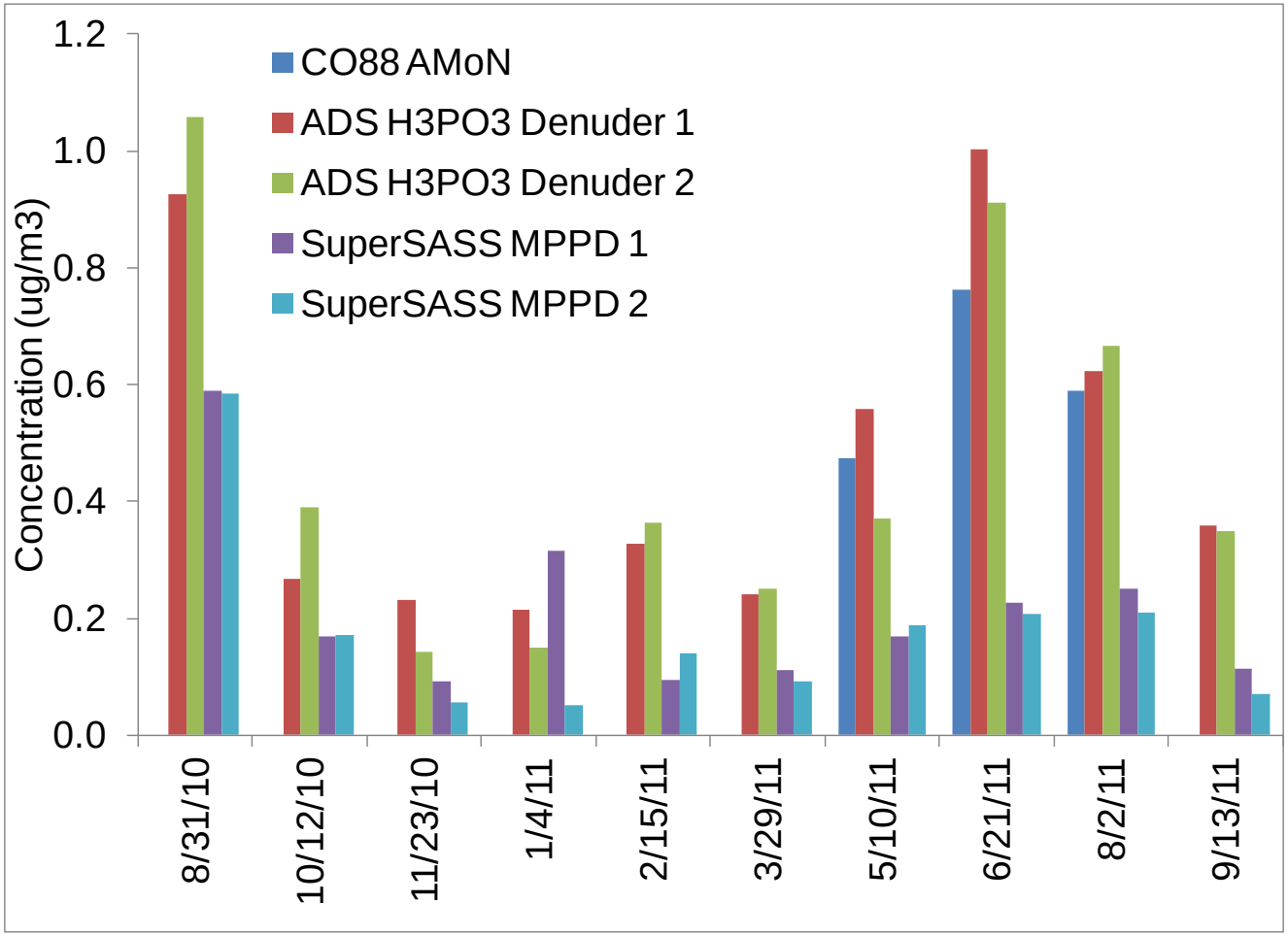
Ammonia Results – Palo Duro, TX (PAL190)

Preliminary Results



Ammonia Results – Rocky Mtn NP, CO (ROM206)

Preliminary Results

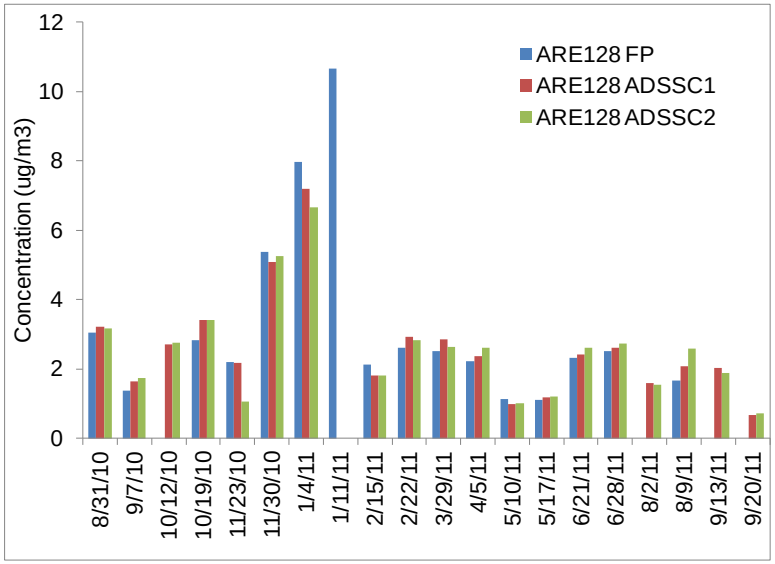


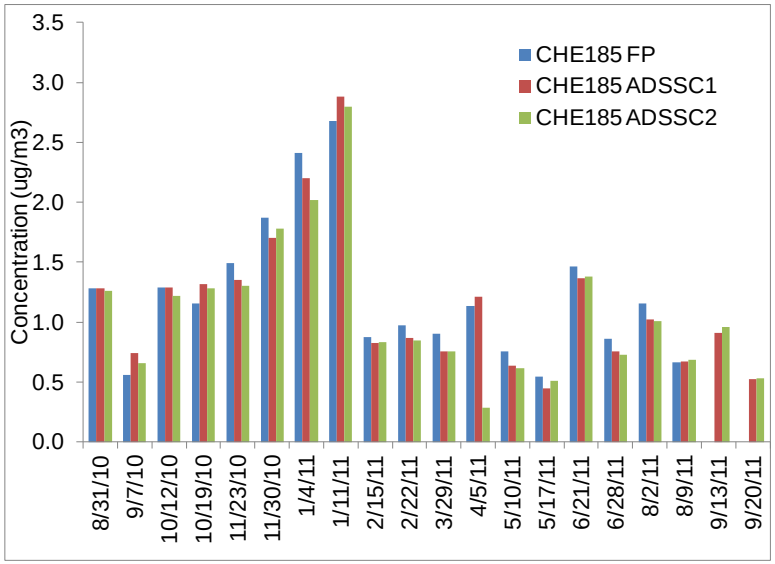
Evaluating CASTNET SO_2, Total NO_3^-, and Particles

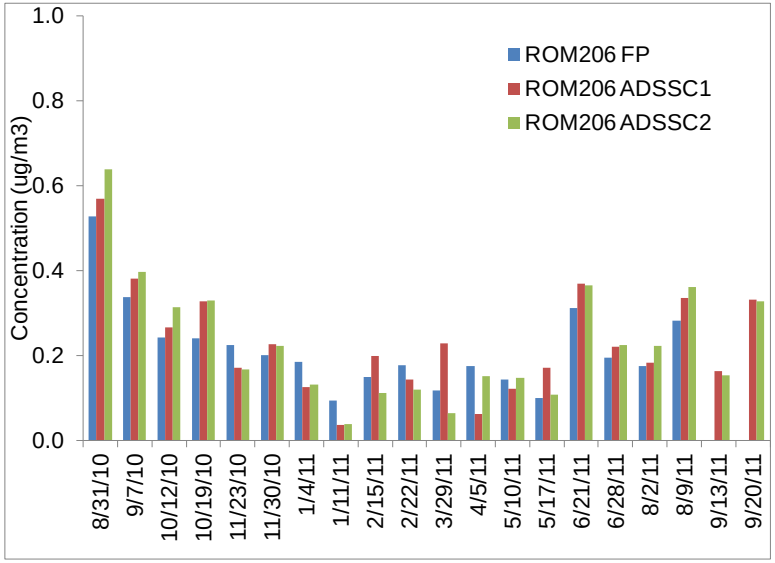
- CASTNET SO_2 and Total NO_3^- data may be included as a component of the AAI that is part of the current proposal for a pilot study for the new secondary standard for SO_x and NO_x.
- Comparison between ADS and CASTNET FP for SO_2, HNO_3, and particles.
- SuperSASS ion module results included in particle comparisons.

SO_2 Comparison

Preliminary Results

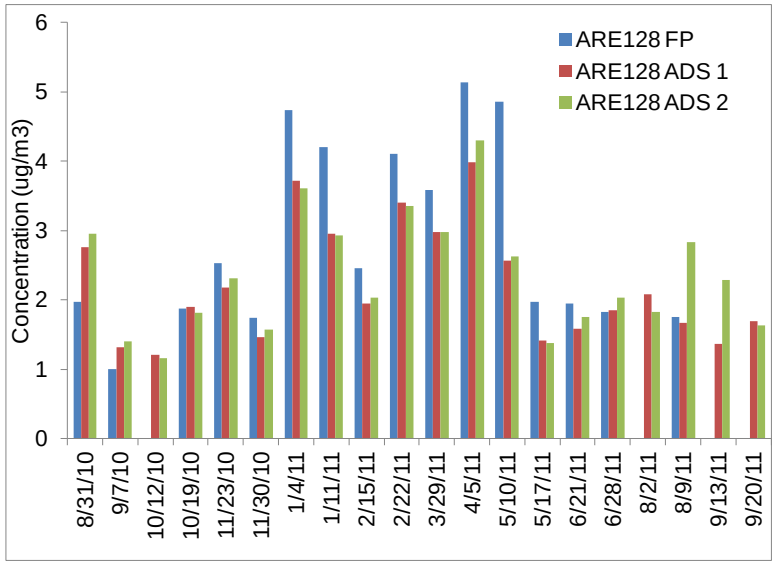


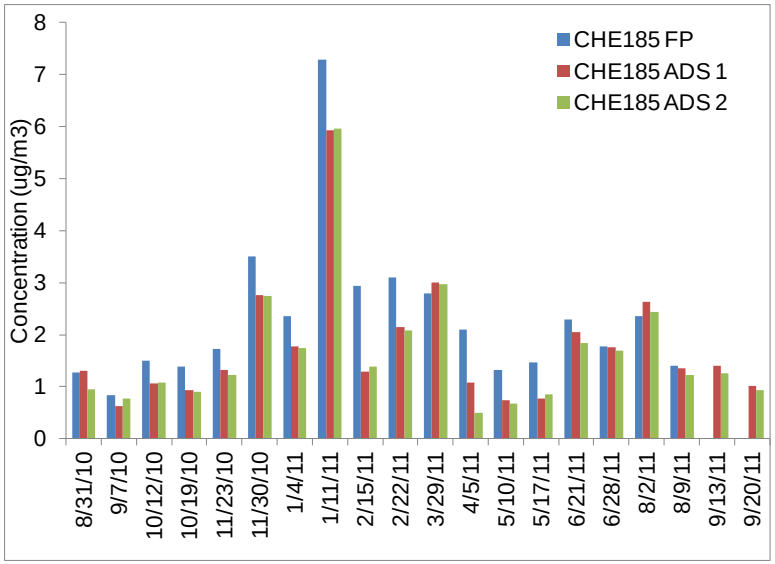


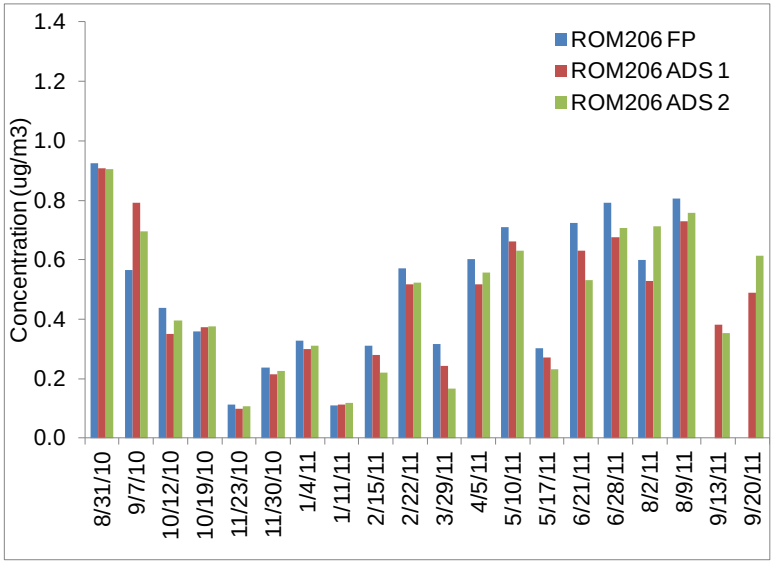


Total NO_3^- Comparison

Preliminary Results

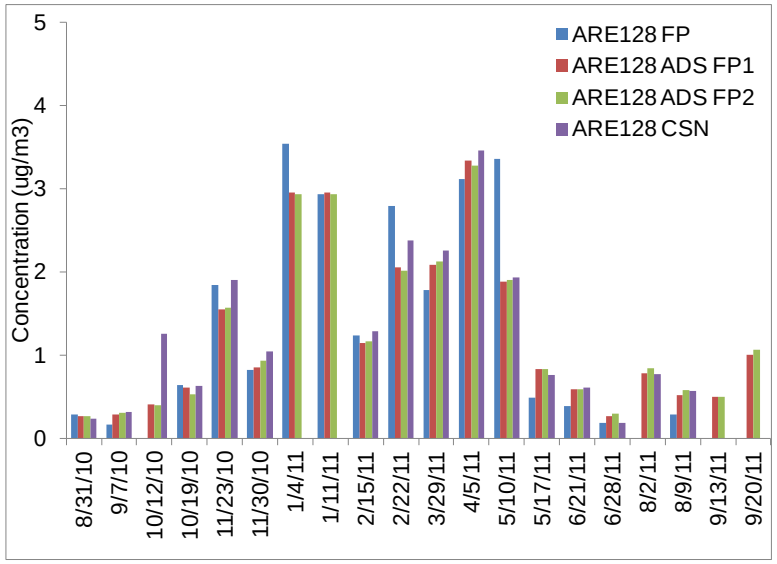


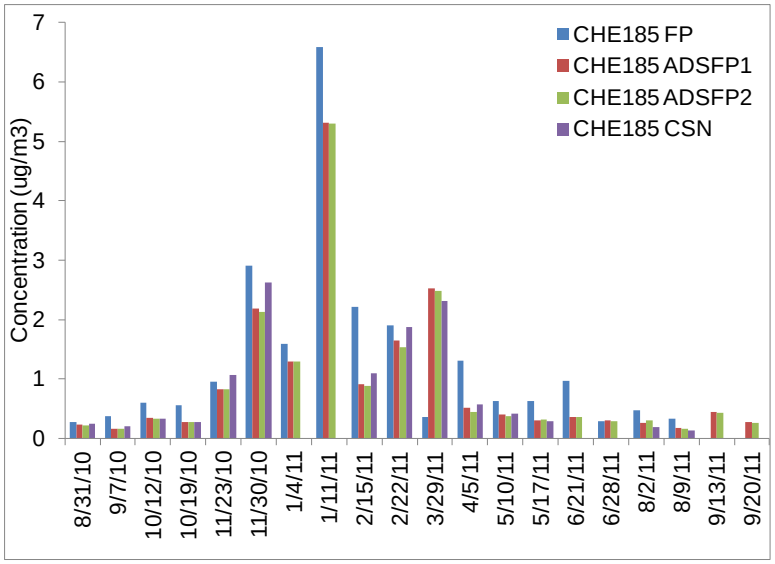


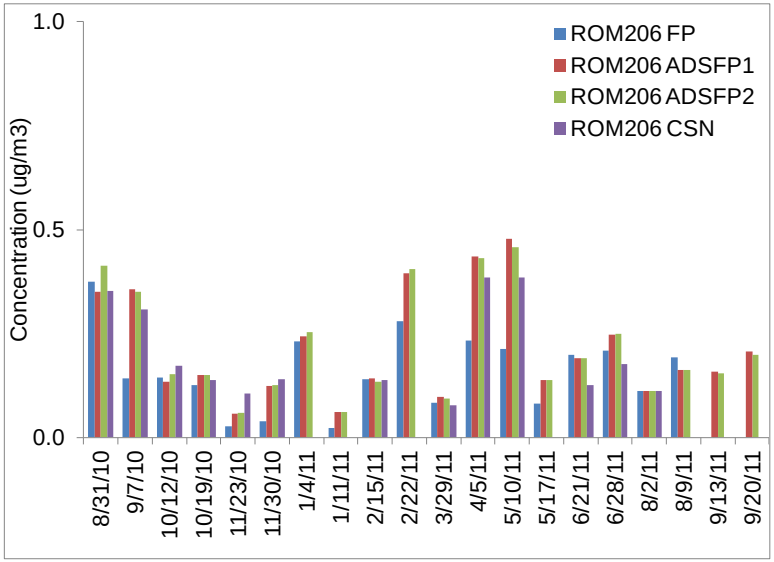


NO_3^- Comparison

Preliminary Results

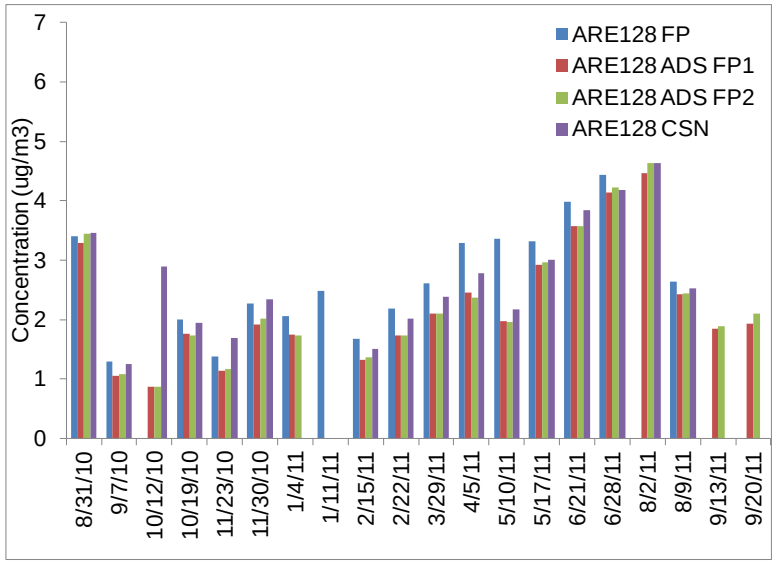


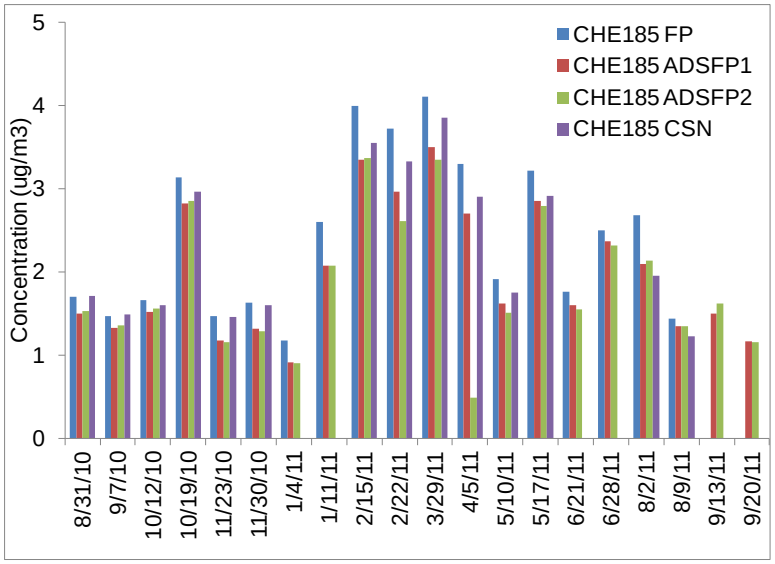


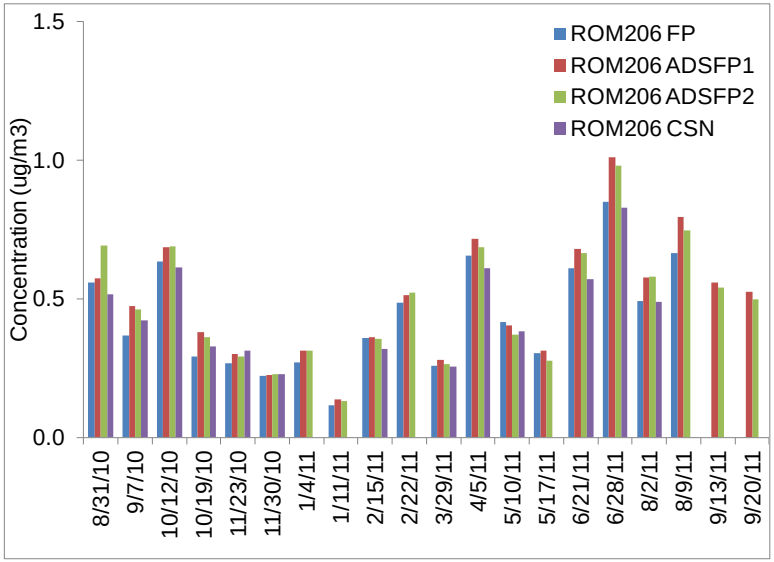


SO_4^{2-} Comparison

Preliminary Results

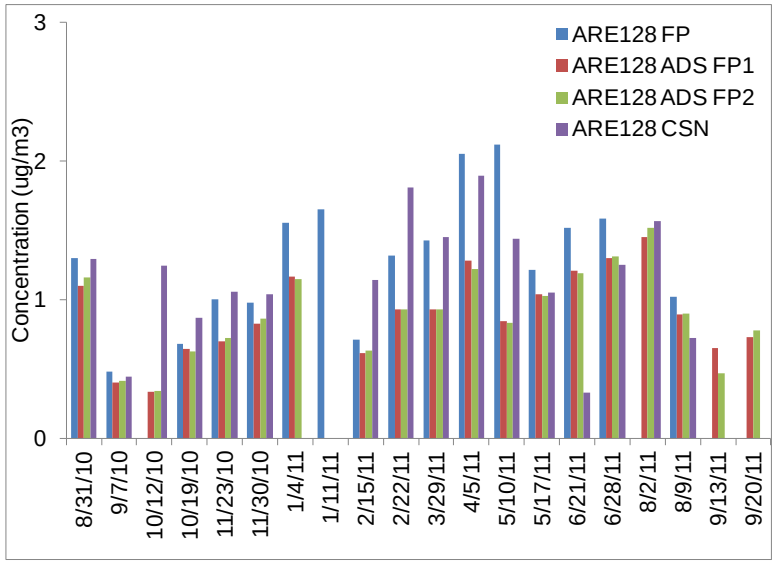


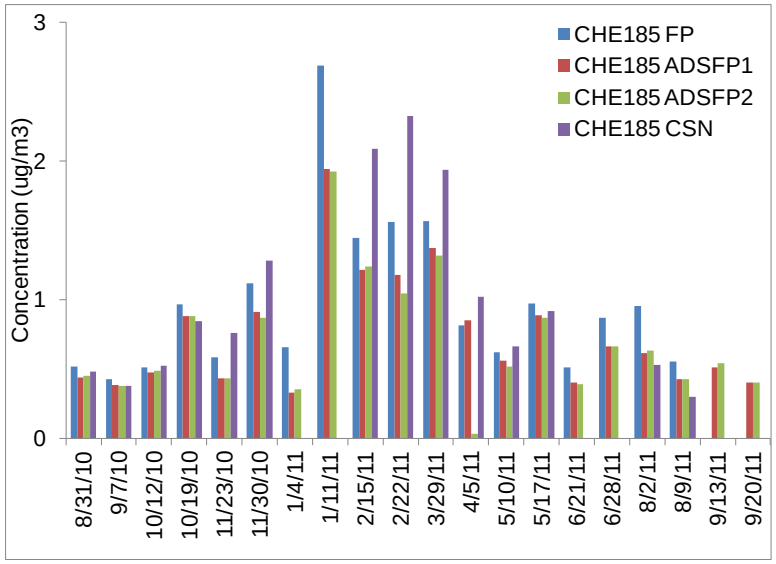


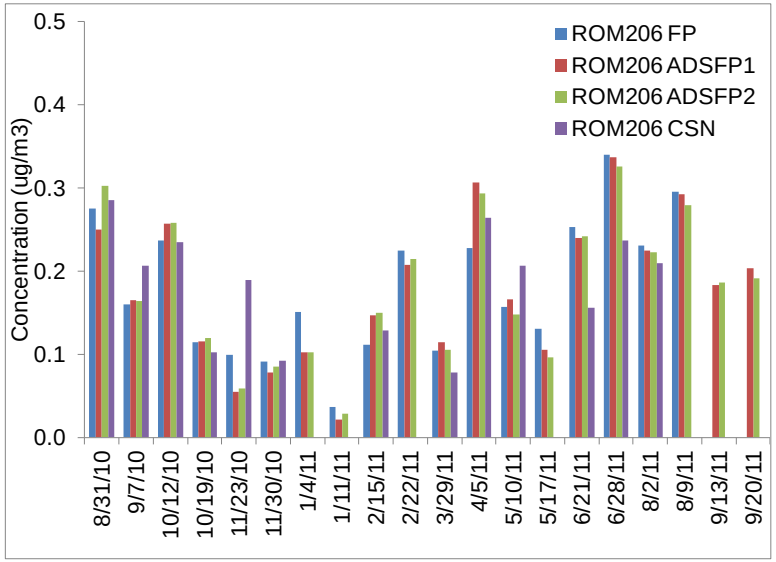


NH_4^+ Comparison

Preliminary Results







Summary

- NH_3 comparison between passive AMoN samplers and reference method ADS looks promising.
- Most important results from this study might be related to the verification of CASTNET SO_2 and Total NO_3^- measurements.
- Data analysis has really just started and will continue through the completion of a summary report and journal article(s).

Thank you!