Meeting Notes: 2025 TDEP Spring Meeting

Date: Wednesday, April 30, 2025

Attendees: Colleen Baublitz (EPA, TDep Co-chair), Kristen Foley (EPA ORD, TDep Co-chair), Da Pan (Georgia Tech, TDep Secretary), Bret Schichtel (National Park Service Air Resource Division), Greg Beachley (EPA Office of Atmospheric Protection, MMF Workgroup Lead), Jesse Bash (EPA ORD), Kristi Morris (National Park Service retired), Mike Bell (NPS Air Resources Division, NADP EC Past Chair), Amanda Cole (Environment and Climate Change Canada, past TDep Co-chair), Chris Rogers (WSP, former TDep Co-chair), Dakota Delong-Maxey (EPA Office of Atmospheric Protection), Dana Grabowski (NADP Program Office), David Gay (NADP Program Office Coordinator), Ian Rumsey (EPA ORD, Stakeholders Workgroup Lead), J. David Felix (Texas A&M Corpus Christi), Jason Lynch (EPA Atmospheric Programs Division), Jason O'Brien (Environment and Climate Change Canada, CAPMoN Head), Jeff Collett (Colorado State University, NADP EC member), John Walker (US Forest Service R&D), Katie Blaydes (Wisconsin State Lab of Hygiene, NAL Supervisor), Ken Brice (Environment and Climate Change Canada), Kevin Mishoe (WSP), Kulbir Banwait (Environment and Climate Change Canada), Liam Trinhnguyen (APHL UW Fellow, TDep algorithm review), Margaret McCourtney (Minnesota Pollution Control Agency), Mark Kuether (NADP Program Office, Data Manager), Mike Barna (National Park Service), Nate Topie (WSP Manager), Nichole Miller (State Lab, NADP Program QA Supervisor), Noel Deyette (USGS, Acting NADP Coordinator, NOS Vice Chair), Ralph Perron (US Forest Service), Ryan Fulgham (US EPA ORD), Timothy Sharac (US EPA Office of Atmospheric Protection), Tracy Dombek (Research Triangle Institute), Vincent Vetro (Environment Climate Change Canada), Weiti

Tseng (National Central University, Taiwan), Winston Luke (NOAA Air Resources Lab, NOS Chair), Alain Robichaud (ECCC), Glenn Wolfe (NASA Goddard).

1. Opening and Recap of Fall 2024 Meeting - Colleen Baublitz

- Colleen Baublitz provided a short introduction to the TDep Science Committee and attendees. She noted that spring meetings tend to be more administrative, while fall meetings have more of a science focus.
- **Fall 2024 Meeting Summary:**

    - **Presentations:** Included nitrogen deposition in complex terrain, new organic nitrogen (CSN) and fine particle measurements (IMPROVE), and Canada's ADAGIO project.
    - **Discussions:** Leveraging WMO GAW infrastructure, with a white paper currently in progress.
    - **Measurement Model Fusion (MMF) WG Update:** Ongoing projects include incorporating weekly wet deposition and IMPROVE/CSN sulfate data, assessing wildfire deposition, and the addition of Liam, a new APHL fellow, for network optimization.
    - **Measurements WG Update:** 2024 activities included SNIPIT (total N and P) evaluation, measuring smoke tracers in wet deposition, and a Southeastern US winter nitrate study.
    - **Stakeholders WG Update:** Held two webinars in 2024 related to atmospheric nitrogen deposition.

- **CLAD Ozone WG Update:** Expansion of the ozone garden network and investigation of Forest Inventory and Analysis (FIA) data to assess ozone effects on trees.
- **Education and Outreach Subcommittee (EOS) Update:** Sending out semiannual newsletters; an updated TDep fact sheet is now available on the website.

2. Workgroup Updates

- **Measurement & Monitoring (MM) WG - Bret Schichtel**

  - A report from the measurement workshop is expected to be published soon.
  - **Southeastern US Winter Ammonia Nitrate Study:**
    - A field campaign was conducted last winter by NPS and Collett's teams to understand the primary drivers of ammonia nitrate formation in the SE US, which has health and visibility implications.
    - The pilot study observed interesting episodes of ammonia nitrate formation.
    - The team is currently trying to understand differences between 24-hr URG data and continuous observations, with potential volatilization from filters being a factor.
    - A presentation on this study is planned for Mammoth Cave in May (Jonathan Jurigan may present).
  - **SNIPIT Evaluation:**

        - Jeff Collett's group will be testing a new instrument for phosphorus in the next month, which shows good sensitivity.
        - They are also testing acid impacts on phosphorus measurements.
        - John Walker mentioned Coweta could assist with the snippet evaluation.
    - Funding for some projects may be uncertain due to issues at CIRA.
- **Stakeholders WG - Ian Rumsey**
    - A webinar focusing on reduced nitrogen was held, with 130 registered attendees.
    - A third seminar, to be presented by USDA focusing on best management practices, has been delayed but is anticipated for later in spring or summer/early fall.
- **Education and Outreach Subcommittee (EOS) - Tracy Dombek**
    - EOS is working on organizing a communication session, similar to a workshop.
    - This session will involve people from different agencies discussing how they can improve communication within their respective agencies.
- **Measurement Model Fusion (MMF) WG - Greg Beachley** (Introduced by Chris Rogers)
    - A workshop was held on March 26th.
    - Liam, the new APHL UW fellow, is working on a data imputation protocol for missing observation data. This could help incorporate data from intensive studies.

- **Near-term Update (TDep v2025.01):** This version will feature re-aggregated EQUATES data with an improved inverse distance weighting (IDW) radius based on Kristen Foley's correlation analysis. The analysis is looking into using smaller time or spatial periods for IDW due to non-stationarity.
- **Wet Deposition Advancement:** Work includes the expansion of short-period data and the incorporation of EQUATES data.
- **Longer-term Update:** Plans include utilizing more recent CMAQ simulations (2020-2021) and the ADAGIO paper was highlighted.

3. Network Optimization - Presentations by Greg Beachley & Mike Bell, Facilitated by Colleen Baublitz Colleen shared slides from the ad hoc optimization sub-committee. The goal is to provide TDep-specific feedback.

- **Overall Current Recommended Changes:** The AMoN switch to ALPHA samplers and NTN lowering sampling frequency appear to be the most favored options.

- **Timeline of Changes:** Uncertain and dependent on upcoming discussions and federal funding clarity. Noel Deyette emphasized the need to identify "sacred cow" sites. Discussions are scheduled for the week of May 12th, starting Monday in Joint 1, with potential motions by Wednesday, May 14th.

- **Specific Measures Discussed:**

  - **AMoN switch to ALPHA samplers:** Analysis is ongoing, with more results expected at the NOS meeting. There's general support for the switch. Greg B.

supports the switch provided data is supportive, highlighting ammonia's importance.

- **NTN switch to analyzing a composite two-week sample:**
  - Discussion centered on whether the cost reduction (estimated around 30%) would be substantial enough, as many operational costs remain. Bret Schichtel noted that dry sample analysis would decrease, impacting cost savings.
  - Greg B. felt 2-week samples align with TDep's typical time resolution but was concerned about nitrogen measurement reliability, though current studies seem to suggest it will be reliable. He suggested keeping select sites on a weekly schedule (e.g., sites at continental edges).
  - The CAPMON storage study indicated that with refrigerated samples (4°C), ammonium concentrations decrease for 2-3 weeks then stabilize, while nitrate appears stable; there was a low bias for H+.
- **NTN to stop measuring cations:** General consensus is to continue measuring cations.
- **Discontinue NADP precipitation measurements and use PRISM instead:**
  - Evaluation of PRISM is needed. Greg B. mentioned TDep has PRISM comparison data readily available. Mike Bell recalled Greg mentioning a year where PRISM data didn't align well with TDep data; Greg will follow up.
  - Bret S. found PRISM performed well for annual values in complex terrain (Lock Vale) but showed more uncertainty for weekly samples. He is

philosophically opposed to a wet deposition network not measuring rain at an appropriate scale, as high-time-resolution data is valuable.

        - Chris R. suggested a backup plan for rain gauges is crucial as they are expensive and aging. He also questioned PRISM's funding stability. David G. noted PRISM is partly federally funded.
    - **Reducing QA/QC:** More feedback desired.
    - **One in-person meeting per year:** Generally supported, though limitations of virtual meetings are acknowledged.
- **Site Retention Plan & Analysis - Greg Beachley:**

    - Ideas for prioritization: sites at continental edges, areas of specific ecological interest, sites with long temporal trends or good data completeness, and sites filling geographical or ecological gaps. This aligns with CLAD priorities.
    - Inverse Distance Weighting (IDW) leave-one-out analysis:
        - Identified sites that differ significantly from their surroundings (often in mountainous regions/West) and sites that show good agreement (potentially redundant).
        - The model can be re-run with different scenarios (e.g., removing agency-specific sites or newly established sites).
        - Historical data could inform alternative sampling strategies (e.g., week-on/week-off).
- **Discussion Highlights:**

- Kristi M. supported keeping a few sensitive ecosystem sites on a weekly schedule. She inquired about CLAD's view on prioritizing long-term trends versus spatial representativeness. Mike B. responded that CLAD can adapt, noting TDep was initially designed more for trends.
- Winston L. expressed initial opposition to 2-week samples but acknowledged severe budget pressures might make it a better alternative to site closures, as protocols can be reverted if funding improves. He stressed the importance of refrigeration for nitrogen species.
- David G. agreed it's about 10 times harder to start a new site than to modify an existing one's protocol.
- Greg B. asked about the feasibility of one weekly sample per month. John W. replied this might work for trends at some sites but could miss critical deposition events needed for site-specific annual rates (e.g., at Coweta). He advocated for continuing the USGS 1-week vs. 2-week comparison study.
- Mike B. relayed that the program office indicated managing two different sampling processes (weekly and bi-weekly) would be a significant amount of work.
- Timothy S. proposed the idea of a bifurcated network: an NTN "premium" product (1-week sample) and an NTN "economy" mode (2-week sample) depending on site sponsor budgets. David G. noted that federal sites are mostly the ones considering the 2-week option, while states might prefer to continue weekly sampling. Kristi M. confirmed some non-federal sponsors wish to remain on a 1-week schedule.

- Noel D. emphasized the dilemma between keeping the network map alive versus maintaining data quality for modelers.

4. Brief Technical Updates

- **Deposition Modeling Frameworks - Jesse Bash (EPA ORD)**

  - Presented land-use specific deposition estimates derived from the EQUATES model runs (2002-2019).
  - The model output includes 17 layers of deposition, mapped to MODIS IGBP land use classifications at a 0.3 km resolution, normalized so the total deposition matches the 12 km CMac grid cell total.
  - This data is available for species like ammonia, ammonium, nitrate, and organic nitrogen.
  - The output highlights how the model allocates deposition within a grid cell (e.g., higher deposition to riparian buffers compared to adjacent agricultural land). This is particularly useful for TMDL applications.
  - These data are now available on the EPA's Amazon data repository, with a data description to be added shortly.

- **Upcoming Field Campaign: Farm Flux - Glenn Wolfe (NASA Goddard, Farm Flux PI)**

  - Farm Flux is a NASA Earth Venture Suborbital mission focused on understanding agricultural emissions (nitrogen, PM, VOCs) in the US.

    - The mission will utilize two aircraft: a large P3 aircraft for eddy covariance flux measurements over the Midwest and California, and a smaller aircraft targeting emissions from animal feeding operations.
    - Deployments are scheduled for 2026 and 2027.
    - Glenn expressed interest in connecting with TDep regarding how Farm Flux data (mixing ratios and net fluxes of NOx, NH3, O3, VOCs, aerosols) could be integrated or compared with TDep's MMF products.
    - He also sought input on flight planning, particularly concerning areas with significant flux magnitudes, timing, model uncertainties, or network gaps.
    - The project aims to connect with agricultural stakeholders.
    - More information can be found in the NASA Farm Flux white paper (searchable online).
- **New Methods for Deposition Data Fusion: ADAGIO - Alain Robichaud (ECCC)**

    - ADAGIO (Atmospheric Deposition Analysis Generated by Integrating Observations into Models) update focused on dry deposition (a wet deposition paper was published earlier).
    - The method uses optimal interpolation (OI) to combine model concentrations with in-situ air concentration measurements to create an objective analysis field. Dry deposition maps are then derived using model-generated deposition velocities.
    - A key feature is the mapping of analysis increments, which helps identify model biases and artifacts (e.g., capturing ozone stratospheric intrusion in the Southwest US not picked up well by the model alone).

    - An "effective deposition velocity" is defined to preserve short-term variations in flux calculations.
    - Comparison of ADAGIO with the model (GEM-MACH) shows the model tends to underestimate reduced N and overestimate oxidized N. The three largest contributors to dry N deposition are HNO3, NH3, and NO2.
    - A 3-year average of ADAGIO data shows good agreement with TDep MMF products in the US, and ADAGIO also provides coverage for Canada.
    - Future work includes incorporating wildfire emissions via the FireWork system and potentially assimilating satellite data. The dry deposition paper is currently under internal review at ECCC.

5. Closing Remarks - Colleen Baublitz

- Colleen thanked all attendees for their participation, engagement, and valuable feedback, particularly concerning network optimization. She encouraged continued communication with TDep leadership on this topic.