

**National Atmospheric Deposition Program (NADP)  
Council of State and Territorial Epidemiologists (CSTE)**

**Aeroallergen Monitoring Science Committee Meeting**

Wednesday, May 1, 2024; 08:30 AM – 12:30 PM Central Daylight Time

1. Welcome/Zoom Logistics/Introductions
2. Approval of October 23, 2023 meeting minutes
  - Minutes were approved.
3. Recap of activities since October 23, 2023 meeting
  - AMSC Fact Sheet has been completed.
  - Andy approached in December by Connecticut DEP (Pete Babich) about the Maine network. In January, approached by state of Vermont health people. Burlington pollen monitoring site shutting down. People in area wanted to keep the site going. Heard about Maine's plan.
  - Two meetings of the Data Management Work Group. Andy has concluded that it was too difficult logistically to keep bi-monthly meetings going. Maybe one smaller work group with background in coding may be way to go.
  - Update on the Maine network to be provided later in the meeting.
  - Greg W: Getting updates on international aeroallergen monitoring conferences.
4. Stakeholder Updates:
  - CSTE: Claudia Brown  
Have just hired new program manager: Maggie Thelan from WI. She is the PI for a grant received by CDC to support the climate ready cities and states initiative. Maggie works on climate and health issues. She will bring the needed stability and leadership to climate health and equity subcommittee. Claudia has yet to connect with her. CSTE continues to collaborate with Univ of Washington, Dr. Jeremy Hess, to develop and validate modeled pollen info to fill in spatial and temporal gaps in NAB data. Good collaborative effort. Looking to do health and trend analyses with this data.
  - CDC : Claudia Brown  
Working with NAB to establish getting historic NAB pollen info available to public health practitioners. Working on a data use agreement. Under review now. Leveraging our environmental public health tracking network – data explorer. Environmental data health repository. Would not share raw data. Would be able to display some type of pollen indicators such as levels, start date, end date, peak date, etc. Hopeful that this will move forward. Good working relationship.  
GW: have they had interaction with PS? Brown: Waiting for more validation of the data and see how it compares to NAB data.
  - NAB: Pamela Gaybrush  
Working with Claudia on the collaboration. Board open to rebranding the entire NAB, but very deliberately. Main goal is to build the network. Goal is to have NAB stations in every state. Currently not in 13 states. Loaning Burharts to 6 states. Supports new stations and getting not so active ones active again. Working with other orgs like google

pharmas, etc. Board trying to be strategic. Automated sensors becoming more accurate. Subcommittee looking at studies comparing the two. Physician wants to do official study between PS and NAB data.

David Gay: Running PS for a while. Would NAB be open to a combined network? Pam: need a formal request. Send a note to her. David: seems logical to work together. Would love to compare PS data to NAB data collected at the hospital in WI. Pam: Would have to request it through the chain.

GW: Data have been compared that were collected in WI. PS was not right next to hospital collector. Has NAB seen this paper? Comparison done at Emory. Comparison is quite good. More work to be done with grass species.

Coates: some of these automated sensors are not very accurate and not yet ready for primetime as a national network.

Eric Uram: Did compare to NAB site. Used what was published on the internet. Would love to have actual data to make better comparison.

Coates: Have also done corrective changes within the system.

Maine will have rotorod collocated at one of their sites.

- ARL: Dan Coates  
30 stations across Canada. Collect daily. Lab analyzes and produces forecasts. Collaborates with state of Maine. They use GRIPS which they manufacture themselves. Just a normal year for them.
- Pollen Sense:  
No rep.
- EPA: Melissa Puchalski  
SAB report did not support using CASTNET as a platform for pollen monitoring. EPA did have loaner PS operating at WSP offices and did develop polling system. Tribal site NPT006 has interest and Cherokee has purchased PS sensors. April: 3 PS' have been received and are working on installation.

#### 5. Presentations:

##### **Eric Uram: PollenSense 2024 Proposal: Moving AMSC Priorities in the Midwest**

- Utah, WI, NC comparison of different types of pollen collection methods led to Aerobiologia article. Study explored equipment compatibility; wanted to do comparison with NAB with data but there were logistical issues in getting data for the NAB Madison location. Permission given to share data but data were never received.
  - Staffing: Problematic in that weekly sampling and site maintenance is preferred over daily.
  - Financial Needs: Sponsor commitment through grant funding. Need grant money to do verification approaches, side by side analyses.
- Ongoing and emerging programs:
  - State of Maine – Andy Johnson
  - Georgia – Emory University
  - Nevada – UNLV
  - Washington State
  - WI/Upper Midwest – WSLH/NADP
- Upper Midwest: Wisconsin State Lab and NADP
  - Original offer from PS was to provide 50 sensors as a trial program, no shipping costs, free tape cartridges for 1<sup>st</sup> year, payment for PS server subscription (\$50/mo/unit).

- PS required weekly staff maintenance and support to apply corrections from images.
  - Did not know how much money installation would involve, electrical, wifi, and additional program staffing to get all going in a coordinated fashion.
  - Siting Issues and Cost for Coverage:
    - PS requested collocation with 26 CASTNET stations.
    - Proposed 25 in upper Midwest as a Health Disparities Network
      - Financial concerns: data collection and management (hardware, software); pollen ID and verification; flow verification; staff and program oversight (WSLH/NADP staff); data management and data interpretation for public use (APHL fellow?).
      - Exploring 3-7 units. Have run into issues with AP330 PS. Internet service is no longer working, so need to relocate. Looking at Henry Mall rooftop as a new location. Using cardinal compass points in locating 4 of the units to be deployed side by side.
  - Potential Partners:
    - Climate and Health WI – UW-SMPH and State of WI DOH
    - Climate and Health IL - U of Illinois school of public health (SPH).
    - Tribal Interest - Glickwick group: Great Lakes Indian fish and wildlife commission, WI, MN, MI
    - WI Environmental Health Network (medical professionals)
    - UW Arboretum Climate and Health Assc. The arboretum has all the different grasses, trees etc. It is a good universe of pollen.
  - 3 possible locations in WI:
    - 4 units in Madison.
    - Sullivan WI (weather station there),
    - Milwaukee: 16<sup>th</sup> Street health clinic facilities.
    - Possible location in central Chicago thru Univ of Ill.;
  - Budget: installation: \$500/unit; Lease: \$5600/unit; \$600: wifi, data visualization and operations; \$200: extended warranty to keep unit going; \$375: cost of tape and digitization, interpretation in Utah. On Wisconsin side of things: analysis of pics under microscope and comparing to other traditional methods and validation: \$100,000/year. An APHL fellow for software manipulations to share data with public, one-time effort: \$5000, further testing of PS flow: \$5000/year. Grand total across 5 years is \$600,000. Need grant funding.
- Discussion: Greg Weatherbee - How does the cost compare to running 7 sites the old fashioned way, with NAB or ARL? Reply: Each traditional method site costs 5-6 K plus staffing, certified reader, etc.;
- GW: traditional method sounds less expensive.
- Dan Coates: ARL's usual cost/station is 6K, mainly for collection by FSO. Do not charge for equipment, comes back for calibration at end of season, shipping and analysis. Maybe 4K to run a USA site? Shipping can drive up the cost quite a bit.
- GW: sounds way cheaper. 7 sites for 35K. Daily data. Would not have results right away.
- Dan: Turn around time is about 5-6 days depending on shipping, contract, within a week for sure. Overnight shipping will make it quicker. Accuracy rate is great. Auditable. Always do 2 rods.
- GW: Have tech at WI lab who is now certified. Terri and another person who can read pollen. Is Terri officially certified? Another cost to get her certified. Is there a cost? Do

you have to become part of NAB network to be certified? No NAB procedures available. Or send samples to Dan. Sending samples to Dan is preferable.

Eric: same person reading PS as well as other samples. Terri reading PS as well as reading rotorod.

Dan: if they had access to the portal, they could do this also. Will have to check workload. This year looks good. Can give a cost estimate.

Eric: Seasonality; NAB sites a little late getting started. What does ARL do? Sampling ends late October and will start in late January but can do 12 months. In US, PS has detected pollen when there is snow on the ground, but in Canada not worth it during snow.

GW: PS – more to be ID'ed there than pollen. Microplastics, smoke particles, total particulates. Other data streams with PS. Need QA/QC but still had good correlations for total pollen counts. Species ID needs a lot of improvement, but do not discount usefulness of instrument.

Dan: PS does good job counting total pollen.

David G: PS very good at total pollen. Instrument produces a load of great data: mold, plastic, etc. We need to put a proposal together and shop it around. Can be used for silica and asbestos as well. Get validation started soon rather than kick the can down the road.

#### **Emma Markey: Irish Pollen Network: Current Status and Future Plans**

- Main concern from public health perspective is pollen exposure; approximately 30-40% of Europeans have a pollen allergy; Ireland has the 4<sup>th</sup> highest levels of asthma.
- Airborne pollen and other bioaerosols can impact cloud formation which effects radiative forcing.
- Transport of pollen, etc. can also result in spread of invasive plant species and diseases.
- Benefits of monitoring bioaerosols: provides important information for agricultural uses in plant pathology, crop yield predictions and plant distribution; pollen forecasting is a valuable resource for allergy sufferers.
- Seasonal allergies are more common in urban areas and with increased urbanization and climate change, allergies are expected to worsen. Elevated CO<sub>2</sub> levels are expected to increase pollen production. Global warming will lead to earlier springs and thus lengthen the pollen season.
- Pollen Monitoring in Ireland:
  - Commenced in 1978 on West Coast of Ireland in Galway. Several years of studies were done leading to a few publications.
  - Nothing much until 2010/2011 when there were some monitoring campaigns in Dublin.
  - Some real time studies from 2010 through 2014.
  - In 2017 Ireland's EPA funded the pollen monitoring and modeling project (POMMEL).
  - POMMEL is sampled with a Hirst Lanzoni sampler which uses the traditional volumetric compaction method. The flow rate is 10L/minute and pollen is impacted on a silica coated tape. This method requires microscopic identification of a variety of pollen taxa.
  - Over 65 pollen types have been identified in Ireland.
  - Spring peak in March and a bigger summer peak in June. Magnitude changes by year.

- Spring peak dominated by birch and ash pollen and summer peak is dominated by grass pollen.
- Model Parameters and Model Types: Parameters consist of pollen concentrations of previous 1, 7 and 10 days, growing degree days, as well as meteorological parameters like windspeed, direction, rainfall, pressure temperature, global radiation, etc. Currently, classification models are favored as forecasts are given as a threshold rather than a quantitative value.
- Provided as public resources are 3-day pollen forecasts, text descriptions of dominant pollen/spores, and a pollen calendar.
- Future Modeling Work:
  - Updating and optimizing existing source receptors.
  - Investigating pollen transport and dispersion, e.g. HYSPLIT.
  - Modeling efforts to focus on incorporating additional monitoring data.
- Real-time Pollen Monitoring: Traditional methods are too time consuming and laborious. Considering Swisens Poleno, Rapid-E, WIBS-NEO, Huns BA500, etc.
- Swisens Poleno – Jupiter Model:
  - Operates by holographic imaging and light induced fluorescence,
  - Classification done by machine learning algorithm; must be trained using known pollen samples. In operation since 2023.
- Poleno step-wise Plan:
  - Train Poleno with known pollen samples;
  - Clean data;
  - Optimize classification algorithm;
  - Evaluate Poleno performance versus Hirst via colocation;
  - Streamline data flow to real-time data;
  - Incorporate real-time data into models;
  - Extend classification to fungal spores.
- 2024 Objectives:
  - Evaluation of sampling sites;
  - Expansion of sampling sites;
  - Inclusion of additional real-time devices;
  - Validation of performance of novel instrumentation via colocation with Burkhardt's and Hurst's;
  - Optimize ML algorithm for real-time pollen classification;
- For further information/questions please email at [Emma.markey@met.ie](mailto:Emma.markey@met.ie)
- Discussion/ Questions:
  - Do the new instruments have the resolution to identify fungal spores as they are so small? Spores are going to have to be around 5 micron size. Training for smaller spores will take a lot of effort.

**Andy Johnson: The Maine Pollen Landscape**

- Very few NAB sites in the northeast and mid-Atlantic states. There is a new site though in eastern Massachusetts. None in Maine.
- The Maine network uses PS400 Particulate Sensor.
- Will be paired with a rotorod for comparison to traditional method.
- Site selection considerations:
  - Goals: BRACE grant is to conduct public health activities designed to protect citizens from adverse effects of changing climate.

- Siting Criteria: coverage for sensitive populations; maximum population coverage; maximum geographic coverage; maximum biodiversity.
  - Limitations: Staff availability; where best to collocate?
  - The selected sites are in Rumford, Augusta, Cape Elizabeth and Bangor. The Micmac Tribe operates a PS sensor in Caribou.
    - The rotorod will be collocated in Augusta.
    - The 5<sup>th</sup> PS sensor will be used for spatial assessment (scale of representativeness) and as a spare. Can use tower at Howland for vertical assessment at some point in time.
  - Issues experienced with the PS sensors consisted of camera focusing, connection issues, tape cartridges, SD cards, motors, light infiltration, and dashboard.
  - The PS' were deployed at the selected sites as of April 1<sup>st</sup>. Not ready yet to make data public. Will focus first on total pollen counts.
6. Discussion Time: Topic - Future Directions
- Greg: Eric Uram working with Andy in Maine would be beneficial given all of Eric's experience. Eric used a different PS model than what Maine is using. So would have to get up to speed on the 400 model. Andy thinks their IT folks would benefit from working with Eric.
  - Greg: There is potential for having two small state networks, Maine and Wisconsin. Coordination between the networks is important for standardizing operating procedures. Need to include Washington state in this as well.
  - Instrument siting criteria are needed.
  - Produce an SOP.
  - Greg asked John Walker about analyzing a split sample from NADP bucket at Duke for total organic nitrogen and see if there is a correlation to pollen loading. John: It would be interesting to see if there is a correlation between soluble organic nitrogen in precipitation relative to the pollen loading. It could also motivate us to find ways to determine the total nitrogen, soluble and insoluble fractions in precipitation as this issue has not been addressed yet.
  - We need a better understanding of what the state of Washington is doing. AMSC to reach out.
7. Wrap-up and Adjourn
- The 'main' wrap-up was that Andy Johnson is retiring at the end of May!
  - Liza Woodard will be the Maine DEP representative at NADP meetings.
  - Meeting adjourned