EPA’s Office of Atmospheric Programs (OAP) Update

National Ambient Air Monitoring Conference
August 23, 2022
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High elevation CASTNET + NADP wet deposition monitoring site Gothic, CO
Outline

• OAP Organization
• OAP Monitoring Programs
• New Measurements to Address Emerging Environmental Issues
• Fiscal Impacts on Rural Monitoring Programs

EPA/NPS co-located CASTNET sites at Rocky Mountain National Park, CO
Mission: To reduce harmful air pollution and protect the global environment

Areas of Expertise include:
- Emissions accounting and electronic reporting
- Environmental monitoring and atmospheric chemistry
- Energy and economic modeling
- Impact analysis to support rulemakings
- Climate and stratospheric ozone science
- Partnership programs
OAP/Clean Air Markets Division

- Implementation of power plant emission reduction programs:
  - Acid Rain Program
  - Cross-State Air Pollution Rules for ozone and PM NAAQS
  - Mercury and Air Toxics Standards
- Online tools for reporting, data, analysis and visualization of emissions and implementation data
- Assessment of emissions, air quality, and environmental results supported by CAMD’s emissions and ambient air monitoring programs
Clean Air Markets Division (CAMD)

- Manages OAP’s environmental (air quality, surface water, and deposition) monitoring programs to:
  - Develop and implement innovative, transparent, adaptive, results-driven regulatory programs
  - Evaluate human and environmental health impacts under current and future emission reduction programs
  - Assess program effectiveness using high-quality, consistent data
- CAMD’s air quality programs provide data in rural areas/communities, on tribal lands, and within National Parks and other Class I areas to improve understanding of atmospheric transport, secondary aerosol formation and emerging environmental issues
Connection between Policy and Environmental Results

Total S Deposition from 2000-2002 and 2018-2020

OAP's emissions & environmental monitoring data provide scientific accountability for policy implementation.
Enhanced Portfolio: Climate and Environmental Justice

- Increased focus on evaluating how CAMD emission reduction programs and monitoring networks can help inform climate policy and assessments

- Power Plants & Neighboring Communities – combines power plant emissions data with demographic information to help identify a community’s potential vulnerability to environmental concerns
  - Tool shows power plants (all plants supplying electricity to the grid) located in or near communities with one or more of the 6 key demographics at or above the 80th percentile nationally

Data on ~275 large (> 25 MW) coal-fired plants from EPA’s Power Plant and Neighboring Communities Mapping Tool
Ambient Air Quality Monitoring

- **What is CASTNET**
  - Rural ambient air quality monitoring network measuring weekly concentrations of reactive nitrogen, sulfur, base cations, chloride and hourly ozone
  - Program is supported by EPA/OAP, National Park Service (NPS), and Bureau of Land Management Wyoming State Office (BLM)
  - Operations and laboratory services supported through EPA and NPS/BLM contracts
  - Quality Assurance program – follow the requirements in 40 CFR, laboratory is accredited, robust independent audit program

- **What makes CASTNET unique from SLAMS?**
  - Provides air quality and atmospheric deposition results in **rural communities**
  - **Only network providing data to evaluate deposition fluxes** and subsequent environmental impacts (critical load exceedances)
  - OAP works directly with tribes, EPA Regions and OAR IO to **build tribal monitoring capacity**
  - EPA’s contract is used to support S/L/T agencies in implementing and improving their regulatory monitoring programs
Addressing Air Quality Collaboratively

- **National Atmospheric Deposition Program (NADP)** is a cooperative hosted by the Wisconsin State Laboratory of Hygiene at the University of Wisconsin-Madison
  - Supported by federal, tribal, state and local agencies, universities, NGOs, and private companies
  - Monitoring changes in pollutants (e.g., nitrogen, sulfur, pH) in precipitation since 1978

- Five sub-networks with sites primarily located in rural areas
  - **National Trends Network (NTN)** – 30 sites supported by OAP
  - Mercury Deposition Network (MDN)
  - **Ammonia Monitoring Network (AMoN)** – 71 sites supported by OAP
  - Atmospheric Mercury Network (AMNet)
  - Mercury Litterfall Network (MLN)

- Program provides a forum for scientific research including
  - critical loads,
  - pollutant loadings to urban landscapes,
  - measurement model fusion techniques, and
  - addressing global assessment of mercury concentrations and deposition

- **AMoN** is the only source of routine, consistent NH₃ concentrations in the United States
  - Increasing trends
  - High spatial variability
  - Precursor to PM formation in rural and urban areas

2021 Annual Average NH₃ Concentrations
Addressing Persistent and New Air Quality Issues

- CASTNET sites are uniquely situated in areas impacted by area emission sources (e.g., agriculture, burning)
- Oil & gas impacts on O₃
  - VOCs and NOy
- Wildfire impacts

- Increasing gaseous reduced nitrogen concentrations
  - Driver for PM formation
    - Gas-particle partitioning is important for improving model performance
  - Eutrophication & linkages to HABs

Bondville, IL
Annual Trends in Nitrogen Concentrations
CASTNET and NADP address emerging scientific questions

- **Black Carbon** in Precipitation (Dr. Ross Edwards, U. of WI & NADP)
  - 12-month study of BC in precipitation at 13 existing NADP/NTN sites (August 2022 – July 2023)
  - Spatial and temporal distribution of BC in precipitation – thought to be the main removal process

- **Microplastics** – found in 98% of wet and dry deposition samples collected in protected areas in the western US
  - Type and size of microplastic pollution
  - Fate and transport to understand aquatic and terrestrial impacts

- **Organic N** constitutes ~25% total N budget globally but sources, concentrations, deposition, and ecological impacts are poorly understood
  - Total N/Water Soluble Organic N Study – develop robust methods to constrain spatial and temporal variability of ON and incorporate routine measurements into CASTNET

Average Wet + Dry Plastic Deposition in 2018

Average = 0.11

Sampled Jan. – Mar. 2020

Sampled Mar. – Jul. 2021

Brahney et al., 2020
CASTNET and NADP address emerging scientific questions

*Per- and polyfluoroalkyl substances*

Washington's Crossing - Trenton, NJ

NJ-99

- Pilot study to assess fate, transport, and transformation of **PFAS compounds** in precipitation (ORD, WSLH, OAP, NY, NJ, ME, Kickapoo Tribe, WI DNR)
- 2020 precipitation-weighted concentrations and fluxes will be released this fall
- Interest in understanding total loadings to drinking water and other aquatic systems

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**SEASONAL CHANGE**

- **JAN**
  - Lake Ice Thaw & Freeze
- **FEB**
  - Timing of Spring Snowmelt
- **MAR**
  - Alaskan River Ice Breakup
- **APR**
  - Spring Snowpack
- **MAY**
  - Arctic Sea Ice Melt Season
- **JUN**
  - Frost-Free Season
- **JUL**
  - Wildfire Season
- **AUG**
  - Leaf and Bloom Dates
- **SEP**
  - Cherry Blossoms Peak Bloom
- **OCT**
  - Heat Wave Season
- **NOV**
  - Growing Season
- **DEC**
  - Ragweed Season

*Observed evidence of changes in seasonality. Solid lines represent time of year when indicators typically occur, and arrows denote earlier and later shifts in the season.*

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- **Aeroallergen** Pilot Study Conducted in 2021 to evaluate sensor methodology as compared to NAB manual methods
- Potential for deploying real-time sensors at CASTNET sites to assess changing seasons and health impacts
FY 22 Budget Implications for Ambient Monitoring

- Due to FY 22 budget constraints, OAP suspended operations ("mothballed") at 26 locations on May 10th 2022
  - CASTNET and NADP sites impacted
  - Executed suspensions quickly to realize maximum cost savings and keep remaining sites operating
  - If the FY 23 budget is at the FY 22 level OAP will need to take additional steps to operate the programs under the enacted budget (e.g., close additional sites)

- Gaps as a result of sites
  - CASTNET data allow the Agency to assess air quality impacts to rural communities – often lacking other air quality monitors
  - CASTNET & NADP provide data on ozone concentrations and PM (NH₃) and ozone precursors not measured by other networks (e.g. NH₃, HNO₃, NH₄)
  - Data are used to develop, evaluate, and validate air quality models used to assess future air quality under potential emissions and climate scenarios
  - Some sites have been operating for more than 30 years
Independent Scientific Review

• EPA will conduct a review of the CASTNET program and OAP’s contribution to NADP through the EPA’s Science Advisory Board (SAB)
  • Open access to meetings and records, with opportunities for public comments to the committee
  • Report with recommendations will be available on the SAB website

• Requesting the panel comment on (draft charge questions):
  • Do the presented options address the most important new scientific questions
  • The continuation of existing monitoring sites and data collection and the key questions they address
  • Under the current fiscal constraints do the options presented address Agency’s air quality monitoring priorities

• Current status of the review (Aug. 2022)
  • SAB will begin collecting nominations for panelists
  • Preparing background documents and presentations
  • Defining final charge questions

Round Robin – Thursday @ 10:30am
Visit the NADP booth
Several presentations and posters using CASTNET + NADP data

Questions

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