



SeaTac International Airport



Trifecta for Change |

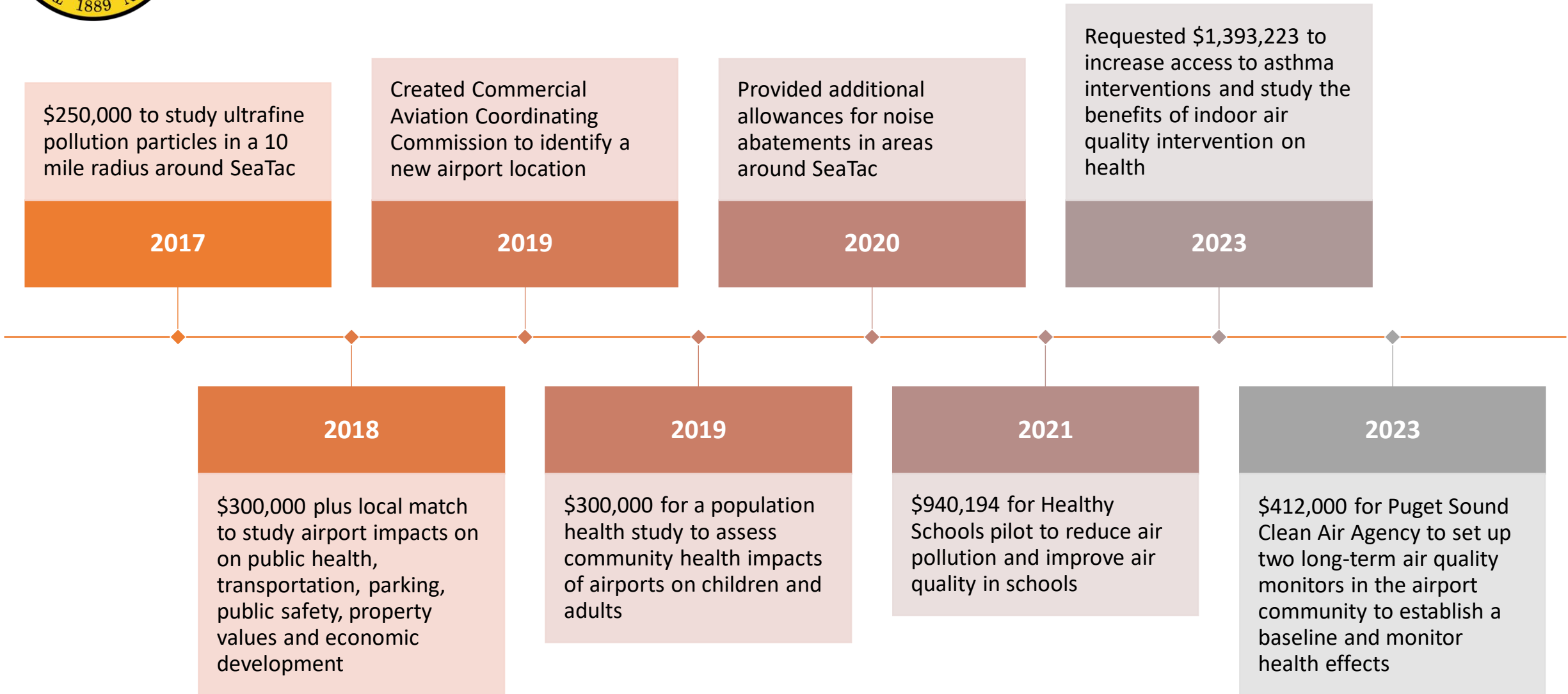
System Change

- Shifting the dialogue from airports being a “nuisance” to understanding the health impacts and having community members share their stories
- Having a state institution leading the efforts to study the prevalence of pollution related to Jet A fuel (ultrafine particles)
- Creating partnerships at local, state and federal level to move forward mitigation



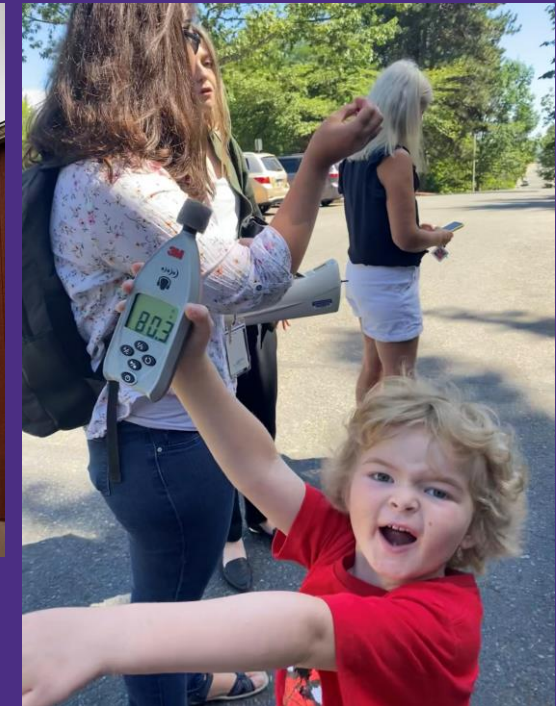


Washington State Investments



Research and Engagement

Ultrafine Particle (UFP)
Exposures
Elena Austin, ScD



Ultrafine Particles (UFPs) Background

Ultrafine Particles unregulated but potentially important in determining health outcomes

Health Effects more uncertain compared to PM_{2.5}, associated with neurological and birth outcomes

Important sources include diesel combustion (truck traffic, aircraft), wood-smoke and photochemical processes

Variable spatial and temporal distribution

Ref: A Systematic Review of The Impact of Commercial Aircraft Activity on Air Quality Near Airports, 2021

<https://doi.org/10.1016/j.cacint.2021.100066>

UFP Research at UW – Community Engagement



Funding for UFP research at DEOHS provided by local, State and Federal grants



UFP Advisory Group
*Bi-yearly meetings



Ongoing communication with community
*Presentations, walk-arounds and gatherings



Project communication including media and policy briefs

MOV-UP Study Findings



Summary

Communities underneath and downwind of jets landing at Seattle-Tacoma International Airport are exposed to a type of ultrafine particle pollution that is distinctly associated with aircraft, according to a 2019 University of Washington (UW) study that is the first to identify the unique signature of aircraft emissions in Washington.

The finding comes from the two-year Mobile Observations of Ultrafine Particles (MOV-UP) study funded by the Washington State Legislature and led by the UW Department of Environmental & Occupational Health Sciences and the Department of Civil and Environmental Engineering.

The MOV-UP study examined the air-quality impacts of aircraft traffic on communities located

The discovery creates opportunities to investigate the health effects of aircraft-related pollution, how different neighborhoods are impacted by it and specific interventions to reduce people's exposure to these pollutants.

Previous studies have linked exposure to ultrafine pollution particles to breast cancer, heart disease, prostate cancer and a variety of lung conditions.

This policy brief describes some of the remaining knowledge gaps about aircraft-related pollution.

It also proposes next steps that state legislators can take to better understand the health impacts of ultrafine particle pollution and to protect the health of people who live and work in the vicinity of Sea-Tac Airport.

- Ultrafine particles (UFP) are emitted from both traffic and aircraft sources.
- Total concentration of UFP (10 - 1000 nm) did not distinguish roadway and aircraft features.
- The spatial impact of traffic and aircraft UFP emissions can be separated using a combination of mobile monitoring and standard statistical methods.
- There are key differences in the particle size distribution and the black carbon concentration for roadway and aircraft features.
- Fixed site monitoring confirms that aircraft landing activity is associated with a large fraction of particles between 10-20 nm.

MOV-UP Project Website

<https://deohs.washington.edu/mov-up>

Knowledge Gaps Identified

Gap # 1: How do concentrations of UFP compare within different communities?

- What is the role of monitoring?

Gap # 2: How can we reduce human exposures to UFP?

- Where and how to intervene?

Gap # 3: What are the health effects of aircraft UFP?

- Long-term and short-term effect on health through toxicology and epidemiology



Current Seattle Area UFP Activities

- Portable HEPA filter intervention. **Healthy Schools; Healthy Air** (Funded by the State of Washington and local partners)
- Asthma and Airport Air Quality Intervention (pending)
- **Community Health and Airport Operations Related Noise and Air Pollution**
 - Dr. Kris Johnson, Assessment, Policy Development & Evaluation, Seattle and King County
- **Adult Change in Thought – Air Pollution Study (ACT-AP)** (Funded by NIH/NIA)
 - *Dr. Magali Blanco, University of Washington*



Healthy Schools; Healthy Air

Evaluating impact of air quality interventions in school environments



PROJECT GOALS:

- Do current ventilation solutions effectively control indoor air quality in schools?
- Are there school based interventions that significantly improve indoor air quality?
- What are the long-term average exposures across the spatial area?

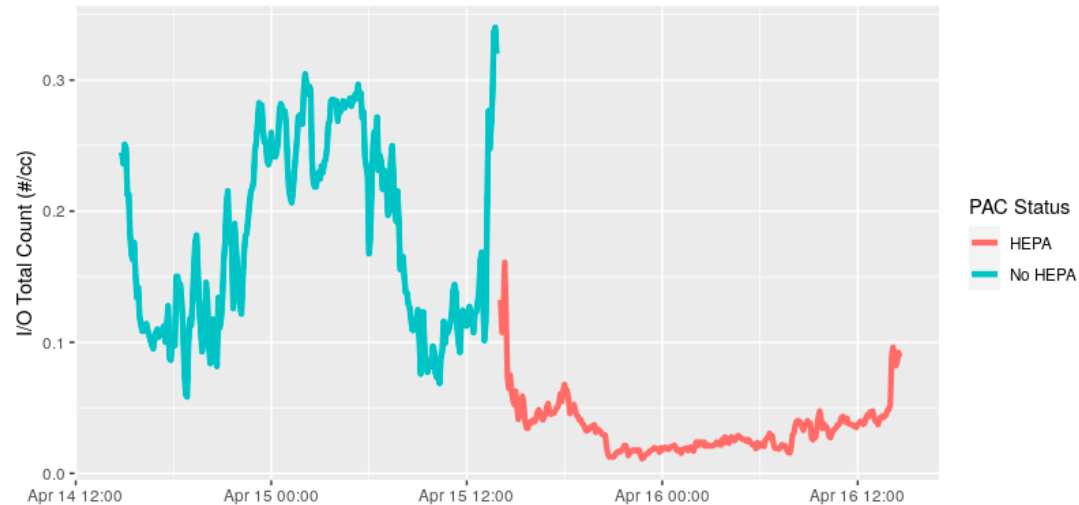
RATIONAL:

School-aged children represent a vulnerable population with respect to air pollution exposure. School ventilation systems are not evaluated for the efficiency in removing ultrafine particles from outdoor sources including roadway traffic, aircraft traffic and wildfire smoke

Funding Received From WA State and cities of SeaTac, Burien, Federal Way, Normandy Park and Des Moines

Healthy Schools, Healthy Air Findings

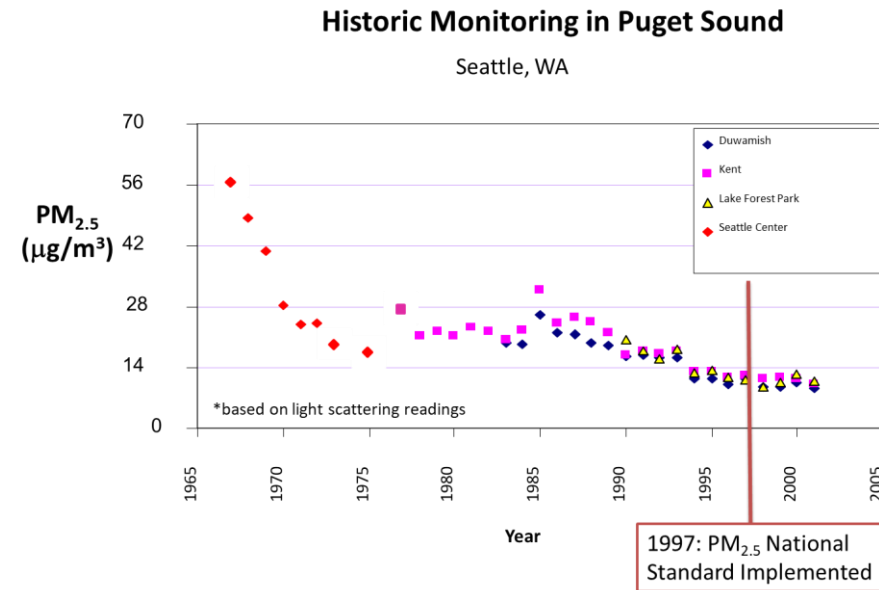
- 16 participating schools located various distances from traffic and flight paths
 - 5 classrooms recruited per school
- Collecting real-time indoor and outdoor data on air pollution
- Deploying room based HEPA filters and tracking real-time energy consumption of each unit



<https://doi.org/10.3390/atmos13101623>

Outdoor Air Quality – Long term averages

- **Developing and refining mobile monitoring** to estimate annual exposure concentrations to traffic and aviation air pollutants including NO_x , Black Carbon and size-resolved particles.
- Engage with State and local agencies to develop plans for **long-term monitoring**
- Calculating **emissions factors** and modeling the impact of changes in aviation





DEOHS Research Team

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FROM RESEARCH TO POLICY COMMUNITY PERSPECTIVE ON THE IMPACT OF AVIATION NOISE AND AIR POLLUTION

THIS PRESENTATION HIGHLIGHTS
SUCCESSFUL ELEMENTS OF A
COLLABORATIVE PARTNERSHIP
CREATED BETWEEN ORGANIZATIONS,
COMMUNITY MEMBERS, ACADEMIC
RESEARCHERS AND STATE AND
FEDERAL LEGISLATORS



FROM COMPLAINER TO CAMPAIGNER

My primary question has always been; “Is it safe to live here?” and what is this black soot on my patio? In 2016, legislative action specified community involvement and I became a community representative on an advisory board with the UW in an ongoing investigation of ultrafine particles connected to aviation. This relationship has grown and taken different directions depending on what we learn.

During our meetings we were able to interact and over time got to know each other. It became apparent that the lived experience of the community was important to the process. Each represented interest, between community, legislator and researcher had its own role clearly defined in the legislation and lent value to the outcomes of the research.

**FOR DECADES, COMMUNITY MEMBERS HAVE
COMPLAINED ABOUT FUMES, SOOT, NOISE,
ILLNESSES, SLEEP LOSS, CANCER AND OVERALL
DETEORINATION OF THEIR QUALITY OF LIFE**

- Community voices are easy to ignore but can often help point research and policy in the right direction. Fortunately for our communities, some legislators took an interest and created an active partnership between themselves, some energized community members and interested researchers. Our process began with community meetings five years ago and has been steadily moving forward to implementing solutions. We have made more progress in that short time than in previous decades working alone.
- Our concerns have been heard, our questions are getting answered, funding is being provided and we are learning.

TRIFECTA FOR LEGISLATION, RESEARCH AND RESULTS

- WA State Representative Tina Orwall has spent a lot of time in the community listening to our concerns and worked to find ways to get answers to our questions and solutions to our problems. A key component in the legislation was to keep the community involved in the research and legislation every step of the way. Everybody in an airport community can follow this pattern, create a relationship, work toward research and funding and start to get answers to some of your most critical questions. Many of the researchers here at ANES know each other and share information. What you learn can benefit many others.
- Dr. Austin and others at the University of Washington have included community in all conversations, educating us on their findings. She believes it has been an asset to their focus on our progress to include community voices in real conversations, not always just telling us what they've done but also asking us if it is helpful and posing options for next steps.

COLLABORATIVE APPROACH

SOME RESULTS



- When we were able to see a model showing the area of the ultrafine plume, we asked what is the health of the people inside the impact area. This led to the health status report which will be presented here on the health panel tomorrow. Our next question was; What is on the ultrafines and how will it affect body systems? The team continues to investigate
- State law has been changed that now allows residents to receive improved noise mitigation and now recently introduced as federal funding legislation
- We have discovered where aviation emissions are infiltrating into homes and schools and tested and administered a successful air filtration mitigation
- We have found health disparities in the impacted communities and now exploring interventions
- We are interested in knowing more about the connection between aviation emissions and observed health outcomes and are continuing our partnership
- Citizens have been provided with facts, science and data which has brought much needed credibility while keeping our issues in front of the eyes of those who are able to effect change