Des Moines Air Quality Monitoring Station

The Des Moines Air Quality Monitoring Station (AQMS) will provide long-term, community-centered measurements of ultrafine particles and other air pollutants south of Sea-Tac Airport (SEA). Building on the University of Washington's Mobile ObserVations of Ultrafine Particles (MOV-UP) study, the station will help distinguish local aircraft-related pollution from broader regional sources.

Why monitor UFPs?

UFPs are particles smaller than 100 nanometers (0.1 µm) that may affect human health (Figure 1).

Aircraft emissions have a distinct particle-size signature, allowing the Des Moines AQMS to identify aircraft-related pollution through measurements of UFP particle size distributions (PSDs).



Scan to learn more about UFPs!

Figure 1. Relative size of UFP compared to fine ($PM_{2.5}$) and coarse (PM_{10}) particles.

Providing insights into local air pollution

The Des Moines AQMS uniquely measures both UFP number concentrations and PSDs. Because different sources emit particles of different sizes, PSDs serve as a source fingerprint. Particles in the 10–20 nm range are indicative of aircraft-related emissions and can be used to estimate their impacts on downwind locations as shown in Figure 2.

The new AQMS near the southern runway provides a unique opportunity to quantify aircraft impacts during north-flow operations.

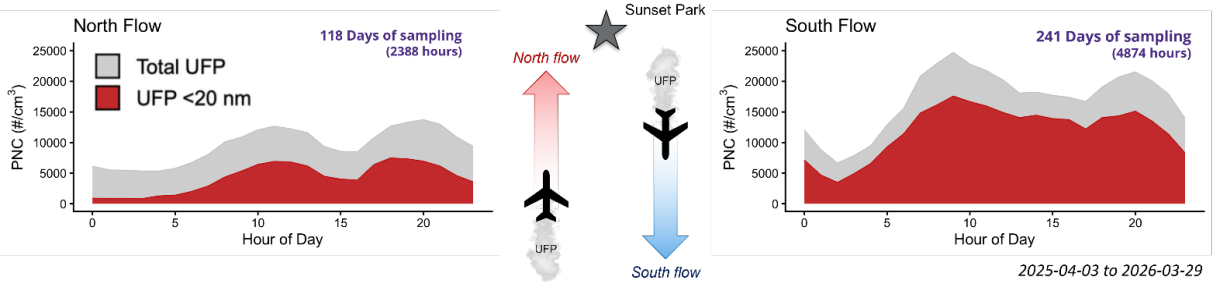


Figure 2. UFP concentrations are higher when landing aircraft are overhead, supporting other studies that have identified the impact of landing aircraft on ground level concentrations of UFPs. The red portions of the figures represent UFPs <20 nm. Aircraft are landing overhead of the Des Moines AQMS when the airport is in South Flow.

What this means for the community

A unique monitoring network

Two monitoring stations at opposite ends of SEA provide a more complete picture of airport-related air pollution under different wind and runway operation conditions (Figure 3).

Tracking changes over time

Long-term monitoring will help evaluate how aircraft emissions change as technologies and fuels, including sustainable aviation fuel (SAF), continue to evolve.

Working together

The AQMS reflects a collaborative effort among state agencies, community stakeholders, and researchers to improve understanding of local air quality and support evidence-based decisions.

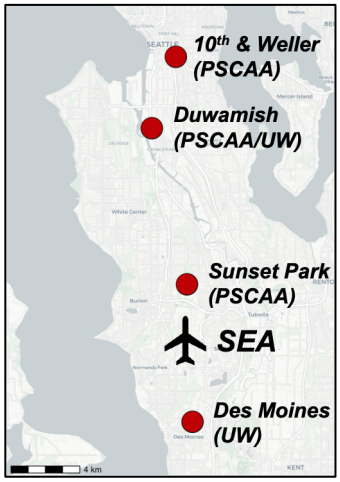


Figure 3. UFP AQMS locations in the Greater Seattle Area with entities managing each site.

What the new AQMS measures

The Des Moines AQMS continuously measures key air pollutants from transportation and other combustion sources using the instruments listed in Table 1. Together, these measurements help track local air quality and how it changes with weather and airport operations.

Table 1. Details of instrumentation at the Des Moines AQMS

Target pollutant		Model
A	Ultrafine particles (UFP) count with particle size information	Scanning Mobility Particle Sizer TSI 3938 (with water-based CPC)
B	Fine particulate matter ($PM_{2.5}$)	Nephelometer Aurora 1000
C	Black carbon (BC)	microAethalometer MA200
D	Nitrogen dioxide (NO_2)	Aerodyne Research CAPS NO_2
E	Carbon monoxide (CO)	Serinus 30 analyzer
F	Carbon dioxide (CO_2)	Licor (LI-850)

A



B



C



D



E



F



Data access

Scan this for the project website!

https://deohs.washington.edu/des-moines-aqms

The UW research team is currently developing a data sharing dashboard that airport community members can access to. Information includes measurements up until the previous day.

Partners

Des Moines Waterland City

UW Environmental & Occupational Health Sciences, School of Public Health, University of Washington

Puget Sound Clean Air Agency

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