



Emerging Technologies for Air Quality Monitoring



Karner et al 2010

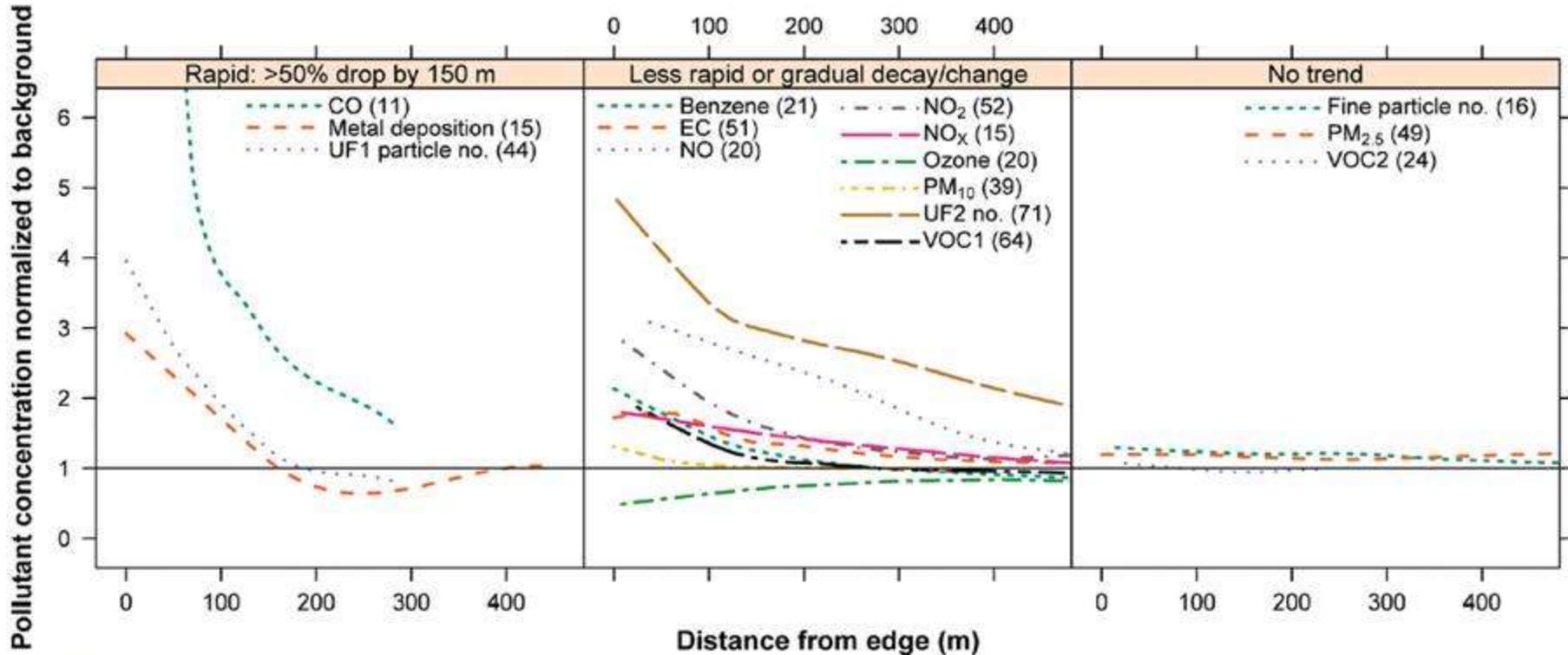
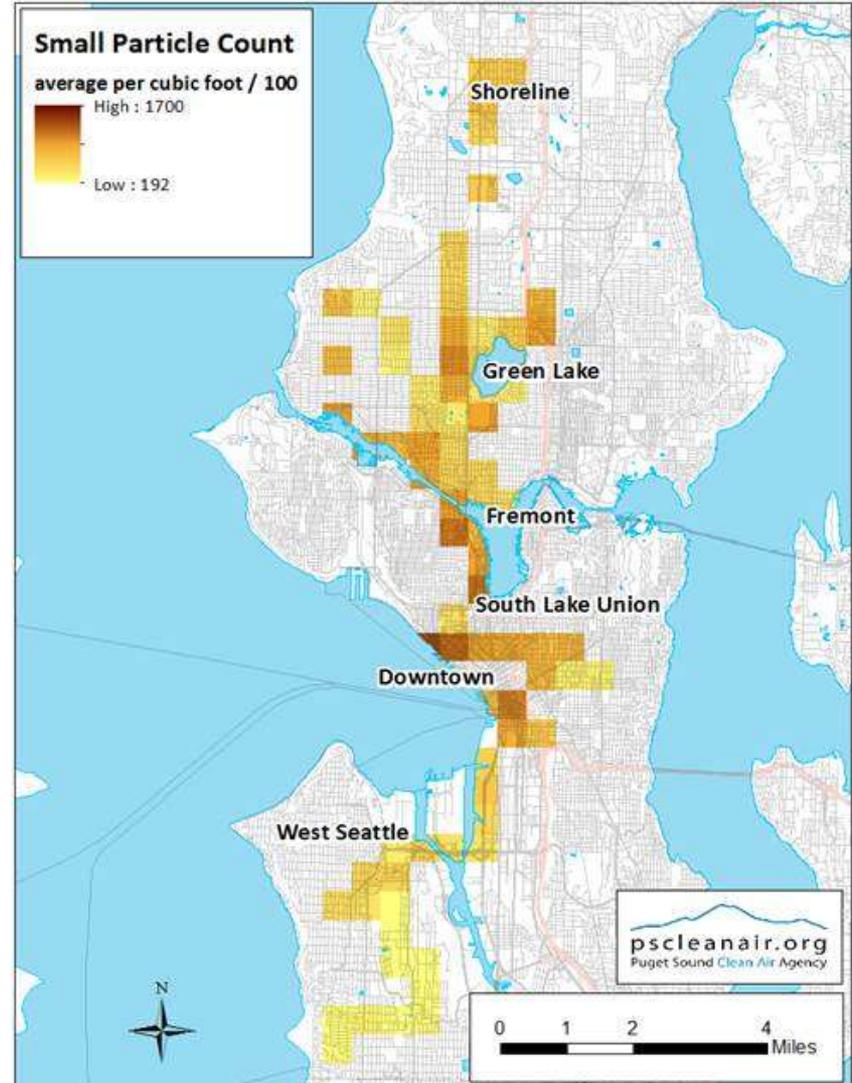
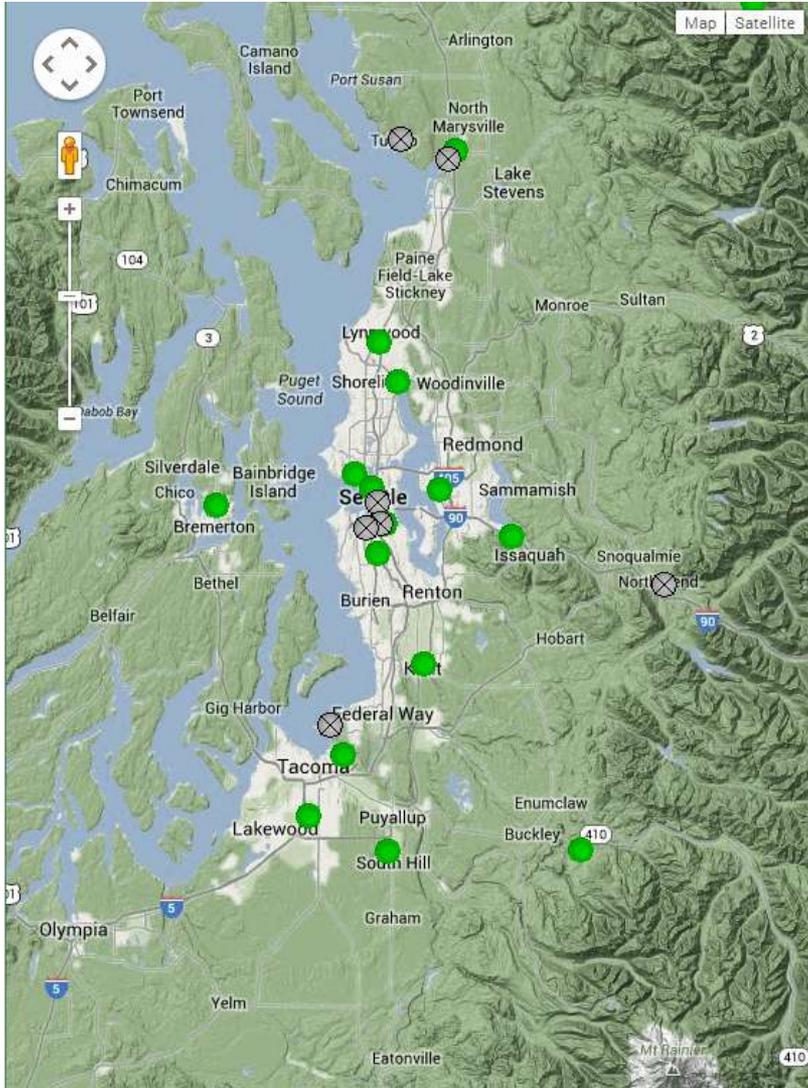
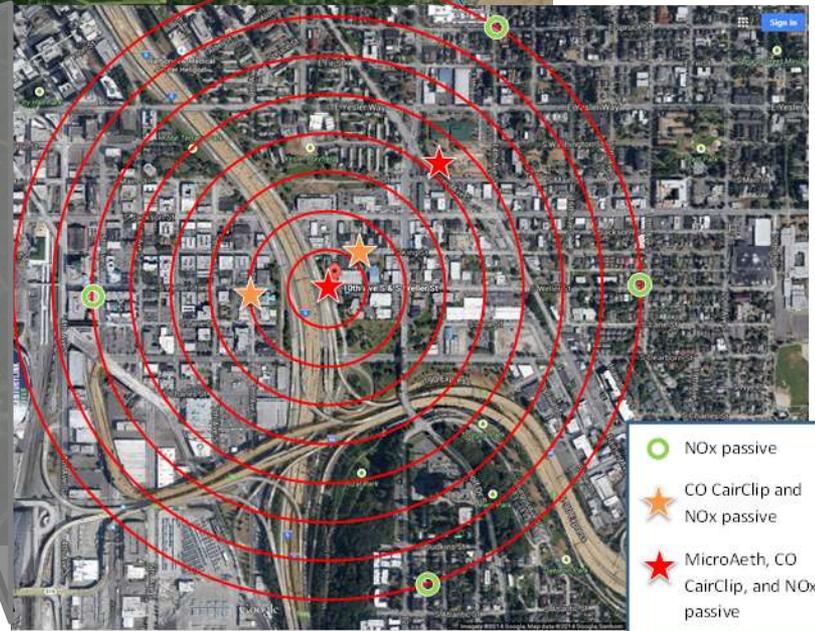
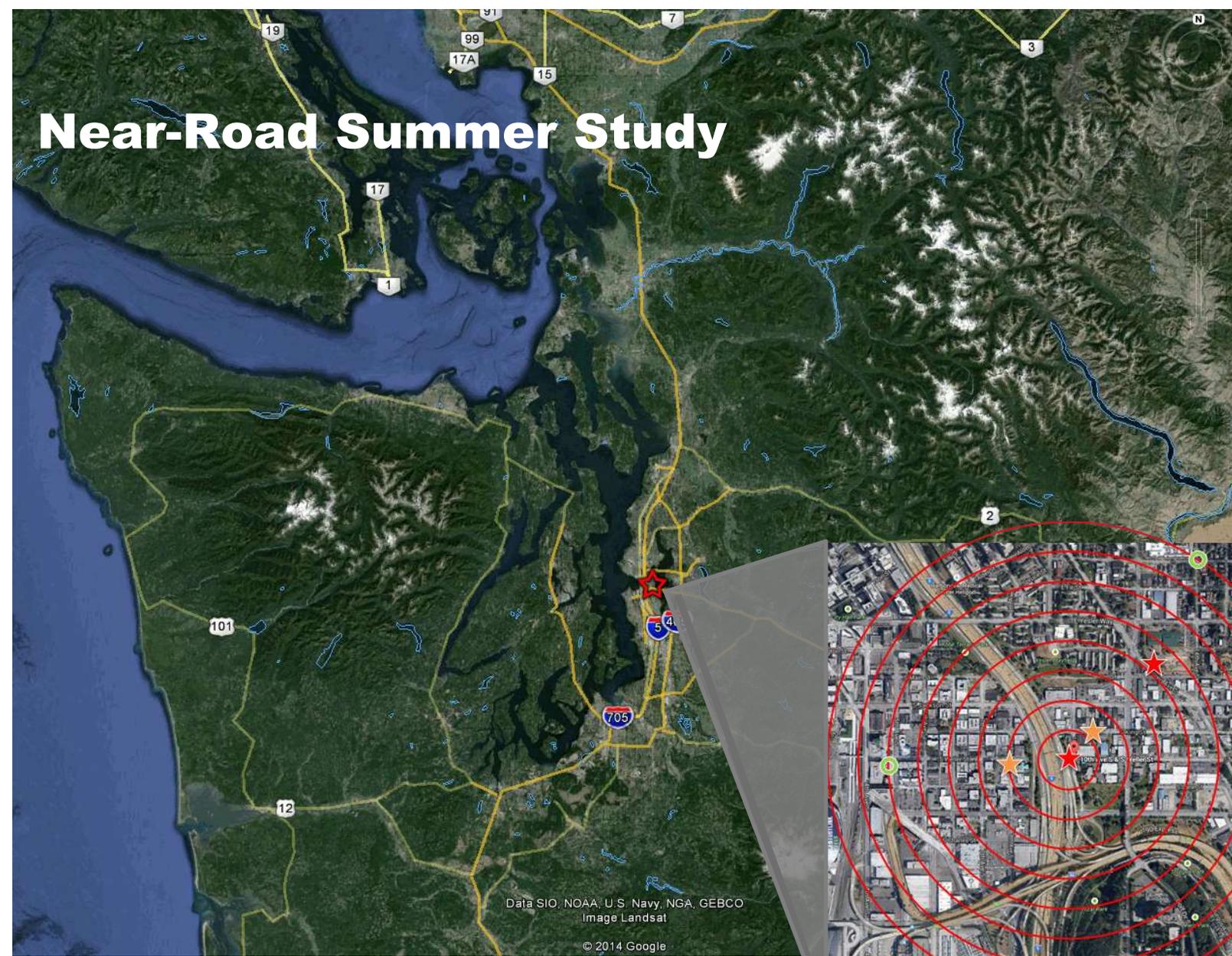


FIGURE 2. Local regression of background normalized concentrations on distance. The horizontal line indicates background concentration. A loess smoother ($\alpha = 0.75$, degree = 1) is fitted to each pollutant which is placed into one of three groups. The regression sample size, n , is given in parentheses after each pollutant.

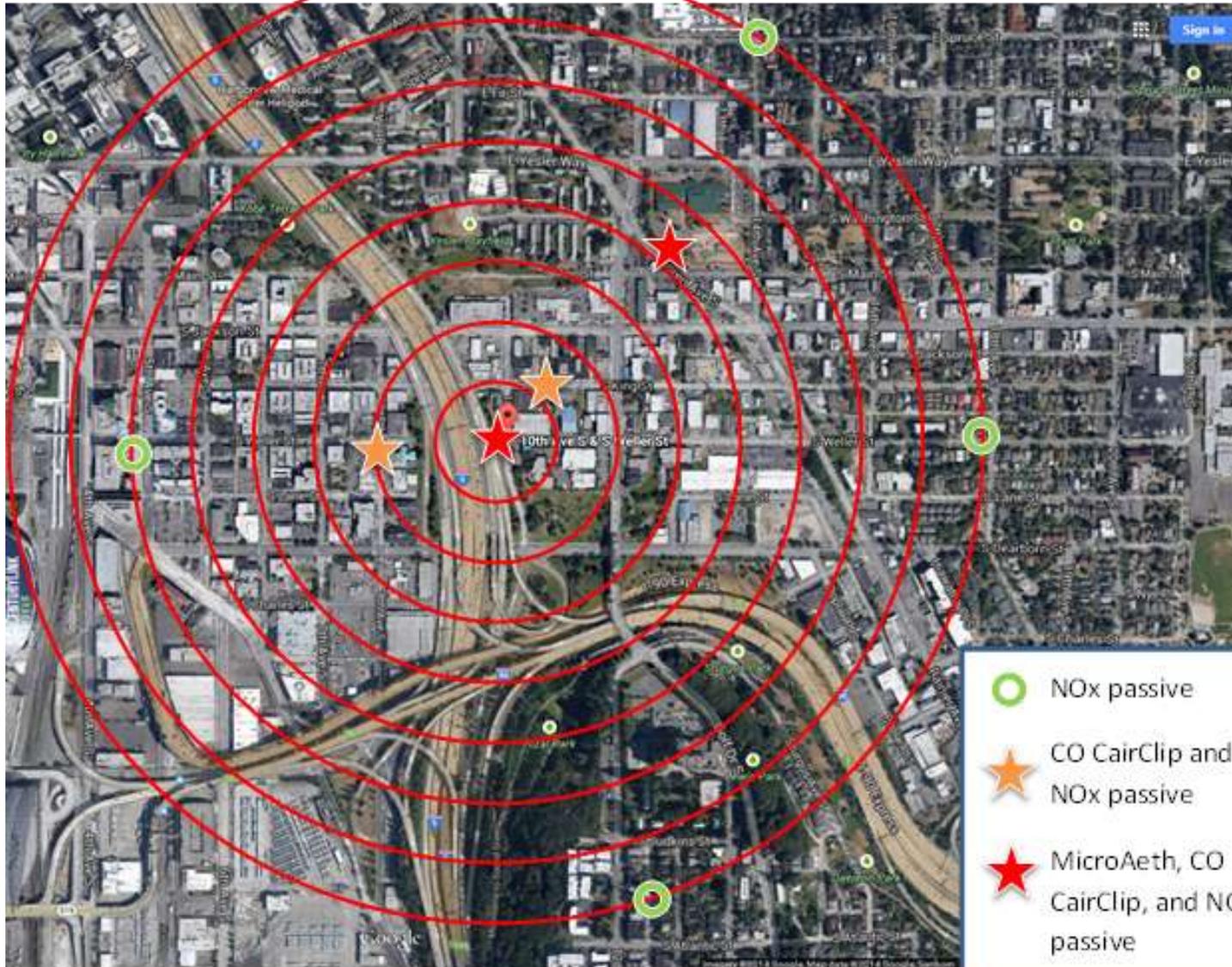
Neighborhood Scale → High Spatial Resolution



Near-Road Summer Study



Centered Around the Ecology NO₂ site

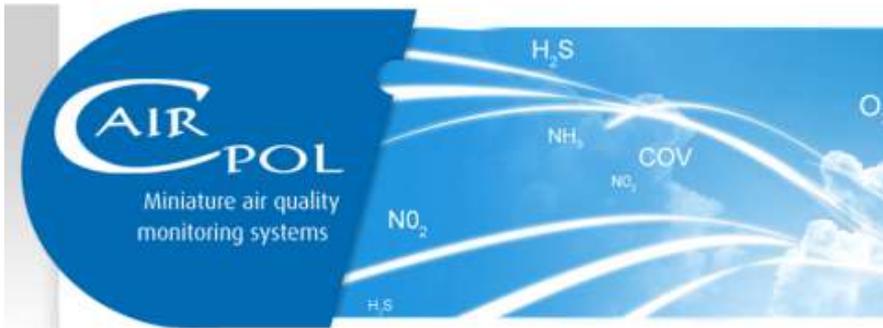


Changing Demands And Becoming Mobile



New technology

- Very small, very low cost
- Portable
- Accurate
- Frequent measurements



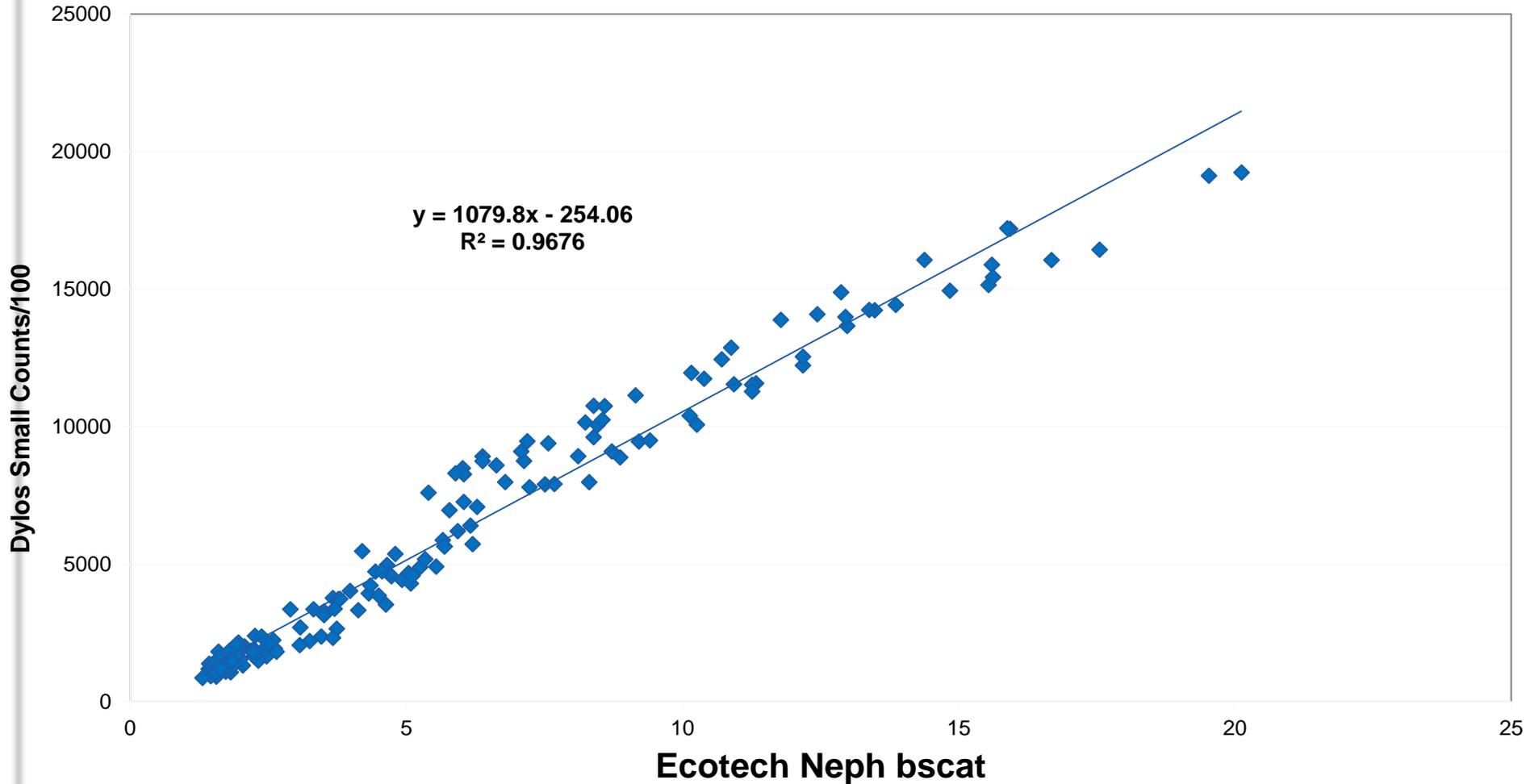
Dylos air quality monitor

- Laser particle counter
- \$200 - \$300
- Measures small and large particles
 - ~1 μ m and 5 μ m and up

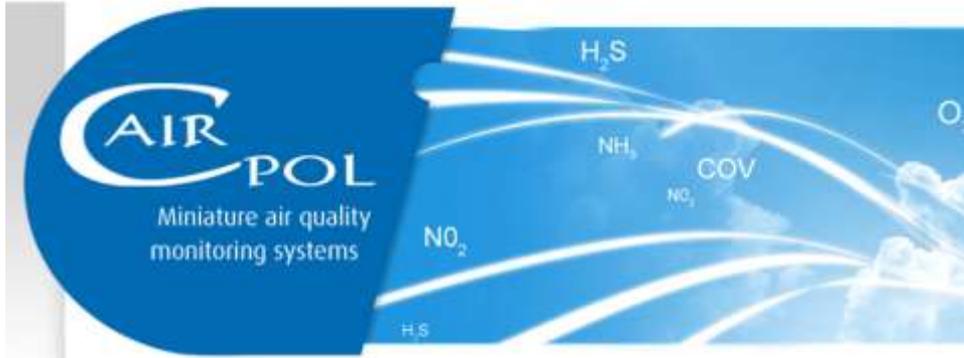


Dylos to Nephelometer correlation

Puyallup Ecotech Neph bscat vs. Dylos Small Counts



CairClip



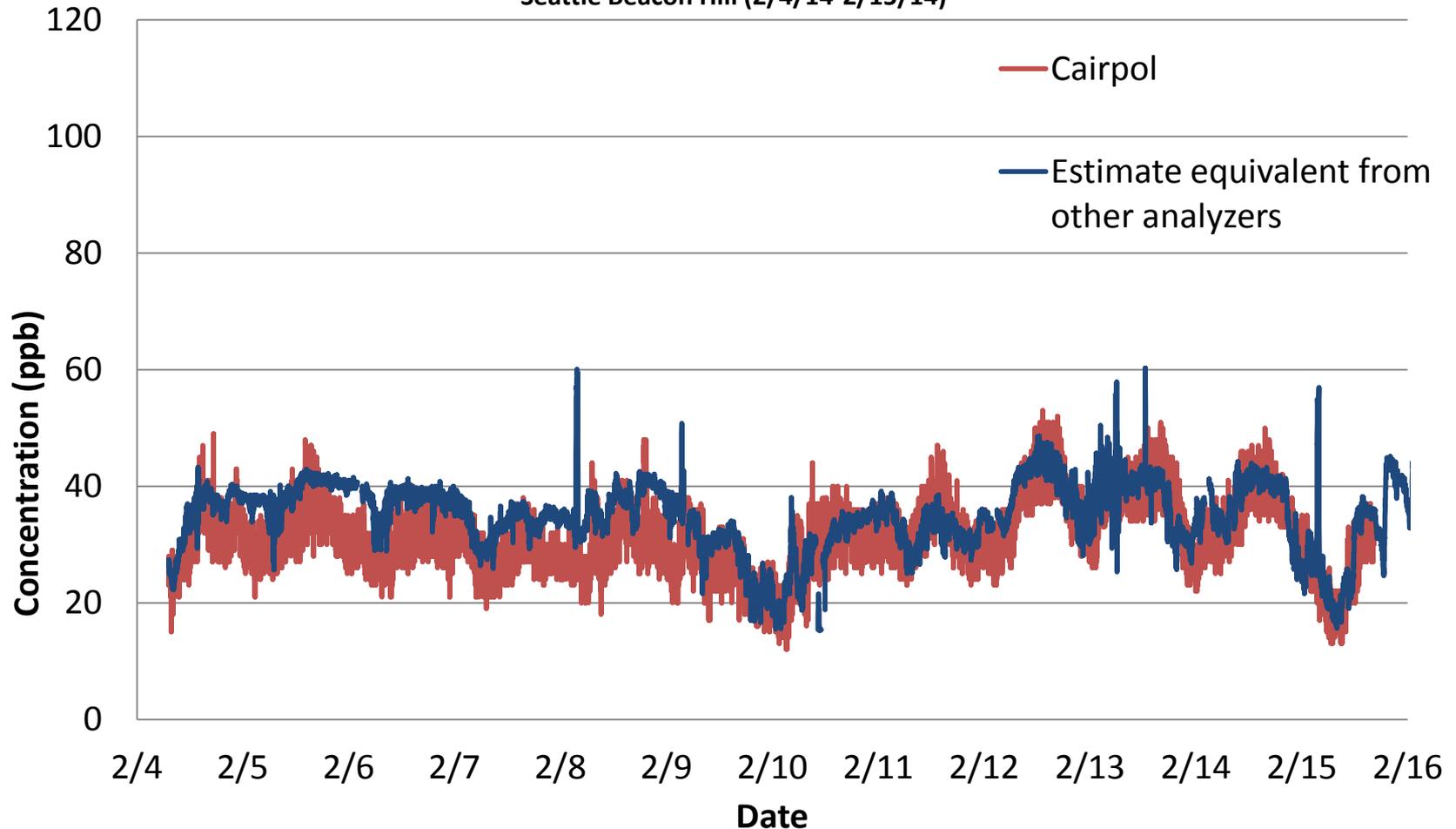
- **Electrochemical sensor**
- **Very small, and costs ~\$1000**
- **Data can be collected at ppb levels**
- **1 minute averages**



Cairpol NO₂ O₃ correlation to standard methods

Minute NO₂•O₃ Concentrations of Cairpol and API model 400 (O₃) + 0.7(Thermo 42C (NO₂))

Seattle Beacon Hill (2/4/14-2/15/14)



Micro Aethalometer

- Same measurement technology as an Aethalometer
- Can be battery powered for 24 hours
- 1 second time resolution (noisy)



Pros

- **The instruments are inexpensive**
- **They work as well if not better than you might expect considering the price and the new technology**
- **Allow us to try new monitoring projects**
 - **Survey air quality in new locations**
 - **Seasonal studies**
 - **Rethink how we see monitoring going forward**
- **More public engagement**

Cons

- **More public engagement**
- **Instruments are sensitive to changes and are noisy**
- **Long lead times, less reliable, not tried and true**
- **High spatial resolution introduces new questions**
 - **How do we interpret the numbers?**

Public Engagement and new technologies

#AirQualityEgg
by @Sensemakers

Funded! This project was successfully funded on Apr 26, 2012.

927 backers
\$144,592 pledged of \$28,000 goal
0 seconds to go

Project by @Sensemakers
\$28,000 goal
10 backers
Has not connected Facebook

See full site Collect me



How polluted is my road?

A publication by *Jenny Jones*, Green Party Member of the London Assembly. This web page reflects my views as an individual Assembly Member and not those of the London Assembly.

Like Tweet +1 Share

London is one of the most polluted cities in Europe. Air pollution has been linked to life-shortening lung and heart conditions, breast cancer and diabetes. It is estimated there are over 4,000 extra deaths each year in London from particulates and health costs are estimated at up to £20 billion a year - like the cost of obesity.

The tools on this web site help you to understand how it affects areas where you live, study, work and play.

How polluted is my road?
Find out how much pollution is emitted on roads near you every year.

How polluted is my school?
Look at the 1,148 schools near heavily polluted roads in London.

How polluted is 2020?
Will your street, bus stop or school still be near legal pollution levels in 2020?

How polluted is Putney?
Have the Mayor's techno-fixes solved the problem for Putney shoppers?



AirCasting App



AirCasting Air Monitor

Make Your Own
AirCasting
Luminescent Apparel



Questions?

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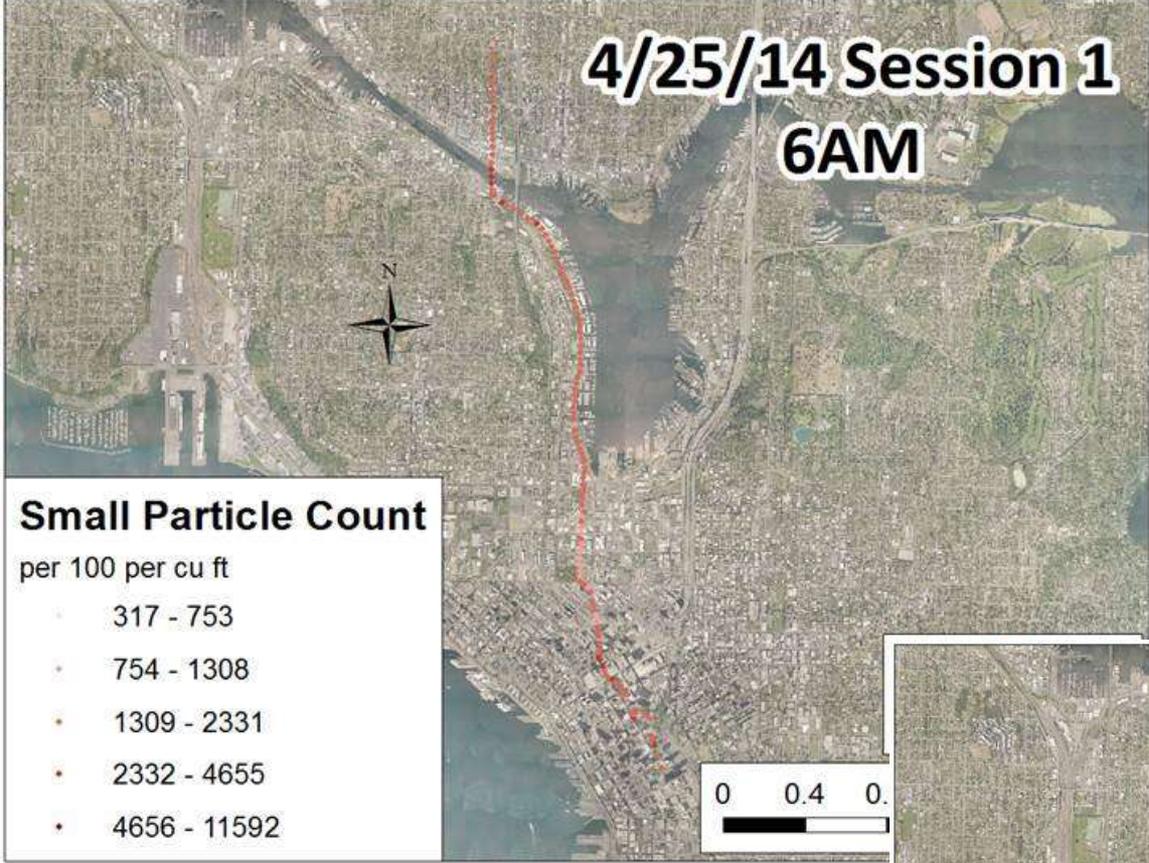
Intro to mobile monitoring

- **Have been staying out in front of the new technology and we have been using it to help us answer some questions at the agency**
- **Winter Mobile Monitoring Study**

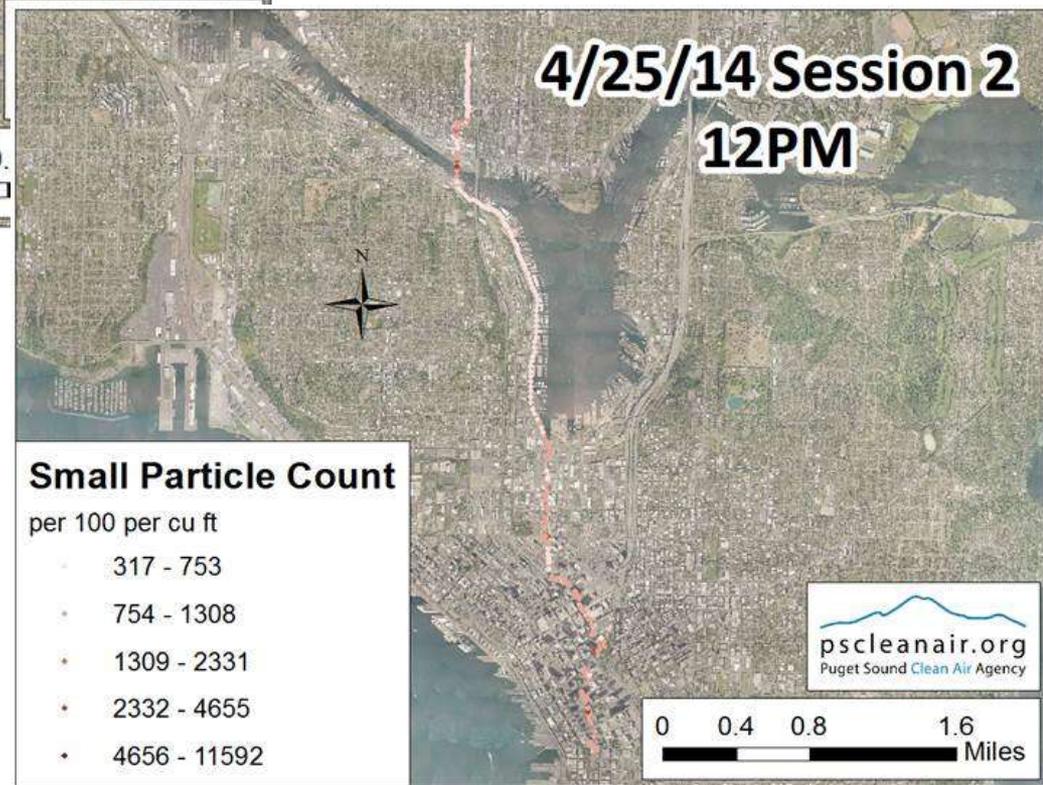
High Spatial Resolution Air Quality Information

- **Idea is to get air quality data that is highly resolved on a fine scale**
- **May not be temporally resolved but we are focusing on community engagement and embracing that people want to know what is happening now**
- **Meet the challenges of changing culture and accessibility**

4/25/14 Session 1 6AM



4/25/14 Session 2 12PM



Bike to work month

- **Pilot Study for the micro sensors**
- **Dilos, GPS, and micro aeth**