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Puget Sound Clean Air Agency

2014 Chinatown-International District Near-Road Study

Phil Swartzendruber, PhD

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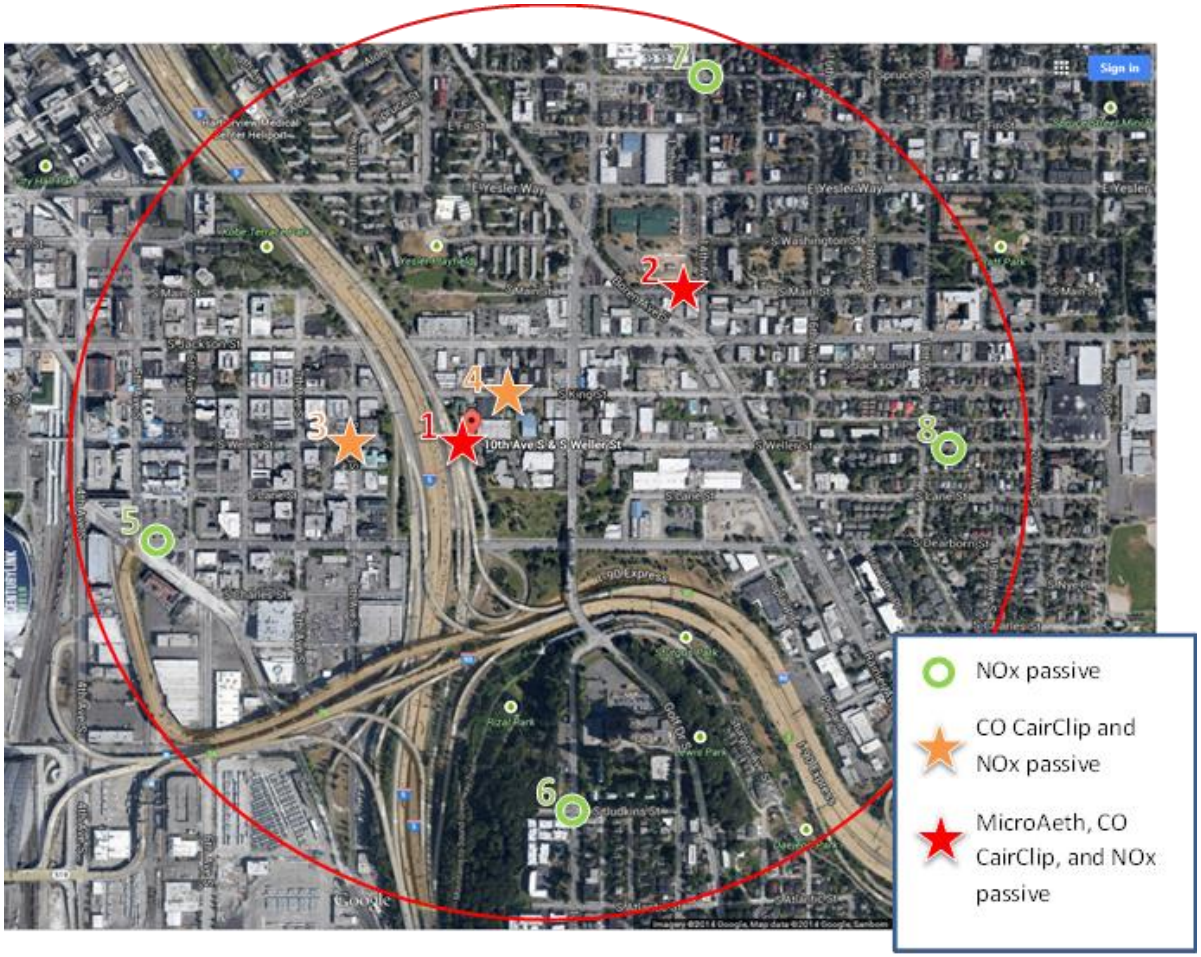
Background

- Cars and trucks are major pollution sources
- research on the near-road environment has been increasing
- potential health impacts include cardiovascular and toxics
- in 2010 EPA adopted NO_2 near-road rule
- in 2014 we established our 10th and Weller Near-Road site
- in late summer 2014, we conducted a neighborhood study:
  - test new, simple technologies
  - test mobile monitoring
  - look at gradient from road

Summary of Observations

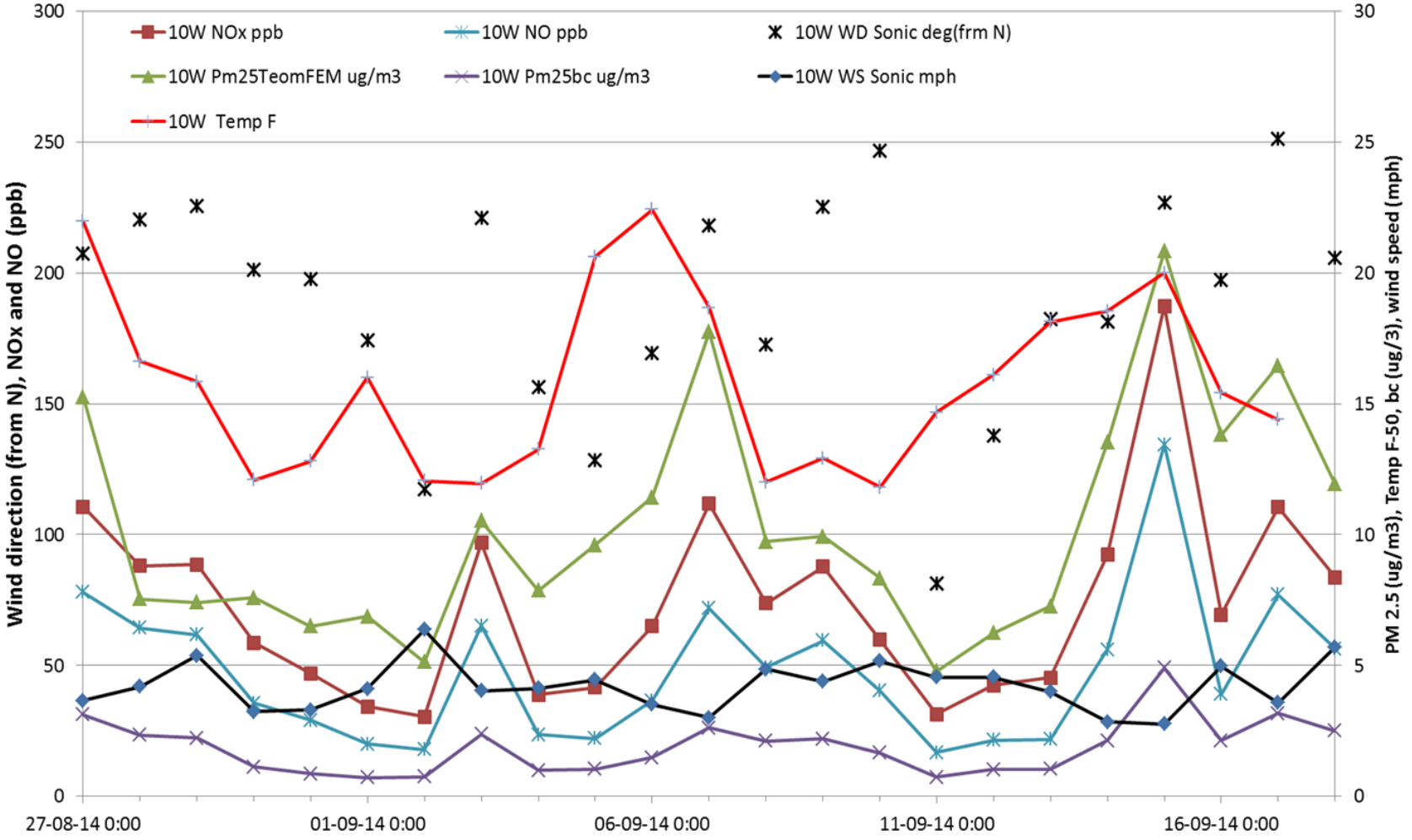
#	Site	NO_2, NOx, Ogawa Badges	Carbon Monoxide	Black Carbon	Other
1	10th & Weller	Aug 27 - Sept 10, Sept 10 - Sept 24	Continuous - Trace CO Aug 27 - Sept 19 - CairPol 1 Aug 27 - Sept 19 - CairPol 2	Continuous - Aethelometer	Continuous - Ozone, NO, NO_2, Temperature, Wind Speed & Direction
2	14th & Main	Aug 27 - Sept 10, Sept 10 - Sept 24	Aug 27 - Sept 18 - CairPol	Aug 27 - Sept 4, Sept 8-13, Sept 15-18 - MicroAeth	-
3	8th & Weller	Aug 27 - Sept 10, Sept 10 - Sept 24	Sept 2-19 - CairPol	-	-
4	12th & King	Aug 27 - Sept 10, Sept 10 - Sept 24	Aug 27 - Sept 18 - CairPol	-	-
5	5th & Dearborn	Aug 27 - Sept 10, Sept 10 - Sept 24	-	-	-
6	12th & Judkins	Aug 27 - Sept 10, Sept 10 - Sept 24	-	-	-
7	14th & Spruce	Aug 27 - Sept 10, Sept 10 - Sept 24	-	-	-
8	18th & Weller	Aug 27 - Sept 10, Sept 10 - Sept 24	-	-	-

Map of monitoring sites



- 1) 10th & Weller NRM
- 2) 14th & Main
- 3) 8th & Weller
- 4) 12th & King
- 5) 5th & Dearborn
- 6) 12th & Judkins
- 7) 14th & Spruce
- 8) 18th & Weller

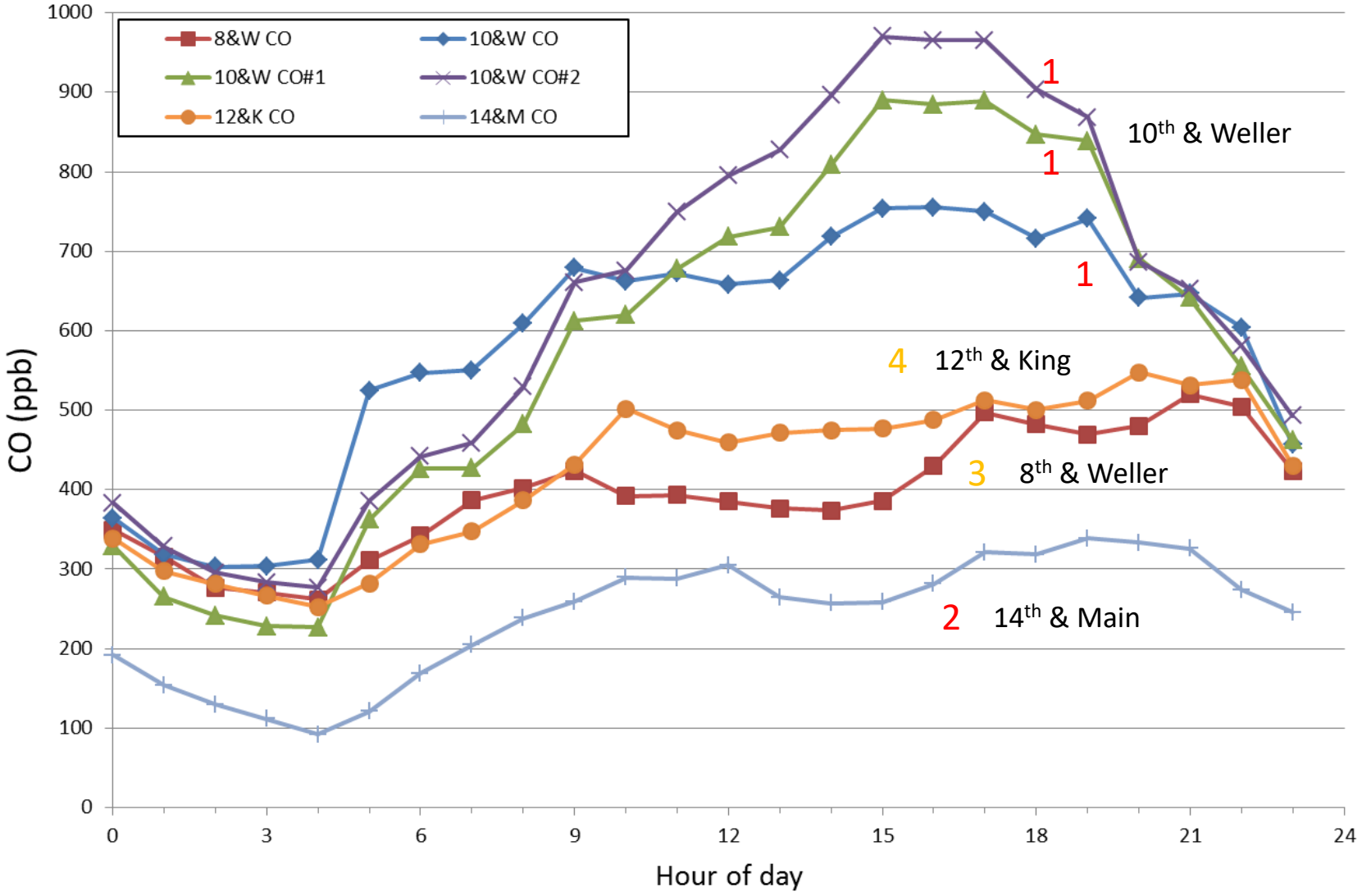
10&W Daily PM2.5, NO, NOx, black carbon, temperature, wind speed, wind direction



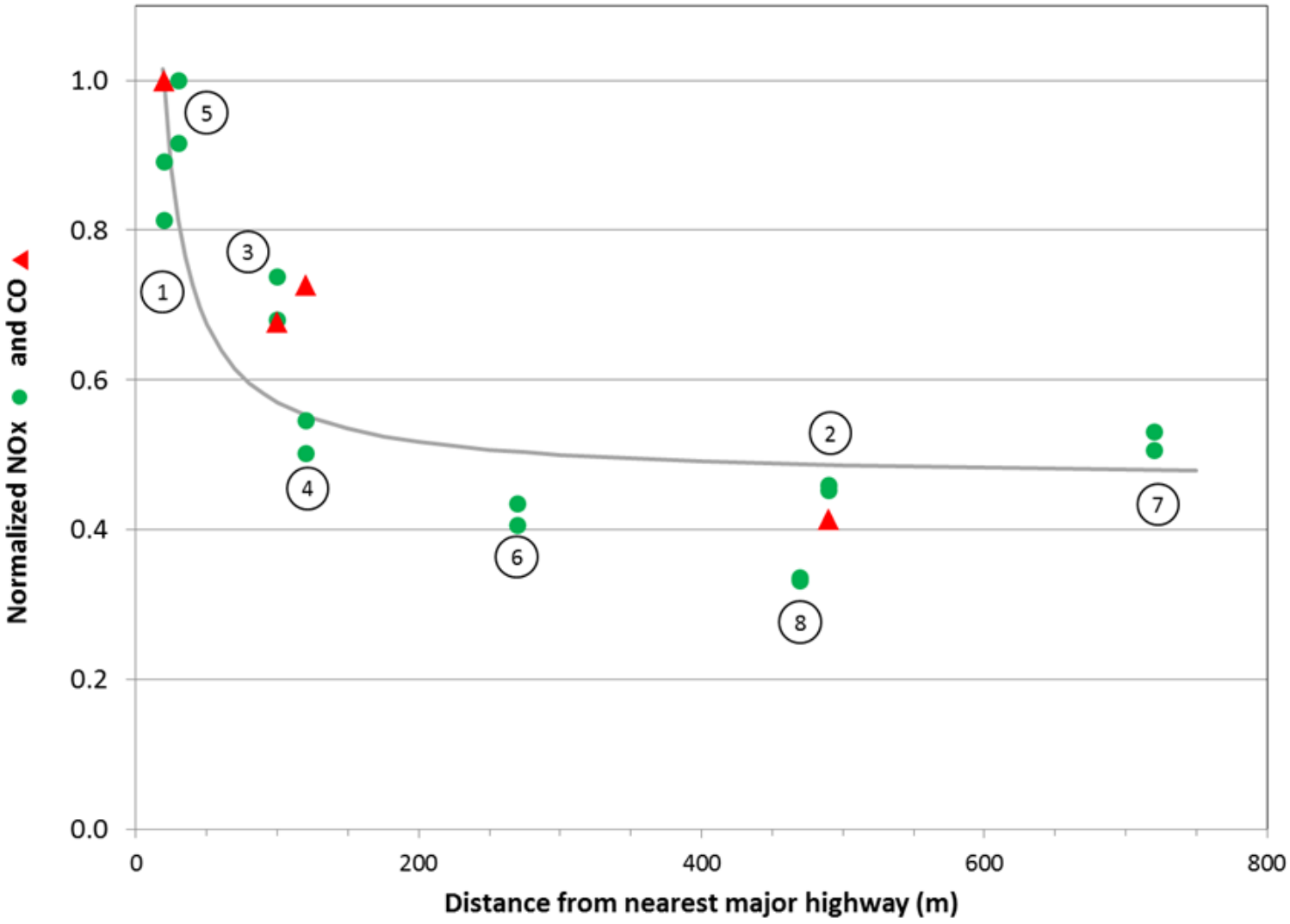
Correlations at 10th & Weller NRM

	CO	*NOx*	*PM2.5*	*bc*	*NO*	*O3+NO2*	*WD*	*WS*	*NO2*	*uv*
NOx	0.93	1								
Pm2.5	0.84	0.86	1							
bc	0.89	0.98	0.87	1						
NO	0.90	0.99	0.82	0.98	1					
O3+NO2	0.68	0.73	0.81	0.73	0.70	1				
Wind Direction	0.60	0.66	0.52	0.65	0.67	0.46	1			
Wind Speed	-0.57	-0.45	-0.51	-0.32	-0.41	-0.41	-0.27	1		
NO2	0.95	0.96	0.92	0.92	0.92	0.77	0.59	-0.53	1	
uv	0.91	0.98	0.88	1.00	0.98	0.74	0.64	-0.36	0.94	1
Temp F	0.50	0.32	0.47	0.30	0.28	0.48	-0.07	-0.45	0.43	0.33

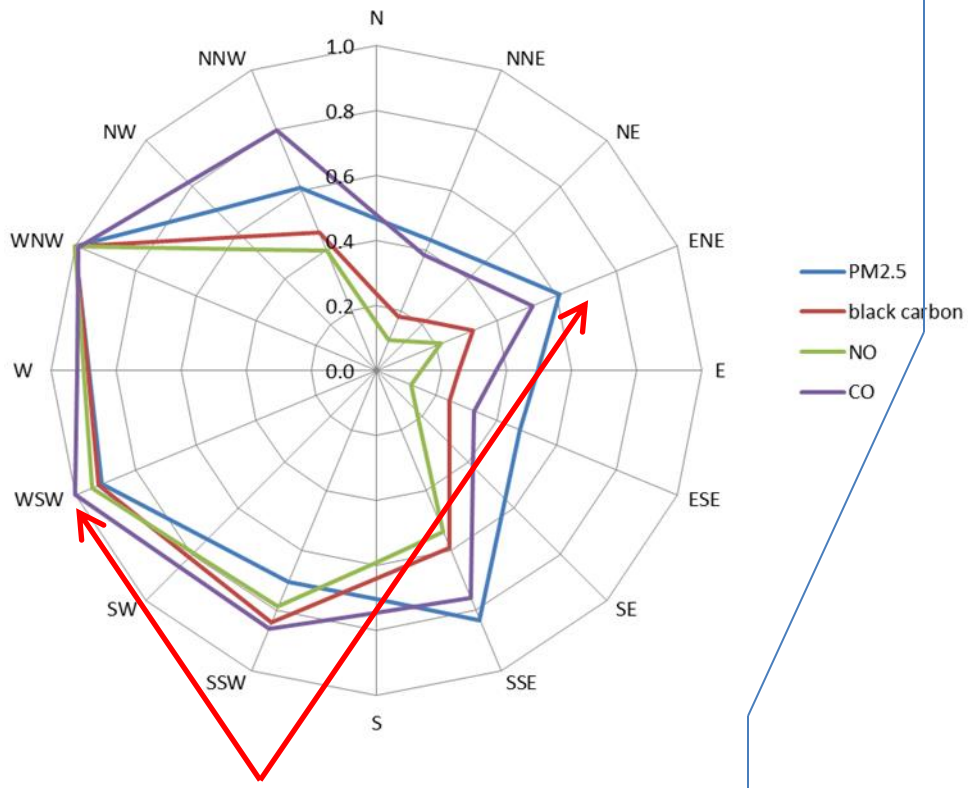
Daily pollution tracer (CO) at four sites



Pollution vs Distance to major traffic



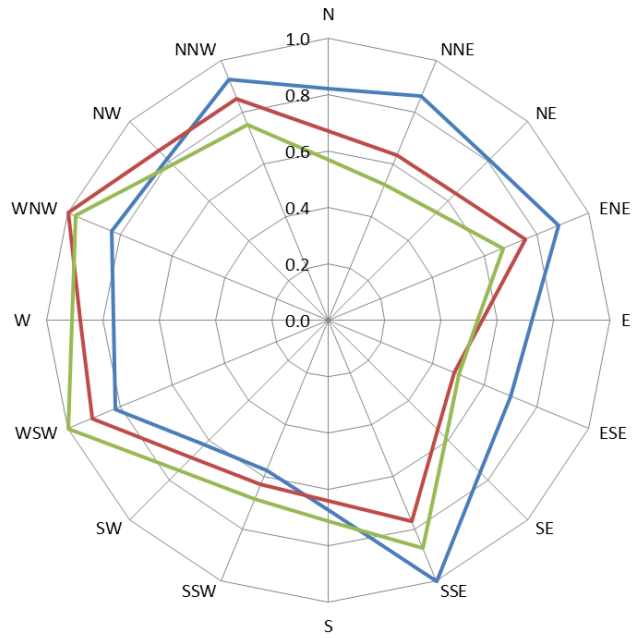
10th & Weller normalized PM 2.5, black carbon, NO, and CO as function of wind direction



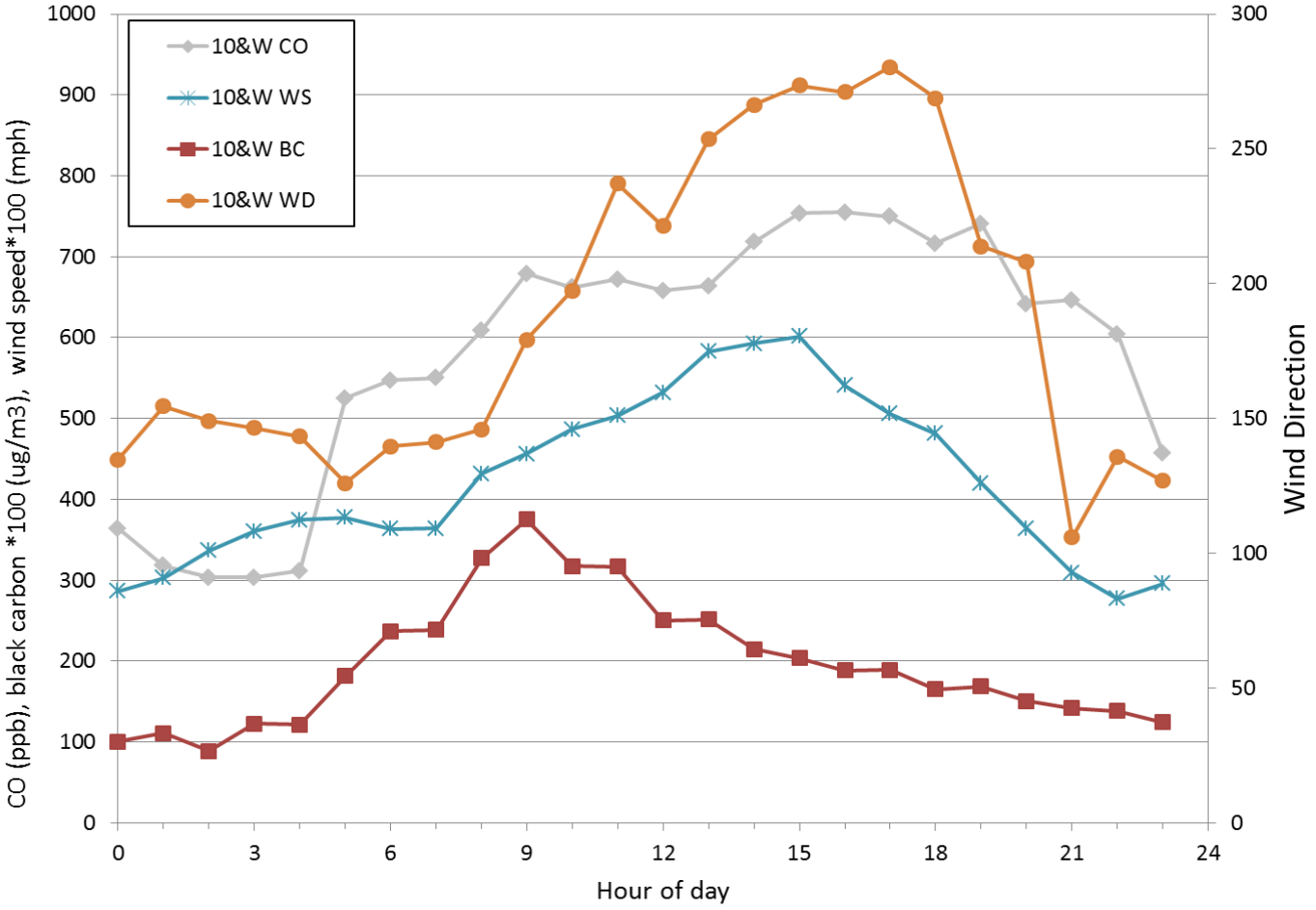
At the Near-Road Monitor (NRM), pollution levels are much higher when the winds are coming from I-5, than when winds are toward I-5

Further away from the road (the CairPol sites), pollution level levels are more uniform with direction, suggesting no strong local source

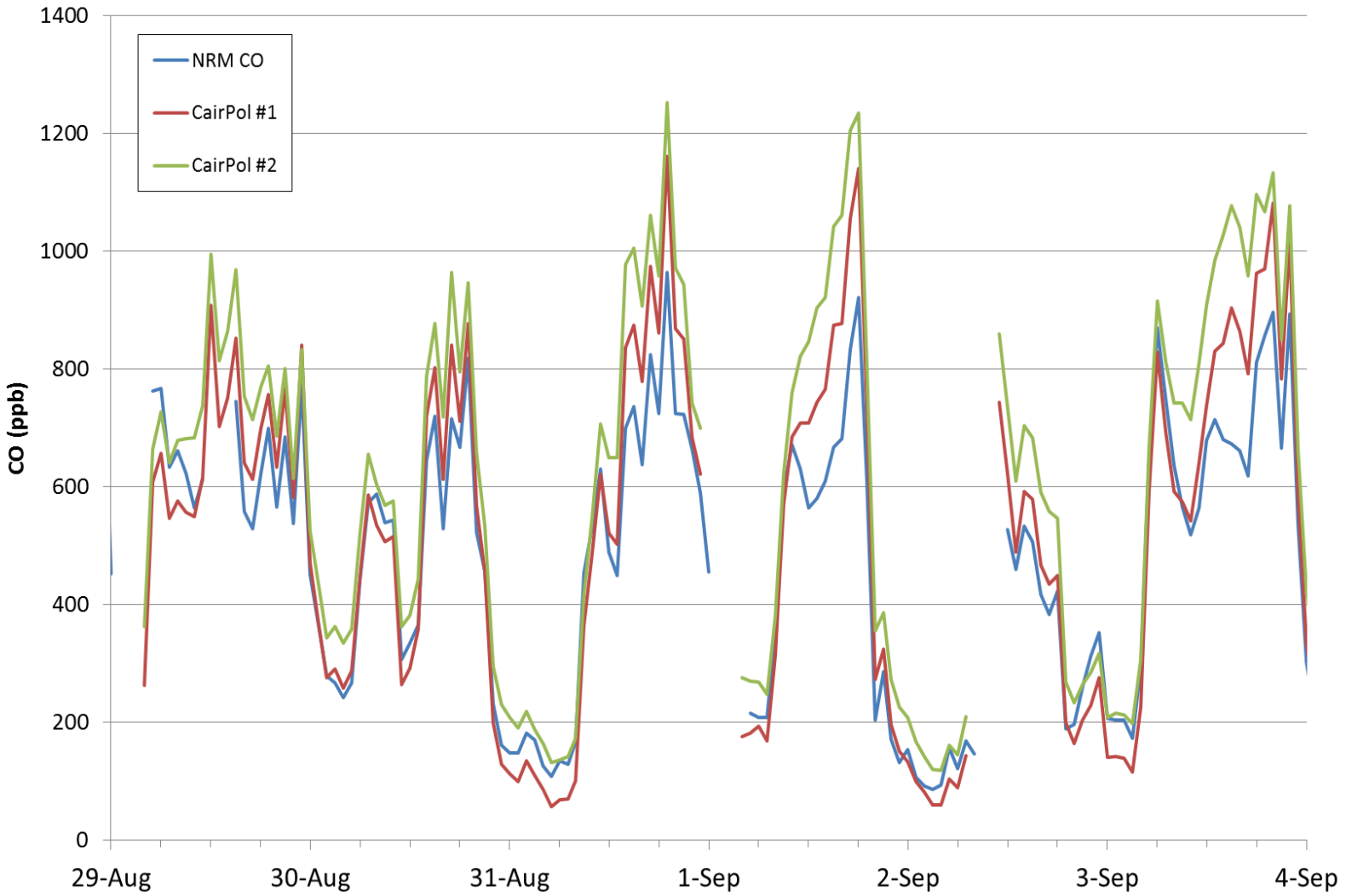
Normalized CO as a function of wind direction at CairPol sites



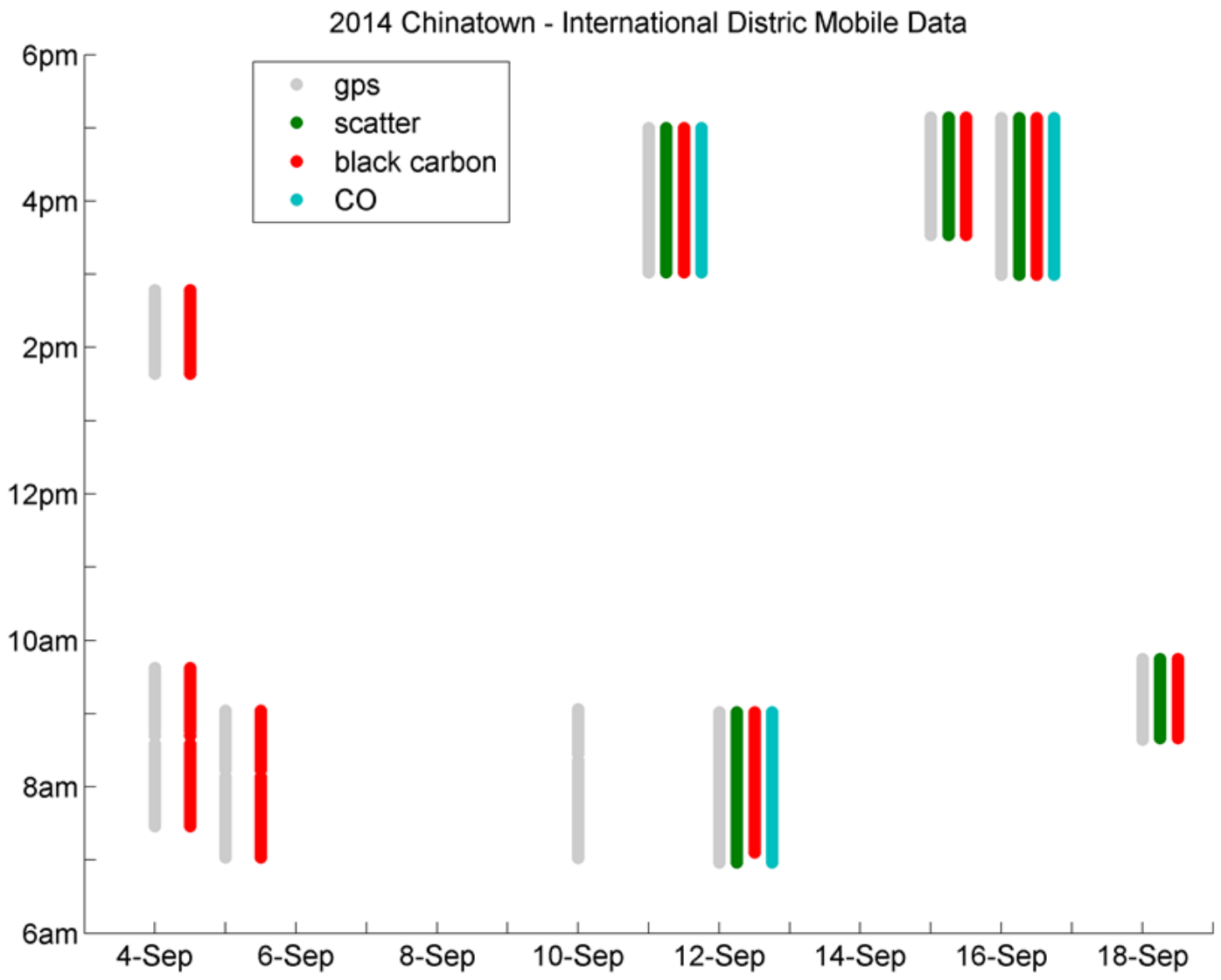
Diurnal pattern at 10th & W for CO, black carbon, wind speed and direction



Subset of CO data showing intercomparison with CairPol devices

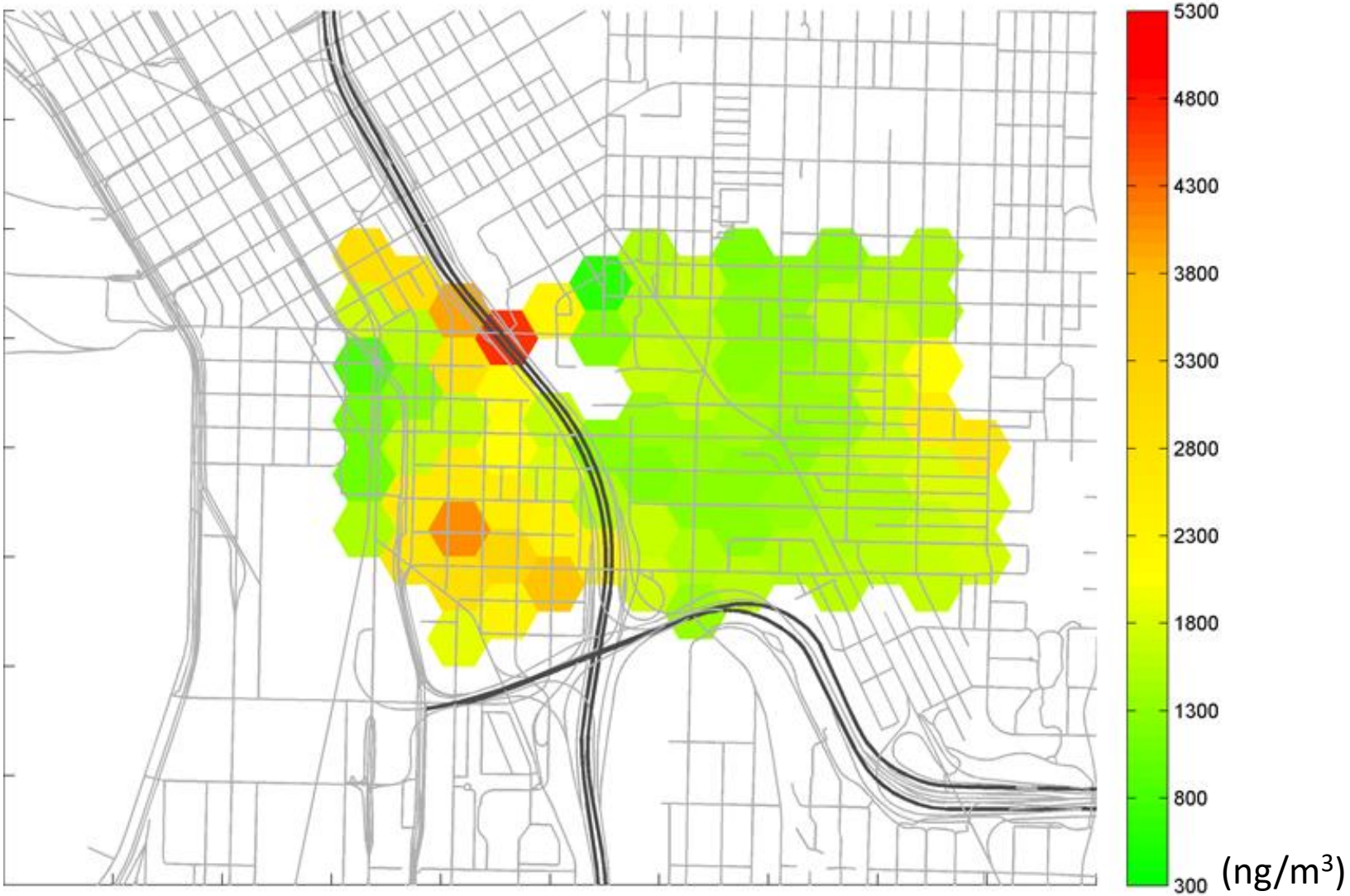


Mobile Data Availability



Mobile average PM 500’ cells

Mobile black carbon, 500’ cells



Mobile CO, 500’ cells

Mobile CO, 100’ cells

Conclusions I

- The following suite of pollutants are closely correlated, so likely have a common source from I-5:
  - CO, PM2.5, NOx, black carbon
- diurnal pattern is consistent with presumed traffic patterns
- away from I-5 (> 100m) sees about ½ the CO spike as the 10&W Near-Road Monitor
- wind direction consistent with I-5 influence at Near-Road Monitor, little direction influence otherwise

Conclusions II

- traffic apart from I-5 appears to impact area as well, but to a much smaller extent
- Baily Gatzert appears far enough from I-5 to not see a major impact from I-5 emissions
- lots of variability and hotspots in mobile routes
- estimated PM at the Ogawa sites away from major roads was all < 7 ug/m^3.