June 2018

Updates and upcoming plans

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Agenda

Updates
- King Street project
- Traffic pollution research
  - Emissions from trucks
  - Non-tailpipe emissions
- Smart highways
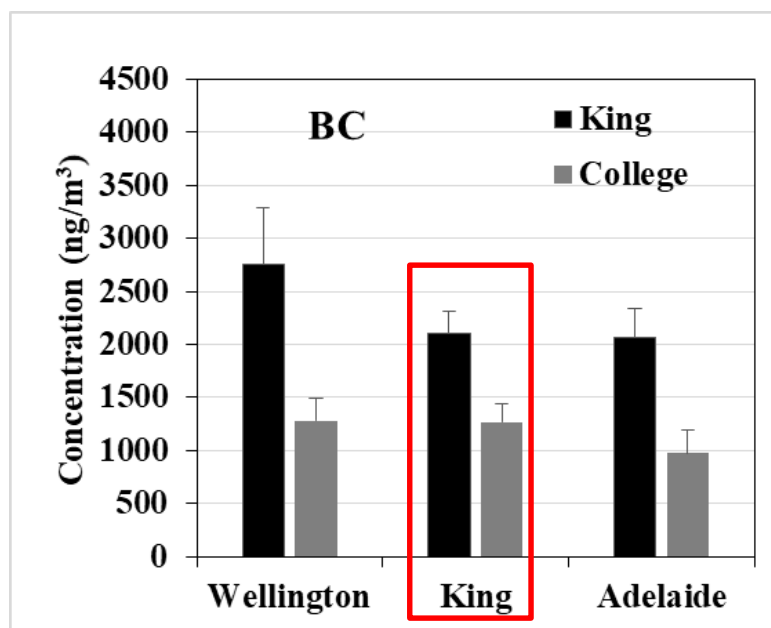
Plans
Smart City Projects
- Mississauga
- Oshawa

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TORONTO

Update on King Street Pilot
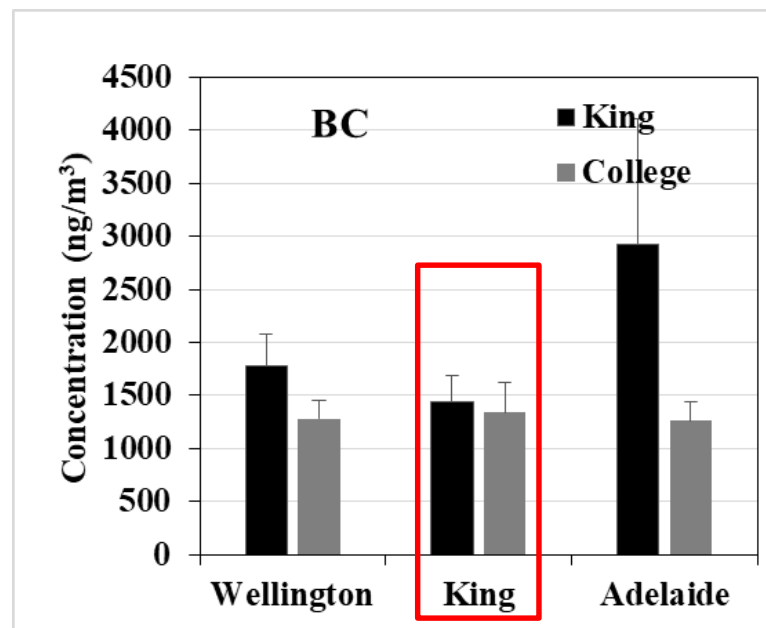
Before vs. During the project : Black Carbon

8-10 am Nov. 9 (Before)

8-10 am Nov. 23 (During)

BC: King/College = ~1.7
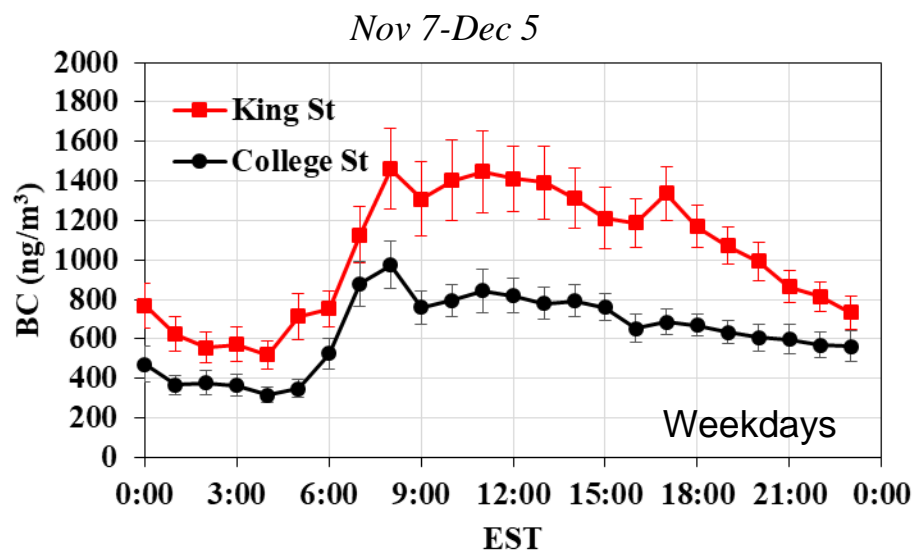
BC: King/College= ~1.1
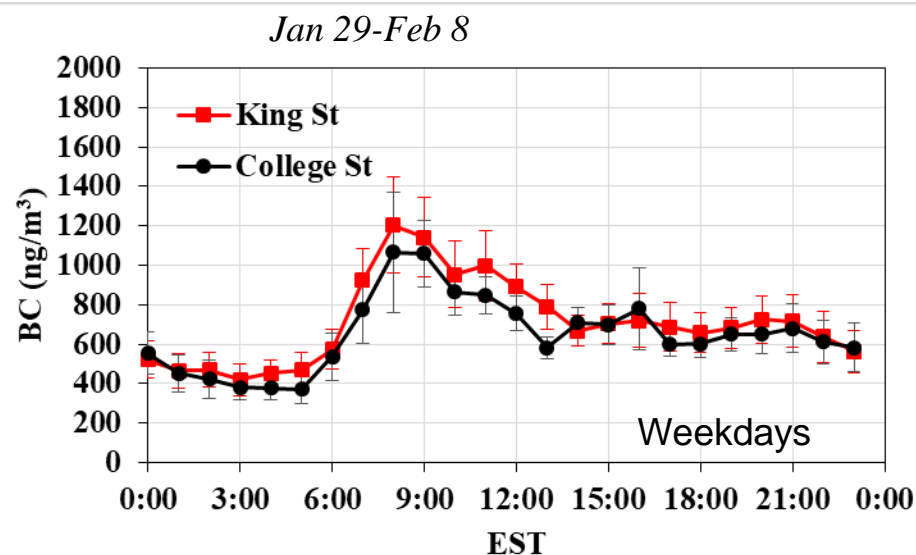
35% ↓

Stationary Monitoring Of Black Carbon

Fall (Nov 7 – Dec 5)   **Winter (Jan 29 – Feb 8)**

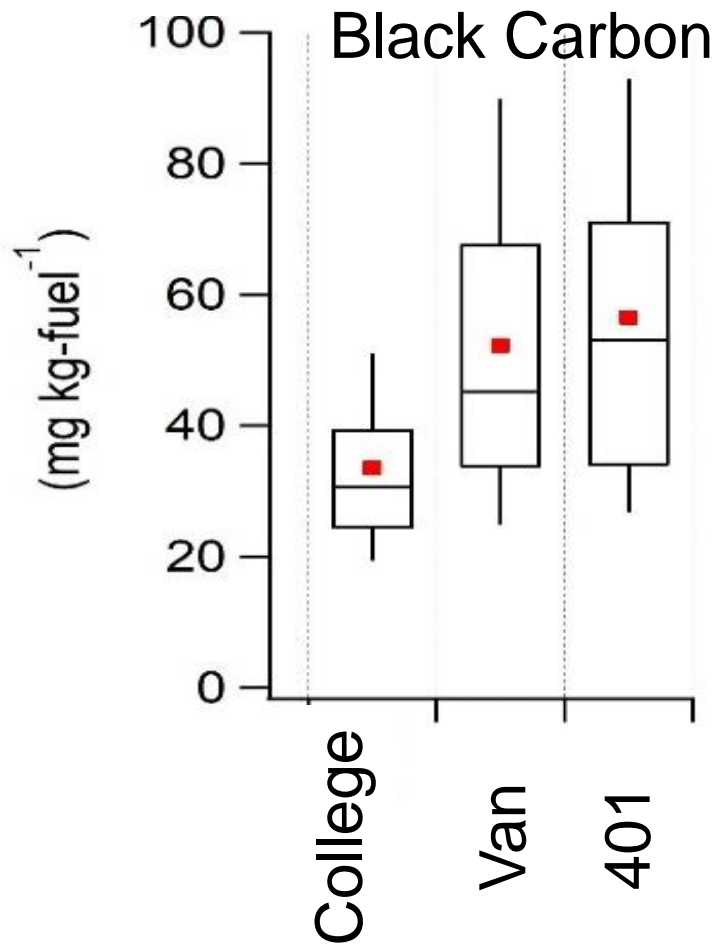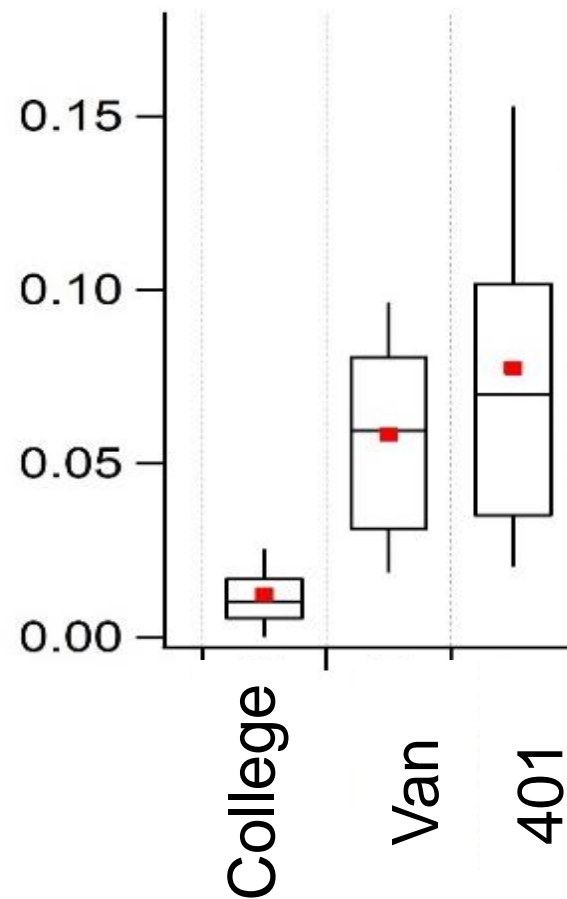| King/College*	Fall	Winter
UFP	1.16	1.05
BC	1.51	1.10

8 am – 10 am, Weekdays Only

Update on Traffic Pollution Research
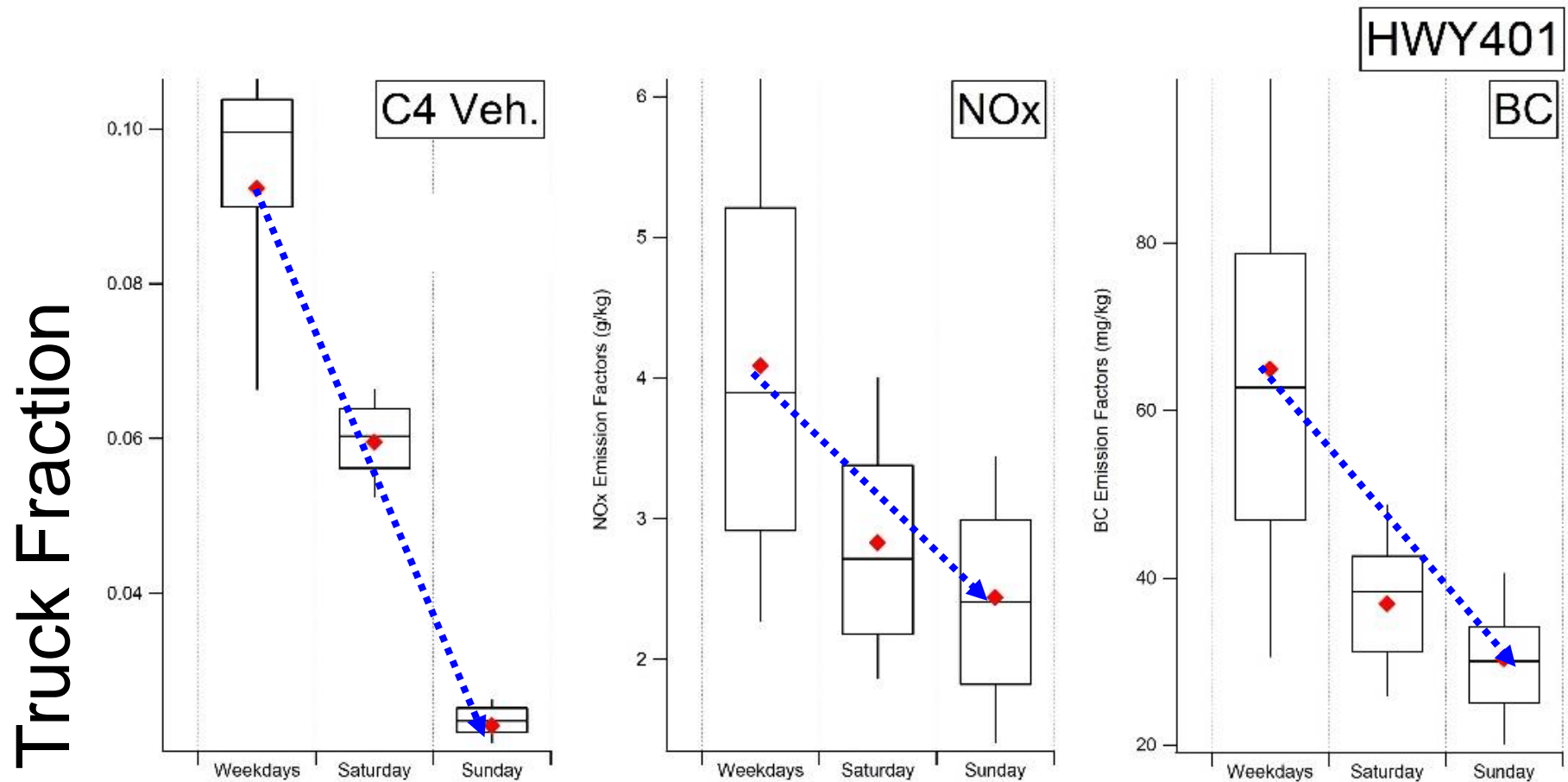
- Contribution of Trucks

- Non-tailpipe emissions

Fleet Average Emission Factors:
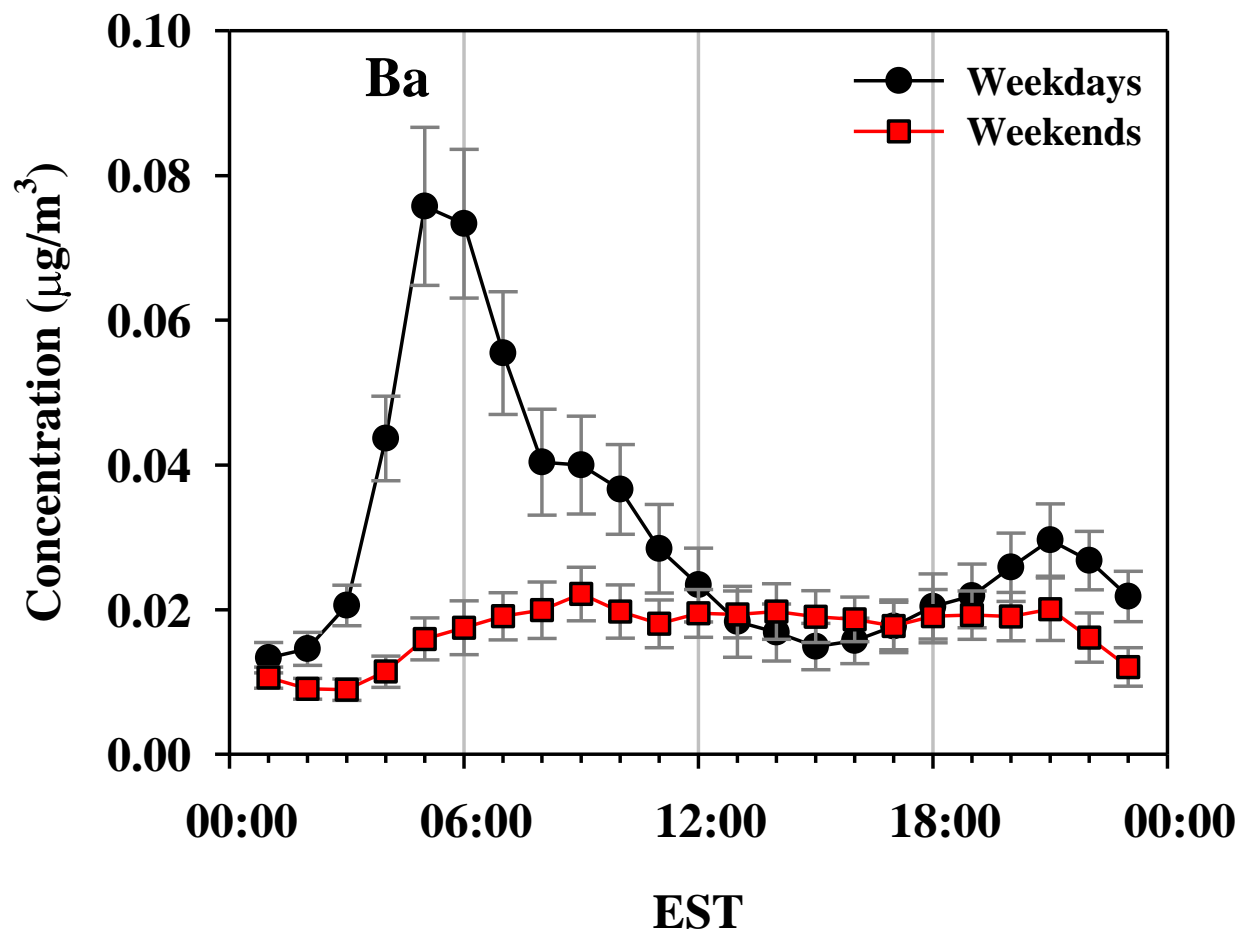## Depends on Percentage of Trucks

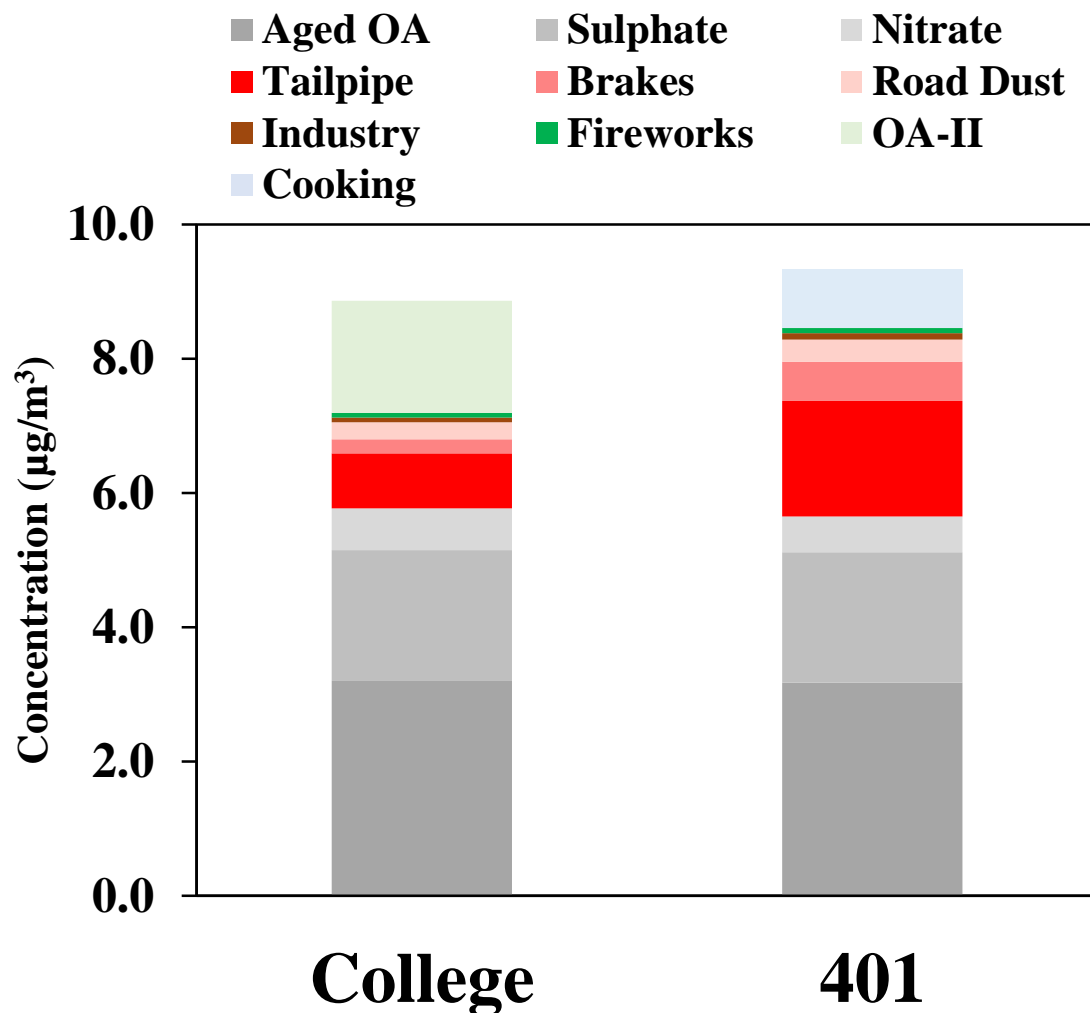# Weekday vs. Saturday vs. Sunday on 401

Average Traffic Contribution
Two years of data (2015-17)

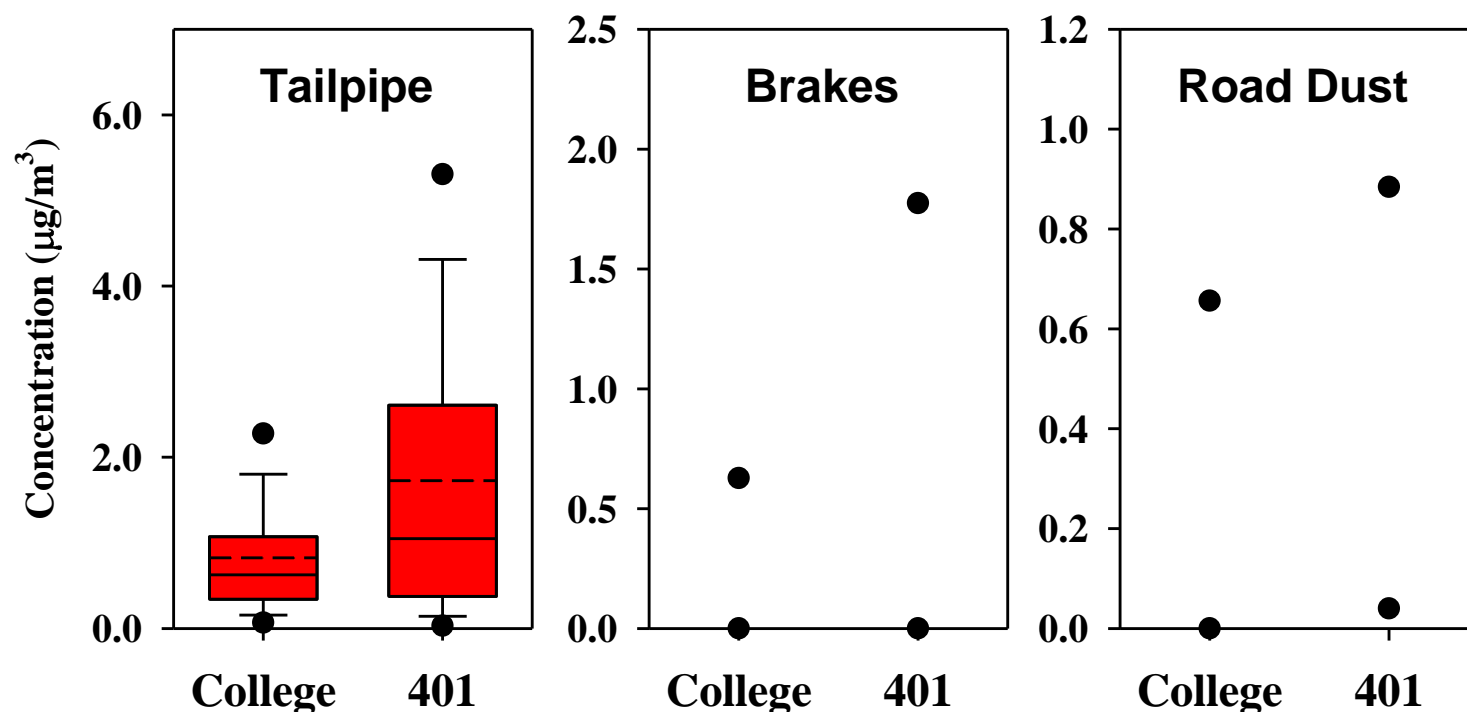| Pollutant	Vancouver	401	College
NO [ppb]	28	18	3.8
NO_2 [ppb]	9.7	9.2	5.3
CO [ppb]	153	115	69
CO_2 [ppm]	39	20	13
$PM_{2.5}$ [µg m^{-3}]	4.0	4.3	2.9
UFP [cm^{-3}]	15200	22700	7100
BC [µg m^{-3}]	1.3	1.0	0.41

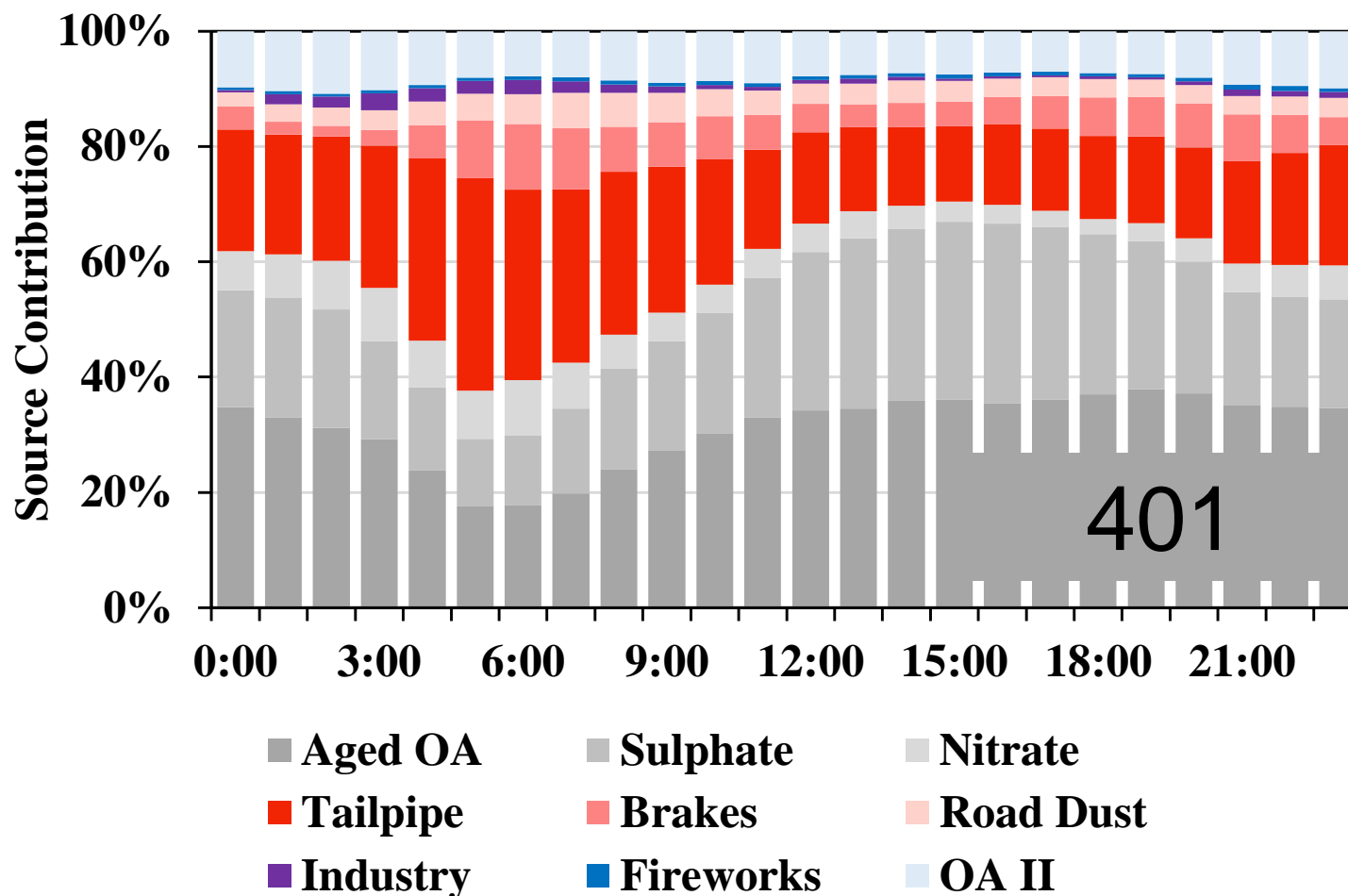# Non-Tailpipe Emissions: Highway 401

Traffic Contribution to PM2.5
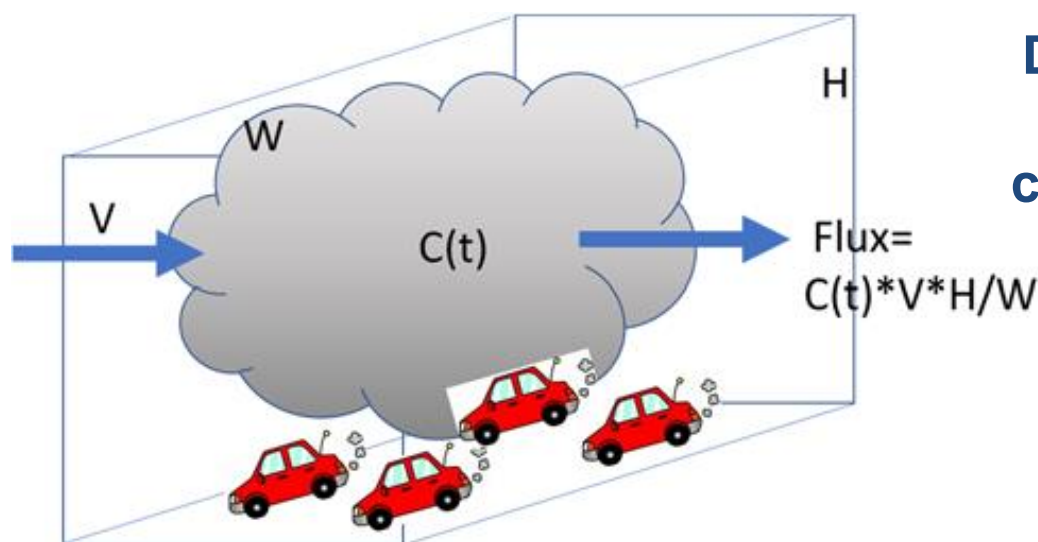
Traffic Contribution to PM2.5

Percent Contribution to PM2.5

Update on Smart Highways Project

- CO2 measurements can be used to isolate traffic contributions

- May allow estimates of most traffic pollutants (via EF)

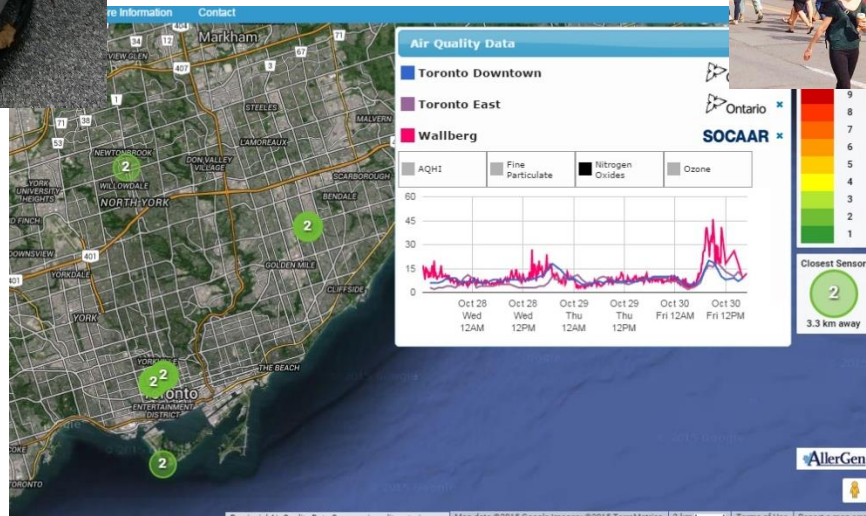- Estimate and monitor true CO2 emission reductions in relation to climate

Determination of emission flux based on measured concentration (C(t)), windspeed (V) and vertical distribution height(H).

In the figure: H, W, V, C(t), Flux= C(t)*V*H/W

Plans: AirSENCE in Smart City Projects

Array of sensors for: CO, NOx, O3 CO2 and PM

Oshawa Smart City Projects

- Deploy 5 AirSENCE devices in for 8 months in downtown Oshawa

- Parallel deployment of ROVER traffic in road monitors

- Establish baseline levels

- Link into Teaching City initiative by making data available and providing instructional elements

Mississauga Smart City Project

- Proposed: Deploy 45 AirSENCE units (BCIP)
- Integrate AirSENCE network with existing city public information infrastructure
- Overlap with OCE project to evaluate school drop-off zones
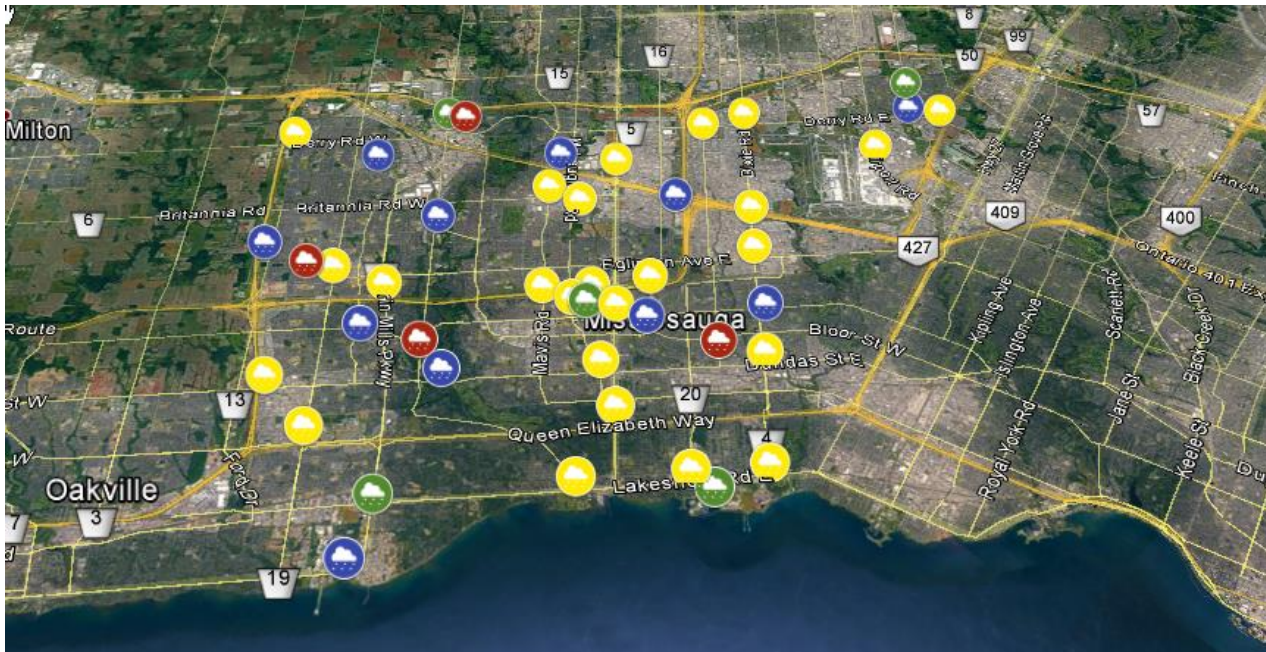
Summary

- Fraction of trucks can dominate total traffic emissions

- Road dust is an emerging issue

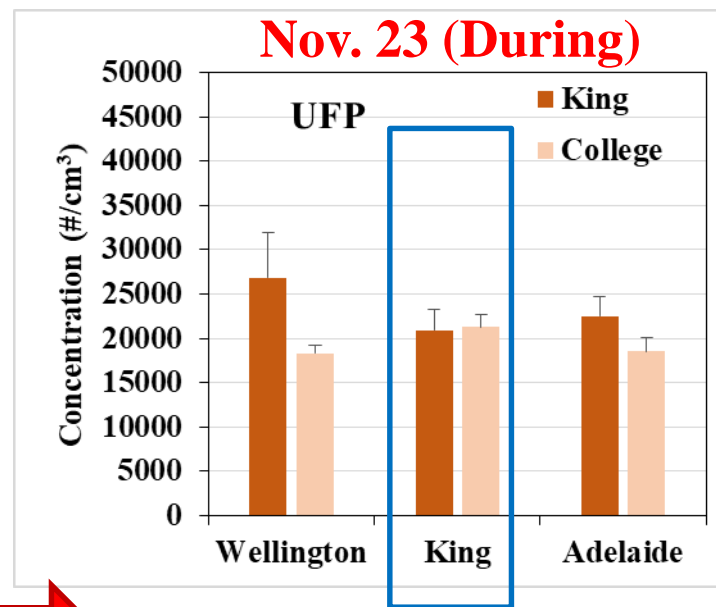- Smart city projects are being launched

Before vs. During the project : Ultrafine Particles

8 am – 10 am	Temp (C)	RH (%)	WD	WS, m/s	PM2.5, µg/m³	NOx, ppb	UFP, #/cm³
Nov 9, Thur	5.2	46	Southwest	2.0	7.5	52	36,000
Nov. 23, Thur	1.3	51	Southwest	2.3	6.2	34	23,000

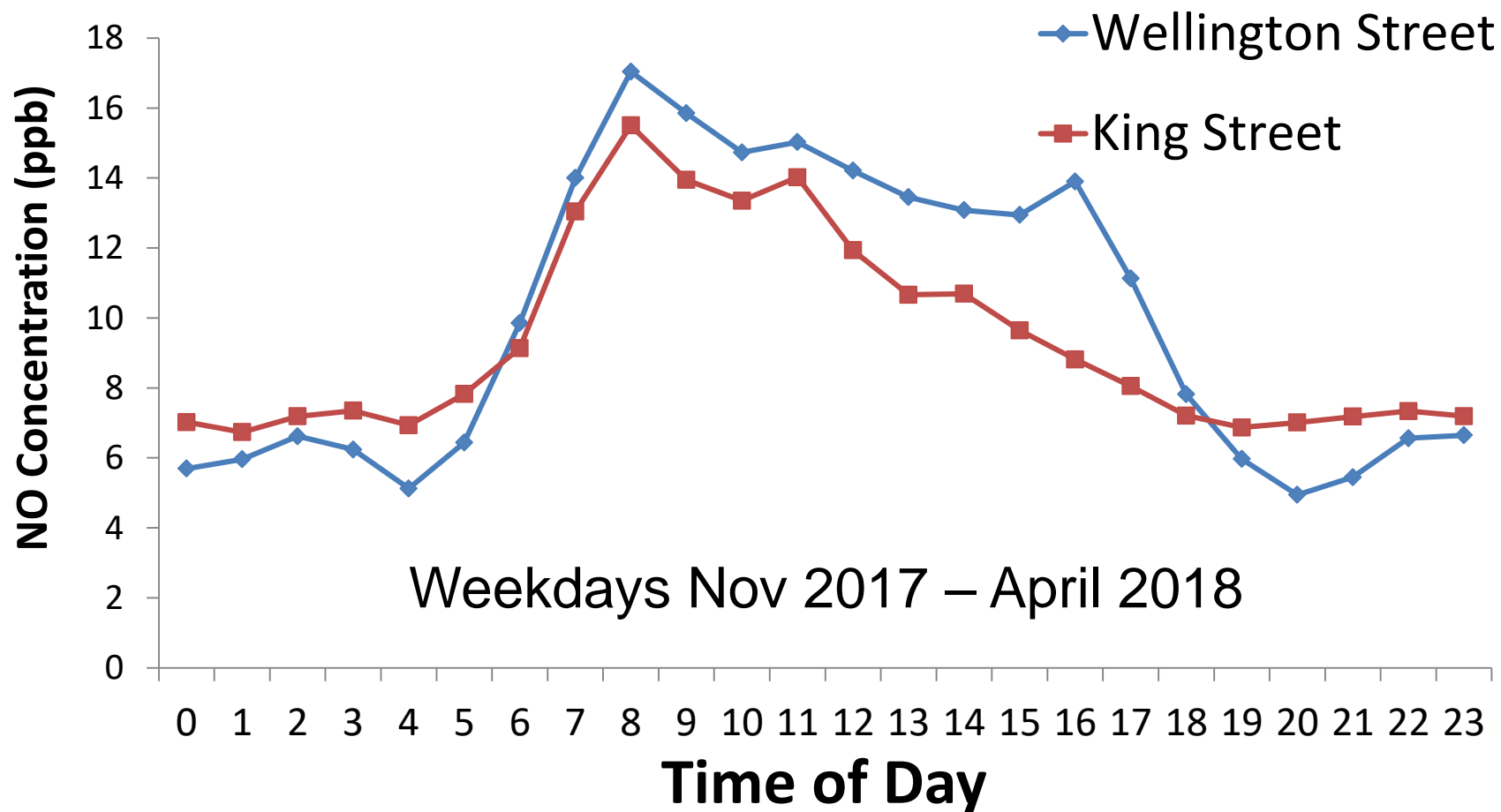**Nov. 9 (Before)**

Nov. 23 (During)
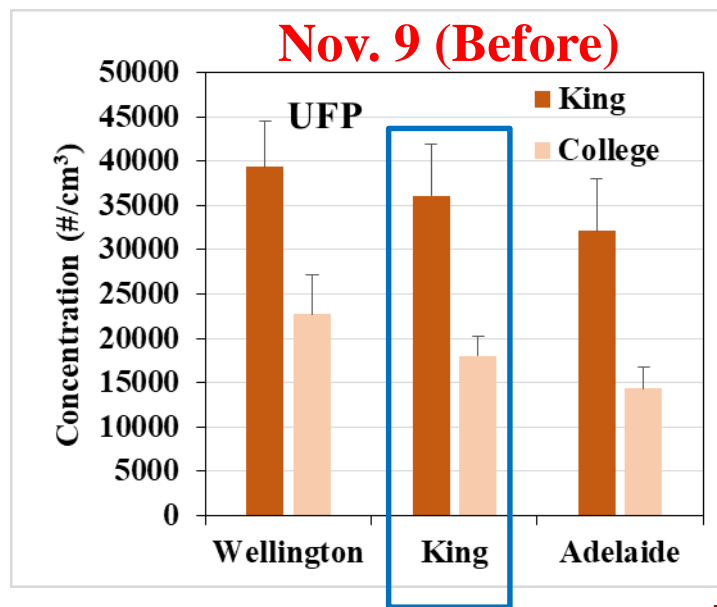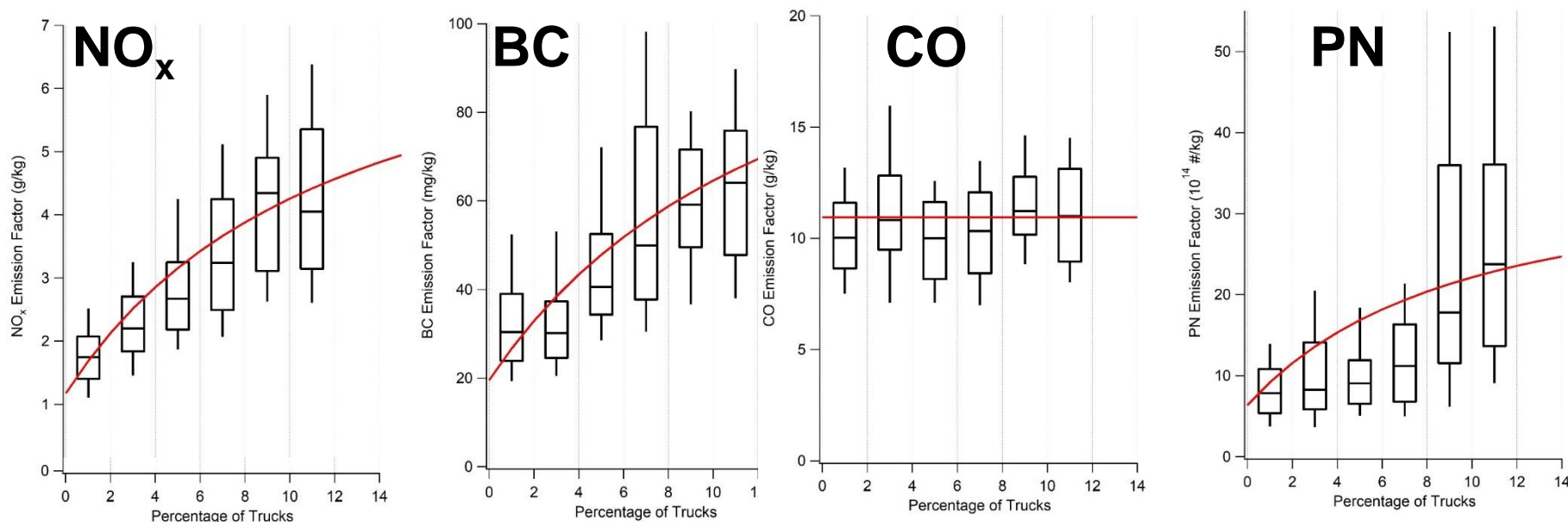
UFP: King/College = ~2.0

50% ↓

UFP: King/College= ~1.0

King Street Pilot – Nitrogen Oxide

Emission Factors vs. Percentage of Trucks

- Plateau in NO_x and BC EFs with increasing %Trucks

- CO EFs relatively constant across %Trucks
- PN EFs greater increase %Trucks > 8%

Non-Tailpipe Emissions: Downtown