

Non-exhaust Traffic Emissions and Asthmatic Airways

Quantifying how brake wear and tyre particles affect lung function in people with asthma through real-world exposure testing.

Prof Chris Griffiths and Dr James Scales



Three Exposure Sites



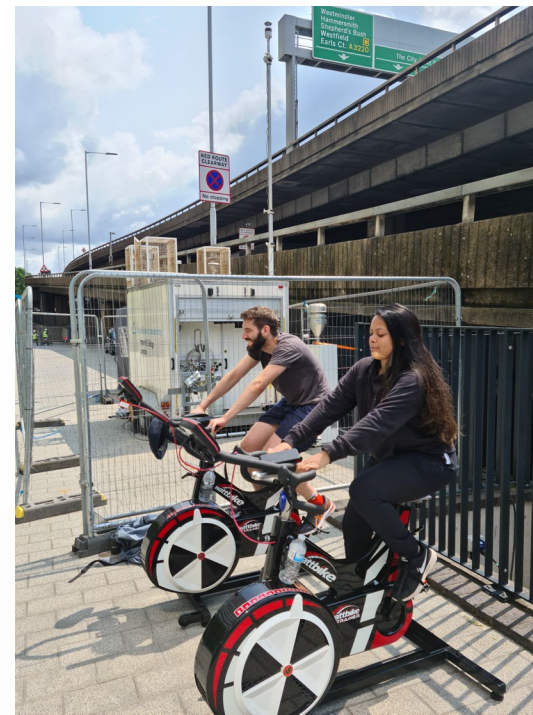
Marylebone Road

Busy road with stop-go traffic designed to maximize brake wear particle exposure.



White City (A40)

High-speed continuous traffic on major trunk road to enhance tyre and road wear exposure.

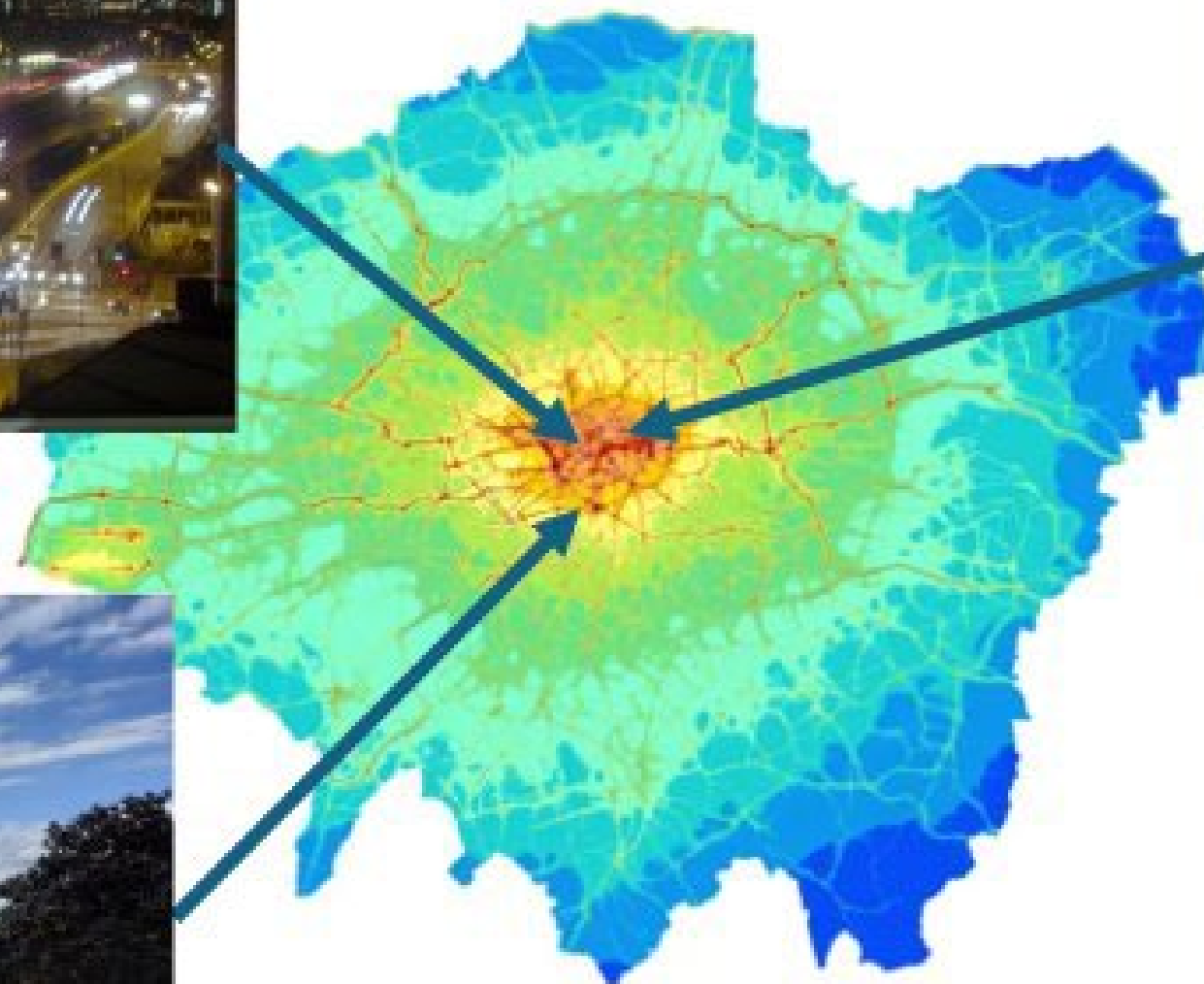
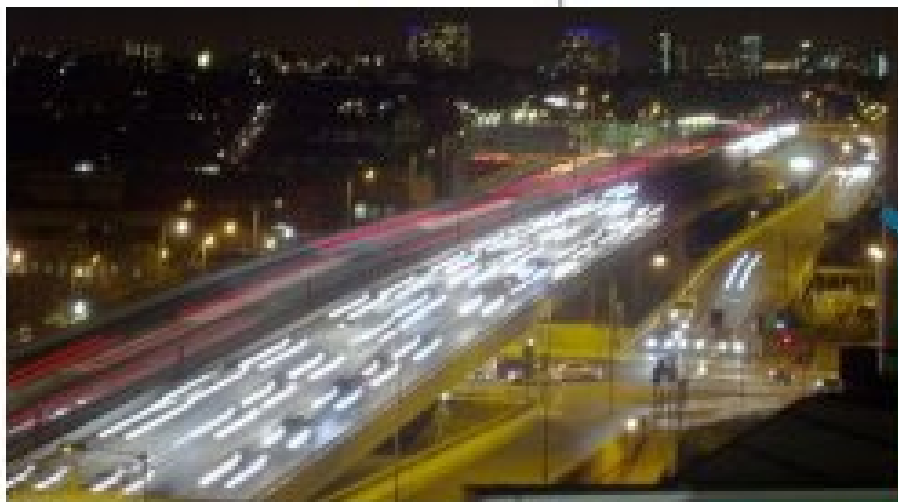


Honor Oak Park

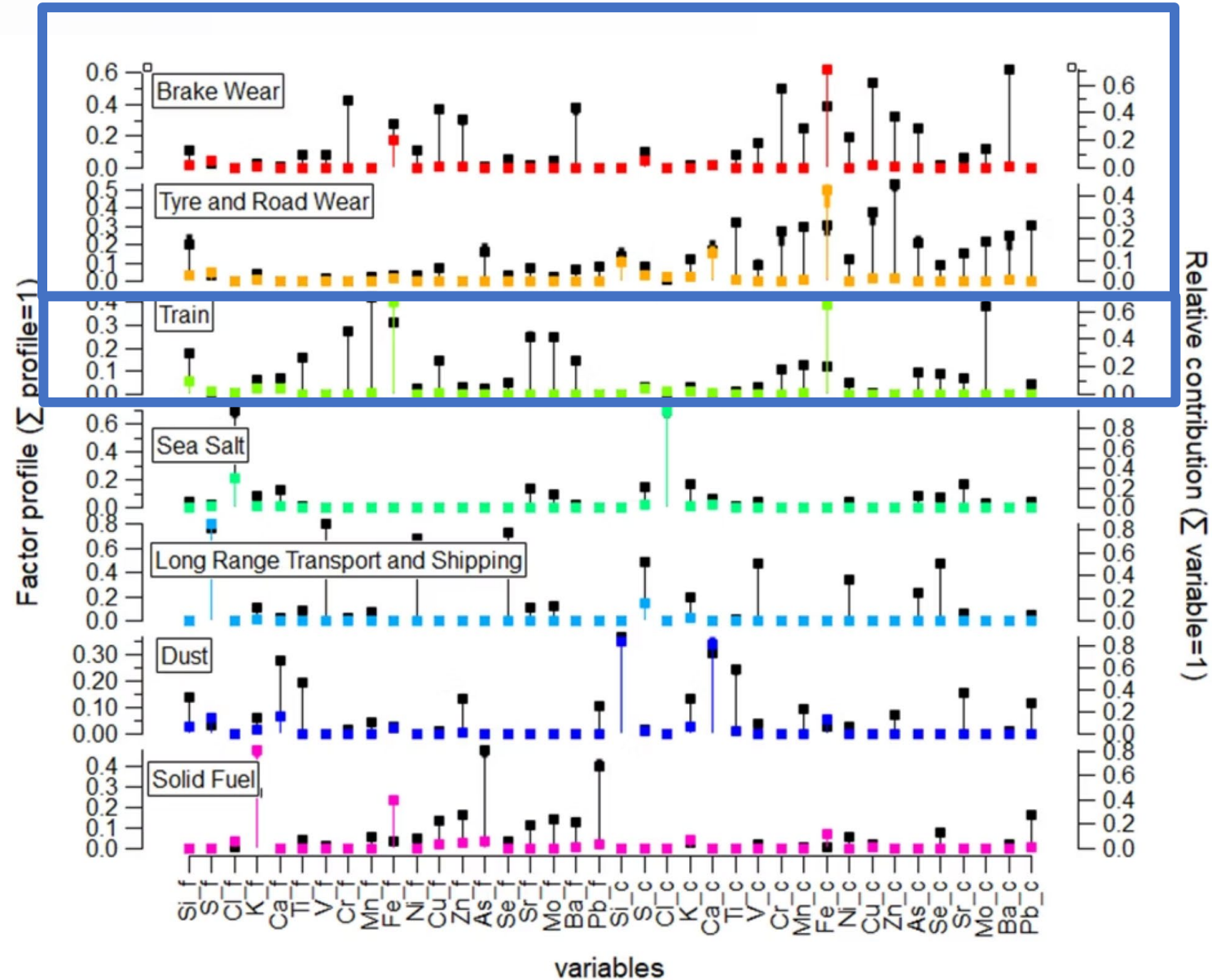
Urban background location away from traffic sources, serving as the control reference site.



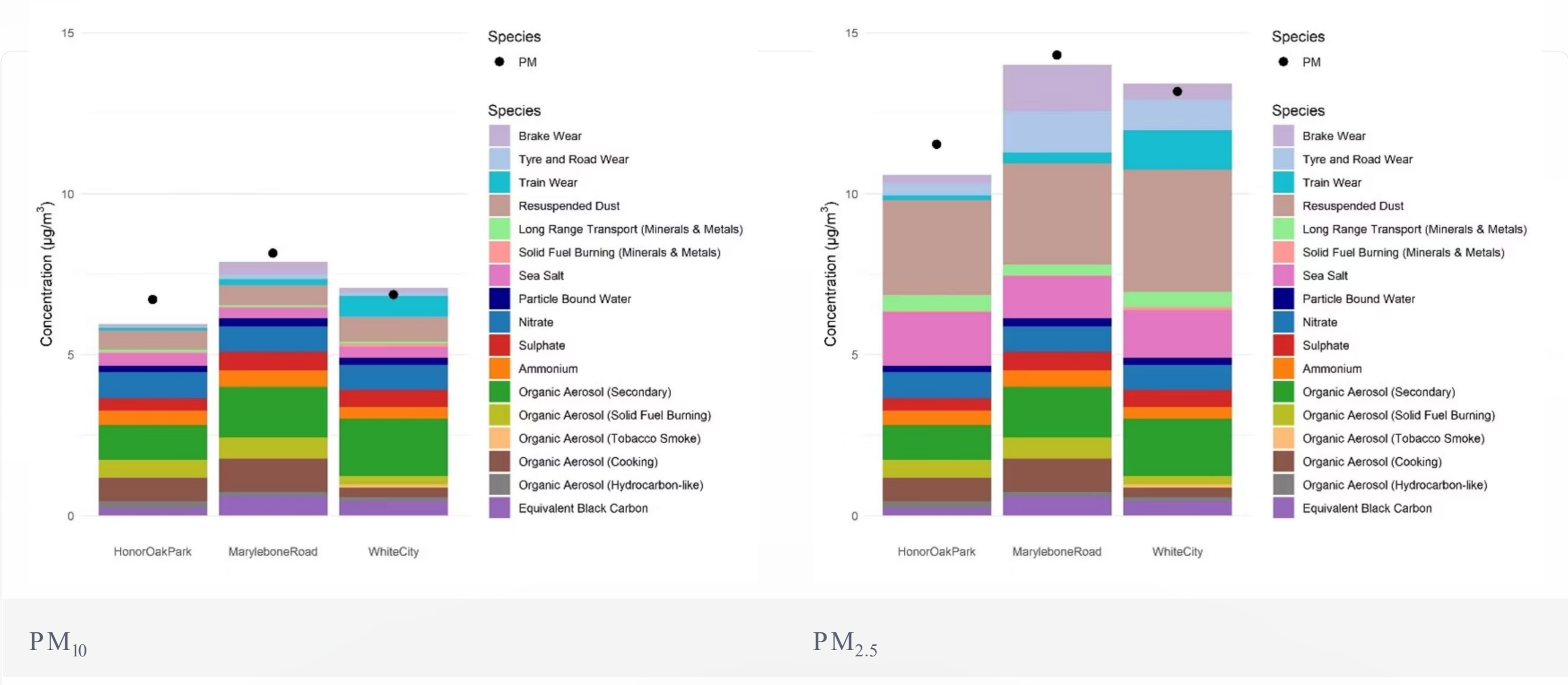
Measurement Locations



Measured airborne elements and relative contribution to sources



Source appointed particulate matter



PM_{10}

$PM_{2.5}$

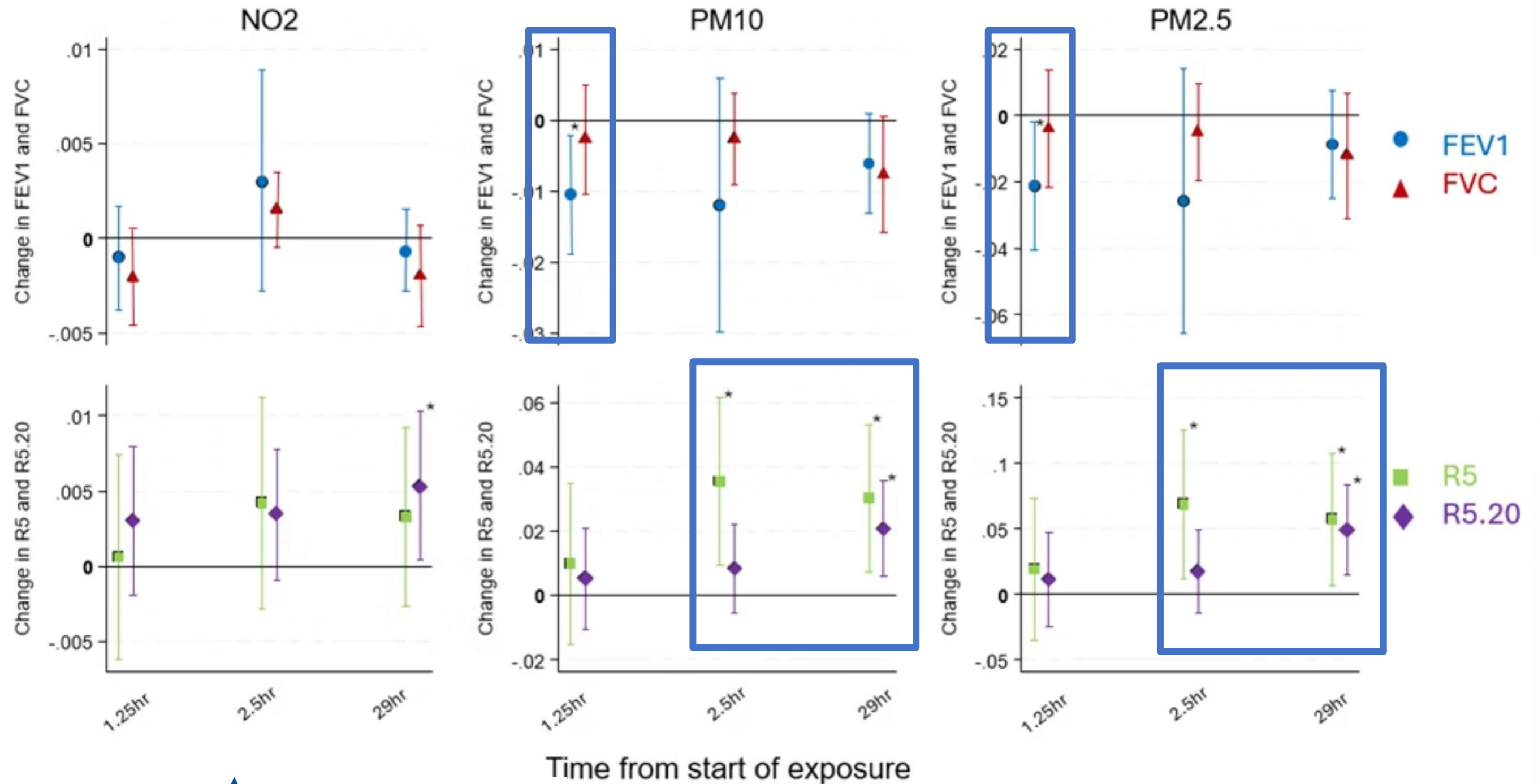
By site differences: Primary outcomes

Site	FEV1 Time Point: 1.25hr (N=33)				FEV1 Time Point: 2.5hr (N=32)				FEV1 Time Point: 29hr (N=32)			
	Coefficient	95% CI		P-value	Coefficient	95% CI		P-value	Coefficient	95% CI		P-value
Honor Oak Park	Ref				Ref				Ref			
Marylebone Road	-0.09	-0.20	0.01	0.073	-0.07	-0.30	0.16	0.531	0.01	-0.07	0.10	0.747
White City	-0.15	-0.25	-0.04	0.005*	-0.24	-0.47	-0.01	0.042*	-0.09	-0.18	0.00	0.04*

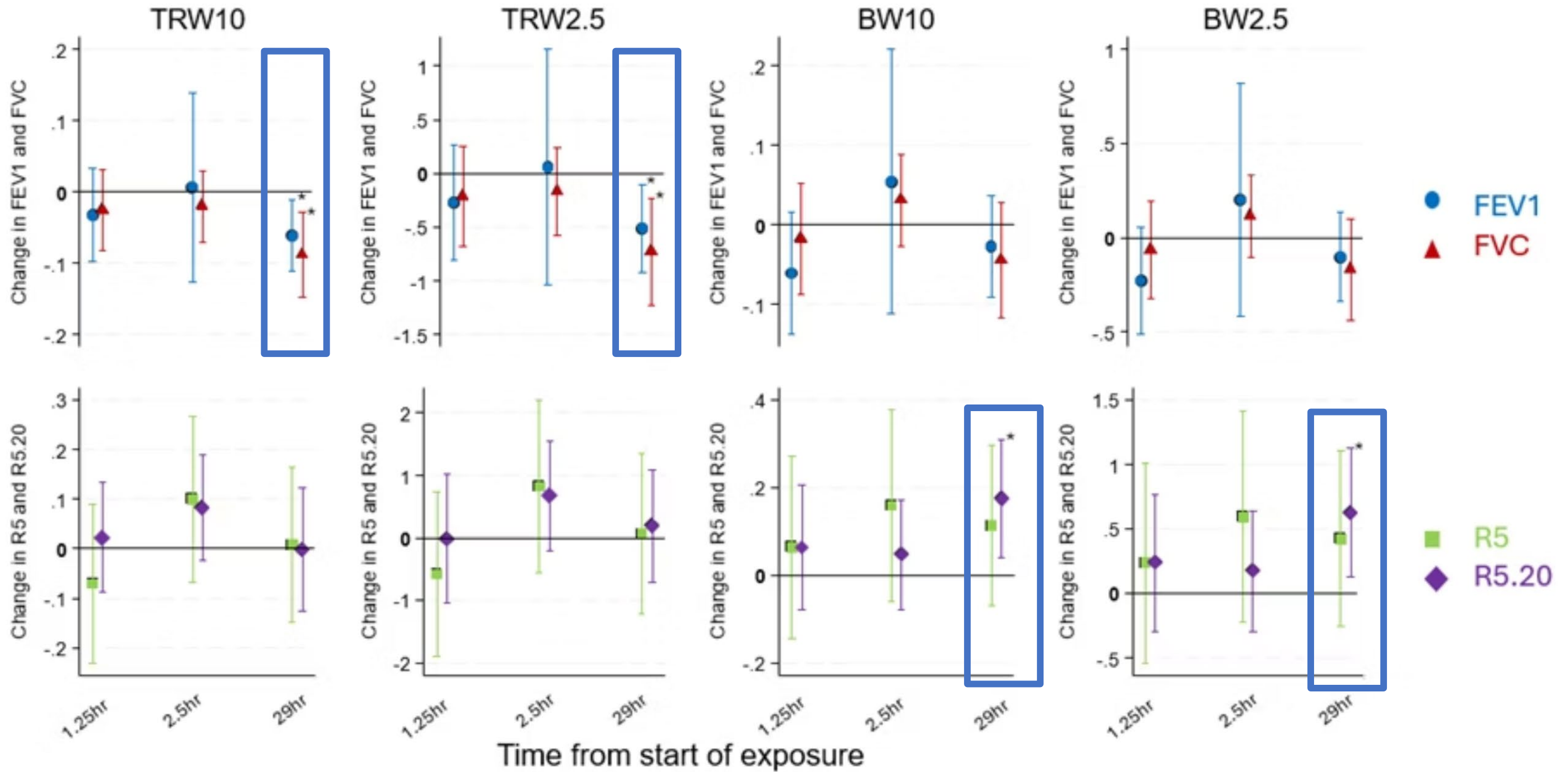
Site	IL6 (pg/mL) at 29 hours post exposure			
	Coefficient	95% CI		P-value
Honor Oak Park	Ref			
Marylebone Road	38.46	7.97	68.95	0.013
White City	15.81	-12.72	44.35	0.277

Covariates in the model: Age, sex, asthma severity, allergic status and prior pollutant exposure.

Spirometry, oscillometry measurements by pollutant



Spirometry, oscillometry measurements by pollutant source



Key finding: Differential effects by pollutant source



Tyre & Road Wear

Associated with reductions in FEV₁ and FVC, our primary outcome measures.



Brake Wear

Significantly increased inflammation (IL6) and small airway resistance (R5-R20) the day following exposure.



Next steps

- Develop international networks to progress to large epidemiological study
- Establish biomarkers of exposure.
- Conduct chamber based exposure studies to explore impacts without ambient confounding
- Repeat exposures in other vulnerable groups to confirm responses.

Thank you

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