

Table S-1. Summary of Hourly Meteorological Parameters for the Boston Metro Core Area

Wind direction from (degree)	Fraction of hours
(North) 0	6.6%
30	4.4%
60	4.1%
(East) 90	5.4%
120	6.0%
150	3.0%
(South) 180	4.9%
210	11.0%
240	14.6%
(West) 270	11.9%
300	17.1%
330	10.5%

Wind speeds (m/s)	Fraction of hours
< 1.5	< 1%
1.5 - 3.1	15%
3.1 - 5.1	27%
> 5.1	57%

	Temperature (°C)
Minimum	- 19
Mean	11
Median	12
Maximum	36

	Urban Mixing Height (m)
Minimum	2
Mean	926
Median	826
Maximum	3,770

Table S-2 Actual and Uniform Scheme Population Summary for the Six Regions around the Road Segments

Population Scheme	Actual Population			Uniform
Region enclosed within Radii	Mean	5th percentile	95th percentile	
0 - 50m	62	0	161	39
50 - 100m	178	5	439	117
100 - 200m	674	68	1,519	468
200 – 500m	4,182	904	7,826	3,279
500 - 1000m	13,104	4,114	22,921	11,709
1000 - 5000m	322,125	135,401	442,555	374,691

Table S-3. Intake Fraction predicted by inverse of mixing height for low mixing heights

	n (hours)	R^2	Parameter	Estimate	s.e.	p-value
All hours	8715		20% β_o	9.06E-06	8.66E-08	<0.0001
			β_1	2.27E-04	4.92E-06	<0.0001
MH < 100 m	363		42% β_o	8.65E-06	1.18E-06	<0.0001
			β_1	2.24E-04	1.38E-05	<0.0001

Table S-4. Intake Fraction sensitivity to roughness length, deposition velocity, and settling velocity

Roughness Length, z_o	% Difference in iF from Base Case
500 cm (Base Case)	0%
100 cm	6%
10 cm	17%
1 cm	28%
Diameter of particle, D_p , and deposition velocity, V_d	
$D_p = 2.5 \mu\text{m}$, $V_s = V_d = 0.021 \text{ cm/s}$ (Base Case)	0%
$D_p = 2.5 \mu\text{m}$, $V_s = 0.021 \text{ cm/s}$, $V_d = 0$	0%
$D_p = 10 \mu\text{m}$, $V_s = V_d = 0.3 \text{ cm/s}$	-1%
$D_p = 50 \mu\text{m}$, $V_s = V_d = 7.5 \text{ cm/s}$	-20%

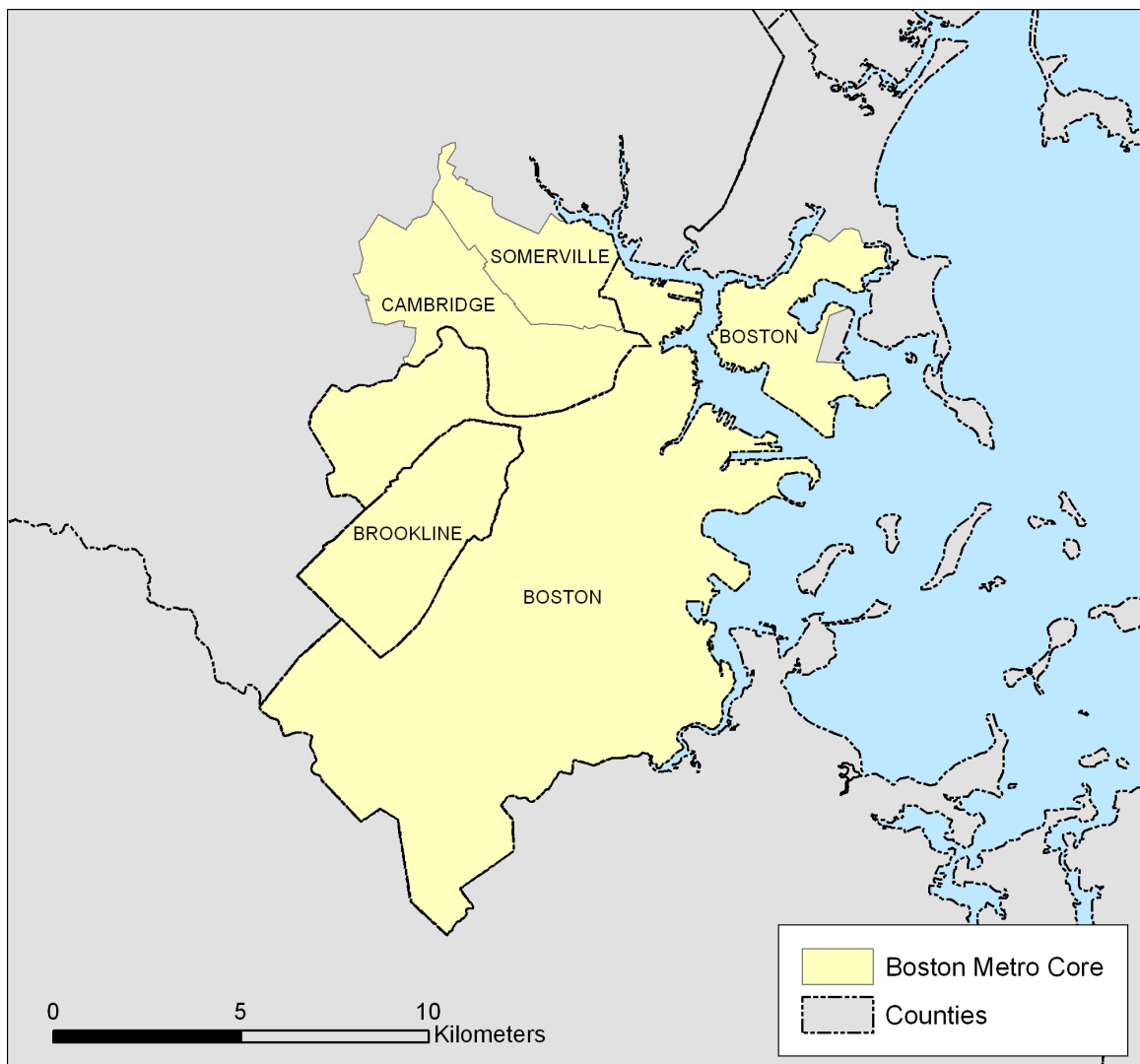


Figure S-1. Boston Metro Core Study Area

Logan Airport, the source of hourly surface meteorological data, is located at the far eastern section of the Boston Metro Core study area. Chatham, the source of upper air data, is located 80 km to the southeast.

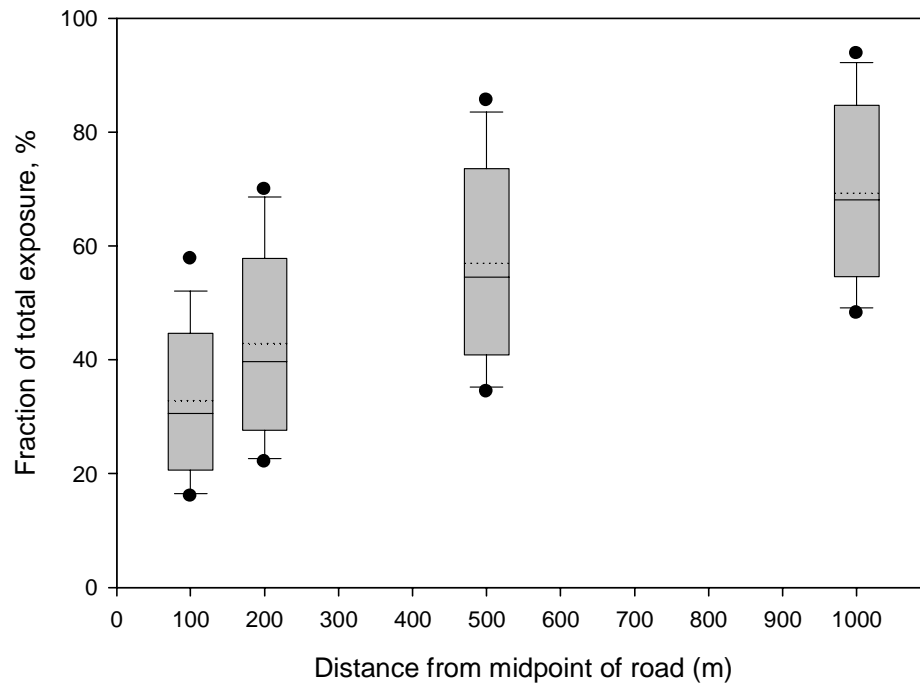
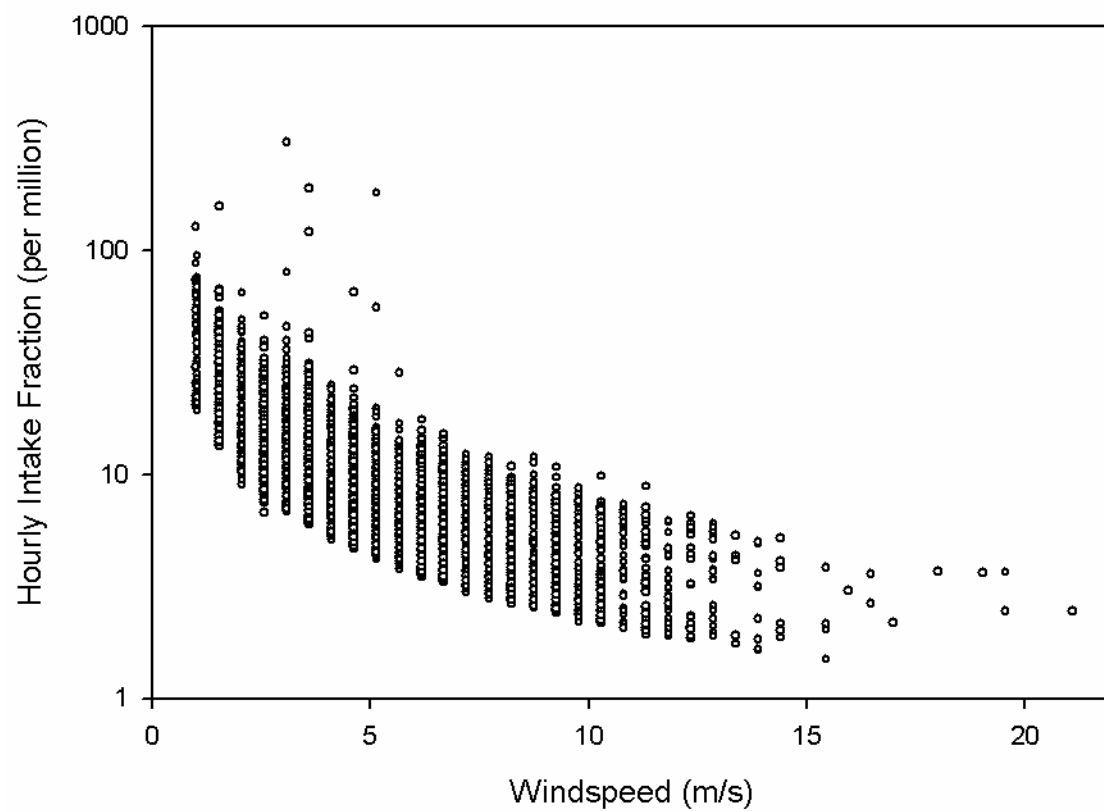


Figure S-2. Fraction of Total Exposure Captured in Specified Radius

Uniform population density used. The box plots represent the 5th and 95th percentiles of the 8715 hourly iFs with dots, the middle half of the data by the shaded box, and the median and mean in the box by a solid and dotted line, respectively. At a distance of 5000 m, the fraction of total exposure for all hours would converge to 100%.



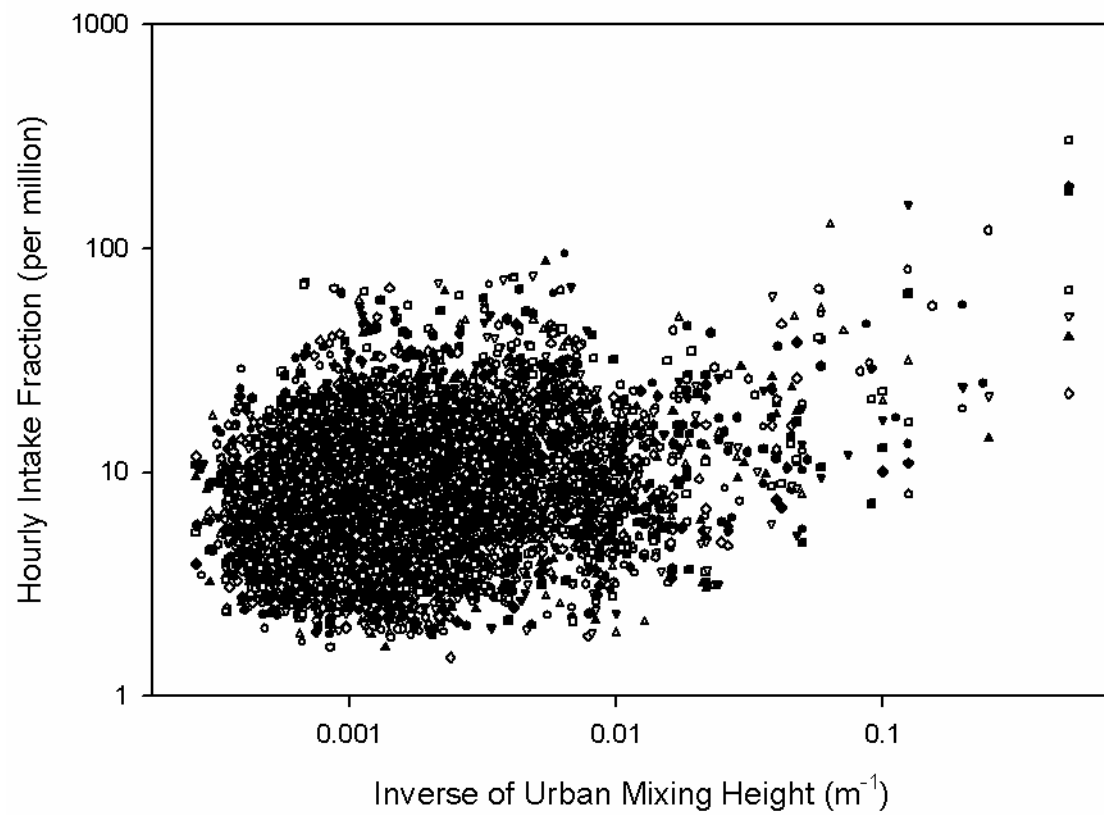


Figure S-4. Hourly Intake Fraction versus the Inverse of Urban Mixing Height
Uniform population density used. Markers denote 8715 hours of data.

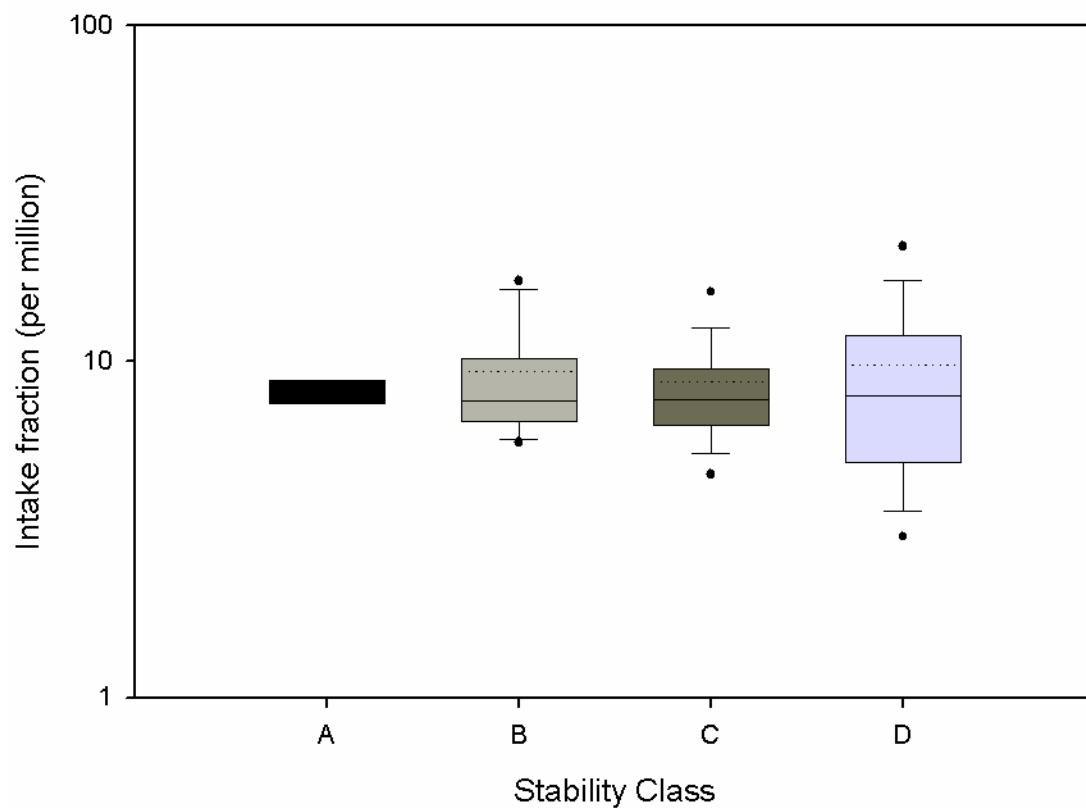


Figure S-5. Hourly Intake Fraction versus Stability Class

Uniform population density used. Stable stability classes E and F were collapsed into neutral class D (n = 7696 hours), as indicated when CAL3QHCR is run in the urban mode. During the year, there were only 8 hours in extremely unstable stability class A, 204 hours in moderately unstable class B, and 757 hours in slightly unstable class C.

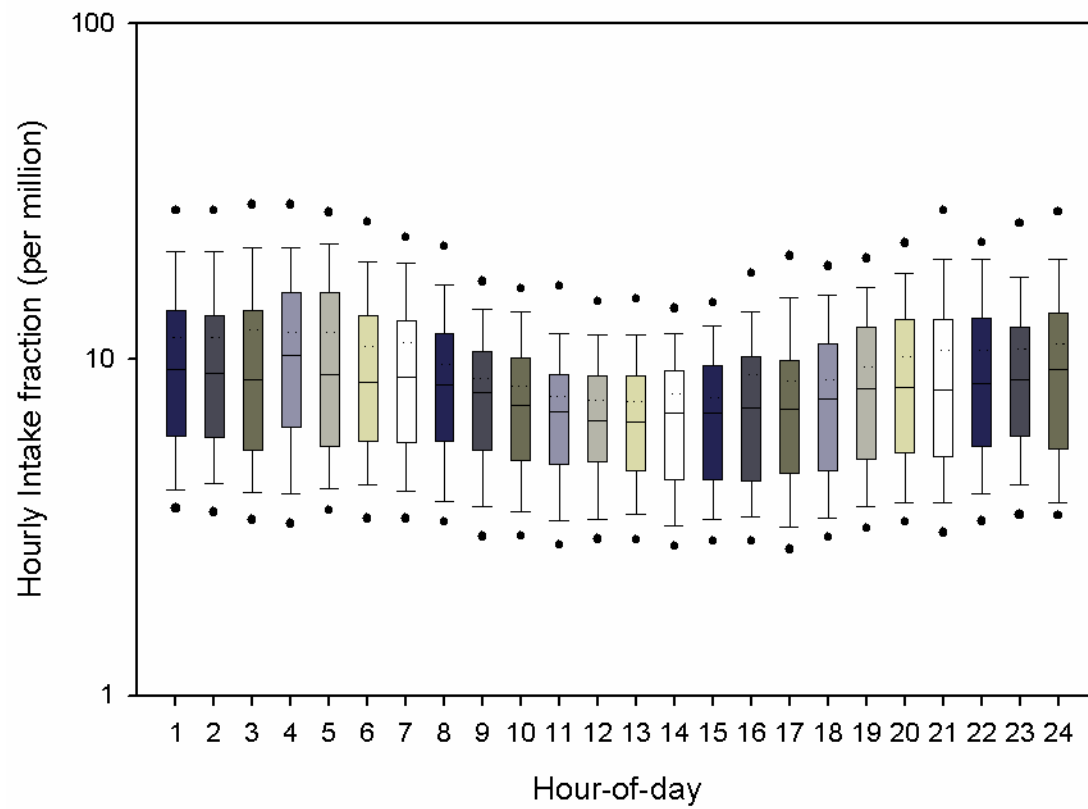


Figure S-6. Hourly Intake Fraction versus time-of-day
Uniform population density used. The 8715 hours of data for the year are separated by time-of-day, so each box plot represents approximately 363 hours.