

Supporting Information for

Linking In-Vehicle Ultrafine Particle Exposures to On-Road Concentrations

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S.1 Vehicles tested

Table S1: List of Vehicles tested in the study.

Manufacturer	Model	Year	Odometer	Manufacturer	Model	Year	Odometer
Mazda	Mazda121	1989	98955	Chevrolet	Tahoe	2002	157776
Toyota	Cressida	1990	286872	Ford	E Series	2003	196778
Buick	Sabre	1991	191198	Chevrolet	Silverado	2004	123634
Toyota	Camry	1992	332878	Chevrolet	Cavalier	2004	109509
Buick	Sabre	1992	197576	Chevrolet	Traverse	2004	43235
Cadillac	DeVille	1993	265342	Toyota	Corolla	2005	53234
Honda	Accord	1993	134521	Honda	Accord	2005	106656
Saab	Saab	1994	137600	Chevrolet	Silverado	2005	152896
Chevrolet	Astro van	1995	280046	Mazda	Mazda-6	2005	141003
Jeep	Cherokee	1995	225835	VW	Golf	2005	10663
Jeep	Cherokee	1995	306675	Toyota	Scion xB	2006	70538
Toyota	Corolla	1996	300774	GMC	Sierra	2006	118160
Nissan	Sentra	1996	428982	Toyota	Corolla	2006	139461
Toyota	RAV4	1997	295957	GMC	Colorado	2007	65238
Hyundai	Accent	1997	164968	Honda	Accord	2007	67800
Honda	Civic	1998	137430	Toyota	Yaris	2007	67141
Mitsubishi	Magna	1998	85677	Toyota	Matrix	2007	65501
Honda	Civic	1999	122336	Subaru	Outback	2007	6777
Toyota	Lexus	1999	80528	Chrysler	Crysler300	2008	66955
Ford	Expedition	1999	86061	Toyota	Hilux	2005	6992
Honda	Accord	1999	244470	Toyota	Prius	2009	16713
Ford	Taurus	1999	156619	Toyota	Scion xD	2009	11200
Ford	Contour	1999	183632	Toyota	Scion XB	2009	63894
Honda	Accord	2000	148626	Toyota	Matrix	2009	42078
Subaru	Liberty	2000	58648	Ford	Explorer	2010	1893
Toyota	Corolla	2000	126176	Toyota	Prius	2010	4733
Toyota	Camry	2000	167235	Toyota	Prius	2010	26741
Chevrolet	Tahoe	2001	142445	Toyota	Scion XB	2010	39934
Ford	Escort	2001	202419	Honda	Insight	2010	45771
Nissan	Pathfinder	2001	258848	Honda	Insight	2010	39740
Chevrolet	Cavalier	2001	80184	Honda	Civic	2010	10245
Chevrolet	Express 2500SL	2002	24882	Smart	SmartCar	2010	2339
Nissan	Infinity G35	2002	98219	Toyota	Prius	2010	1893
Toyota	Camry	2002	173610	Honda	Civic	2010	35520
Toyota	RAV4	2002	387434	Hyundai	Elantra	2011	660
Audi	A4	2002	166126				

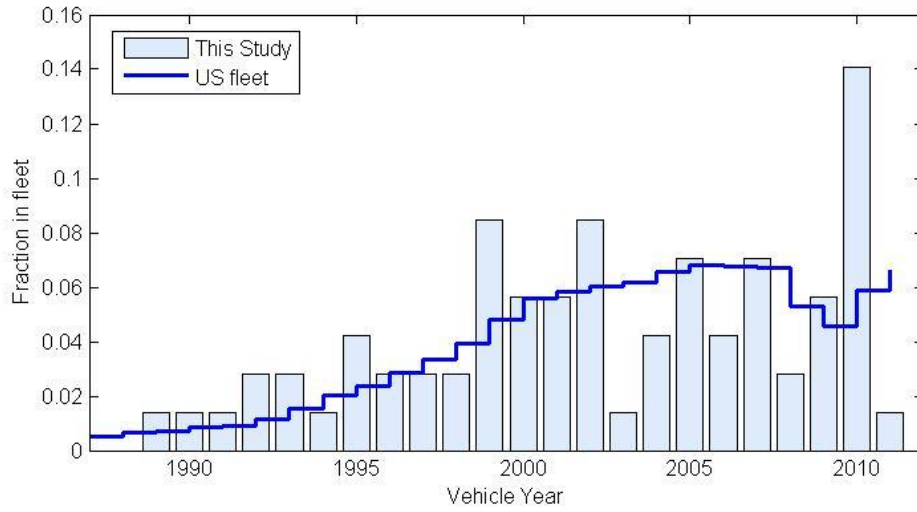
S.2 Instrumentation

Table S: Instruments used for the study.

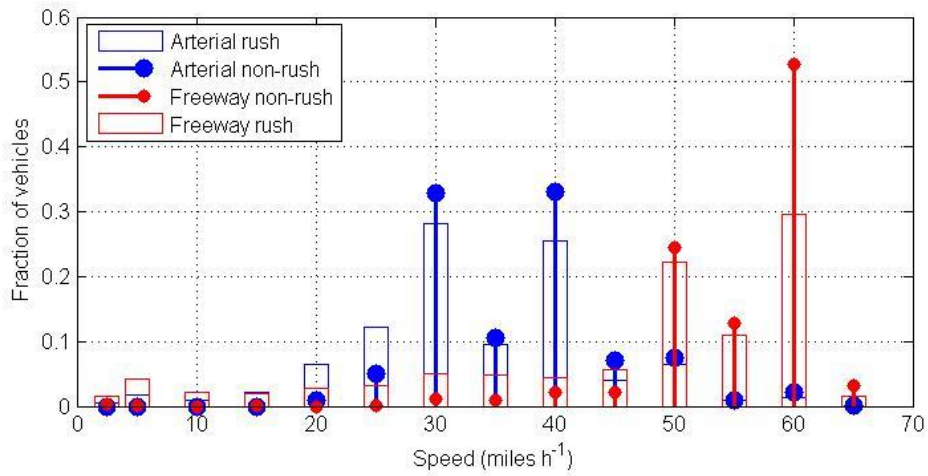
INSTRUMENT				
	Units	TSI Q-TRAK 7565	LICOR LI-820	Garmin GPSMAP 76CSC
Range		0-5000 ppm	0-20000 ppm	
Resolution		1 ppm	0.1 ppm	0.1 mph
Accuracy		±3% of reading or ±50 ppm, whichever is greater	>3% of the reported value	0.05 m/sec
Response Time		20 secs	-	1 sec
Logging Interval	(sec)	10	1	1
Averaging Interval	(sec)	10	10	10
Calibration Frequency		~ 50 hours of operation	Factory Calibration before and after the sampling campaign	-
Time-Sync Frequency		~ < 10 hours of operation	At the beginning of each car tested	-
	Units	CPC 3007		
Range		Size: 0.01 to >1 µm Concentration: 0 to 100,000 particles/cm ³		
Resolution		1 particle/cm ³		
Accuracy		±20%		
Response Time		<9 sec for 95% response		
Logging Interval	(sec)	1 sec		
Averaging Interval	(sec)	10 sec		
Calibration Frequency		Factory calibrated before study		
Time-Sync Frequency		every operation		

S.3 Input Distributions

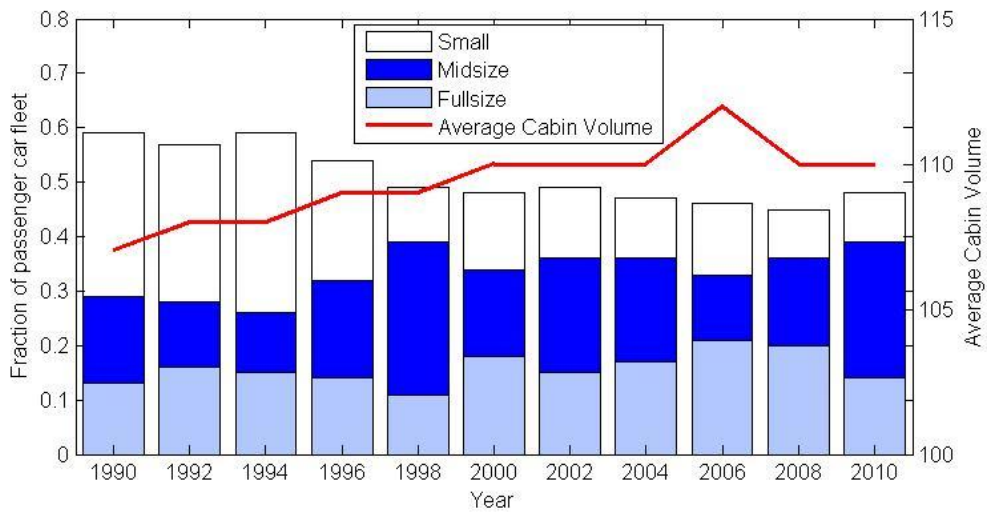
S.3.1 Age Distribution



S.3.2 Speed Distribution



S.3.3 Volume Distribution



S.3.4 Manufacturer Distribution

Table S3: Manufacturer share of the vehicles in operation in U.S.

Manufacturer	% of vehicle currently in operation
Ford	20
GM	28.5
Chrysler	12.8
Toyota	11.8
Honda	8.1
Nissan	5.3
Hyundai	2.9
Other	10.6

S.3.5 Percentile values for distribution of ultrafine particles on roadways

Table S4: Ultrafine Particle Distribution on typical arterial roads and freeways in Los Angeles.

Percentile	Concentration Arterial	Concentration Freeway	Percentile	Concentration Arterial	Concentration Freeway
1	8413	13588	51	24137	65712
2	9548	15798	52	24489	66452
3	10325	18335	53	24850	67433
4	10898	19693	54	25192	68434
5	11238	20901	55	25576	69225
6	11556	22667	56	26031	70155
7	11872	24166	57	26520	70847
8	12114	25737	58	26912	71956
9	12352	27399	59	27320	72858
10	12614	28776	60	27650	74061
11	12855	30112	61	28031	74956
12	13108	31126	62	28359	75883
13	13321	32469	63	28753	76725
14	13521	33765	64	29122	77734
15	13721	34812	65	29578	78603
16	13925	36243	66	30095	79389
17	14142	37011	67	30578	80848
18	14417	38231	68	31151	81901
19	14643	38918	69	31749	83122
20	14889	39797	70	32301	84328
21	15145	40949	71	32860	85513
22	15379	42002	72	33428	86706
23	15636	42955	73	34172	87922
24	15851	44078	74	35050	88696
25	16053	44905	75	35916	89583
26	16257	45860	76	36932	90954
27	16508	46818	77	37911	92421
28	16782	47827	78	38945	93539
29	17068	48335	79	40056	94923
30	17374	49179	80	41447	96623
31	17679	49931	81	42753	99381
32	17954	50735	82	43946	101093
33	18252	51578	83	45529	104252
34	18557	52175	84	47178	106121
35	18848	52740	85	49117	108546
36	19153	53724	86	50846	110485
37	19393	54489	87	52814	113685
38	19649	55103	88	55117	116872
39	19924	55914	89	57896	120734
40	20251	56846	90	60935	124830
41	20615	57569	91	64000	129652
42	20956	58239	92	68773	135339
43	21319	58949	93	74674	142100
44	21677	59889	94	81033	148357
45	22053	60476	95	89025	160278
46	22435	61272	96	100736	176949
47	22805	61984	97	116708	196138
48	23147	62992	98	141988	232624
49	23483	63907	99	181966	285071
50	23788	64816	100	364221	318278

S.4 Model fit and residuals

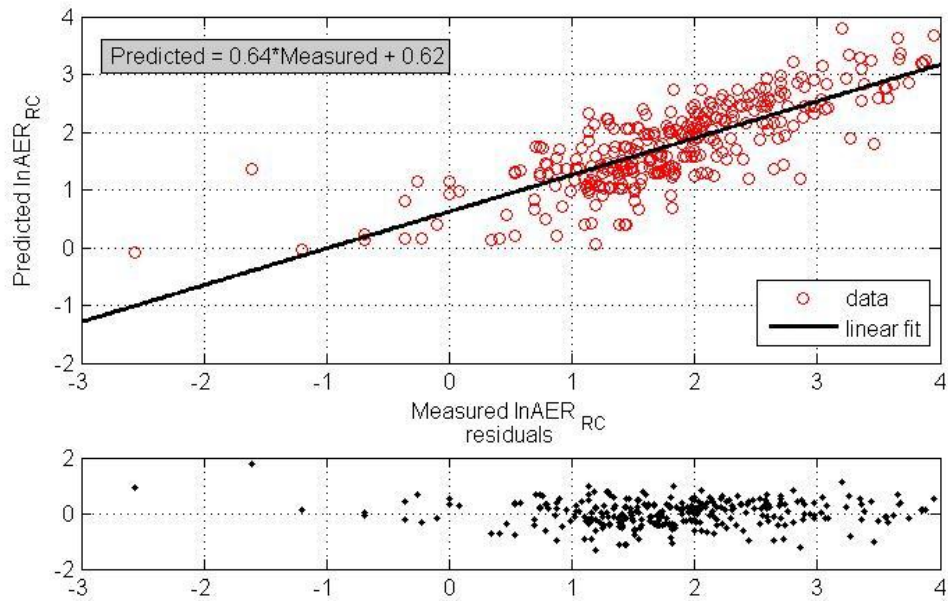


Figure S-1: Model predictions vs. AER measurements under RC conditions

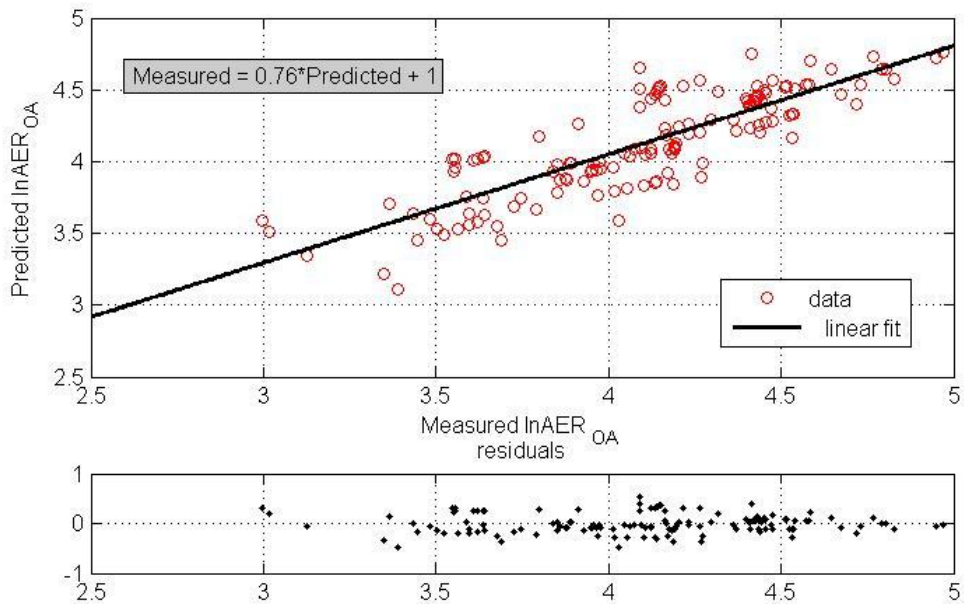


Figure S-2: Model predictions vs. AER measurements under OA conditions

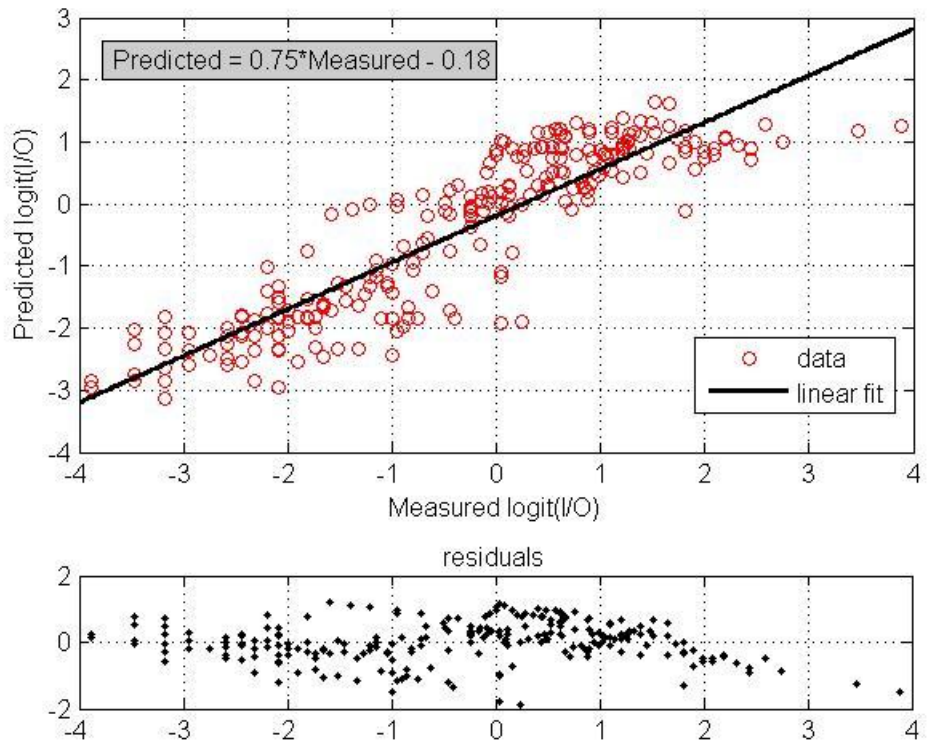


Figure S-3: Model predictions vs. I/O ratio measurements