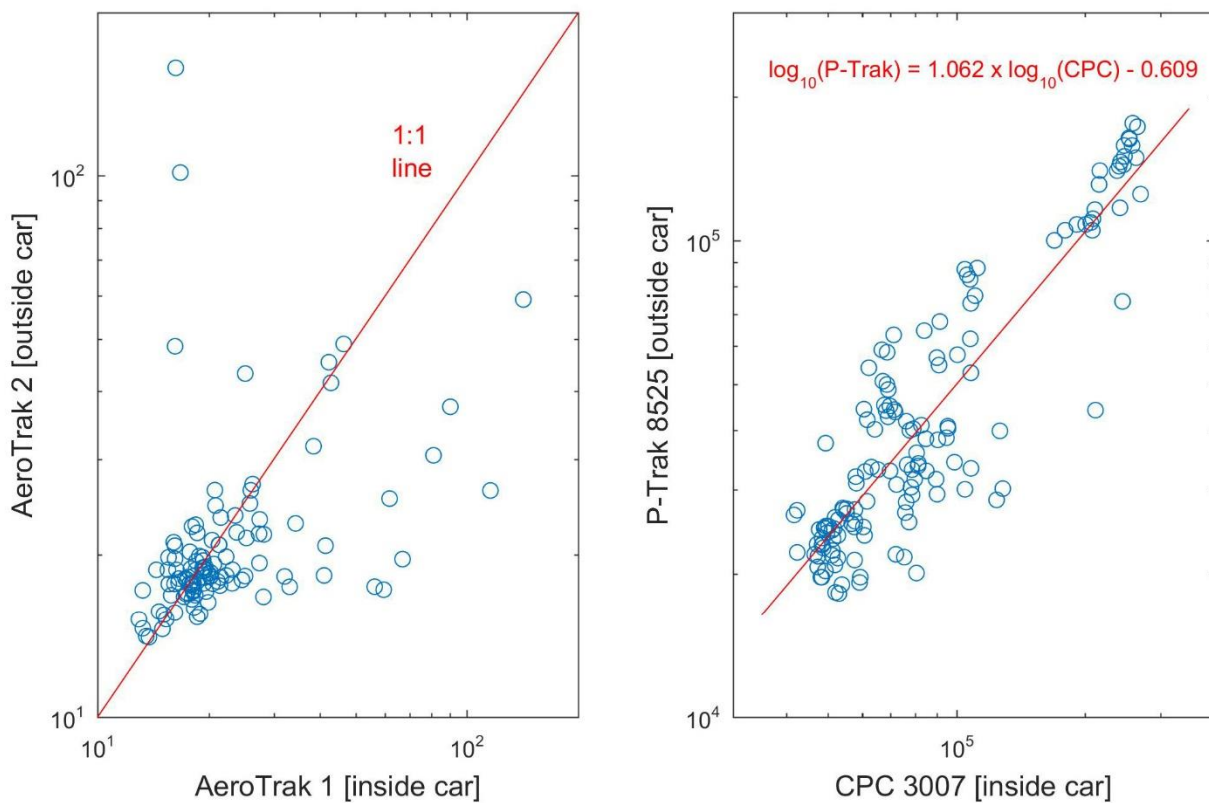


## Supplementary Material

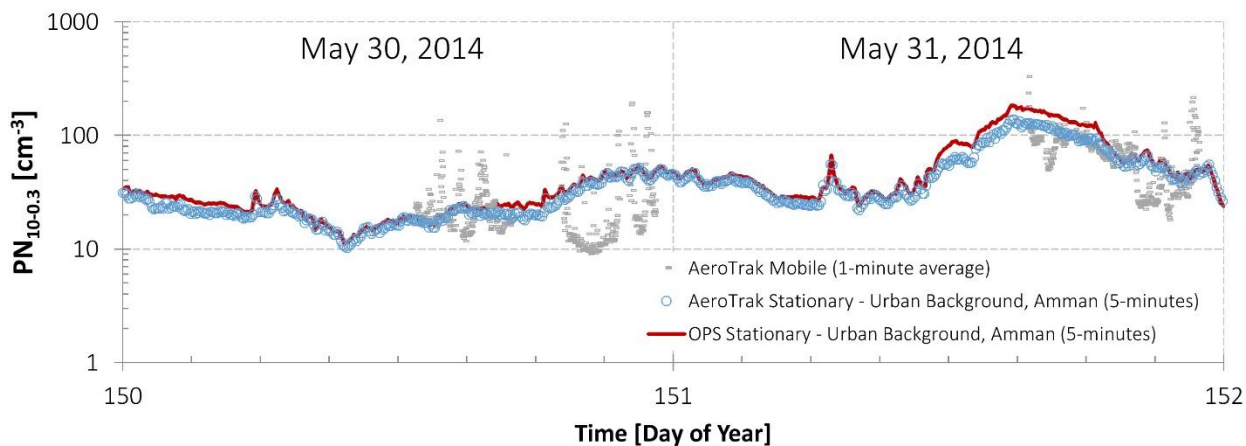
### Mobile Aerosol Measurement in the Eastern Mediterranean – A Utilization of Portable Instruments

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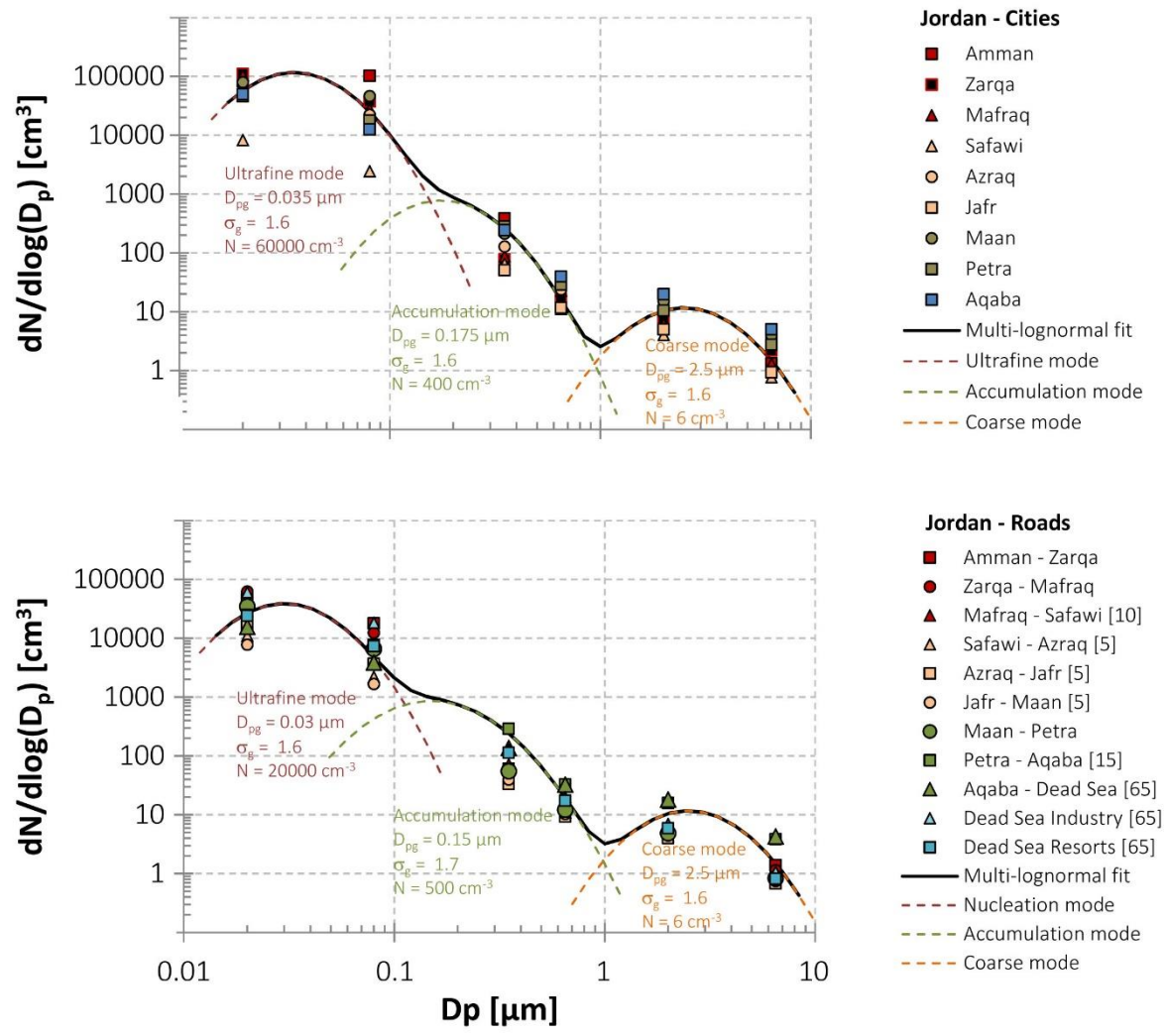


**Fig. S1.** A comparison between the instruments inside the car (CPC 3007 and AeroTrak 1) and the ones outside the car (P-Trak and AeroTrak 2) during a session performed nearby the campus of the University of Jordan. These plots illustrate the reliability of the simple “mobile setup” representing the “outside car” particle number concentrations





**Fig. S3.** Particle number concentrations (diameter range 0.3–10  $\mu\text{m}$ ) measured with the OPS and the AeroTrak at the stationary site (urban background, Amman) and compared to the measured concentrations with an AeroTrak operated on the mobile setup. *Both AeroTrak concentrations were averaged to 1-minute. The number concentrations were calculated by integrating the measured particle number size distribution over the measured particle size range 0.3–10  $\mu\text{m}$ .*



**Fig. S4.** Average particle number size distributions derived from the merge of the three instruments: CPC, P-Trak and AeroTrak: (a) average across cities and (b) average along main roads.

**Table S1.** Particle number concentrations ( $\text{cm}^{-3}$ ) in different size fractions measured across the cities.

	<b>Time Period</b>	<b>Size fraction</b>	<b>Mean</b>	<b>Std</b>	<b>25%</b>	<b>median</b>	<b>75%</b>	<b>#</b>
Zarqa	13:42–14:51	10–25 nm	43748.8	26078.4	26447.0	38818.9	61866.1	67
	May 30	25–300 nm	40502.7	30597.1	21130.8	31203.2	53021.2	63
		300–1000 nm	22.2	18.4	12.8	15.7	25.8	65
		10–1000 nm	82158.1	51003.1	46943.1	72695.5	108108.7	69
		1–10 $\mu\text{m}$	4.1	1.4	3.1	3.7	4.6	65
		2.5–10 $\mu\text{m}$	1.3	0.7	0.9	1.1	1.5	65
Mafraq	15:13–15:29	10–25 nm	41337.5	24451.0	22274.2	32853.0	63869.1	16
	May 30	25–300 nm	29819.8	17566.4	13989.6	27908.9	39326.8	16
		300–1000 nm	26.1	10.2	20.8	23.3	25.7	16
		10–1000 nm	71186.7	41084.7	36501.7	62389.9	104048.6	16
		1–10 $\mu\text{m}$	3.3	0.4	3.0	3.1	3.4	16
		2.5–10 $\mu\text{m}$	0.8	0.1	0.7	0.7	0.8	16
Safawi	16:30–16:44	10–25 nm	3304.1	3557.3	1325.2	1863.4	3397.0	15
	May 30	25–300 nm	2626.6	2876.3	1563.5	1793.1	2482.2	15
		300–1000 nm	17.8	12.7	14.4	14.6	14.8	15
		10–1000 nm	5950.6	6256.2	2890.4	3575.2	5945.2	15
		1–10 $\mu\text{m}$	2.1	0.3	1.9	2.0	2.1	15
		2.5–10 $\mu\text{m}$	0.5	0.1	0.4	0.4	0.5	15
Azraq	17:16–19:21	10–25 nm	29379.0	23212.8	11731.1	23168.1	37864.1	28
	May 30	25–300 nm	23916.6	19608.0	9086.3	15596.4	41318.2	20
		300–1000 nm	35.6	30.0	13.8	23.6	47.2	21
		10–1000 nm	58108.5	39521.3	23395.0	50140.8	81989.9	29
		1–10 $\mu\text{m}$	6.5	6.8	2.9	4.0	8.0	21
		2.5–10 $\mu\text{m}$	2.2	2.9	0.6	0.9	3.3	21
Jafr	20:56–21:16	10–25 nm	18778.6	24935.6	2955.5	12883.0	22471.6	21
	May 30	25–300 nm	13780.2	20958.9	2835.3	7864.4	12878.3	21
		300–1000 nm	14.7	11.0	9.7	10.4	13.6	21
		10–1000 nm	32576.1	44584.4	5857.5	23515.9	31776.6	21
		1–10 $\mu\text{m}$	2.6	1.0	2.1	2.2	2.6	21
		2.5–10 $\mu\text{m}$	0.6	0.4	0.4	0.5	0.5	21
Ma'an	21:27–22:12	10–25 nm	31561.0	28369.8	14221.3	16378.6	46350.9	38
	May 30	25–300 nm	50087.3	39426.4	21448.4	42005.8	70777.8	21
		300–1000 nm	57.8	41.0	25.2	40.4	82.4	21
		10–1000 nm	61135.3	57075.5	24810.7	29613.0	95564.6	41
		1–10 $\mu\text{m}$	8.4	11.6	3.5	4.4	6.6	21
		2.5–10 $\mu\text{m}$	2.4	3.4	0.9	1.2	2.1	21
Petra	22:35–23:10	10–25 nm	18289.6	15307.3	5226.5	14551.9	25386.9	66
	May 30	25–300 nm	19268.2	19614.5	5039.1	12042.7	26658.8	66
		15:20–15:51	300–1000 nm	71.3	55.0	22.7	78.3	96.4
	May 31	10–1000 nm	37845.4	33965.0	10425.9	27806.9	56000.8	66
		1–10 $\mu\text{m}$	5.8	2.9	3.3	4.8	8.3	66
		2.5–10 $\mu\text{m}$	1.7	0.9	0.8	1.4	2.5	66
Aqaba	17:43–19:06	10–25 nm	19808.1	17971.7	7235.4	14082.3	28011.4	84
	May 31	25–300 nm	13554.8	12298.7	4866.9	9237.7	20024.6	84
		300–1000 nm	66.3	16.7	55.2	63.2	71.8	84
		10–1000 nm	33440.3	29080.2	11844.8	23847.1	46031.7	84

		1–10 $\mu\text{m}$	10.9	1.9	9.7	10.6	11.7	84
		2.5–10 $\mu\text{m}$	3.0	0.8	2.5	2.9	3.2	84
Amman	22:24–23:17	10–25 nm	32961.9	32741.1	26956.3	35083.4	51227.5	54
	May 31	25–300 nm	110790.1	63374.2	63735.5	120240.4	143980.4	27
		300–1000 nm	95.5	48.5	59.6	87.2	121.7	27
		10–1000 nm	119728.5	57298.8	64790.5	116380.2	173566.8	54
		1–10 $\mu\text{m}$	4.1	0.8	3.4	4.1	4.5	27
		2.5–10 $\mu\text{m}$	0.8	0.2	0.6	0.8	0.9	27

**Table S2.** Particle number concentrations ( $\text{cm}^{-3}$ ) in different size fractions measured over the main roads.

Road Section	Time Period	Size fraction	Mean	Std	25%	median	75%	#
Amman–Zarqa	13:11–13:40	10–25 nm	18588.0	12824.0	9429.1	15032.3	19131.7	28
		May 30	25–300 nm	19285.4	11701.8	11363.9	16271.4	20832.7
		300–1000 nm	17.2	4.5	14.3	15.0	18.8	28
		10–1000 nm	37893.5	24185.9	21615.9	32853.3	38819.1	28
		1–10 $\mu\text{m}$	2.9	0.4	2.6	2.8	3.2	28
		2.5–10 $\mu\text{m}$	0.8	0.3	0.7	0.7	1.0	28
Zarqa–Mafraq	14:52–15:11	10–25 nm	24734.6	7330.5	20979.2	23133.2	27733.3	20
		May 30	25–300 nm	13381.6	2671.0	12339.2	14019.7	15131.1
		300–1000 nm	11.5	1.4	10.5	11.0	12.7	20
		10–1000 nm	38130.5	9562.6	32724.1	37350.5	42409.7	20
		1–10 $\mu\text{m}$	2.7	0.2	2.6	2.7	2.8	20
		2.5–10 $\mu\text{m}$	0.7	0.1	0.6	0.7	0.7	20
Mafraq–Safawi	15:34–16:29	10–25 nm	11666.3	9606.1	3934.9	7903.6	18012.1	56
		May 30	25–300 nm	7823.5	6669.8	2954.4	5794.6	11253.4
		300–1000 nm	21.3	10.7	13.0	18.9	25.1	56
		10–1000 nm	19513.9	15426.9	6891.3	14348.1	28826.5	56
		1–10 $\mu\text{m}$	2.6	0.5	2.2	2.6	3.0	56
		2.5–10 $\mu\text{m}$	0.6	0.2	0.5	0.6	0.7	56
Safawi–Azraq	16:45–17:15	10–25 nm	4383.4	5244.6	1177.2	1783.8	6225.1	31
		May 30	25–300 nm	2367.3	1671.3	1348.1	1474.4	3562.8
		300–1000 nm	15.4	1.6	14.6	15.0	15.8	10
		10–1000 nm	7099.7	7502.5	2495.6	3350.6	9293.1	31
		1–10 $\mu\text{m}$	2.3	0.2	2.1	2.3	2.4	10
		2.5–10 $\mu\text{m}$	0.6	0.1	0.5	0.6	0.6	10
Azraq–Jafr	19:22–20:55	10–25 nm	6462.2	7319.5	2008.8	3040.7	8233.7	94
		May 30	25–300 nm	4003.6	5103.8	1115.7	2785.7	4667.0
		300–1000 nm	10.2	6.0	8.1	8.9	9.7	94
		10–1000 nm	10478.0	11823.8	3059.4	5761.4	14908.7	94
		1–10 $\mu\text{m}$	2.0	0.3	1.8	2.0	2.2	94
		2.5–10 $\mu\text{m}$	0.4	0.1	0.3	0.4	0.4	94
Jafr–Ma'an	21:17–21:26	10–25 nm	3096.0	3170.6	911.4	1729.8	3938.6	10
		May 30	25–300 nm	1811.1	1579.0	652.5	1247.0	1911.7
		300–1000 nm	11.9	1.8	10.1	11.7	13.6	10
		10–1000 nm	4921.2	4721.2	1575.7	2968.1	5821.4	10
		1–10 $\mu\text{m}$	2.2	0.2	2.1	2.3	2.3	10
		2.5–10 $\mu\text{m}$	0.4	0.0	0.4	0.4	0.5	10
Ma'an–Petra	22:13–22:34	10–25 nm	13823.1	15201.1	2860.8	7453.1	18649.8	22
		May 30	25–300 nm	7158.2	10383.4	2196.4	3724.8	6362.2
		300–1000 nm	15.9	6.7	12.7	14.5	16.2	22
		10–1000 nm	20999.7	24469.0	5332.2	11337.3	30096.0	22
		1–10 $\mu\text{m}$	2.4	0.5	2.1	2.3	2.5	22
		2.5–10 $\mu\text{m}$	0.5	0.1	0.4	0.5	0.6	22
Petra–Aqaba	15:52–17:03	10–25 nm	9885.0	12359.8	1779.9	4394.0	14766.0	66
		May 31	25–300 nm	8307.1	9477.0	2896.1	4118.1	10482.6
		300–1000 nm	73.9	18.7	57.5	78.2	85.1	62

		10–1000 nm	17963.1	20053.0	4594.3	9671.7	26007.6	66
		1–10 $\mu\text{m}$	8.7	1.0	7.9	8.8	9.1	62
		2.5–10 $\mu\text{m}$	2.3	0.4	2.1	2.2	2.4	62
Aqaba–Dead Sea	19:07–20:58	10–25 nm	6195.2	9862.8	1562.4	2176.8	5822.5	110
	May 31	25–300 nm	4163.0	5007.8	2080.9	2419.1	3855.7	110
		300–1000 nm	39.9	17.3	22.9	39.5	54.3	110
		10–1000 nm	10408.0	14462.2	3756.8	4652.0	9577.7	110
		1–10 $\mu\text{m}$	9.8	8.5	3.2	8.5	12.4	110
		2.5–10 $\mu\text{m}$	2.6	2.6	0.6	2.1	3.6	110
Dead Sea Industry	20:59 -21:54	10–25 nm	23987.9	22303.5	7170.9	17342.5	30133.4	56
	May 31	25–300 nm	19745.8	24243.5	5092.5	9642.6	22249.6	56
		300–1000 nm	34.2	19.5	23.2	27.2	39.2	56
		10–1000 nm	43771.3	44023.9	12292.1	28427.1	55247.1	56
		1–10 $\mu\text{m}$	3.4	0.9	2.9	3.2	3.8	56
		2.5–10 $\mu\text{m}$	0.6	0.3	0.5	0.6	0.7	56
Dead Sea Resorts	21:55–22:23	10–25 nm	9596.3	11208.5	3565.3	5834.1	11521.1	29
	May 31	25–300 nm	7941.2	7863.9	4001.9	5017.7	7357.9	29
		300–1000 nm	30.5	4.5	27.2	28.9	32.9	29
		10–1000 nm	17570.9	18591.3	7459.1	11976.1	17148.5	29
		1–10 $\mu\text{m}$	2.8	0.3	2.6	2.7	3.0	29
		2.5–10 $\mu\text{m}$	0.5	0.1	0.4	0.5	0.5	29



**Table S3.** Particulate mass and black carbon concentrations ( $\mu\text{g}/\text{m}^3$ ) in different size fractions measured across the cities.

	<b>Time Period</b>	<b>Size fraction</b>	<b>Mean</b>	<b>Std</b>	<b>25%</b>	<b>median</b>	<b>75%</b>	<b>#</b>
Zarqa	13:42–14:51	PM <sub>1</sub>	46.1	27.1	31.5	36.7	53.3	67
		PM <sub>2.5</sub>	49.8	27.9	34.4	40.3	57.3	67
	May 30	PM <sub>10</sub>	94.3	53.7	60.9	77.0	108.9	67
		PM <sub>10-2.5</sub>	44.5	32.1	27.7	35.8	50.8	67
		PM <sub>10-1</sub>	48.1	33.2	31.5	39.7	54.2	67
		BC	12.3	27.1	1.1	2.3	9.3	69
Mafraq	15:13–15:29	PM <sub>1</sub>	34.7	13.7	27.0	29.8	34.9	16
		PM <sub>2.5</sub>	37.9	14.3	30.0	32.9	38.1	16
	May 30	PM <sub>10</sub>	57.9	19.6	45.9	51.3	63.2	16
		PM <sub>10-2.5</sub>	20.1	6.3	15.8	17.5	23.3	16
		PM <sub>10-1</sub>	23.2	6.9	18.5	20.6	27.0	16
		BC	6.2	13.7	1.9	3.2	8.4	15
Safawi	16:30–16:44	PM <sub>1</sub>	18.2	8.1	15.7	16.0	16.5	15
		PM <sub>2.5</sub>	20.0	8.5	17.3	17.7	18.4	15
	May 30	PM <sub>10</sub>	29.3	10.7	24.2	26.5	28.4	15
		PM <sub>10-2.5</sub>	9.3	2.7	7.2	8.8	10.1	15
		PM <sub>10-1</sub>	11.2	3.0	8.9	10.3	12.0	15
		BC	3.4	8.1	0.2	0.3	1.0	10
Azraq	17:16–19:21	PM <sub>1</sub>	83.8	83.4	18.1	56.7	104.9	31
		PM <sub>2.5</sub>	88.9	85.9	20.8	60.7	112.4	31
	May 30	PM <sub>10</sub>	145.0	131.3	36.3	106.7	197.7	31
		PM <sub>10-2.5</sub>	56.2	68.1	13.2	21.7	80.9	31
		PM <sub>10-1</sub>	61.2	71.7	15.4	25.0	87.5	31
		BC	31.4	83.4	0.6	8.9	50.6	39
Jafr	20:56–21:16	PM <sub>1</sub>	8.4	7.7	4.6	5.7	8.8	21
		PM <sub>2.5</sub>	10.3	8.4	6.5	7.0	10.3	21
	May 30	PM <sub>10</sub>	18.8	16.6	11.6	13.5	16.6	21
		PM <sub>10-2.5</sub>	8.5	8.4	5.5	6.0	7.0	21
		PM <sub>10-1</sub>	10.4	9.0	7.2	7.5	8.8	21
		BC	1.9	7.7	0.3	0.5	4.6	10
Ma'an	21:27–22:12	PM <sub>1</sub>	51.1	81.1	23.3	30.7	50.2	46
		PM <sub>2.5</sub>	55.8	88.7	26.0	33.7	53.2	46
	May 30	PM <sub>10</sub>	111.7	169.8	52.2	74.9	93.8	46
		PM <sub>10-2.5</sub>	55.9	82.1	26.7	35.4	49.5	46
		PM <sub>10-1</sub>	60.6	89.6	29.3	38.8	52.5	46
		BC	11.7	81.1	1.5	1.9	7.8	46
Petra	22:35–23:10	PM <sub>1</sub>	52.5	52.8	17.2	57.3	68.2	66
		PM <sub>2.5</sub>	57.1	54.2	19.5	63.4	75.3	66
	May 30	PM <sub>10</sub>	97.8	74.8	40.0	101.7	138.0	66
		PM <sub>10-2.5</sub>	40.7	26.1	18.8	35.8	60.3	66
		PM <sub>10-1</sub>	45.3	28.4	21.0	39.0	67.2	66
		BC	4.3	52.8	1.2	1.7	4.2	64
Aqaba	17:43–19:06	PM1	86.7	22.2	74.5	84.0	93.9	84
		PM2.5	96.4	23.7	83.8	93.9	103.9	84
	May 31	PM10	177.9	64.9	141.3	173.0	191.2	84

		PM10-2.5	81.5	42.4	55.7	78.7	89.8	84
		PM10-1	91.2	44.0	64.6	88.5	100.1	84
		BC	4.8	22.2	1.7	2.4	3.8	82
Amman	22:24-23:17	PM <sub>1</sub>	65.5	43.1	40.0	50.7	74.2	54
	May 31	PM <sub>2.5</sub>	68.8	43.2	43.2	54.5	78.2	54
		PM <sub>10</sub>	87.3	42.7	60.7	76.3	95.5	54
		PM <sub>10-2.5</sub>	18.5	8.3	12.3	16.9	24.0	54
		PM <sub>10-1</sub>	21.8	8.7	15.3	20.2	27.5	54
		BC	21.3	43.1	2.6	9.8	26.2	54

**Table S4.** Particulate mass and black carbon concentrations ( $\mu\text{g}/\text{m}^3$ ) in different size fractions measured over the main roads.

Road Section	Time Period	Size fraction	Mean	Std	25%	median	75%	#
Amman–Zarqa	13:11–13:40	PM <sub>1</sub>	24.5	7.8	18.3	23.1	28.2	28
		PM <sub>2.5</sub>	27.2	8.1	20.8	25.7	31.6	28
	May 30	PM <sub>10</sub>	51.3	22.6	35.8	44.1	59.4	28
		PM <sub>10-2.5</sub>	24.1	15.0	14.0	18.9	28.3	28
		PM <sub>10-1</sub>	26.8	15.4	16.5	21.3	31.4	28
		BC	2.3	7.8	0.7	0.9	3.0	28
Zarqa–Mafraq	14:52–15:11	PM <sub>1</sub>	22.9	2.4	21.4	21.9	25.0	20
		PM <sub>2.5</sub>	25.5	2.5	23.8	24.6	27.7	20
	May 30	PM <sub>10</sub>	41.9	6.2	37.3	40.2	44.2	20
		PM <sub>10-2.5</sub>	16.4	4.0	13.8	15.4	17.3	20
		PM <sub>10-1</sub>	19.0	4.0	16.3	18.0	20.1	20
		BC	1.6	2.4	0.7	0.9	1.7	20
Mafraq–Safawi	15:34–16:29	PM <sub>1</sub>	24.8	8.9	17.6	22.1	29.8	56
		PM <sub>2.5</sub>	27.3	9.3	19.8	24.4	33.1	56
	May 30	PM <sub>10</sub>	42.6	14.6	29.8	39.0	52.7	56
		PM <sub>10-2.5</sub>	15.3	6.3	10.3	14.7	18.8	56
		PM <sub>10-1</sub>	17.8	6.7	12.3	17.1	21.4	56
		BC	1.7	8.9	0.4	0.8	1.8	56
Safawi–Azraq	16:45–17:15	PM <sub>1</sub>	18.1	4.3	14.6	16.3	21.0	31
		PM <sub>2.5</sub>	20.1	4.5	16.6	18.2	23.3	31
	May 30	PM <sub>10</sub>	31.0	10.8	23.0	28.0	35.8	31
		PM <sub>10-2.5</sub>	10.9	6.6	6.4	8.3	14.4	31
		PM <sub>10-1</sub>	12.9	6.8	8.2	10.2	16.4	31
		BC	2.2	4.3	0.8	1.4	2.5	23
Azraq–Jafr	19:22–20:55	PM <sub>1</sub>	7.4	7.1	4.7	5.6	8.2	94
		PM <sub>2.5</sub>	9.0	7.2	6.2	7.0	10.0	94
	May 30	PM <sub>10</sub>	16.2	10.1	11.5	13.5	17.2	94
		PM <sub>10-2.5</sub>	7.3	4.7	5.3	6.3	7.2	94
		PM <sub>10-1</sub>	8.9	4.9	6.7	7.7	9.0	94
		BC	1.7	7.1	0.4	0.5	0.9	78
Jafr–Ma’an	21:17–21:26	PM <sub>1</sub>	5.7	1.0	4.5	6.2	6.3	10
		PM <sub>2.5</sub>	7.4	1.0	6.3	7.9	8.2	10
	May 30	PM <sub>10</sub>	13.4	2.0	11.0	14.2	15.2	10
		PM <sub>10-2.5</sub>	6.0	1.1	5.2	6.1	6.8	10
		PM <sub>10-1</sub>	7.7	1.2	6.7	7.8	8.7	10
		BC	0.5	1.0	0.3	0.3	0.5	5
Ma’an–Petra	22:13–22:34	PM <sub>1</sub>	9.0	5.9	5.8	7.4	9.0	22
		PM <sub>2.5</sub>	10.9	6.2	7.7	9.2	11.0	22
	May 30	PM <sub>10</sub>	20.3	10.0	14.7	17.1	20.2	22
		PM <sub>10-2.5</sub>	9.4	4.3	6.8	8.2	9.2	22
		PM <sub>10-1</sub>	11.3	4.7	8.5	10.2	11.2	22
		BC	2.0	5.9	0.2	0.4	1.2	19
Petra–Aqaba	15:52–17:03	PM <sub>1</sub>	54.1	15.5	44.5	53.6	58.3	66
		PM <sub>2.5</sub>	60.5	16.4	50.5	60.1	65.2	66
	May 31	PM <sub>10</sub>	97.7	34.9	78.8	91.3	103.5	66

		PM <sub>10-2.5</sub>	37.2	20.3	25.2	33.1	39.8	66
		PM <sub>10-1</sub>	43.6	21.2	31.2	39.7	46.5	66
		BC	2.9	15.5	1.3	1.7	2.5	63
Aqaba–Dead Sea	19:07–20:58	PM <sub>1</sub>	54.0	38.2	19.7	53.9	78.0	110
	May 31	PM <sub>2.5</sub>	61.9	45.2	21.8	61.2	86.7	110
		PM <sub>10</sub>	113.4	101.1	29.3	97.4	163.7	110
		PM <sub>10-2.5</sub>	51.4	56.5	7.0	36.6	75.5	110
		PM <sub>10-1</sub>	59.4	63.6	9.3	43.6	84.3	110
		BC	1.0	38.2	0.3	0.7	1.0	108
Dead Sea Industry	20:59 -21:54	PM <sub>1</sub>	29.4	16.3	21.4	24.6	30.3	56
	May 31	PM <sub>2.5</sub>	31.8	16.9	23.3	26.8	33.0	56
		PM <sub>10</sub>	42.6	24.7	28.7	35.8	44.2	56
		PM <sub>10-2.5</sub>	10.8	10.9	5.5	8.8	12.4	56
		PM <sub>10-1</sub>	13.2	11.6	7.4	11.0	15.1	56
		BC	5.4	16.3	0.3	0.6	1.8	50
Dead Sea Resorts	21:55–22:23	PM <sub>1</sub>	24.5	3.9	21.8	23.8	26.0	29
	May 31	PM <sub>2.5</sub>	26.5	4.0	23.6	26.2	28.0	29
		PM <sub>10</sub>	32.7	6.6	28.3	31.7	34.7	29
		PM <sub>10-2.5</sub>	6.3	2.9	4.3	5.0	7.2	29
		PM <sub>10-1</sub>	8.3	3.1	6.2	7.0	9.1	29
		BC	1.3	3.9	0.6	0.7	1.4	29