Wintertime Particulate Pollution Episodes in an Urban Valley of the Western U.S.: A Case Study

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Supplement Information

Table S-0. Organic marker compounds measured by thermal-desorption-gas chromatography-mass spectrometry (TD-GC-MS), total organic carbon (TOC), and ion chromatography-pulsed amperometric detection (IC-PAD) analyses.

Group	Mnemonic	Chemical Species	Analytical Method[a]
Polycyclic Aromatic Hydrocarbons (PAHs)	acnapy	acenapthene	TD-GC-MS
	acnape	acenaphthylene	TD-GC-MS
	fluore	fluorene	TD-GC-MS
	phenan	phenanthrene	TD-GC-MS
	anthra	anthracene	TD-GC-MS
	fluora	fluoranthene	TD-GC-MS
	pyrene	pyrene	TD-GC-MS
	baanth	benzo[a]anthracene	TD-GC-MS
	chrysn	chrysene	TD-GC-MS
	bbfl	benzo(b)fluoranthene	TD-GC-MS
	bjkfl	benzo(j,k)fluoranthene	TD-GC-MS
	bbjkfl	bbfl + bjkfl	TD-GC-MS
	bafl	benzo[a]fluoranthene	TD-GC-MS
	bepyrn	benzo[e]pyrene	TD-GC-MS
	bapyrn	benzo[a]pyrene	TD-GC-MS
	peryle	perylene	TD-GC-MS
	retene	retene	TD-GC-MS
	incdpy	indeno[1,2,3-cd]pyrene	TD-GC-MS
	dbanth	dibenzo[a,h]anthracene	TD-GC-MS
	bghipe	benzo[ghi]perylene	TD-GC-MS
	corone	coronene	TD-GC-MS
	dbaepy	dibenzo(a,e)pyrene	TD-GC-MS
	fl9one	9-fluorenone	TD-GC-MS
	m_9ant	9 methyl anthracene	TD-GC-MS
	m_13fl	2-methylfluoranthene	TD-GC-MS
	cp_cdpyr	cyclopenta(c,d)pyrene	TD-GC-MS
	baa7_12	benz[a]anthracene-7,12-dione	TD-GC-MS
	chry56m	methyl chrysene	TD-GC-MS
	pic	picene	TD-GC-MS
Hopanes & Steranes	hop13	18α(H),21β(H)-22,29,30-trisnorhopane	TD-GC-MS
	hop15	17α(H),21β(H)-22,29,30-trisnorhopane	TD-GC-MS
	hop17	17α(H),21β(H)-30-norhopane	TD-GC-MS
	hop15a	17ß (H),21α(H)-22,29,30-norhopane	TD-GC-MS
	hop17a	17β(H),21α(H)-30-norhopane	TD-GC-MS
	hop19	17α(H),21β(H)-hopane	TD-GC-MS
	hop19a	17α(H),21α(H)-hopane	TD-GC-MS
	hop20	17β(H),21α(H)-hopane	TD-GC-MS
	hop21	22S-17α(H),21β(H)-30-homohopane	TD-GC-MS
	hop22	22R-17α(H),21β(H)-30-homohopane	TD-GC-MS
	hop24	22S-17α(H),21β(H)-30,31-bishomohopane	TD-GC-MS
	hop25	22R-17α(H),21β(H)-30,31-bishomohopane	TD-GC-MS
	hop26	22S-17α(H),21β(H)-30,31,32-trisomohopane	TD-GC-MS
	hop27	22R-17α(H),21β(H)-30,31,32-trishomohopane	TD-GC-MS
	hop28	22S-tretrahomohopane	TD-GC-MS
	hop29	22R-tetrashomohopane	TD-GC-MS
	hop30	22S-pentashomohopane	TD-GC-MS
	hop31	22R-pentashomohopane	TD-GC-MS
	ster1	ααα 20S-cholestane	TD-GC-MS
	ster2	αββ 20R-cholestane	TD-GC-MS
	ster3	αββ 20S-cholestane	TD-GC-MS
	ster4	ααα 20R-cholestane	TD-GC-MS
	ster5	ααα 20S 24S-methylcholestane	TD-GC-MS

Table S-0 (continued)

Group	Mnemonic	Chemical Species	Analytical Method[a]
Hopanes & Steranes, continued	ster6	αββ 20R 24S-methylcholestane	TD-GC-MS
	ster7	αββ 20S 24S-methylcholestane	TD-GC-MS
	ster8	ααα 20R 24R-methylcholestane	TD-GC-MS
	ster9	ααα 20R,24S- methylcholestane	TD-GC-MS
	ster10	αββ 20R 24R-ethylcholestane	TD-GC-MS
	ster11	αββ 20S 24R-ethylcholestane	TD-GC-MS
	ster12	ααα 20S 24R/S-ethylcholestane	TD-GC-MS
n-Alkanes	pentad	n-pentadecane	TD-GC-MS
	hexad	n-hexadecane	TD-GC-MS
	heptad	n-heptadecane	TD-GC-MS
	octad	n-octadecane	TD-GC-MS
	nonad	n-nonadecane	TD-GC-MS
	eicosa	n-eicosane	TD-GC-MS
	heneic	n-heneicosane	TD-GC-MS
	docosa	n-docosane	TD-GC-MS
	tricosa	n-tricosane	TD-GC-MS
	tetcos	n-tetracosane	TD-GC-MS
	pencos	n-pentacosane	TD-GC-MS
	hexcos	n-hexacosane	TD-GC-MS
	hepcos	n-heptacosane	TD-GC-MS
	octcos	n-octacosane	TD-GC-MS
	noncos	n-nonacosane	TD-GC-MS
	tricont	n-triacontane	TD-GC-MS
	htricont	n-hentriacontane	TD-GC-MS
	dtricont	n-dotriacontane	TD-GC-MS
	ttricont	n-tritriacontane	TD-GC-MS
	tetricont	n-tetratriacontane	TD-GC-MS
	ptricont	n-pentatriacontane	TD-GC-MS
	hxtricont	n-hexatriacontane	TD-GC-MS
	hptricont	n-heptatriacontane	TD-GC-MS
	otricont	n-octatriacontane	TD-GC-MS
	ntricont	n-nonatriacontane	TD-GC-MS
	tetracont	n-tetracontane	TD-GC-MS
Branched Alkanes	isoc29	iso-nonacosane	TD-GC-MS
	anteisoc29	anteiso-nonacosane	TD-GC-MS
	isoc30	iso-triacontane	TD-GC-MS
	anteisoc30	anteiso-triacontane	TD-GC-MS
	isoc31	iso-hentriacotane	TD-GC-MS
	anteisoc31	anteiso-hentriacotane	TD-GC-MS
	isoc32	iso-dotriacontane	TD-GC-MS
	anteisoc32	anteiso-dotriacontane	TD-GC-MS
	isoc33	iso-tritriactotane	TD-GC-MS
	anteisoc33	anteiso-tritriactotane	TD-GC-MS
	nonad2m	2-methylnonadecane	TD-GC-MS
	nonad3m	3-methylnonadecane	TD-GC-MS
	prist	pristane	TD-GC-MS
	phytan	phytane	TD-GC-MS
	squal	squalane	TD-GC-MS
Cycloalkane	chexa8	n-octylcyclohexane	TD-GC-MS
	chex10	n-decylcyclohexane	TD-GC-MS
	chex13	n-tridecylcyclohexane	TD-GC-MS
	chex17	n-heptadecylcyclohexane	TD-GC-MS
	chex19	n-nonadecylcyclohexane	TD-GC-MS
Alkenes	octdecen	1-octadecene	TD-GC-MS
Water Soluble Organics	npoc	water soluble organic carbon (WSOC)	TOC
	levg	levoglucosan	IC-PAD

[a] TD-GC-MS: thermal desorption-gas chromatography-mass spectrometry; TOC: total organic carbon; IC-PAD: ion chromatography-pulsed amperometric detection.

Table S-1. Average of $PM_{2.5}$ mass and chemical concentrations (μg/m^3) and their signal-to-noise ratio (SNR). (Shaded species were selected for EV-CMB modeling.)

	Site/Network	Central Reno Site (CSN)			
	Sampling Period	12/03/09 – 01/29/10			
	No. of Samples	20[a]			
Group	**Chemical Species**	**Number of Valid Data**	**Concentration Range (μg/m^3)**	**Average[a] Concentration (μg/m^3)**	**SNR[c]**
Mass	$PM_{2.5}$	20	1.9 - 52	17	19
Elements	Na	20	0 - 0.15	0.042	3.8
	Mg	20	0 - 0.0087	0.00083	0.39
	Al	20	0.0087 - 0.17	0.044	5.6
	Si	20	0.026 - 0.51	0.13	11
	P	20	0 - 0	0	0
	S	20	0.015 - 0.48	0.14	14
	Cl	20	0.00093 - 0.45	0.072	14
	K	20	0.014 - 0.23	0.083	14
	Ca	20	0.0041 - 0.13	0.038	12
	Ti	20	0 - 0.023	0.0051	4
	V	20	0 - 0.003	0.00063	1
	Cr	20	0 - 0.017	0.0018	4.6
	Mn	20	0 - 0.014	0.0019	4.4
	Fe	20	0.02 - 0.27	0.097	13
	Co	20	0 - 0.0017	0.0003	0.83
	Ni	20	0 - 0.0021	0.00063	1.7
	Cu	20	0 - 0.011	0.0033	3.1
	Zn	20	0 - 0.037	0.012	9.3
	As	20	0 - 0.0018	0.00026	0.63
	Se	20	0 - 0.00083	0.000097	0.26
	Br	20	0 - 0.0076	0.0023	2.8
	Rb	20	0 - 0.0013	0.0002	0.51
	Sr	20	0 - 0.0023	0.00069	0.29
	Zr	20	0 - 0.0049	0.00086	0.18
	Ag	20	0 - 0.0023	0.00026	0.078
	Cd	20	0 - 0.016	0.0016	0.35
	In	20	0 - 0.012	0.0014	0.22
	Sn	20	0 - 0.023	0.0029	0.48
	Sb	20	0 - 0.013	0.0011	0.14
	Ba	20	0 - 0.01	0.0017	0.51
	Pb	20	0 - 0.0068	0.0018	1.4
Water Soluble Ions	NO_3^-	20	0.18 - 11	4	14
	SO_4^+	20	0.049 - 1.2	0.36	13
	NH_4^+	19	0.085 - 3.7	1.2	14
	Na^+	20	0.022 - 0.26	0.086	1.7
	K^{+a}	18	0 - 0.18	0.072	13
Thermal Carbon Fractions[d]	OC1	20	0.21 - 5.4	1.3	25
	OC2	20	0.16 - 3	1	17
	OC3	20	0.25 - 3.3	1.3	21
	OC4	20	0.12 - 1.1	0.63	20
	OPR	20	0 - 4.6	0.68	34
	OCR	20	0.8 - 17	5	46
	EC1	20	0.27 - 8.4	2.4	33
	EC2	20	0.022 - 0.09	0.047	7.7
	EC3	20	0 - 0.011	0.00057	7.8
	ECR	20	0.23 - 4	1.8	20

Table S-1 (continued)

	Site/Network	Reno (CSN)			
	Period	12/3/09 – 1/29/10			
	# of Samples	20[a]			
Group	**Species[b]**	**# of Valid Data**	**Range**	**Average[a] Concentration (μg/m^3)**	**SNR[c]**
Polycyclic Aromatic Hydrocarbons	Acnapy × 10^3	20	0 - 0.6	0.035	0.47
	acnape × 10^3	20	0 - 0	0	0
	fluore × 10^3	20	0 - 0.011	0.00053	0.087
	phenan × 10^3	20	0 - 0.69	0.069	2.8
	anthra × 10^3	20	0 - 0.22	0.011	0.19
	fluora × 10^3	20	0 - 2.3	0.3	13
	pyrene × 10^3	20	0 - 2.7	0.38	17
	baanth × 10^3	20	0.043 - 2.4	0.46	20
	chrysn × 10^3	20	0 - 2.1	0.45	18
	bbfl × 10^3	20	0.13 - 1.6	0.5	20
	bjkfl × 10^3	20	0.075 - 1.5	0.43	20
	bbjkfl × 10^3	20	0.22 - 3.1	0.93	28
	bafl × 10^3	20	0 - 0.69	0.18	10
	bepyrn × 10^3	20	0.068 - 1.3	0.39	20
	bapyrn × 10^3	20	0.094 - 2.1	0.6	20
	peryle × 10^3	20	0 - 0.42	0.049	0.97
	retene × 10^3	20	0.15 - 13	1.7	20
	incdpy × 10^3	20	0.033 - 1.6	0.39	20
	dbanth × 10^3	20	0 - 0.21	0.048	11
	bghipe × 10^3	20	0.036 - 1.6	0.45	20
	corone × 10^3	20	0 - 0.43	0.12	19
	dbaepy × 10^3	20	0 - 0.31	0.07	20
	fl9one × 10^3	20	0 - 0.5	0.051	2.5
	m_9ant × 10^3	20	0 - 0	0	0
	m_13fl × 10^3	20	0 - 0.47	0.05	5.9
	cp_cdpyr × 10^3	20	0 - 8.5	2.3	11
	baa7_12 × 10^3	20	0.015 - 0.59	0.16	20
	chry56m × 10^3	20	0 - 0.23	0.041	3.3
	pic × 10^3	20	0 - 0.19	0.029	2.2
Hopanes & Steranes	hop13 × 10^3	20	0.0066 - 0.16	0.052	20
	hop15 × 10^3	20	0.0094 - 0.2	0.066	20
	hop17 × 10^3	20	0.018 - 0.51	0.19	20
	hop15a × 10^3	20	0.0019 - 0.091	0.03	20
	hop17a × 10^3	20	0.0014 - 0.099	0.03	20
	hop19 × 10^3	20	0.012 - 0.46	0.16	20
	hop19a × 10^3	20	0 - 0.024	0.0093	5.5
	hop20 × 10^3	20	0 - 0.06	0.02	17
	hop21 × 10^3	20	0.0064 - 0.23	0.082	20
	hop22 × 10^3	20	0.0082 - 0.27	0.093	20
	hop24 × 10^3	20	0 - 0.14	0.05	14
	hop25 × 10^3	20	0 - 0.095	0.032	17
	hop26 × 10^3	20	0.003 - 0.073	0.027	20
	hop27 × 10^3	20	0.004 - 0.075	0.026	20
	hop28 × 10^3	20	-0.0027 - 0.063	0.02	20
	hop29 × 10^3	20	-0.0022 - 0.042	0.014	20
	hop30 × 10^3	20	-0.0037 - 0.077	0.023	20
	hop31 × 10^3	20	-0.0036 - 0.045	0.015	18
	ster1 × 10^3	20	0.0032 - 0.13	0.047	20
	ster2 × 10^3	20	0.0038 - 0.093	0.033	20
	ster3 × 10^3	20	0.0037 - 0.079	0.027	20
	ster4 × 10^3	20	0.0053 - 0.11	0.041	20
	ster5 × 10^3	20	0.0016 - 0.13	0.034	20
	ster6 × 10^3	20	0.0031 - 0.079	0.027	20
	ster7 × 10^3	20	0.0033 - 0.093	0.03	20
	ster8 × 10^3	20	0.0038 - 0.1	0.033	20

Table S-1 (continued)

	Site/Network	Reno (CSN)			
	Period	12/3/09 – 1/29/10			
	# of Samples	20[a]			
Group	**Species[b]**	**# of Valid Data**	**Range**	**Average[a] Concentration ($\mu g/m^3$)**	**SNR[c]**
Hopanes & Steranes, continued	ster9 × 10^3	20	0.0025 - 0.06	0.017	20
	ster10 × 10^3	20	0.0036 - 0.12	0.036	20
	ster11 × 10^3	20	0.0082 - 0.18	0.063	20
	ster12 × 10^3	20	0.02 - 0.54	0.21	20
Water Soluble Organics	npoc × 10^3	18	230 - 7000	1900	10
	levg × 10^3[a]	18	93 - 1300	430	16
n-Alkanes	pentad × 10^3	20	0 - 0.34	0.041	0.44
	hexad × 10^3	20	0 - 0.56	0.052	0.53
	heptad × 10^3	20	0 - 0.94	0.17	1.2
	octad × 10^3	20	0 - 1	0.22	1.6
	nonad × 10^3	20	0 - 2.6	0.37	2.4
	eicosa × 10^3	20	0.23 - 8	0.92	20
	heneic × 10^3	20	0.25 - 9.6	1.2	20
	docosa × 10^3	20	0.22 - 6.9	1.2	20
	tricosa × 10^3	20	0.32 - 5.8	1.3	20
	tetcos × 10^3	20	0.33 - 5.1	1.6	20
	pencos × 10^3	20	0.11 - 5.2	1.6	20
	hexcos × 10^3	20	0.23 - 3.3	1.2	20
	hepcos × 10^3	20	0.4 - 4.6	1.5	20
	octcos × 10^3	20	0.2 - 3.2	1	20
	noncos × 10^3	20	0.17 - 4.2	1.3	20
	tricont × 10^3	20	0.15 - 2.1	0.77	20
	htricont × 10^3	20	0.5 - 3.6	1.6	20
	dtricont × 10^3	20	0 - 2	0.76	15
	ttricont × 10^3	20	0.53 - 3.2	1.4	20
	tetricont × 10^3	20	0.28 - 2.4	1	20
	ptricont × 10^3	20	0.6 - 3	1.3	20
	hxtricont × 10^3	20	0.63 - 2.5	1.1	20
	hptricont × 10^3	20	0 - 0	0	0
	otricont × 10^3	20	0 - 0	0	0
	ntricont × 10^3	20	0 - 0	0	0
	tetracont × 10^3	20	0 - 0	0	0
Branched Alkanes	isoc29 × 10^3	20	0 - 0.36	0.13	5.6
	anteisoc29 × 10^3	20	0 - 0.29	0.071	2.6
	isoc30 × 10^3	20	0 - 0.37	0.075	1.7
	anteisoc30 × 10^3	20	0.13 - 0.85	0.39	20
	isoc31 × 10^3	20	0.28 - 1.1	0.57	20
	anteisoc31 × 10^3	20	0 - 0.63	0.22	4.5
	isoc32 × 10^3	20	0 - 0.83	0.37	7.8
	anteisoc32 × 10^3	20	0.39 - 1.3	0.72	20
	isoc33 × 10^3	20	0.34 - 1	0.6	20
	anteisoc33 × 10^3	20	0.14 - 0.74	0.31	20
	nonad2m × 10^3	20	0 - 0.26	0.06	7.3
	nonad3m × 10^3	20	0 - 0.37	0.055	8
	prist × 10^3	20	0 - 0.38	0.048	0.71
	phytan × 10^3	20	0 - 0.63	0.094	1.5
	squal × 10^3	20	0 - 0.18	0.05	16
Cycloalkane	chexa8 × 10^3	20	0 - 0.017	0.00086	0.11
	chex10 × 10^3	20	0 - 0	0	0
	chex13 × 10^3	20	0 - 0.074	0.011	0.92
	chex17 × 10^3	20	0.019 - 0.3	0.075	20
	chex19 × 10^3	20	0 - 0.32	0.092	15
Alkenes	octdecen × 10^3	20	0 - 1.1	0.24	3.4

Table S-1 (continued)

	Site/Network	Reno (CSN)			
	Period	12/3/09 – 1/29/10			
	# of Samples	20[a]			
Group	**Species**	**# of Valid Data**	**Range**	**Average[a] Concentration (μg/m^3)**	**SNR[c]**
Absorption (Mm^{-1})	b_{abs} (370 nm)	20	5.5 - 86	39	20
	b_{abs} (880 nm)	20	1.8 - 50	19	20

[a] Average of 20 samples except for 18 samples for K^+ and levg.
[b] See Table S-0 for organic species names.
[c] Signal-to-noise ratio (SNR) is calculated by $\sqrt{\sum_i C_i^2 / \sum_i \sigma_i^2}$ where C_i and σ_i are value and uncertainty of each measurement.
[d] OC and EC were measured by the IMPROVE_A TOR protocol (Chow et al., 2007; 2011) where OC1–OC4 are the organic carbon evolved at 140, 280, 480, and 580 °C, respectively, in a 100% He atmosphere; EC1–EC3 are the elemental carbon evolved at 580, 740, and 840 °C, respectively, in a 98% He/2% O_2 atmosphere; OPR is pyrolyzed OC; OCR is OC by reflectance (OC1+OC2+OC3+OC4+OPR); and ECR is EC by reflectance (EC1+EC2+EC3-OPR). It is assumed that the analytical uncertainties are similar to those reported by the IMPROVE program for the urban Phoenix site (PHOE1) for the same sampling period. The uncertainty of each RENO_C carbon measurement was assigned as the uncertainty of PHOE1 measurement with the closest concentration level.

Table S-2. Source profiles assembled for EV-CMB receptor modeling. (Shaded entries designate profiles included in the final source apportionment.)

Category	Subcategory	Mnemonic	Year	Location	Description	Reference
Geological	Paved Road Dust	TahoeNRD	2003	Lake Tahoe	Resuspension soil dust ($PM_{2.5}$) from Village Lakeshore	(Kuhns et al., 2004)
		TahoeSRD	2003	Lake Tahoe	Resuspension soil dust ($PM_{2.5}$) from Mays/Southwood	
		GPVRDC	1995	Las Vegas	Composite of 7 paved road dust samples	(Green et al., 2004)
		FDPVRD	1997	Central California	Composite of 2 paved road dust samples from San Joaquin Valley	(Chow et al., 2003)
		RNOPVRD	2010	Reno	Paved road dust samples collected along the two north lanes of the S 12th Ave, a well-traveled road a few blocks south of Anderson school near the Reno site (301 State Street)	This study
	Unpaved Road Dust & Surface Soil	GUPRDC	1995	Las Vegas	Composite of 2 unpaved road dust samples	(Green et al., 2004)
		FDUNPVRD	1997	Central California	Composite of 2 unpaved road dust samples from San Joaquin Valley	(Chow et al., 2003)
		GSOILC	1995	Las Vegas	Composite of 5 desert soil samples	(Green et al., 2004)
		RNOSOIL	2010	Reno	Mixture of surface soil from bare ground vacant lot along the east side of Anderson School near the Reno site (301 State Street)	This study
	Construction	CONST	1997	Central California	Composite of 2 construction & earthmoving dust profiles	(Chow et al., 2003)
	Asian Dust	AD_IMPRO	2001	California and Oregon	Composite of 3 IMPROVE samples (4/29/1998 at CRLA1 and LAVO1 and 4/16/2001 at LAVO1) representing Asian dust impact	This study
	De-Icing Agents	RNOSalt1	2010	Reno, NV	Reno de-icing material from Public Works stockpile. 5:1 mixture of rock salt and Paiute Pit granite sand	This study
		RNOSalt2	2010	Reno, NV	Reno de-icing material from Public Works stockpile. 5:1 mixture of rock salt and Paiute Pit granite sand	This study
Mobile	Diesel Exhaust	LVOnRD	2003	Las Vegas	On-road diesel exhaust, a composite	(Green et al., 2004)
		LVOffRD	2003	Las Vegas	Off-road diesel exhaust, a composite	
		DIESEL	2001	Southern California	Composite of medium and heavy duty diesel vehicles	(Fujita et al., 2007a; 2007b)
	Gasoline Exhaust	LVOnRSW	2003	Las Vegas	Onroad gasoline vehicle exhaust at Swenson	(Green et al., 2004)
		GAS	2001	Southern California	Composite of low and high gasoline emitters	(Fujita et al., 2007a; 2007b)
Biomass Burning	Residential Wood Combustion	CRBURN_H	2001	Northern Nevada	California hardwood (oak, cedar, almond) combustion in a fireplace	(Fitz et al., 2004)
		CRBURN_S	2001	Northern Nevada	California softwood (pine, tamarack) combustion in a fireplace	
		LTFP_H	2004	Lake Tahoe	Residential hardwood combustion in a fireplace	(Kuhns et al., 2004)
		LTFP_S	2004	Lake Tahoe	Residential softwood combustion in a fireplace	
		LTWS_H	2004	Lake Tahoe	Residential hardwood combustion in a woodstove	
		LTWS_S	2004	Lake Tahoe	Residential softwood combustion in a woodstove	
Coal Combustion	Coal-Fired Power Plant	MZPPC	1995	Northern Colorado	Composite of ten coal-fired boiler emission samples	(Watson et al., 2001)
		BVCFPP	1999	Texas	Composite of 26 profiles of stack emissions from coal-fired boilers in Texas.	(Chow et al., 2004)
Oil Combustion	Oil-Fired Plant	IMGPEC	1992	Southern California Border	Composite of six Mexicali oil-fueled glass plant emission profiles collected on 12/17/92.	(Watson and Chow, 2001)
		BVCAT1	1999	Texas	Composite of 5 profiles of stack emissions from a Texas petroleum refinery's catalytic cracker	(Chow et al., 2004)
Cement	Cement Factory	BVCEM	1999	Texas	Composite of 11 profiles of cement kiln emissions	(Chow et al., 2004)

Table S-2 (continued)

Category	Subcategory	Mnemonic	Year	Location	Description	Reference
Cooking	Meat Cooking	BVCOOK	2000	Southern California	Composite of charcoal chicken, propane chicken, and charcoal hamburger cooking profiles.	(Chow et al., 2004)
Secondary	Secondary Bisulfate	AMBSUL			Ammonium bisulfate	(Watson et al., 1994)
	Secondary Sulfate	AMSUL			Ammonium sulfate	
	Secondary Nitrate	AMNIT			Ammonium nitrate	
	Secondary OC	SOC			Secondary organic carbon	

Table S-3. $PM_{2.5}$ source profile abundances (in % of $PM_{2.5}$ mass) for the four geological materials collected in this study. See profile descriptions in Table S-2.

Group	Species	RNOPVRD	RNOSOIL	RNOSalt1	RNOSalt2
Mass	$PM_{2.5}$	100 ± 7.3	100 ± 7.6	100 ± 7.4	100 ± 7.8
Elements	Na	0 ± 0.41	0 ± 0.55	2.7 ± 0.28	3.3 ± 0.81
	Mg	0 ± 0.14	0 ± 0.18	0 ± 0.038	0 ± 0.21
	Al	4.4 ± 0.32	4.1 ± 0.3	5.1 ± 0.38	3.6 ± 0.28
	Si	18 ± 1.3	16 ± 1.1	15 ± 1.1	10 ± 0.78
	P	0.044 ± 0.0058	0 ± 0.0061	0 ± 0.0013	0 ± 0.0071
	S	0.45 ± 0.033	0.37 ± 0.028	0.96 ± 0.071	1.8 ± 0.13
	Cl	0.091 ± 0.0081	0.081 ± 0.0087	9.7 ± 0.72	12 ± 0.89
	K	1.3 ± 0.094	0.86 ± 0.064	1.4 ± 0.1	2.1 ± 0.16
	Ca	2.9 ± 0.21	7.5 ± 0.55	3.6 ± 0.26	2 ± 0.15
	Ti	0.53 ± 0.039	0.23 ± 0.019	0.37 ± 0.028	0.23 ± 0.021
	V	0.014 ± 0.0047	0.013 ± 0.0061	0.011 ± 0.0015	0.019 ± 0.0072
	Cr	0.029 ± 0.005	0.1 ± 0.0097	0.1 ± 0.0076	1.8 ± 0.13
	Mn	0.094 ± 0.016	0.11 ± 0.021	0.12 ± 0.01	0.25 ± 0.03
	Fe	5 ± 0.36	3.8 ± 0.28	5.2 ± 0.38	10 ± 0.78
	Co	0 ± 0.0046	0.0058 ± 0.0061	0 ± 0.0013	0 ± 0.0071
	Ni	0.012 ± 0.013	0.033 ± 0.018	0.042 ± 0.0049	0.71 ± 0.058
	Cu	0.021 ± 0.017	0.017 ± 0.022	0.01 ± 0.0047	0.12 ± 0.027
	Zn	0.083 ± 0.0077	0.012 ± 0.0061	0.011 ± 0.0015	0.034 ± 0.006
	As	0 ± 0.0046	0 ± 0.0061	0 ± 0.0013	0 ± 0.0071
	Se	0 ± 0.0046	0 ± 0.0061	0 ± 0.0013	0 ± 0.0071
	Br	0 ± 0.0046	0 ± 0.0061	0.0046 ± 0.0013	0.075 ± 0.0093
	Rb	0.0005 ± 0.0046	0.002 ± 0.0061	0.0061 ± 0.0014	0.0003 ± 0.0071
	Sr	0.044 ± 0.0056	0.048 ± 0.007	0.054 ± 0.0042	0.034 ± 0.0075
	Zr	0 ± 0.0075	0.0037 ± 0.0099	0.017 ± 0.0025	0.03 ± 0.012
	Ag	0 ± 0.011	0 ± 0.014	0 ± 0.0029	0.0025 ± 0.016
	Cd	0.0045 ± 0.013	0.014 ± 0.018	0 ± 0.0037	0 ± 0.021
	In	0.0094 ± 0.014	0.0086 ± 0.019	0.0018 ± 0.004	0 ± 0.022
	Sn	0 ± 0.014	0 ± 0.019	0.0028 ± 0.004	0 ± 0.022
	Sb	0 ± 0.023	0 ± 0.03	0.0038 ± 0.0063	0 ± 0.035
	Ba	0.016 ± 0.053	0.023 ± 0.071	0 ± 0.015	0.073 ± 0.083
	Pb	0.0086 ± 0.0051	0 ± 0.0067	0.0055 ± 0.0015	0 ± 0.0078
Water Soluble Ions	NO_3^-	0.12 ± 0.12	0.12 ± 0.16	0.022 ± 0.034	0.28 ± 0.19
	SO_4^+	0.037 ± 0.12	0.31 ± 0.16	2.8 ± 0.2	4.9 ± 0.41
	NH_4^+	0.068 ± 0.12	0 ± 0.16	0 ± 0.034	0 ± 0.19
	Na^+	0.19 ± 0.12	0.2 ± 0.16	7.1 ± 0.52	11 ± 0.88
	K^+	0.23 ± 0.12	0 ± 0.16	0.16 ± 0.036	0.99 ± 0.2
Thermal Carbon Fractions (IMPROVE_A protocol, Chow et al., 2007b)	OC1	0.43 ± 0.031	0.45 ± 0.033	0 ± 0	0.27 ± 0.02
	OC2	1.2 ± 0.088	0.8 ± 0.059	0.086 ± 0.0062	1 ± 0.075
	OC3	7.5 ± 0.54	2.4 ± 0.18	0.65 ± 0.047	1.8 ± 0.13
	OC4	4.1 ± 0.3	1.9 ± 0.14	0.37 ± 0.027	0.42 ± 0.031
	OPR	1.6 ± 0.12	0.4 ± 0.03	0.014 ± 0.001	0 ± 0
	OCR	15 ± 1.7	5.9 ± 1.2	1.1 ± 0.24	3.4 ± 1.2
	EC1	2.1 ± 0.15	0.4 ± 0.03	0.014 ± 0.001	0 ± 0
	EC2	0.8 ± 0.058	0.26 ± 0.019	0 ± 0	0 ± 0
	EC3	0 ± 0	0 ± 0	0 ± 0	0 ± 0
	ECR	1.3 ± 0.2	0.26 ± 0.23	0 ± 0.049	0 ± 0.27

Table S-3 (continued).

Group	Species[a]	RNOPVRD	RNOSOIL	RNOSalt1	RNOSalt2
Polycyclic Aromatic Hydrocarbons (PAHs)	Acnapy $\times 10^3$	0 ± 76	0 ± 97	0 ± 21	0 ± 110
	acnape $\times 10^3$	0 ± 22	0 ± 29	0 ± 6.2	0 ± 33
	fluore $\times 10^3$	0 ± 6.5	0 ± 8.3	0 ± 1.8	0 ± 9.4
	phenan $\times 10^3$	0 ± 18	0 ± 23	0 ± 4.9	0 ± 26
	anthra $\times 10^3$	0 ± 62	0 ± 80	0 ± 17	0 ± 90
	fluora $\times 10^3$	0 ± 18	0 ± 23	0 ± 4.9	0 ± 26
	pyrene $\times 10^3$	0 ± 17	0 ± 22	0 ± 4.7	0 ± 25
	baanth $\times 10^3$	0 ± 8.3	0 ± 11	0 ± 2.3	0 ± 12
	chrysn $\times 10^3$	0 ± 15	0 ± 19	0 ± 4.1	0 ± 22
	bbfl $\times 10^3$	0 ± 8.6	0 ± 11	0 ± 2.4	0 ± 12
	bjkfl $\times 10^3$	0 ± 17	0 ± 22	0 ± 4.7	0 ± 25
	bbjkfl $\times 10^3$	0 ± 19	0 ± 25	0 ± 5.3	0 ± 28
	bafl $\times 10^3$	0 ± 15	0 ± 19	0 ± 4.2	0 ± 22
	bepyrn $\times 10^3$	0 ± 7.8	0 ± 10	0 ± 2.1	0 ± 11
	bapyrn $\times 10^3$	0 ± 17	0 ± 22	0 ± 4.6	0 ± 24
	peryle $\times 10^3$	0 ± 35	0 ± 45	0 ± 9.6	0 ± 51
	retene $\times 10^3$	0 ± 8.4	0 ± 11	0.23 ± 0.35	0 ± 12
	incdpy $\times 10^3$	0 ± 6.2	0 ± 7.9	0 ± 1.7	0 ± 9
	dbanth $\times 10^3$	0 ± 3.7	0 ± 4.7	0 ± 1	0 ± 5.3
	bghipe $\times 10^3$	0 ± 11	0 ± 14	0 ± 2.9	0 ± 15
	corone $\times 10^3$	0 ± 6.2	0 ± 7.9	0 ± 1.7	0 ± 8.9
	dbaepy $\times 10^3$	0 ± 1.7	0 ± 2.1	0 ± 0.46	0 ± 2.4
	fl9one $\times 10^3$	0 ± 15	0 ± 19	0 ± 4	0 ± 21
	m_9ant $\times 10^3$	0 ± 270	0 ± 350	0 ± 74	0 ± 390
	m_13fl $\times 10^3$	0 ± 6.6	0 ± 8.5	0 ± 1.8	0 ± 9.6
	cp_cdpyr $\times 10^3$	0 ± 170	0 ± 220	0 ± 47	0 ± 250
	baa7_12 $\times 10^3$	0 ± 6.8	0 ± 8.8	0.44 ± 0.45	0 ± 9.9
	chry56m $\times 10^3$	0 ± 7.6	0 ± 9.7	0 ± 2.1	0 ± 11
	pic $\times 10^3$	0 ± 7.9	0 ± 10	0 ± 2.2	0 ± 11
Hopanes & Steranes	hop13 $\times 10^3$	0.19 ± 0.56	0.088 ± 0.68	0.018 ± 0.14	0.13 ± 0.77
	hop15 $\times 10^3$	0.33 ± 0.62	0.17 ± 0.7	0 ± 0.32	0 ± 1.7
	hop17 $\times 10^3$	0.81 ± 0.9	0.43 ± 0.71	0.027 ± 0.13	0 ± 1.7
	hop15a $\times 10^3$	0.22 ± 0.77	0.15 ± 0.96	0 ± 0.25	0 ± 1.3
	hop17a $\times 10^3$	0 ± 1.3	0.1 ± 1.3	0.019 ± 0.28	0 ± 1.8
	hop19 $\times 10^3$	1.2 ± 1.4	0.54 ± 1.2	0 ± 0.52	0 ± 2.7
	hop19a $\times 10^3$	0.12 ± 0.67	0 ± 1.4	0 ± 0.3	0 ± 1.6
	hop20 $\times 10^3$	0.18 ± 0.55	0.065 ± 0.67	0 ± 0.22	0 ± 1.2
	hop21 $\times 10^3$	0.47 ± 0.97	0.26 ± 1.1	0 ± 0.27	0 ± 1.4
	hop22 $\times 10^3$	0.54 ± 0.92	0.32 ± 1	0 ± 0.23	0 ± 1.2
	hop24 $\times 10^3$	0.3 ± 0.51	0 ± 3.3	0 ± 0.72	0 ± 3.8
	hop25 $\times 10^3$	0.3 ± 0.67	0.18 ± 0.8	0 ± 0.39	0 ± 2.1
	hop26 $\times 10^3$	0.25 ± 0.52	0.14 ± 0.61	0 ± 0.13	0 ± 0.67
	hop27 $\times 10^3$	0.25 ± 0.76	0.096 ± 0.92	0 ± 0.2	0 ± 1
	hop28 $\times 10^3$	0.2 ± 0.6	0.13 ± 0.74	0 ± 0.16	0 ± 0.83
	hop30 $\times 10^3$	0.24 ± 0.77	0.19 ± 0.95	0 ± 0.2	0 ± 1.1
	hop31 $\times 10^3$	0.15 ± 3	0.18 ± 1.8	0 ± 0.39	0 ± 2.1
	ster1 $\times 10^3$	0.25 ± 0.59	0.092 ± 0.69	0 ± 0.22	0.077 ± 0.78
	ster2 $\times 10^3$	0.12 ± 0.54	0.052 ± 0.67	0 ± 0.14	0 ± 0.76
	ster3 $\times 10^3$	0.11 ± 0.81	0.04 ± 1	0 ± 0.14	0 ± 0.76
	ster4 $\times 10^3$	0.32 ± 1	0.041 ± 1.2	0 ± 0.1	0 ± 0.54
	ster5 $\times 10^3$	0.17 ± 0.73	0.06 ± 0.91	0 ± 0.1	0 ± 0.53
	ster6 $\times 10^3$	0.17 ± 0.63	0.043 ± 0.78	0 ± 0.13	0 ± 0.68
	ster7 $\times 10^3$	0.23 ± 0.36	0.065 ± 0.36	0 ± 0.12	0 ± 0.66
	ster8 $\times 10^3$	0.22 ± 0.89	0.051 ± 1.1	0 ± 0.047	0 ± 0.25
	ster9 $\times 10^3$	0.031 ± 0.52	0.061 ± 0.67	0 ± 0.047	0 ± 0.25
	ster10 $\times 10^3$	0.12 ± 1.7	0.053 ± 2.1	0 ± 0.11	0 ± 0.58
	ster11 $\times 10^3$	0.13 ± 1.4	0.05 ± 1.7	0 ± 0.086	0 ± 0.46
	ster12 $\times 10^3$	0.4 ± 0.99	0.14 ± 1.2	0 ± 0.23	0 ± 1.2

Table S-3 (continued).

Group	Species[a]	RNOPVRD	RNOSOIL	RNOSalt1	RNOSalt2
Water Soluble Organics	npoc $\times 10^3$	- - -	- - -	- - -	- - -
	levg $\times 10^3$	- - -	- - -	- - -	- - -
n-Alkanes	pentad $\times 10^3$	4.4 ± 5.3	5.5 ± 6.6	0 ± 17	5.3 ± 6.7
	hexad $\times 10^3$	4.7 ± 4.7	7.5 ± 7.2	0 ± 20	6 ± 5.8
	heptad $\times 10^3$	0 ± 89	0 ± 110	0 ± 24	0 ± 130
	octad $\times 10^3$	0 ± 74	0 ± 95	0 ± 20	0 ± 110
	nonad $\times 10^3$	0 ± 95	0 ± 120	0 ± 26	0 ± 140
	eicosa $\times 10^3$	0 ± 44	0 ± 57	0 ± 12	0 ± 64
	heneic $\times 10^3$	0 ± 28	0 ± 36	0 ± 7.8	0 ± 41
	docosa $\times 10^3$	0 ± 32	0 ± 41	0 ± 8.9	0 ± 47
	tricosa $\times 10^3$	0 ± 18	0 ± 23	0 ± 4.9	0 ± 26
	tetcos $\times 10^3$	0 ± 19	0 ± 24	0 ± 5.2	0 ± 27
	pencos $\times 10^3$	0.8 ± 1	0 ± 16	0 ± 3.4	0 ± 18
	hexcos $\times 10^3$	0 ± 16	0 ± 20	0 ± 4.3	0 ± 23
	hepcos $\times 10^3$	0 ± 16	0 ± 20	0 ± 4.3	0 ± 23
	octcos $\times 10^3$	0 ± 18	0 ± 23	0 ± 5	0 ± 26
	noncos $\times 10^3$	0 ± 19	0 ± 24	0 ± 5.1	0 ± 27
	tricont $\times 10^3$	0 ± 25	0 ± 32	0 ± 6.9	0 ± 36
	htricont $\times 10^3$	0 ± 32	0 ± 41	0 ± 8.8	0 ± 46
	dtricont $\times 10^3$	0 ± 41	0 ± 52	0 ± 11	0 ± 59
	ttricont $\times 10^3$	2.4 ± 2.3	0 ± 57	0 ± 12	0 ± 64
	tetricont $\times 10^3$	2.8 ± 2.7	0 ± 48	0 ± 10	0 ± 55
	ptricont $\times 10^3$	5.9 ± 5.7	0 ± 63	0 ± 13	0 ± 71
	hxtricont $\times 10^3$	9.4 ± 9.1	0 ± 180	0 ± 39	0 ± 200
	hptricont $\times 10^3$	0 ± 860	0 ± 1100	0 ± 240	0 ± 1300
	otricont $\times 10^3$	0 ± 1300	0 ± 1700	0 ± 360	0 ± 1900
	ntricont $\times 10^3$	0 ± 1100	0 ± 1500	0 ± 310	0 ± 1700
	tetracont $\times 10^3$	0 ± 1200	0 ± 1500	0 ± 330	0 ± 1700
Branched Alkanes	isoc29 $\times 10^3$	0 ± 15	0 ± 19	0 ± 4.1	0 ± 22
	anteisoc29 $\times 10^3$	0 ± 15	0 ± 19	0 ± 4.1	0 ± 22
	isoc30 $\times 10^3$	0 ± 24	0 ± 30	0 ± 6.5	0 ± 34
	anteisoc30 $\times 10^3$	0 ± 24	0 ± 30	0 ± 6.5	0 ± 34
	isoc31 $\times 10^3$	0 ± 32	0 ± 41	0 ± 8.8	0 ± 46
	anteisoc31 $\times 10^3$	0 ± 32	0 ± 41	0 ± 8.8	0 ± 46
	isoc32 $\times 10^3$	0 ± 39	0 ± 50	0 ± 11	0 ± 57
	anteisoc32 $\times 10^3$	0 ± 39	0 ± 50	0 ± 11	0 ± 57
	isoc33 $\times 10^3$	0 ± 44	0 ± 56	0 ± 12	0 ± 63
	anteisoc33 $\times 10^3$	0 ± 44	3.1 ± 2.9	0 ± 12	0 ± 63
	nonad2m $\times 10^3$	0 ± 4.7	0 ± 6	0 ± 1.3	0 ± 6.8
	nonad3m $\times 10^3$	0 ± 3.9	0 ± 5	0 ± 1.1	0 ± 5.7
	prist $\times 10^3$	0 ± 45	3.2 ± 3.9	0 ± 12	0 ± 65
	phytan $\times 10^3$	2.1 ± 2.8	3.2 ± 3.9	0 ± 10	0 ± 54
	squal $\times 10^3$	0 ± 2.5	0 ± 3.3	0 ± 0.7	0 ± 3.7
Group	**Species[a]**	**RNOPVRD**	**RNOSOIL**	**RNOSalt1**	**RNOSalt2**
Cycloalkane	chexa8 $\times 10^3$	0 ± 8.6	0 ± 11	0 ± 2.3	0 ± 12
	chex10 $\times 10^3$	0 ± 9.1	0.76 ± 7.7	0 ± 2.5	0 ± 13
	chex13 $\times 10^3$	0 ± 8.1	0 ± 10	0 ± 2.2	0 ± 12
	chex17 $\times 10^3$	0 ± 2.5	0 ± 3.1	0 ± 0.67	0 ± 3.6
	chex19 $\times 10^3$	0 ± 4.6	0 ± 5.9	0 ± 1.3	0 ± 6.7
Alkenes	octdecen $\times 10^3$	0 ± 46	0 ± 59	0.95 ± 2.7	0 ± 67
Light Transmission	b_{abs} (370 nm)	55 ± 2.8	29 ± 1.5	39 ± 1.9	36 ± 1.8
	b_{abs} (880 nm)	20 ± 1	9.5 ± 0.47	8.3 ± 0.42	21 ± 1.1

[a] See Table S-0 for organic species names.

Table S-4. EV-CMB sensitivity tests for the 1/17/2010 and 1/5/2010 sample. $PM_{2.5}$ source contribution estimates (SCEs ± 1σ) in μg/m^3 and performance measures (i.e., r^2, χ^2, and %MASS) are reported. The best profile combination, marked in bold, were found in Trial V and selected for EV-CMB modeling of all samples.

		RENO_C: 9.08 ± 0.52 μg/m^3; collected on 1/17/2010)						
Source	**Profile[a]**	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**
Geological	RNOPVRD	0.54 ± 0.17	0.56 ± 0.16	0.64 ± 0.12	0.78 ± 0.12	**0.78 ± 0.13**		
	RNOSOIL						0.36 ± 0.13	0.45 ± 0.10
	RNOSALT1							
	RNOSALT2	0.37 ± 0.12	0.37 ± 0.11	0.29 ± 0.09	0.26 ± 0.09	**0.25 ± 0.09**	0.48 ± 0.09	0.43 ± 0.08
Gasoline	GAS	0.64 ± 0.31	0.48 ± 0.25		0.14 ± 0.15	**0.15 ± 0.16**	0.63 ± 0.31	0.32 ± 0.25
	LVOnRGas			0.03 ± 0.01				
Diesel	DIESEL	1.58 ± 0.41	1.36 ± 0.37	0.52 ± 0.28	1.31 ± 0.35	**1.68 ± 0.39**	1.69 ± 0.43	1.67 ± 0.43
	LVOnRDie							
Biomass Burning	CRBURN_H	2.77 ± 0.25	2.50 ± 0.26	1.78 ± 0.29	1.27 ± 0.27	**1.36 ± 0.29**	2.13 ± 0.23	1.31 ± 0.31
	CRBURN_S	-	-	1.80 ± 0.65				
	LTWS_H				2.07 ± 0.82	**2.82 ± 0.89**		2.80 ± 1.01
	LTWS_S						1.19 ± 0.38	
Secondary	AMSUL	0.04 ± 0.09	0.07 ± 0.07	0.15 ± 0.03	0.12 ± 0.06	**0.10 ± 0.07**	0.04 ± 0.09	0.08 ± 0.07
	AMBSUL							
	AMNIT	1.36 ± 0.17	1.36 ± 0.17	1.38 ± 0.17	1.38 ± 0.17	**1.38 ± 0.17**	1.37 ± 0.17	1.38 ± 0.17
	SOC							
Cooking	BVCOOK		1.16 ± 0.57	1.91 ± 0.37	1.57 ± 0.56			
r^2		*0.75*	*0.77*	*0.81*	*0.94*	***0.92***	*0.93*	*0.91*
χ^2		*5.93*	*6.59*	*10.23*	*1.71*	***1.66***	*1.42*	*1.82*
%MASS		*80.4*	*86.5*	*93.6*	*98.0*	***93.9***	*86.9*	*93.0*

[a] See Table S-2 for a short description of each source profile. Profiles not included in a test are left blank. A dash is used to indicate profiles that were included in the test but eliminated by the model (due to negative contributions).

		RENO_C: 39.2 ± 2.0 μg/m^3; collected on 1/5/2010)						
Source	**Profile[a]**	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**
Geological	RNOPVRD	2.09 ± 0.37	2.15 ± 0.35	2.30 ± 0.33	2.27 ± 0.33	**2.22 ± 0.33**		
	RNOSOIL						1.11 ± 0.27	1.14 ± 0.21
	RNOSALT1							
	RNOSALT2	0.93 ± 0.28	0.92 ± 0.27	0.84 ± 0.27	0.95 ± 0.26	**0.98 ± 0.27**	1.60 ± 0.24	1.70 ± 0.23
Gasoline	GAS	0.84 ± 0.48	0.62 ± 0.39		0.00 ± 0.21	**0.01 ± 0.21**	0.87 ± 0.53	0.08 ± 0.24
	LVOnRGas			0.09 ± 0.05				
Diesel	DIESEL	5.36 ± 1.07	3.99 ± 1.02	3.70 ± 0.88	3.82 ± 0.95	**4.99 ± 1.03**	6.02 ± 1.17	4.92 ± 1.07
	LVOnRDie							
Biomass Burning	CRBURN_H	9.90 ± 0.82	8.15 ± 0.78	8.60 ± 0.79	6.17 ± 0.87	**7.94 ± 1.03**	6.94 ± 0.70	7.89 ± 1.07
	CRBURN_S	-	-	-				
	LTWS_H				4.81 ± 1.88	**7.24 ± 2.29**		7.73 ± 2.45
	LTWS_S						3.32 ± 1.01	
Secondary	AMSUL	0.16 ± 0.21	0.24 ± 0.17	0.31 ± 0.14	0.31 ± 0.15	**0.25 ± 0.18**	0.14 ± 0.23	0.21 ± 0.18
	AMBSUL							
	AMNIT	10.68 ± 1.32	10.70 ± 1.32	10.71 ± 1.32	10.72 ± 1.32	**10.71 ± 1.32**	10.71 ± 1.32	10.71 ± 1.32
	SOC							
Cooking	BVCOOK		7.20 ± 1.61	7.66 ± 1.52	7.28 ± 1.60			
r^2		*0.84*	*0.86*	*0.86*	0.96	***0.95***	*0.92*	*0.92*
χ^2		*4.90*	*5.40*	*5.65*	1.39	***1.61***	*2.18*	*2.28*
%MASS		*76.5*	*86.7*	*87.3*	92.8	***87.6***	*78.4*	*87.7*

[a] See Table S-2 for a short description of each source profile. Profiles not included in a test are left blank. A dash is used to indicate profiles that were included in the test but eliminated by the model (due to negative contributions).

Table S-5. MPIN matrix for the 1/17/2010 and 1/5/2010 Trial V sample. High MPIN values (> 0.4) are marked.

	AMSUL	**AMNIT**	**LTWS_H**	**CRBURN_H**	**GAS**	**DIESEL**	**RNOPVRD**	**RNOSalt2**
SPECIES[a]								
NO_3^-	0	1	0	0	0	0	0	0
Na^+	-0.04	0	-0.09	0.01	0.06	0	-0.45	0.64
K^+	0	0	0.05	0.47	-0.05	-0.13	0.02	-0.02
OC	-0.04	0	0.71	0.09	-0.11	0.21	0.08	-0.16
EC	-0.15	0	-0.22	-0.09	-0.08	1	-0.23	0
Al	0.03	0	0.14	-0.03	-0.12	-0.07	0.44	-0.11
Si	0.02	0	0.02	0	0.09	-0.16	1	-0.5
P	-0.05	0	-0.18	0.01	0.15	0.13	-0.08	0.02
S	1	0	0	0	0	0	0	0
Cl	-0.04	0	0.22	0.03	0.01	-0.1	-0.53	0.8
K	0.04	0	0.55	0.15	-0.16	-0.19	0.14	-0.05
Ca	-0.04	0	-0.18	0.06	0.02	0.21	0.47	-0.21
Ti	0.03	0	0.1	-0.01	-0.09	-0.05	0.37	-0.21
Mn	-0.01	0	-0.02	0	0	-0.03	-0.13	0.36
Fe	-0.06	0	-0.09	-0.06	-0.03	0.08	-0.25	1
Cu	-0.05	0	-0.15	0.03	0.13	0.04	-0.2	0.25
Zn	-0.11	0	-0.2	0.1	0.17	0.42	-0.14	-0.01
As	0	0	0	0	0	0	0	0
Se	0	0	0	0	0	0.01	0	0
Br	-0.03	0	-0.07	0	0.04	0.11	-0.11	0.11
Rb	0	0	-0.01	0.01	0	0	0	0
Sr	0	0	0.01	0	-0.01	0	0.04	-0.01
Pb	-0.01	0	-0.03	0.01	0.03	0.01	-0.01	0
retene	-0.03	-0.01	-0.74	1	0.09	-0.09	-0.04	-0.08
incdpy	0.02	0	1	-0.3	0.09	-0.33	0.08	-0.04
bghipe	-0.03	0	0.18	-0.07	0.24	-0.16	-0.06	0.03
corone	-0.18	-0.02	-0.64	0.15	1	-0.26	-0.39	0.18
hop17	-0.03	0	0.17	-0.11	-0.01	0.17	-0.02	-0.01
hop19	-0.03	0	0.49	-0.2	0.2	-0.13	-0.02	0
hop26	0	0	-0.07	0.09	0.01	-0.01	0.02	-0.03
hop27	0	0	-0.01	0.02	0	0	0.02	-0.02
levg	0.05	0	0.76	-0.22	-0.17	-0.14	0.14	-0.06
prist	-0.01	0	-0.03	0	-0.01	0.07	-0.01	0
phytan	-0.04	0	-0.15	-0.01	-0.04	0.33	-0.07	0

Table S-5, continued.

	AMSUL	AMNIT	LTWS_H	CRBURN_H	GAS	DIESEL	RNOPVRD	RNOSalt2
SPECIES[a]								
NO3-	0	1	0	0	0	0	0	0
Na+	-0.04	0	-0.02	0.01	0.03	0	-0.53	0.74
K+	-0.01	0	-0.1	0.76	-0.03	-0.18	-0.03	-0.01
OC	-0.06	0	0.48	0.28	-0.08	0.2	0.01	-0.09
EC	-0.14	0	-0.15	-0.15	-0.04	1	-0.22	0.02
Al	0.02	0	0.09	-0.03	-0.07	-0.12	0.5	-0.1
Si	0.03	0	0.01	-0.03	0.05	-0.11	1	-0.52
P	-0.06	0	-0.17	-0.03	0.12	0.33	-0.06	-0.02
S	1	0	0	0	0	0	0	0
Cl	-0.02	0	0.1	0.04	-0.01	-0.05	-0.29	0.41
K	0.01	0	0.28	0.3	-0.07	-0.2	0.04	0
Ca	-0.04	0	-0.18	0.08	0.01	0.26	0.46	-0.22
Ti	0.02	0	0.05	0.01	-0.05	-0.08	0.42	-0.26
Mn	-0.03	0	0	0.01	0	-0.07	-0.35	0.75
Fe	-0.06	0	-0.01	-0.09	-0.01	0.08	-0.37	1
Cu	-0.03	0	-0.06	0.02	0.05	0.06	-0.17	0.23
Zn	-0.09	0	-0.11	0.13	0.06	0.47	-0.09	-0.03
As	0	0	0	0	0	0	0	0
Se	0	0	-0.01	0	0	0.02	0	0
Br	-0.03	0	-0.04	-0.02	0.02	0.15	-0.13	0.13
Rb	0	0	-0.05	0.11	0	-0.01	0	-0.01
Sr	0	0	0	0.01	-0.01	-0.01	0.07	-0.02
Pb	-0.01	0	-0.03	0.02	0.02	0.02	0	-0.01
retene	-0.02	0	-0.53	1	0.03	-0.12	-0.02	-0.09
incdpy	0.03	0	1	-0.39	0.01	-0.3	0.07	0.01
bghipe	0	0	0.28	-0.12	0.11	-0.11	0	0.01
corone	-0.09	0	-0.37	0.14	1	-0.18	-0.2	0.08
hop17	-0.03	0	0.18	-0.16	-0.02	0.2	-0.03	0
hop19	-0.01	0	0.71	-0.37	0.09	-0.08	0.02	0.02
hop26	0	0	-0.1	0.18	0	-0.02	0.03	-0.04
hop27	0	0	-0.02	0.04	0	-0.01	0.03	-0.03
levg	0.03	0	0.65	-0.24	-0.1	-0.17	0.07	0
prist	-0.01	0	-0.04	0	-0.01	0.09	-0.02	0
phytan	-0.06	0	-0.15	-0.04	-0.02	0.42	-0.09	0

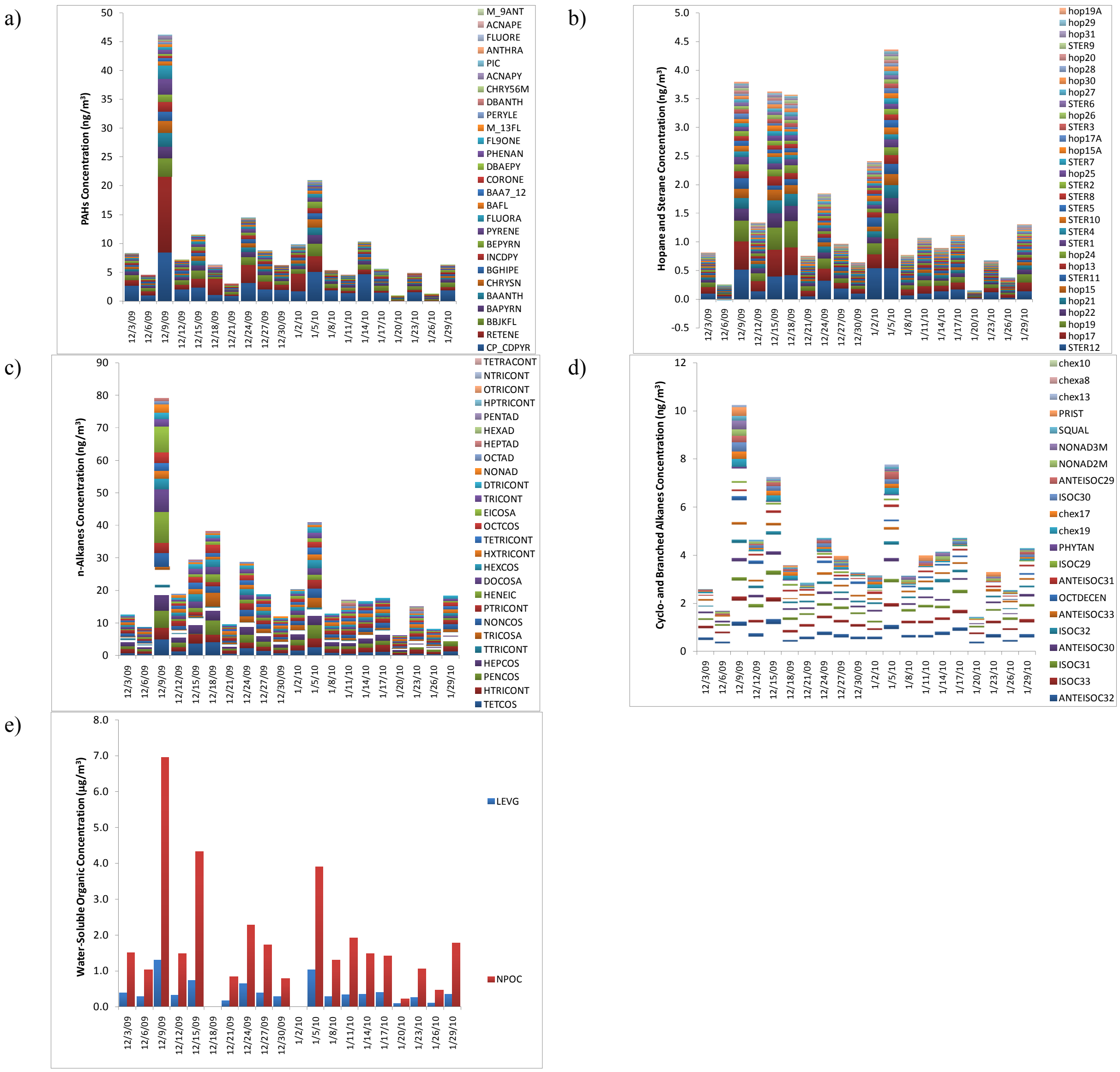

Figure S-1. Concentrations of organic marker species for: a) p-PAHs, b) hopanes and steranes, c) n-alkanes, d) cyclo- and branched alkanes, and e) water soluble organic compounds (WSOC, npoc) and levoglucosan (levg). Species are sorted by the average abundance. See Table S-0 for details of mnemonics and chemical species.

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