

**Electronic Supplementary Material to:
Profiles and Source Apportionment of Nonmethane Volatile Organic
Compounds in Winter and Summer in Xi'an, China, based on the
Hybrid Environmental Receptor Model***

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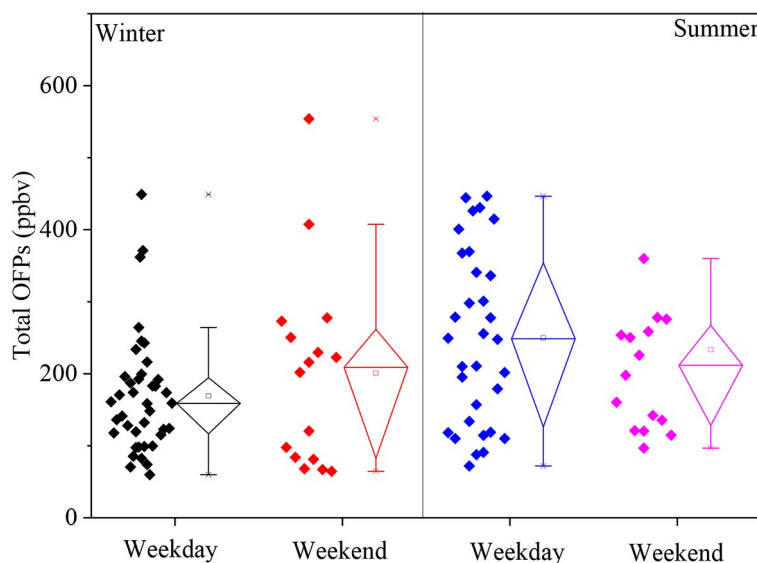


Fig. S1. Total OFPs comparison between weekdays and weekends.

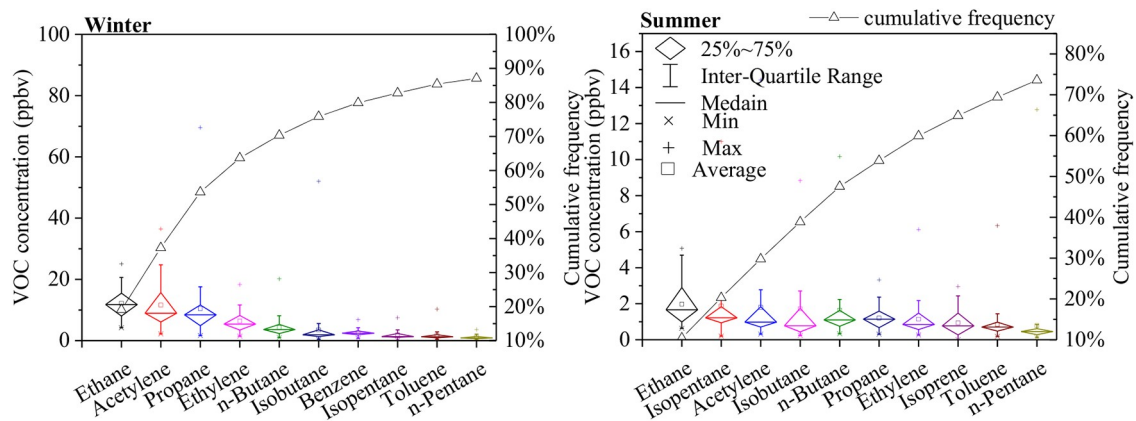


Fig. S2. Campaign-averaged top 10 species in winter and summer. The box plots indicate the campaign-averaged VOC concentrations and the minimum, 25th, 50th, 75th, and maximum percentiles. A cumulative frequency curve is fitted for the top 10 species.

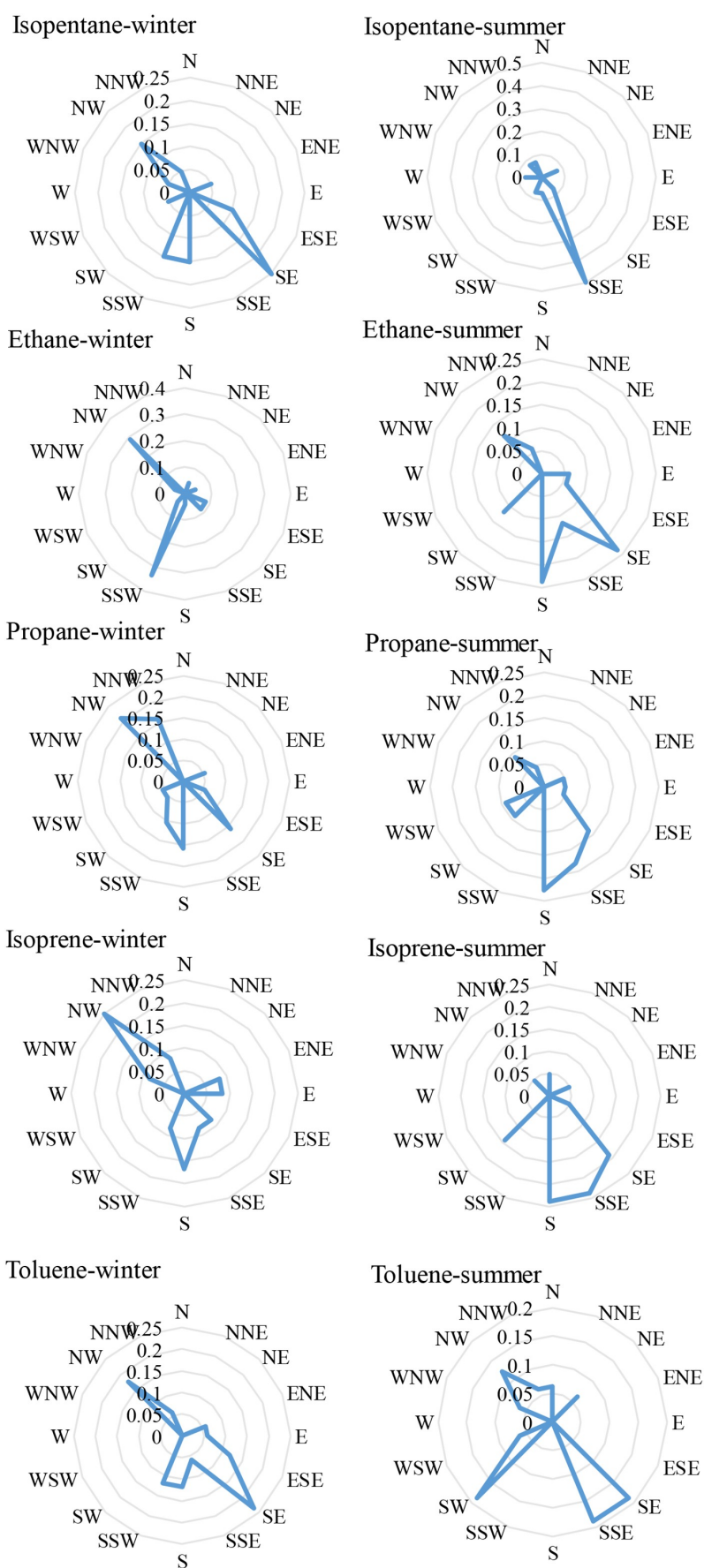


Fig. S3. CPF of five typical VOC species in winter and summer.

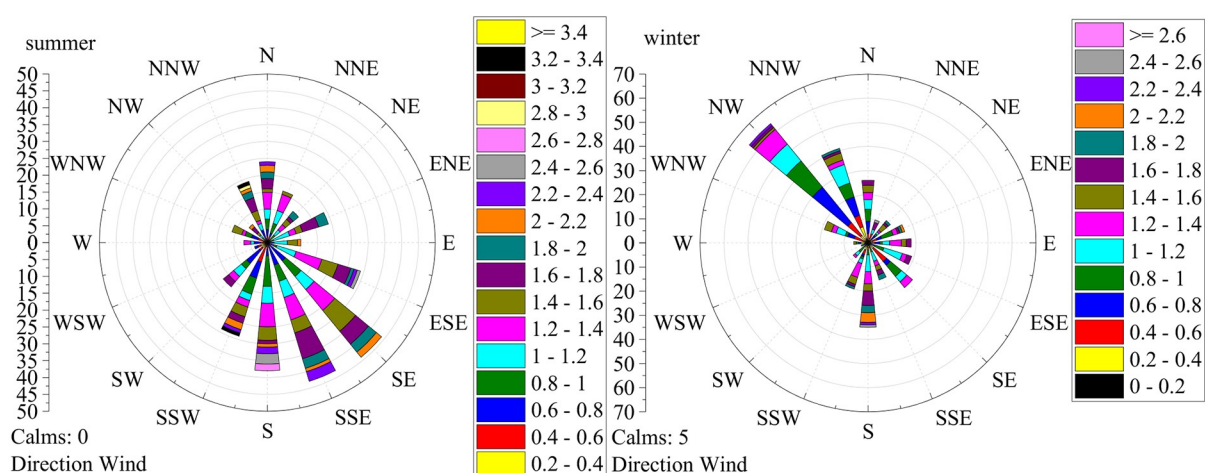


Fig. S4. Wind rose of sampling period in winter and summer.

Table S1. Online instruments used in this study.

Instrument	Model	Detection range	Accuracy	Time resolution
CO	Thermo Scientific™ Model 48i	0–20 000 ppm	0.1 ppm	60 s
SO ₂	Thermo Scientific™ Model 43i	0–1000 ppb	0.2 ppb	300 s
O ₃	Thermo Scientific™ Model 49i	0–200 ppm	0.5 ppb	60 s
NO _x	Thermo Scientific™ Model 42i	0–100 ppm	0.4 ppb	5 s

Table S2. MDLs for VOC species measured in this study (pptv).

VOC species	MDL ^a	VOC species	MDL	VOC species	MDL
Ethylene	8	2-Methylpentane	26	n-Octane	14
Acetylene	26	3-Methylpentane	23	Ethyl-benzene	23
Ethane	60	1-Hexene	24	m/p-Xylene	19
Propylene	32	n-Hexane	42	Styrene	17
Propane	81	Methyl-cyclopentane	21	o-Xylene	8
Isobutane	35	2,4-Dimethylpentane	16	n-Nonane	7
1-Butene	40	1,3-butadiene	18	Isopropylbenzene	4
n-Butane	46	Benzene	17	n-Propylbenzene	6
Trans-2-butene	20	Cyclohexane	13	m-Ethyltoluene	11
Cis-2-Butene	20	2-Methyl-hexane	47	p-Ethyltoluene	7
Isopentane	75	2,3-Dimethyl-pentane	13	1,3,5-Trimethyl-benzene	9
1-Pentene	19	3-Methyl-hexane	11	o-Ethyltoluene	15
n-Pentane	37	2,2,4-Trimethyl-pentane	20	1,2,4-Trimethylbenzene	21
Isoprene	20	n-Heptane	4	n-Decane	11
Trans-2-pentene	22	Methyl-cyclohexane	23	1,2,3-Trimethylbenzene	13
Cis-2-pentene	19	2,3,4-Trimethyl-pentane	27	m-Diethylbenzene	10
2,2-Dimethyl-butane	16	Toluene	24	p-Diethylbenzene	8
Cyclopentane	29	2-Methyl-heptane	6	n-Undecane	20
2,3-Dimethylbutane	26	3-Methyl-heptane	8	n-Dodecane	25

Note: ^aMDL expressed as pptv as air concentration.

Table S3. MDLs for OVOC species measured in this study (ppmv).

VOC species	MDL ^a
Formaldehyde	0.0011
Acetaldehyde	0.0012
Acetone	0.0029
Propanal	0.0022
methyl ethyl ketone	0.0040
iso-n-butanal	0.0009
Benzaldehyde	0.0023
iso-pentanal	0.0030
n-pentanal	0.0034
o-tolualdehyde	0.0033
m-tolualdehyde	0.0026
p-tolualdehyde	0.0038
Hexanal	0.0028
2,5-dimethylbenzaldehyde	0.0090
n-heptanal	0.0355
n-octanal	0.0045
n-nonanal	0.0028
n-decanal	0.0066
Glyoxal	0.0101
Methylglyoxal	0.0073

Note: ^aMDL expressed as ppmv in solution.

Table S4. Average concentrations of trace gases on weekdays and weekends.

		Weekdays					Weekends				
		NO ₂ ^a	CO ^b	O ₃ ^a	SO ₂ ^a	T, °C	NO ₂	CO	O ₃	SO ₂	T, °C
Winter	Avg	72.8	1.5	20.6	18.5	-0.2	84.4	1.8	18.4	16.9	1.6
	SD	24.5	0.6	19.6	5.5	3.0	24.7	0.8	18.6	7.2	3.3
Summer	Avg	13.7	0.7	93.2	10.2	31.7	14.4	0.8	95.7	10.5	31.6
	SD	4.9	0.4	58.7	5.9	3.9	6.3	0.1	52.4	6.1	2.9

Notes: ^aunits: $\mu\text{g m}^{-3}$; ^bunits: mg m^{-3} ; Avg, average; SD, standard deviation.

Table S5a. Composition of VOCs in different sampling time periods in summer.

	0800–0900 LST		1500–1600 LST		1900–2000 LST		2300–2400 LST		Total Avg	TSD
	Avg	SD	Avg	SD	Avg	SD	Avg	SD		
Acetylene	3.79	3.72	0.99	0.50	1.67	2.10	0.76	0.30	1.80	1.65
Ethylene	2.18	1.38	0.66	0.24	0.92	0.54	0.81	0.33	1.14	0.62
Propylene	0.34	0.14	0.24	0.11	0.24	0.10	0.24	0.13	0.27	0.12
1-Butene	0.35	0.38	0.35	0.21	0.35	0.20	0.44	0.77	0.37	0.39
Trans-2-butene	0.03	0.04	0.08	0.05	0.07	0.09	0.05	0.12	0.06	0.08
Cis-2-Butene	0.02	0.03	0.05	0.06	0.06	0.07	0.02	0.04	0.04	0.05
1-Pentene	0.03	0.03	0.02	0.03	0.03	0.05	0.01	0.02	0.02	0.03
Isoprene	0.84	0.40	1.48	0.88	1.24	0.69	0.20	0.13	0.94	0.53
Trans-2-pentene	0.02	0.02	0.02	0.03	0.04	0.03	0.01	0.02	0.03	0.03
Cis-2-pentene	0.01	0.01	0.00	0.01	0.01	0.02	0.00	0.00	0.01	0.01
1-Hexene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,3-Butadiene	0.00	0.00	0.00	0.00	0.04	0.12	0.03	0.10	0.02	0.05
Alkene	7.61	6.15	3.89	2.12	4.68	4.01	2.57	1.98	4.69	3.56
Ethane	3.09	1.16	1.83	1.16	1.36	0.78	1.62	0.79	1.97	0.97
Propane	1.50	0.48	1.31	0.95	0.97	0.56	1.02	0.51	1.20	0.63
Isobutane	1.14	0.93	1.66	2.17	3.02	3.49	1.07	1.55	1.72	2.04
n-Butane	1.71	1.34	1.64	2.02	1.98	2.68	1.25	1.10	1.65	1.79
Isopentane	3.00	3.08	2.18	2.21	1.14	0.29	1.17	1.04	1.87	1.66
n-Pentane	0.60	0.33	1.63	3.57	0.41	0.14	0.53	0.60	0.79	1.16
2,2-Dimethyl-butane	0.02	0.02	0.01	0.02	0.01	0.02	0.00	0.01	0.01	0.02
Cyclopentane	0.06	0.04	0.08	0.11	0.05	0.07	0.02	0.02	0.05	0.06
2,3-Dimethylbutane	0.05	0.04	0.04	0.05	0.01	0.02	0.01	0.01	0.03	0.03
2-Methylpentane	0.23	0.12	0.20	0.26	0.17	0.11	0.10	0.06	0.18	0.14
3-Methylpentane	0.18	0.09	0.20	0.27	0.17	0.13	0.10	0.08	0.17	0.14
n-Hexane	0.97	1.53	0.78	1.21	0.33	0.31	0.28	0.33	0.59	0.84
Methyl-cyclopentane	0.06	0.03	0.06	0.07	0.05	0.04	0.02	0.02	0.05	0.04
2,4-Dimethylpentane	0.00	0.01	0.01	0.02	0.01	0.02	0.00	0.00	0.01	0.01
Cyclohexane	0.59	0.18	0.77	0.58	0.51	0.14	0.53	0.16	0.60	0.26
2-Methyl-hexane	0.04	0.03	0.03	0.05	0.04	0.04	0.00	0.00	0.02	0.03
2,3-Dimethyl-pentane	0.00	0.01	0.01	0.02	0.02	0.03	0.00	0.00	0.01	0.01
3-Methyl-hexane	0.05	0.03	0.04	0.06	0.04	0.04	0.02	0.02	0.04	0.04
2,2,4-Trimethyl-pentane	0.06	0.05	0.04	0.03	0.04	0.03	0.03	0.03	0.04	0.04
n-Heptane	0.19	0.19	0.09	0.08	0.11	0.11	0.09	0.09	0.12	0.12
Methyl-cyclohexane	0.06	0.03	0.07	0.10	0.09	0.14	0.03	0.03	0.06	0.07
2,3,4-Trimethyl-pentane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methyl-heptane	0.01	0.01	0.00	0.01	0.01	0.02	0.00	0.01	0.01	0.01
3-Methyl-heptane	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.02	0.01	0.01
n-Octane	0.06	0.04	0.04	0.04	0.05	0.04	0.02	0.03	0.04	0.04
n-Nonane	0.05	0.03	0.02	0.02	0.04	0.03	0.02	0.02	0.03	0.03
n-Decane	0.04	0.02	0.05	0.09	0.04	0.02	0.03	0.02	0.04	0.04
n-Undecane	0.04	0.04	0.03	0.05	0.05	0.13	0.02	0.03	0.04	0.06
n-Dodecane	0.05	0.05	0.03	0.06	0.02	0.03	0.02	0.04	0.03	0.04
Alkane	13.87	9.89	12.88	15.31	10.74	9.48	8.01	6.61	11.38	10.32
Benzene	1.07	1.50	0.46	0.50	0.37	0.28	0.58	0.95	0.62	0.81
Toluene	0.98	0.42	1.13	1.66	0.76	0.29	0.56	0.30	0.86	0.67
Ethyl-benzene	0.29	0.17	0.31	0.57	0.30	0.17	0.17	0.10	0.27	0.25
m/p-Xylene	0.66	0.43	0.72	1.29	0.64	0.35	0.41	0.27	0.61	0.58
Styrene	0.15	0.16	0.20	0.42	0.07	0.05	0.06	0.04	0.12	0.17
o-Xylene	0.29	0.19	0.31	0.56	0.27	0.14	0.17	0.09	0.26	0.25
Isopropylbenzene	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01
n-Propylbenzene	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
m-Ethyltoluene	0.04	0.02	0.02	0.02	0.03	0.02	0.03	0.02	0.03	0.02

Table S5a. (Continued.)

	0800–0900 LST		1500–1600 LST		1900–2000 LST		2300–2400 LST		Total Avg	TSD
	Avg	SD	Avg	SD	Avg	SD	Avg	SD		
p-Ethyltoluene	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
1,3,5-Trimethyl-benzene	0.02	0.01	0.02	0.01	0.02	0.01	0.01	0.01	0.02	0.01
o-Ethyltoluene	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
1,2,4-Trimethylbenzene	0.06	0.03	0.04	0.03	0.05	0.04	0.04	0.03	0.05	0.03
1,2,3-Trimethylbenzene	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
m-Diethylbenzene	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
p-Diethylbenzene	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
Aromatic	3.65	2.98	3.27	5.14	2.58	1.42	2.07	1.87	2.89	2.85
formaldehyde	5.71	1.35	6.34	2.69	5.83	2.21	3.63	0.33	5.38	1.65
acetaldehyde	1.63	0.54	1.55	0.79	0.83	0.71	0.42	0.32	1.11	0.59
acetone	3.14	0.87	3.06	1.20	2.79	0.81	2.40	0.90	2.85	0.95
propanal	0.20	0.12	0.15	0.15	0.15	0.10	0.03	0.04	0.13	0.10
methyl ethyl ketone	3.43	1.69	4.60	0.41	4.17	3.40	2.38	1.45	3.65	1.74
iso-+n-butanal	0.43	0.12	0.64	0.11	0.63	0.20	0.35	0.15	0.51	0.14
benzaldehyde	0.22	0.20	0.11	0.15	0.10	0.10	0.12	0.10	0.14	0.14
iso-pentanal	0.24	0.20	0.28	0.22	0.17	0.20	0.10	0.16	0.20	0.19
n-pentanal	0.20	0.16	0.28	0.24	0.16	0.20	0.08	0.12	0.18	0.18
o-tolualdehyde	0.17	0.12	0.17	0.06	0.11	0.05	0.09	0.08	0.13	0.08
m-tolualdehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p-tolualdehyde	0.04	0.05	0.03	0.05	0.00	0.00	0.02	0.04	0.02	0.04
hexanal	0.09	0.11	0.16	0.09	0.08	0.11	0.05	0.06	0.10	0.09
2,5-dimethylbenzaldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n-heptanal	0.66	0.10	0.84	0.28	0.70	0.17	0.52	0.43	0.68	0.25
n-octanal	0.30	0.07	0.69	0.23	0.43	0.17	0.30	0.11	0.43	0.15
n-nonanal	0.64	0.61	1.96	0.78	0.84	0.77	0.30	0.35	0.93	0.62
n-decanal	0.43	0.17	1.49	0.59	0.70	0.45	0.29	0.15	0.73	0.34
glyoxal	0.77	0.23	1.24	0.30	1.01	0.16	0.62	0.15	0.91	0.21
methylglyoxal	0.73	0.34	1.30	0.43	1.13	0.28	0.81	0.27	0.99	0.33
OVOC	19.05	7.05	24.90	8.78	19.85	10.10	12.49	5.21	19.07	7.78
Σ	56.75	37.43	54.51	38.50	46.71	32.14	30.82	18.31	47.19	31.59

Notes: Avg, average value; SD, standard deviation; TAVG, total average VOCs per day; TSD, total standard deviation for daily average VOCs. Bold fonts denote the sum concentration of the VOCs within the category.

Table S5b. Composition of VOCs in different sampling time periods in winter.

	0800–0900 LST		1500–1600 LST		1900–2000 LST		2300–2400 LST		Total Avg	TSD
	Avg	SD	Avg	SD	Avg	SD	Avg	SD		
Acetylene	14.07	8.83	7.86	3.72	9.80	7.98	14.74	9.94	11.62	8.28
Ethylene	8.60	4.39	3.93	1.97	5.11	2.50	7.94	4.50	6.39	3.94
Propylene	1.33	0.92	0.48	0.42	0.57	0.25	1.00	0.80	0.85	0.73
1-Butene	1.48	1.74	0.53	0.61	0.45	0.44	0.78	1.07	0.81	1.14
Trans-2-butene	0.26	0.47	0.02	0.03	0.05	0.04	0.12	0.14	0.11	0.26
Cis-2-Butene	0.14	0.20	0.02	0.04	0.03	0.04	0.11	0.15	0.07	0.14
1-Pentene	0.04	0.04	0.02	0.04	0.01	0.02	0.04	0.05	0.03	0.04
Isoprene	0.05	0.11	0.00	0.01	0.01	0.03	0.05	0.07	0.03	0.07
Trans-2-pentene	0.04	0.05	0.00	0.01	0.01	0.01	0.04	0.05	0.02	0.04
Cis-2-pentene	0.02	0.02	0.00	0.01	0.00	0.00	0.02	0.03	0.01	0.02
1-Hexene	0.01	0.02	0.00	0.00	0.00	0.00	0.02	0.04	0.01	0.03
1,3-Butadiene	0.55	0.71	0.08	0.20	0.16	0.20	0.63	0.74	0.35	0.57
Alkene	12.52	7.41	5.08	3.09	6.40	3.28	10.75	6.90	8.69	6.21
Ethane	15.21	4.79	10.65	4.79	11.64	5.26	11.20	4.12	12.17	4.96
Propane	12.75	8.78	7.04	3.95	8.92	4.77	8.57	4.37	10.44	10.04
Isobutane	3.71	2.21	1.80	1.06	2.52	1.73	2.63	1.86	3.52	6.85

Table S5b. (Continued.)

	0800–0900 LST		1500–1600 LST		1900–2000 LST		2300–2400 LST		Total Avg	TSD
	Avg	SD	Avg	SD	Avg	SD	Avg	SD		
n-Butane	5.32	2.96	3.28	2.16	3.29	1.62	3.86	1.81	4.24	3.15
Isopentane	2.83	1.85	1.21	0.70	1.30	0.55	1.93	0.84	1.85	1.26
n-Pentane	1.70	1.18	0.74	0.44	0.83	0.41	1.08	0.60	1.09	0.80
2,2-Dimethyl-butane	0.15	0.21	0.04	0.02	0.04	0.02	0.09	0.13	0.08	0.13
Cyclopentane	0.28	0.33	0.07	0.04	0.08	0.04	0.15	0.20	0.15	0.21
2,3-Dimethylbutane	0.25	0.33	0.06	0.04	0.07	0.04	0.14	0.20	0.13	0.20
2-Methylpentane	1.00	1.32	0.30	0.19	0.35	0.16	0.56	0.57	0.55	0.76
3-Methylpentane	0.91	1.28	0.25	0.15	0.29	0.11	0.45	0.41	0.47	0.71
n-Hexane	1.06	1.53	0.42	0.23	0.49	0.23	0.57	0.37	0.63	0.82
Methyl-cyclopentane	0.43	0.47	0.14	0.06	0.18	0.08	0.27	0.33	0.25	0.30
2,4-Dimethylpentane	0.06	0.08	0.01	0.02	0.02	0.01	0.03	0.03	0.03	0.05
Cyclohexane	0.59	0.38	0.44	0.08	0.44	0.07	0.49	0.17	0.49	0.22
2-Methyl-hexane	0.27	0.36	0.07	0.06	0.11	0.04	0.16	0.11	0.15	0.20
2,3-Dimethyl-pentane	0.10	0.13	0.03	0.02	0.03	0.01	0.06	0.05	0.06	0.08
3-Methyl-hexane	0.26	0.33	0.08	0.04	0.09	0.04	0.15	0.11	0.14	0.19
2,2,4-Trimethyl-pentane	0.19	0.15	0.08	0.05	0.09	0.03	0.14	0.17	0.13	0.12
n-Heptane	0.27	0.19	0.15	0.05	0.22	0.14	0.21	0.14	0.21	0.14
Methyl-cyclohexane	0.20	0.15	0.09	0.04	0.10	0.04	0.15	0.12	0.13	0.10
2,3,4-Trimethyl-pentane	0.06	0.08	0.01	0.01	0.01	0.02	0.03	0.06	0.03	0.06
2-Methyl-heptane	0.07	0.04	0.03	0.02	0.04	0.01	0.05	0.03	0.05	0.03
3-Methyl-heptane	0.07	0.05	0.03	0.01	0.03	0.02	0.04	0.03	0.04	0.03
n-Octane	0.12	0.07	0.10	0.09	0.12	0.11	0.10	0.07	0.11	0.08
n-Nonane	0.06	0.04	0.04	0.04	0.07	0.07	0.07	0.06	0.06	0.06
n-Decane	0.04	0.05	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.03
n-Undecane	0.03	0.04	0.01	0.02	0.01	0.03	0.01	0.01	0.02	0.03
n-Dodecane	0.05	0.11	0.00	0.00	0.01	0.03	0.00	0.01	0.01	0.06
Alkane	48.06	24.09	27.16	12.35	31.42	14.20	33.22	12.05	37.29	23.88
Benzene	3.28	1.42	2.17	0.79	2.22	0.94	2.66	1.02	2.58	1.13
Toluene	2.55	2.46	1.02	0.49	1.17	0.47	1.84	1.35	1.65	1.53
Ethyl-benzene	0.49	0.33	0.23	0.17	0.33	0.18	1.14	1.57	0.55	0.87
m/p-Xylene	0.58	0.48	0.20	0.17	0.33	0.22	1.23	1.87	0.58	1.03
Styrene	0.11	0.17	0.01	0.03	0.02	0.04	0.13	0.15	0.07	0.12
o-Xylene	0.50	0.37	0.19	0.16	0.29	0.16	0.96	1.24	0.48	0.71
Isopropylbenzene	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01
n-Propylbenzene	0.03	0.02	0.01	0.01	0.01	0.01	0.03	0.02	0.02	0.02
m-Ethyltoluene	0.07	0.07	0.01	0.02	0.02	0.02	0.06	0.08	0.04	0.06
p-Ethyltoluene	0.06	0.04	0.02	0.01	0.03	0.01	0.05	0.03	0.04	0.03
1,3,5-Trimethyl-benzene	0.05	0.05	0.01	0.01	0.02	0.01	0.03	0.04	0.03	0.04
o-Ethyltoluene	0.05	0.04	0.01	0.01	0.01	0.02	0.04	0.03	0.03	0.03
1,2,4-Trimethylbenzene	0.18	0.19	0.03	0.05	0.06	0.04	0.15	0.17	0.10	0.14
1,2,3-Trimethylbenzene	0.05	0.06	0.01	0.02	0.02	0.02	0.04	0.04	0.03	0.04
m-Diethylbenzene	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01
p-Diethylbenzene	0.02	0.03	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.02
Aromatic	8.04	4.54	3.93	1.58	4.53	1.71	8.38	6.36	6.22	4.45
Formaldehyde	4.26	3.43	4.46	2.72	4.03	1.67	4.26	1.60	4.25	2.41
Acetaldehyde	3.47	2.16	3.23	1.79	2.80	1.35	3.61	1.97	3.28	1.82
Acetone	4.32	3.24	5.79	2.46	4.41	1.89	4.07	2.27	4.65	2.54
Propanal	0.44	0.21	0.38	0.15	0.37	0.15	0.44	0.20	0.41	0.18
methyl ethyl ketone	1.09	0.78	1.25	0.73	1.10	0.66	1.06	0.68	1.12	0.70
iso-n-butanal	0.56	0.52	0.28	0.12	0.33	0.22	0.46	0.39	0.40	0.36
Benzaldehyde	0.16	0.10	0.21	0.10	0.17	0.09	0.17	0.09	0.18	0.09

Table S5b. (Continued.)

	0800–0900 LST		1500–1600 LST		1900–2000 LST		2300–2400 LST		Total Avg	TSD
	Avg	SD	Avg	SD	Avg	SD	Avg	SD		
iso-pentanal	0.18	0.10	0.21	0.12	0.18	0.09	0.18	0.11	0.19	0.11
n-pentanal	0.20	0.12	0.14	0.05	0.15	0.07	0.18	0.07	0.17	0.08
o-tolualdehyde	0.15	0.15	0.08	0.05	0.08	0.08	0.12	0.11	0.11	0.10
m-tolualdehyde	0.04	0.06	0.01	0.02	0.03	0.05	0.04	0.05	0.03	0.05
p-tolualdehyde	0.24	0.18	0.17	0.09	0.18	0.12	0.23	0.16	0.21	0.14
Hexanal	0.17	0.07	0.20	0.09	0.17	0.09	0.17	0.10	0.18	0.09
2,5-dimethylbenzaldehyde	0.20	0.21	0.09	0.05	0.08	0.05	0.17	0.16	0.13	0.14
n-heptanal	0.35	0.30	0.62	0.30	0.50	0.20	0.40	0.26	0.47	0.28
n-octanal	0.09	0.05	0.14	0.06	0.12	0.06	0.10	0.08	0.11	0.07
n-nonanal	0.38	0.19	0.51	0.23	0.46	0.25	0.40	0.29	0.44	0.24
n-decanal	0.22	0.07	0.27	0.09	0.23	0.08	0.20	0.11	0.23	0.09
Glyoxal	0.15	0.22	0.39	0.29	0.25	0.18	0.22	0.19	0.25	0.24
methylglyoxal	0.36	0.36	0.41	0.32	0.31	0.20	0.39	0.21	0.37	0.28
OVOC	12.75	9.10	14.39	7.10	11.92	5.88	12.61	7.47	12.92	7.57
Σ	95.45	53.97	58.43	27.84	64.06	33.06	79.69	42.72	76.73	50.39

Notes: Avg, average value; SD, standard deviation; TAVG, total average VOCs per day; TSD, total standard deviation for daily average VOCs. Bold fonts denote the sum concentration of the VOCs within the category.

Table S6. Source profiles for HERM inputs and outputs.

	Gasoline vehicle		Diesel vehicle		Coal		Biomass		HERM Output 1		HERM Output 2		HERM Output 3	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
Ethane	3.19	0.75	0.27	0.05	15.84	7.98	5.23	0.91	–	–	0.36	0.18	12.65	2.50
Propane	0.33	0.05	0.78	0.65	6.01	4.10	0.46	0.08	0.04	0.01	1.51	1.13	9.95	1.12
i-Butane	0.47	0.02	0.01	0.01	–	–	0.02	0.00	0.03	0.01	4.75	2.65	1.17	0.25
n-Butane	1.11	0.16	0.01	0.01	0.57	0.66	0.06	0.01	0.04	0.01	11.14	4.06	1.25	0.08
Cyclopentane	0.20	0.05	0.01	0.01	–	–	–	–	0.05	0.03	0.49	0.08	0.04	0.00
i-Pentane	6.17	0.83	0.82	0.84	1.00	0.51	0.01	0.00	0.04	0.02	33.04	9.30	0.92	0.15
n-Pentane	1.07	0.14	0.01	0.00	1.25	1.41	0.01	0.00	0.03	0.03	6.27	1.17	0.30	0.04
Methylcyclopentane	0.58	0.07	0.01	0.00	0.24	0.21	–	–	0.05	0.03	1.60	0.14	0.02	0.01
Cyclohexane	0.77	0.10	0.01	0.00	0.12	0.11	–	–	0.04	0.03	0.13	0.03	–	–
2,2-Dimethylbutane	0.02	0.02	0.01	0.01	–	–	0.05	0.01	–	–	0.20	0.11	0.06	0.01
2,3-Dimethylbutane	0.01	0.01	0.02	0.01	0.11	0.16	–	–	0.12	0.06	0.18	0.04	0.07	0.01
2-Methylpentane	2.96	0.04	0.02	0.03	0.55	0.56	–	–	0.53	0.33	1.81	0.33	0.12	0.01
3-Methylpentane	1.45	0.15	0.00	0.00	0.17	0.17	–	–	0.44	0.29	3.14	0.57	0.11	0.01
n-Hexane	0.91	0.13	0.19	0.19	0.92	0.92	0.01	0.00	0.77	0.46	2.97	0.54	0.40	0.03
Methylcyclohexane	0.40	0.03	0.01	0.00	0.08	0.10	–	–	0.09	0.04	0.69	0.13	0.02	0.00
2,3-Dimethylpentane	0.41	0.05	0.01	0.00	0.30	0.35	–	–	–	–	0.33	0.06	0.02	0.00
2,4-Dimethylpentane	0.30	0.02	0.02	0.03	–	–	–	–	–	–	0.05	0.01	0.01	0.01
2-Methylhexane	1.51	0.37	0.02	0.01	0.12	0.19	–	–	0.04	0.02	0.47	0.09	0.30	0.05
3-Methylhexane	1.55	0.34	0.01	0.00	–	–	–	–	0.05	0.02	0.61	0.11	0.11	0.01
n-Heptane	0.67	0.03	0.71	0.66	1.10	0.72	–	–	0.15	0.06	1.76	0.32	0.13	0.01
2,2,4-Trimethylpentane	0.54	0.08	0.01	0.00	–	–	–	–	–	–	0.01	0.00	0.07	0.00
2,3,4-Trimethylpentane	0.43	0.06	0.01	0.00	–	–	–	–	–	–	0.03	0.01	0.02	0.00
2-Methylheptane	0.94	0.17	0.01	0.00	0.44	0.25	–	–	0.12	0.06	0.26	0.05	0.03	0.00
3-Methylheptane	0.83	0.09	0.01	0.00	0.16	0.11	–	–	0.05	0.02	0.09	0.02	0.03	0.00
n-Octane	0.23	0.04	0.01	0.00	0.78	0.41	0.01	0.00	0.62	0.23	0.63	0.12	0.14	0.04
n-Nonane	0.19	0.02	0.01	0.00	0.45	0.44	–	–	0.86	0.41	0.16	0.03	0.03	0.01
n-Decane	0.21	0.04	0.68	0.36	0.50	0.20	–	–	0.50	0.39	0.08	0.02	0.07	0.04
n-U-ecane	0.20	0.02	7.71	2.20	0.49	0.18	–	–	0.12	0.09	0.07	0.01	0.04	0.01
Ethene	10.98	1.03	15.24	2.95	11.92	7.89	44.51	7.77	–	–	7.79	1.41	12.73	3.24

Table S6. (Continued.)

	Gasoline vehicle		Diesel vehicle		Coal		Biomass		HERM Output 1		HERM Output 2		HERM Output 3	
	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
Propene	4.37	0.63	0.01	0.01	8.38	1.42	2.39	0.42	0.01	0.00	2.69	2.21	6.70	1.04
1,3-butadiene	0.82	0.07	–	–	–	–	0.50	0.09	–	–	0.03	0.01	0.51	0.06
1-Butene	2.03	0.13	1.35	1.04	1.38	0.88	0.38	0.07	–	–	3.46	0.63	1.84	0.17
cis-2-Butene	0.28	0.03	0.01	0.01	1.74	1.59	0.06	0.01	–	–	0.60	0.11	0.39	0.03
trans-2-Butene	0.34	0.03	0.02	0.02	0.96	0.61	0.07	0.01	–	–	0.66	0.12	0.57	0.07
Isoprene	0.28	0.08	2.18	2.21	–	–	0.00	0.00	0.01	0.01	0.02	0.00	31.93	4.99
1-Pentene	0.23	0.06	0.01	0.01	0.68	0.51	0.06	0.01	–	–	1.30	0.24	0.19	0.02
cis-2-Pentene	0.19	0.02	0.01	0.00	0.08	0.13	0.03	0.01	–	–	0.15	0.03	0.05	0.01
trans-2-Pentene	0.12	0.02	0.01	0.00	0.06	0.10	0.05	0.01	–	–	0.33	0.06	0.05	0.01
1-Hexene	0.18	0.02	0.03	0.02	0.50	0.40	0.07	0.01	–	–	1.35	0.25	0.09	0.01
Ethyne	4.51	1.19	4.79	0.93	5.70	1.13	17.26	3.01	–	–	0.90	0.17	12.35	0.96
Benzene	8.22	0.81	0.01	0.00	15.31	5.47	7.82	1.37	0.28	0.13	3.11	0.57	0.43	1.22
Toluene	10.48	0.66	4.53	2.44	6.91	1.28	2.13	0.37	8.52	2.04	3.33	0.60	1.06	0.33
m/p-Xylene	0.19	0.01	3.46	1.56	2.10	0.13	0.24	0.04	8.39	1.02	0.47	0.09	0.77	0.13
Ethylbenzene	1.45	0.38	3.03	1.32	0.84	0.14	0.27	0.05	16.93	2.14	0.63	0.12	0.52	0.07
o-Xylene	–	–	4.45	1.67	0.75	0.11	0.10	0.02	4.81	0.54	0.17	0.03	0.31	0.06
Styrene	0.50	0.08	12.12	7.54	0.05	0.03	0.50	0.09	7.71	2.52	0.05	0.01	0.52	0.04
1,2,3-Trimethylbenzene	2.02	0.22	1.22	0.32	0.21	0.06	0.01	0.00	0.62	0.22	0.03	0.01	0.09	0.03
1,2,4-Trimethylbenzene	3.62	0.26	4.67	2.03	0.34	0.07	0.01	0.00	1.15	0.35	0.08	0.02	0.14	0.03
1,3,5-Trimethylbenzene	0.36	0.02	0.16	0.08	0.12	0.02	0.00	0.00	0.54	0.20	0.02	0.00	0.10	0.03
i-Propylbenzene	0.51	0.14	3.73	1.97	0.02	0.03	0.01	0.00	1.74	0.48	0.01	0.00	0.04	0.00
m-Ethyltoluene	1.10	0.13	0.01	0.00	0.27	0.03	0.03	0.01	3.20	1.12	0.06	0.02	0.16	0.03
n-Propylbenzene	0.31	0.03	11.55	7.49	0.07	0.07	0.01	0.00	–	–	0.03	0.01	0.05	0.00
o-Ethyltoluene	1.02	0.24	5.64	3.85	0.14	0.04	0.01	0.00	0.69	0.24	0.04	0.01	0.08	0.02
p-Ethyltoluene	1.95	0.12	0.01	0.00	0.12	0.02	0.01	0.00	1.21	0.43	0.03	0.01	0.08	0.02
m-Diethylbenzene	1.23	0.15	2.12	1.92	0.08	0.12	0.00	0.00	0.07	0.03	0.01	0.00	0.17	0.18
p-Diethylbenzene	3.93	0.89	0.77	0.85	0.23	0.09	–	–	0.27	0.11	0.02	0.01	0.02	0.01
Formaldehyde	11.19	2.69	0.56	0.21	–	–	7.42	1.30	4.99	1.24	–	–	–	–
Acetaldehyde	–	–	6.11	1.83	–	–	9.47	1.65	4.08	0.98	–	–	–	–
Acetone	–	–	0.83	0.16	0.99	0.25	0.68	0.12	8.04	4.58	–	–	–	–

Notes: Avg, average value; SD, standard deviation; –, below detection limits or not detected.