Supplementary Material:

Diurnal variations of organic molecular tracers and stable carbon isotopic compositions in atmospheric aerosols over Mt. Tai in North China Plain: an influence of biomass burning

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25 **Table S1.** Concentrations of the identified organic compounds in the summertime aerosol
 26 samples collected at the summit of Mt. Tai, Central East China (ng m^{-3}).

Compounds	Early June (n=24)			Late June (n=13)		
	range	mean	std ^a	range	mean	std
I. <i>n</i>-Alkanes						
C ₂₀	0.10-0.83	0.39	0.25	0.04-1.0	0.33	0.30
C ₂₁	0.44-6.1	3.2	1.6	0.06-4.3	1.5	1.3
C ₂₂	0.97-6.9	3.6	1.3	0.04-3.3	1.4	1.0
C ₂₃	1.9-18	8.3	3.5	0.08-5.3	2.6	1.7
C ₂₄	1.6-12	5.0	2.7	0.07-4.6	1.8	1.3
C ₂₅	3.3-21	11	5.2	0.14-7.5	3.4	2.1
C ₂₆	2.6-16	8.1	3.9	0.12-6.1	2.2	1.6
C ₂₇	4.7-50	20	11	0.13-8.4	4.4	2.5
C ₂₈	3.0-23	11	6.4	0.14-6.6	2.6	1.9
C ₂₉	16.2-323	79	68	0.12-14	6.3	4.0
C ₃₀	1.3-15	6.7	4.3	0.04-3.3	1.7	1.0
C ₃₁	3.6-103	30	22	0.10-6.4	3.6	1.8
C ₃₂	0.71-15	3.8	3.4	0.05-2.1	0.95	0.58
C ₃₃	0.60-28	7.6	6.6	0.01-1.9	0.98	0.55
C ₃₄	0.14-6.3	1.4	1.6	0.03-1.9	0.47	0.64
C ₃₅	0.02-0.53	0.23	0.15	nd ^b -0.70	0.20	0.27
C ₃₆	nd-0.63	0.20	0.18	nd-1.1	0.24	0.36
subtotal	54.8-599	199	127	1.2-64	35	19
CPI (C ₂₀ -C ₃₆) ^c	1.8-7.6	3.9	1.3	1.1-3.2	2.1	0.5
II. Fatty acids						
C _{10:0}	nd	nd	nd	0.17-3.2	1.1	0.80
C _{11:0}	nd	nd	nd	0.01-0.62	0.19	0.21
C _{12:0}	3.4-11	6.8	1.7	0.47-24	5.3	5.9
C _{13:0}	1.3-8.0	3.1	1.6	0.02-2.1	0.88	0.76
C _{14:0}	7.3-39	18	7.1	0.51-13	6.5	3.6
C _{15:0}	1.9-7.7	4.4	1.6	0.14-4.2	2.2	1.2
C _{16:0}	17-74	44	14	1.2-84	37	27
C _{17:0}	0.54-3.6	2.0	0.81	0.01-1.9	1.0	0.58
C _{18:0}	6.6-24	14	4.4	0.30-30	14	9.6
C _{19:0}	0.19-2.6	0.95	0.68	0.01-0.86	0.31	0.23
C _{20:0}	0.94-10	4.9	2.3	0.03-4.4	2.0	1.6
C _{21:0}	0.17-6.3	2.8	1.8	0.01-0.82	0.33	0.24
C _{22:0}	3.4-40	17	9.5	0.08-7.0	3.4	2.4
C _{23:0}	1.3-32	10	7.5	nd-6.3	1.9	1.9
C _{24:0}	4.0-67	24	16	0.01-8.4	4.4	2.6
C _{25:0}	0.83-29	8.2	6.6	0.01-1.4	0.69	0.46
C _{26:0}	2.9-98	33	23	0.01-6.3	3.5	1.9
C _{27:0}	0.73-45	10	10	0.01-1.9	0.50	0.59
C _{28:0}	5.9-262	62	60	0.01-11	4.4	3.0
C _{29:0}	0.13-31	6.0	7.3	nd-0.84	0.20	0.22
C _{30:0}	1.7-137	30	31	nd-7.4	2.8	2.2
C _{31:0}	nd-4.7	0.35	0.96	nd-0.19	0.08	0.06
C _{32:0}	nd-27	4.9	6.3	nd-1.3	0.30	0.41
C _{16:1}	nd-1.02	0.12	0.29	nd	nd	nd
C _{18:1}	0.01-3.4	1.6	0.91	0.02-15	4.7	5.0
C _{18:2}	nd-1.3	0.24	0.33	nd-3.4	1.0	1.1
subtotal	76-940	309	199	3.0-198	98	65
CPI (C _{21:0} -C _{32:0}) ^c	3.3-6.0	4.7	0.7	2.3-14	6.2	3.5
III. Fatty alcohols						
C ₁₈	0.02-1.8	0.64	0.50	0.06-2.5	0.95	0.75

Compounds	Early June			Late June		
	range	mean	std	range	mean	std
C ₁₉	0.02-0.98	0.28	0.24	0.01-0.35	0.14	0.10
C ₂₀	0.05-2.1	0.69	0.51	0.02-1.4	0.49	0.41
C ₂₁	0.01-1.8	0.51	0.50	0.01-0.47	0.19	0.14
C ₂₂	0.19-7.8	3.2	2.2	0.05-1.8	0.89	0.58
C ₂₃	0.06-1.7	0.73	0.49	0.02-0.95	0.29	0.23
C ₂₄	1.6-35	11	7.7	0.11-4.1	1.6	1.1
C ₂₅	nd-2.8	1.0	0.81	0.01-0.63	0.24	0.20
C ₂₆	5.6-96	39	25	0.07-10	4.8	2.9
C ₂₇	0.05-10	2.8	3.0	0.02-0.90	0.43	0.28
C ₂₈	15-725	149	158	0.16-21	9.9	6.1
C ₂₉	0.20-12	1.7	2.4	0.01-2.5	0.57	0.68
C ₃₀	0.42-59	18	14	0.05-12	4.5	3.5
C ₃₁	nd-1.4	0.60	0.44	0.04-0.85	0.27	0.25
C ₃₂	0.19-4.6	1.5	1.3	0.02-4.2	1.2	1.3
subtotal	30-954	231	203	0.8-57	27	17
IV. Sugar compounds						
<i>Anhydrosugars</i>						
galactosan (G)	1.9-23	7.9	5.6	nd-2.3	0.91	0.75
mannosan (M)	2.7-24	9.6	5.8	nd-3.4	1.1	1.2
levoglucosan (L)	88-1210	403	298	0.13-67	25	24
L/M ratio	26-59	40	8.6	2.5-48	25	11
L/(G+M) ratio	15-28	22	3.5	0.4-28	14	6.4
<i>Sugars</i>						
fructose	3.6-37	13	7.3	0.15-10	4.1	3.0
glucose	6.0-76	27	18	0.63-39	19	12
sucrose	4.2-54	16	11	0.72-22	11	6.4
trehalose	1.8-106	23	22	0.66-17	9.0	6.4
<i>Sugar alcohols</i>						
glycerol	7.0-74	25	14	0.32-14	6.5	4.2
arabitol	11-231	90	55	0.93-18	11	6.0
mannitol	8.4-250	90	59	1.1-62	24	20
inositol	1.0-8.5	3.2	2.2	0.11-2.4	1.1	0.68
subtotal	159-2060	706	437	8.2-242	112	76
V. Lignin and resin products						
vanillin	0.10-17	2.6	3.9	0.01-0.80	0.20	0.23
vanillic acid	0.47-9.0	3.2	2.5	0.02-0.59	0.22	0.17
syringic acid	0.31-5.4	1.7	1.3	0.01-0.40	0.13	0.12
dehydroabietic acid	0.17-20	3.4	4.0	0.01-1.0	0.53	0.36
subtotal	1.3-52	11	11	0.05-2.0	1.1	0.64
VI. Sterols						
cholesterol	nd-10	3.2	2.7	0.16-8.7	4.3	2.6
β-cholesterol	nd-18	3.0	4.9	nd-31	7.3	9.6
stigmasterol	nd-2.7	0.83	0.67	nd-1.6	0.47	0.51
β-sitosterol	nd-34.5	5.1	8.1	nd-13	3.2	3.7
subtotal	0.23-40	12	11	0.16-44	15	12
VII. Polyacids						
glyceric	9.1-143	42	32	0.54-18	8.0	5.3
malic	21-260	80	51	1.7-38	22	13
tartaric	0.70-16	5.3	3.6	0.30-3.3	1.5	0.81
citric	0.47-14	4.1	3.3	0.04-2.1	0.81	0.55
tricarballic	4.1-66	22	15	0.55-14	8.0	4.1
subtotal	38-499	153	103	3.1-69	41	22
VIII. Aromatic acids						
benzoic	2.4-12	5.8	2.6	0.88-57	9.8	15

Compounds	Early June			Late June		
	range	mean	std	range	mean	std
<i>o</i> -toluic	0.09-1.1	0.43	0.26	0.02-1.3	0.27	0.33
<i>m</i> -toluic	0.19-1.5	0.66	0.33	0.08-3.3	0.72	0.81
<i>p</i> -toluic	0.22-1.5	0.70	0.33	0.03-2.3	0.50	0.58
phthalic	9.7-82	32	17	0.57-39	16	12
<i>iso</i> -phthalic (i-ph)	0.70-11	3.7	2.7	0.07-3.5	1.2	0.94
<i>tere</i> -phthalic (t-ph)	4.0-67	19	14	0.11-11	4.4	3.3
2-hydroxybenzoic (salicylic)	1.1-14	6.2	3.7	0.18-3.5	1.9	1.1
3-hydroxybenzoic	0.30-2.5	1.3	0.70	0.01-0.97	0.39	0.29
4-hydroxybenzoic	2.1-30	11	8.4	0.13-2.4	1.1	0.71
3,4-dihydroxybenzoic	1.3-21	7.4	6.4	0.02-1.4	0.66	0.40
subtotal	26-179	88	48	2.1-115	37	30
IX. Biogenic SOA tracers						
<i>Isoprene SOA tracers</i>						
2-methylglyceric acid	9.0-80	42	19	0.86-94	28	28
Σ C ₅ -alkene triols	12-67	33	15	1.0-36	18	11
2-methylthreitol	7.2-78	30	19	0.18-52	21	19
2-methylerythritol	15-143	58	35	0.51-119	43	37
Σ isoprene SOA tracers	48-340	164	83	2.6-301	110	92
<i>α-/β-pinene SOA tracers</i>						
<i>cis</i> -pinonic acid	3.0-38	13	8.7	0.09-7.6	4.0	2.4
pinic acid	0.14-1.8	0.67	0.41	nd-0.93	0.32	0.22
3-hydroxyglutaric acid	15-120	43	25	1.2-31	18	10
HDCCA ^d	0.3-1.4	0.7	0.3	0.04-1.4	0.7	0.4
3-acetylglutaric acid	0.4-1.6	0.9	0.4	0.07-1.5	0.8	0.4
3-acetyladipic acid	0.2-2.4	0.7	0.5	0.01-0.3	0.2	0.1
3-isopropylglutaric acid	0.8-5.4	3.2	1.4	0.06-3.4	1.7	1.2
MBTCA ^e	1.6-21	8.3	5.2	0.42-11	5.8	3.2
Σ monoterpene SOA tracers	26-167	71	36	1.9-56	31	16
<i>β-Caryophyllene SOA tracer</i>						
β -caryophyllinic acid	3.2-48	18	13	0.05-8.7	4.0	3.2
subtotal	86-481	253	108	4.5-347	146	106
X. Phthalate esters						
dimethyl (DMP)	0.01-9.7	2.2	2.4	0.08-3.9	0.90	0.99
diethyl (DEP)	0.10-5.8	1.7	1.6	0.02-2.2	1.1	0.75
diisobutyl (DiBP)	16-143	58	36	8.0-665	248	206
di-n-butyl (DnBP)	18-94	47	23	5.1-406	149	123
subtotal	39-240	109	58	13-1070	400	330
XI. Hopanes						
C ₂₇ α	nd-0.15	0.05	0.05	0.01-0.25	0.09	0.07
C ₂₇ β	nd-0.20	0.06	0.05	nd-0.19	0.06	0.05
C ₂₉ $\alpha\beta$	0.05-0.50	0.21	0.11	0.01-0.72	0.24	0.20
C ₂₉ $\beta\alpha$	nd-0.19	0.06	0.06	nd-0.29	0.08	0.07
C ₃₀ $\alpha\beta$	0.06-0.84	0.35	0.20	0.02-0.76	0.41	0.29
C ₃₀ $\beta\alpha$	nd-0.12	0.05	0.03	0.01-0.18	0.06	0.06
C ₃₁ $\alpha\beta$ S	nd-0.24	0.08	0.06	0.01-0.45	0.16	0.15
C ₃₁ $\alpha\beta$ R	nd-0.27	0.05	0.06	nd-0.25	0.12	0.09
C ₃₁ $\beta\alpha$	nd-0.61	0.12	0.14	0.03-0.36	0.16	0.11
C ₃₂ $\alpha\beta$ S	nd-0.30	0.10	0.10	0.02-0.43	0.15	0.13
C ₃₂ $\alpha\beta$ R	nd-0.21	0.09	0.06	0.01-0.32	0.11	0.09
subtotal	0.50-2.0	1.2	0.41	0.16-2.9	1.6	1.0
XII. PAHs						
phenanthrene (Phen)	0.01-1.2	0.30	0.33	nd-1.1	0.39	0.34
anthracene (Anthr)	nd-0.07	0.02	0.02	nd-0.10	0.04	0.04
fluoranthene (Flu)	0.25-3.8	1.9	1.2	nd-6.9	1.6	1.8

Compounds	Early June			Late June		
	range	mean	std	range	mean	std
pyrene (Pyr)	0.31-3.4	1.7	1.0	nd-5.5	1.3	1.4
benzo(b)fluorine (BbFlr)	nd-0.27	0.05	0.07	nd-1.1	0.20	0.28
benz(a)anthracene (BaA)	0.01-1.5	0.21	0.36	nd-1.5	0.32	0.39
chrysene/triphenylene(Chry/Trp)	nd-1.8	0.26	0.46	nd-3.5	0.96	0.98
benzo(b)fluoranthene (BbF)	0.53-4.6	2.0	1.3	nd-5.1	1.9	1.5
benzo(k)fluoranthene (BkF)	0.22-3.4	1.5	0.95	nd-1.9	0.74	0.55
benzo(e)pyrene (BeP)	0.17-2.1	1.0	0.59	nd-2.4	0.89	0.68
benzo(a)pyrene (BaP)	0.03-2.0	0.67	0.54	nd-2.1	0.66	0.58
perylene (Per)	0.01-0.22	0.06	0.05	nd-0.61	0.17	0.17
indeno(1,2,3-cd)pyrene (IP)	0.30-2.4	1.3	0.72	nd-2.4	0.87	0.70
dibenz(a,h)anthracene (DbahA)	nd-0.13	0.03	0.03	nd-0.44	0.13	0.12
benzo(ghi)perylene (BghiP)	0.38-3.0	1.5	0.80	nd-2.6	1.0	0.80
anthanthrene (AA)	nd-0.51	0.07	0.10	nd-0.28	0.13	0.09
coronene (Cor)	0.03-1.9	0.44	0.51	nd-1.7	0.66	0.53
subtotal	2.7-25	13	7.3	nd-39	12	11
Total measured organics (ng m ⁻³)	610-5840	2086	1174	36-1990	926	574
Total organics/OC (%) ^f	3.4-8.1	5.8	1.3	1.1-11	6.8	2.2
Water-soluble organics/WSOC (%) ^g	2.7-6.1	3.8	0.9	0.5-4.3	3.2	1.0

^a std = standard deviation. ^b nd = not detected. ^c CPI = carbon preference index:

$$(C_{21}+C_{23}+C_{25}+C_{27}+C_{29}+C_{31}+C_{33}+C_{35})/(C_{22}+C_{24}+C_{26}+C_{28}+C_{30}+C_{32}+C_{34}+C_{36})$$
 for *n*-alkanes;

$$(C_{20}+C_{22}+C_{24}+C_{26}+C_{28}+C_{30}+C_{32})/(C_{21}+C_{23}+C_{25}+C_{27}+C_{29}+C_{31})$$
 for fatty acids. ^d HDCCA: 3-(2-hydroxyethyl)-2,2-dimethylcyclobutane carboxylic acid. ^e MBTCA: 3-methyl-1,2,3-butane tricarboxylic acid. ^f All the quantified organic compounds were converted to their carbon contents to calculate the OC and WSOC ratios. ^g Water-soluble organics: sugars, aliphatic hydroxy-/polyacids, biogenic SOA tracers, benzoic acid, *o*-phthalic acid and vanillic acid. The last two acids are slightly soluble in water.

Fig. S1. Linear correlations between levoglucosan and other parameters measured in the Mt. Tai aerosols.

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42 **Fig. S2.** Diurnal variations of aromatic acids in the Mt. Tai aerosols.

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Fig. S3. Molecular distributions of (a) *n*-alkanes, (b) fatty acids, and (c) fatty alcohols in the Mt. Tai aerosols.