



Supplement of

Particle sized-resolved source apportionment of primary and secondary organic tracer compounds at urban and rural locations in Spain

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Table S1. Summary of meteorological conditions in Warm and Cold sampling periods in the Rural and Urban site.

		Rural				Urban			
		warm		cold		warm		cold	
		<i>mean</i>	<i>sd</i>	<i>mean</i>	<i>sd</i>	<i>mean</i>	<i>sd</i>	<i>mean</i>	<i>sd</i>
Temp.	(°C)	20	± 7	4	± 10	22	± 2	10	± 2
Rel.Humidity	(%)	69	± 23	80	± 22	55	± 3	72	± 8
Wind Speed	(m/s)	4	± 4	2	± 4	2	± 0	3	± 1
Wind Dir.	(°)	78	± 40	176	± 126	187	± 23	162	± 103
Atm.Pressure	(mbar)	1014	± 3	1008	± 26	1010	± 3	1005	± 1

Table S2a-b. Summary of organic tracer compound concentrations in Warm and Cold sampling periods in the Rural site.

RURAL (ng/m ³)	Warm period					
	>7.2 µm	7.2 - 3.0 µm	3.0 - 1.5 µm	1.5 - 1.0 µm	1.0 - 0.5 µm	<0.5 µm
succinic acid (SA)	4.1 ± 1.1	4.3 ± 0.6	6.9 ± 0.4	10.0 ± 1.5	11.0 ± 0.9	37.3 ± 1.2
glutaric acid (GA)	0.5 ± 0.0	0.4 ± 0.0	0.6 ± 0.1	1.0 ± 0.1	1.9 ± 1.0	4.7 ± 0.2
adipic acid (AdA)	0.8 ± 0.7	0.2 ± 0.0	0.3 ± 0.2	0.5 ± 0.0	0.7 ± 0.3	1.6 ± 0.2
pimelic acid (PA)	0.4 ± 0.1	0.4 ± 0.2	0.5 ± 0.0	0.4 ± 0.1	0.5 ± 0.1	1.6 ± 0.5
suberic acid (SbA)	0.7 ± 0.7	0.3 ± 0.1	0.3 ± 0.2	0.4 ± 0.0	0.5 ± 0.2	1.2 ± 0.4
azelaic acid (AzA)	1.6 ± 1.3	0.9 ± 0.2	1.7 ± 0.3	2.2 ± 0.2	2.1 ± 0.2	12.7 ± 2.6
glyceric acid (GyA)	0.8 ± 0.1	0.6 ± 0.2	1.3 ± 0.0	2.5 ± 1.0	2.5 ± 0.8	10.1 ± 0.1
malic acid (MA)	0.5 ± 0.1	0.7 ± 0.2	2.1 ± 1.9	2.4 ± 1.8	3.1 ± 1.9	90.4 ± 8.6
3-hydroxyglutaric acid (3HGA)	0.1 ± 0.0	0.1 ± 0.0	0.2 ± 0.2	0.4 ± 0.5	0.9 ± 1.2	46.5 ± 4.5
MBTCA	0.1 ± 0.0	0.1 ± 0.0	0.1 ± 0.0	0.1 ± 0.0	0.7 ± 0.9	44.3 ± 3.1
cis-pinonic acid (CPA)	16.6 ± 7.1	24.0 ± 9.7	26.7 ± 9.3	29.8 ± 10.5	23.6 ± 22.4	14.3 ± 1.0
pinic acid (PNA)	9.2 ± 1.0	10.0 ± 1.3	19.0 ± 1.2	23.9 ± 2.6	17.7 ± 19.7	151.8 ± 13.6
2-methylglyceric acid (2MGA)	6.2 ± 2.7	7.8 ± 2.3	16.7 ± 8.2	18.5 ± 10.9	7.0 ± 7.9	41.4 ± 0.1
C5-alkene triols (C5T)	1.5 ± 0.7	1.9 ± 0.9	2.8 ± 1.7	5.8 ± 2.3	8.5 ± 10.3	123.5 ± 20.9
2-methylthreitol (2MT1)	5.0 ± 1.2	14.4 ± 7.3	18.1 ± 9.9	15.1 ± 8.5	8.0 ± 9.6	60.3 ± 2.9
2-methylerythritol (2MT2)	11.4 ± 2.0	32.8 ± 19.8	48.4 ± 32.0	43.7 ± 19.9	23.3 ± 28.9	221.0 ± 35.5
phthalic acid (PhA)	1.1 ± 0.6	1.2 ± 0.6	2.1 ± 1.2	2.4 ± 1.1	2.4 ± 2.7	11.2 ± 4.9
terephthalic acid (TPhA)	1.9 ± 1.0	1.9 ± 1.7	3.5 ± 2.9	2.7 ± 0.1	2.7 ± 0.6	4.3 ± 1.4
nicotine (NIC)	0.1 ± 0.0	0.1 ± 0.0	0.1 ± 0.0	0.1 ± 0.0	0.1 ± 0.0	0.6 ± 0.7
galactosan (G)	0.0 ± 0.0	0.1 ± 0.0	0.1 ± 0.0	0.2 ± 0.0	0.2 ± 0.1	1.2 ± 0.1
mannosan (M)	0.0 ± 0.0	0.1 ± 0.0	0.1 ± 0.0	0.2 ± 0.0	0.1 ± 0.1	0.6 ± 0.1
levoglucosan (L)	0.1 ± 0.0	0.4 ± 0.0	0.4 ± 0.2	0.9 ± 0.2	0.7 ± 0.6	6.3 ± 0.6
xylitol (X)	8.4 ± 6.5	49.7 ± 27.7	125.2 ± 79.7	64.6 ± 38.1	22.3 ± 14.7	11.5 ± 7.5
mannitol (MaOL)	6.1 ± 4.6	43.8 ± 15.5	70.4 ± 2.8	31.3 ± 4.3	12.5 ± 5.3	4.8 ± 2.2
α-glucose (αGL)	14.9 ± 9.6	77.6 ± 53.1	85.8 ± 10.6	45.2 ± 0.7	20.4 ± 8.7	14.6 ± 11.1
β-glucose (βGL)	18.4 ± 12.6	88.2 ± 58.4	98.8 ± 7.6	53.2 ± 2.7	21.8 ± 7.2	15.8 ± 11.6
dehydrabietic acid (DHA)	0.2 ± 0.0	0.3 ± 0.2	0.3 ± 0.0	0.2 ± 0.1	0.1 ± 0.1	0.6 ± 0.3
sucrose (S)	14.8 ± 6.9	14.0 ± 9.0	6.3 ± 7.2	1.8 ± 1.0	1.0 ± 0.4	7.8 ± 1.4
mycose (My)	1.9 ± 0.9	34.5 ± 17.5	46.8 ± 27.1	11.0 ± 6.9	2.9 ± 0.5	2.4 ± 0.9
C16:0	19.7 ± 12.4	15.5 ± 1.7	12.1 ± 0.4	15.4 ± 0.5	9.7 ± 2.8	25.4 ± 3.6
C17:0	0.8 ± 0.4	0.5 ± 0.1	0.5 ± 0.0	0.5 ± 0.1	0.4 ± 0.2	1.2 ± 0.1

C18:1	2.6 ± 2.4	2.3 ± 0.9	1.8 ± 0.5	1.2 ± 0.6	0.8 ± 0.3	1.7 ± 1.4
C18:0	4.1 ± 1.8	6.1 ± 0.7	4.2 ± 0.8	3.9 ± 0.0	1.9 ± 0.8	7.4 ± 2.1
C19:0	0.1 ± 0.1	0.2 ± 0.0	0.2 ± 0.0	0.2 ± 0.0	0.2 ± 0.2	0.5 ± 0.0
C20:0	0.4 ± 0.2	0.5 ± 0.2	0.5 ± 0.1	0.4 ± 0.0	0.2 ± 0.2	1.5 ± 0.0
C21:0	0.1 ± 0.0	0.1 ± 0.1	0.2 ± 0.2	0.1 ± 0.0	0.1 ± 0.0	0.5 ± 0.1
fluorenone (flo)	0.00 ± 0.00	0.01 ± 0.00				
phenanthraquinone (pheno)	0.00 ± 0.00					
anthracenequinone (anto)	0.00 ± 0.00	0.03 ± 0.00				
benzo[a]fluorenone (baflo)	0.00 ± 0.00	0.01 ± 0.00				
benzo[b]fluorenone (bbflo)	0.00 ± 0.00	0.01 ± 0.00				
benzanthrenone (bao)	0.00 ± 0.00	0.01 ± 0.00				
phenanthrene (phe)	0.00 ± 0.00	0.03 ± 0.01				
anthracene (ant)	0.00 ± 0.00	0.01 ± 0.00				
fluoranthene (fla)	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.05 ± 0.01
pyrene (pyr)	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.07 ± 0.02
retene (ret)	0.00 ± 0.00					
benz[a]anthracene (baa)	0.00 ± 0.00	0.02 ± 0.01				
chrysene (chry)	0.00 ± 0.00	0.04 ± 0.02				
benzo[b+j]fluoranthene (bbjfla)	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.01 ± 0.00	0.10 ± 0.06
benzo[k]fluoranthene (bkfla)	0.00 ± 0.00	0.03 ± 0.02				
benzo[e]pyrene (bep)	0.00 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.13 ± 0.07
benzo[a]pyrene (bap)	0.00 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.08 ± 0.03
indeno[123cd]pyrene (ip)	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.11 ± 0.05
dibenz[ah]anthracene (dba)	0.00 ± 0.00	0.03 ± 0.01				
benzo[ghi]perylene (bgp)	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.01	0.02 ± 0.01	0.15 ± 0.07
coronene (cor)	0.00 ± 0.00	0.01 ± 0.00	0.00 ± 0.00	0.01 ± 0.01	0.01 ± 0.00	0.06 ± 0.03
17a(H)21β(H)-29-norhopane (norHop)	0.03 ± 0.00	0.03 ± 0.01	0.03 ± 0.01	0.02 ± 0.00	0.05 ± 0.04	0.30 ± 0.06
17a(H)21β(H)-hopane (Hop)	0.03 ± 0.01	0.03 ± 0.01	0.02 ± 0.01	0.02 ± 0.00	0.04 ± 0.03	0.27 ± 0.07
nC20	0.03 ± 0.01	0.02 ± 0.00	0.01 ± 0.01	0.02 ± 0.00	0.04 ± 0.03	0.02 ± 0.01
nC21	0.09 ± 0.05	0.07 ± 0.06	0.04 ± 0.04	0.05 ± 0.00	0.08 ± 0.05	0.13 ± 0.03
nC22	0.09 ± 0.08	0.06 ± 0.00	0.03 ± 0.03	0.07 ± 0.01	0.13 ± 0.09	0.06 ± 0.03
nC23	0.05 ± 0.03	0.05 ± 0.02	0.02 ± 0.02	0.05 ± 0.01	0.07 ± 0.04	0.08 ± 0.04
nC24	0.04 ± 0.04	0.04 ± 0.00	0.02 ± 0.01	0.04 ± 0.01	0.06 ± 0.04	0.11 ± 0.04
nC25	0.15 ± 0.05	0.18 ± 0.08	0.10 ± 0.02	0.18 ± 0.01	0.24 ± 0.03	0.27 ± 0.16
nC26	0.08 ± 0.05	0.06 ± 0.02	0.03 ± 0.01	0.07 ± 0.02	0.13 ± 0.10	0.27 ± 0.27
nC27	0.21 ± 0.04	0.35 ± 0.15	0.22 ± 0.02	0.29 ± 0.04	0.27 ± 0.02	0.46 ± 0.36
nC28	0.08 ± 0.05	0.08 ± 0.01	0.04 ± 0.01	0.08 ± 0.03	0.06 ± 0.01	0.16 ± 0.16

nC29	0.27 ± 0.06	0.57 ± 0.19	0.42 ± 0.10	0.59 ± 0.03	0.41 ± 0.17	0.46 ± 0.26
nC30	0.05 ± 0.03	0.06 ± 0.02	0.03 ± 0.01	0.05 ± 0.01	0.07 ± 0.03	0.14 ± 0.09
nC31	0.16 ± 0.02	0.39 ± 0.09	0.23 ± 0.03	0.38 ± 0.13	0.24 ± 0.16	0.39 ± 0.13
nC32	0.06 ± 0.04	0.06 ± 0.01	0.04 ± 0.03	0.06 ± 0.01	0.08 ± 0.04	0.08 ± 0.04
nC33	0.06 ± 0.02	0.08 ± 0.02	0.05 ± 0.02	0.07 ± 0.00	0.08 ± 0.02	0.14 ± 0.05
nC34	0.05 ± 0.04	0.04 ± 0.00	0.02 ± 0.01	0.04 ± 0.00	0.03 ± 0.00	0.04 ± 0.01

(ng/m ³)	Cold period					
	>7.2 µm	7.2 - 3.0 µm	3.0 - 1.5 µm	1.5 - 1.0 µm	1.0 - 0.5 µm	<0.5 µm
succinic acid (SA)	4.1 ± 1.2	4.7 ± 1.1	5.8 ± 3.4	7.5 ± 2.5	10.5 ± 1.5	35.8 ± 13.3
glutaric acid (GA)	1.5 ± 1.0	1.5 ± 1.2	2.0 ± 1.4	2.4 ± 1.2	2.9 ± 0.0	11.4 ± 4.1
adipic acid (AdA)	1.6 ± 1.4	0.5 ± 0.4	0.7 ± 0.2	0.7 ± 0.4	0.9 ± 0.3	2.3 ± 0.3
pimelic acid (PA)	0.3 ± 0.2	0.2 ± 0.1	0.3 ± 0.2	0.4 ± 0.1	0.5 ± 0.1	4.0 ± 0.5
suberic acid (SbA)	0.8 ± 0.7	0.3 ± 0.2	0.3 ± 0.1	0.5 ± 0.2	0.7 ± 0.2	4.7 ± 0.6
azelaic acid (AzA)	2.2 ± 1.8	1.3 ± 0.7	1.5 ± 0.6	2.8 ± 0.9	5.3 ± 0.9	63.9 ± 5.4
glyceric acid (GyA)	2.4 ± 1.2	1.8 ± 1.6	2.4 ± 2.6	2.6 ± 2.4	3.5 ± 1.9	11.6 ± 4.4
malic acid (MA)	0.1 ± 0.1	0.2 ± 0.1	0.5 ± 0.1	0.5 ± 0.3	0.9 ± 0.3	25.2 ± 3.9
3-hydroxyglutaric acid (3HGA)	0.1 ± 0.0	0.1 ± 0.0	0.2 ± 0.1	0.1 ± 0.0	0.3 ± 0.0	7.6 ± 1.0
MBTCA	0.1 ± 0.0	0.1 ± 0.0	0.1 ± 0.0	0.1 ± 0.0	0.3 ± 0.3	6.4 ± 0.3
cis-pinonic acid (CPA)	4.8 ± 1.0	9.5 ± 0.4	8.5 ± 2.7	9.3 ± 1.6	9.6 ± 0.1	6.6 ± 0.6
pinic acid (PNA)	2.1 ± 2.0	2.9 ± 2.1	3.9 ± 3.3	4.5 ± 2.8	5.7 ± 3.2	31.7 ± 15.7
2-methylglyceric acid (2MGA)	0.4 ± 0.3	0.7 ± 0.6	0.8 ± 0.7	0.8 ± 0.5	1.0 ± 0.6	2.6 ± 0.8
C5-alkene triols (C5T)	0.1 ± 0.1	0.1 ± 0.1	0.1 ± 0.0	0.2 ± 0.2	0.4 ± 0.3	1.5 ± 0.2
2-methylthreitol (2MT1)	0.2 ± 0.0	0.3 ± 0.2	0.4 ± 0.2	0.3 ± 0.0	0.5 ± 0.2	0.5 ± 0.1
2-methylerythritol (2MT2)	0.3 ± 0.0	0.4 ± 0.0	0.7 ± 0.3	0.7 ± 0.2	1.0 ± 0.6	5.2 ± 4.4
phthalic acid (PhA)	3.5 ± 3.8	4.9 ± 5.1	4.8 ± 4.8	5.3 ± 4.9	7.0 ± 6.0	7.4 ± 2.4
terephthalic acid (TPhA)	18.6 ± 17.5	28.9 ± 34.8	33.6 ± 40.8	33.5 ± 36.1	37.6 ± 30.5	28.8 ± 13.8
nicotine (NIC)	0.1 ± 0.0	1.7 ± 2.2				
galactosan (G)	0.8 ± 0.1	1.4 ± 0.1	2.8 ± 0.1	6.2 ± 2.3	18.0 ± 1.4	160.4 ± 52.3
mannosan (M)	0.6 ± 0.0	1.1 ± 0.0	2.7 ± 0.2	7.2 ± 2.4	24.1 ± 8.0	216.3 ± 22.0
levoglucosan (L)	4.5 ± 1.5	9.8 ± 1.6	20.3 ± 2.0	63.2 ± 1.9	173.4 ± 20.4	1329 ± 275.0
xylitol (X)	0.6 ± 0.1	2.8 ± 2.1	8.0 ± 6.1	5.9 ± 3.9	3.9 ± 2.2	14.5 ± 4.8
mannitol (MaOL)	0.4 ± 0.3	1.8 ± 1.9	4.2 ± 3.6	2.2 ± 1.3	0.8 ± 0.7	0.8 ± 0.3
α-glucose (αGL)	2.4 ± 2.1	10.6 ± 11.4	11.5 ± 12.7	6.0 ± 5.2	3.4 ± 1.3	12.5 ± 5.5
β-glucose (βGL)	3.5 ± 2.3	14.3 ± 16.0	13.9 ± 15.2	8.4 ± 7.4	4.3 ± 1.6	14.5 ± 3.1

	1.2 ± 0.8	4.4 ± 1.1	6.8 ± 1.7	24.2 ± 7.3	81.2 ± 5.7	350.0 ± 94.1
dehydrabietic acid (DHA)	1.2 ± 0.8	4.4 ± 1.1	6.8 ± 1.7	24.2 ± 7.3	81.2 ± 5.7	350.0 ± 94.1
sucrose (S)	4.8 ± 2.2	0.9 ± 0.8	0.6 ± 0.1	1.3 ± 0.2	1.1 ± 0.2	10.8 ± 2.8
mycose (My)	0.4 ± 0.2	2.8 ± 3.7	2.7 ± 2.6	1.9 ± 1.2	0.9 ± 0.5	1.4 ± 0.4
C16:0	14.6 ± 13.7	8.4 ± 1.8	5.2 ± 2.0	7.5 ± 2.7	13.1 ± 2.2	73.7 ± 3.2
C17:0	0.7 ± 0.6	0.4 ± 0.0	0.3 ± 0.0	0.6 ± 0.1	0.9 ± 0.0	4.4 ± 0.2
C18:1	9.1 ± 12.1	1.6 ± 0.7	1.4 ± 1.0	1.2 ± 0.6	3.8 ± 1.6	17.4 ± 0.8
C18:0	3.3 ± 3.2	4.0 ± 0.7	2.3 ± 0.6	2.9 ± 0.8	5.2 ± 0.6	49.3 ± 2.1
C19:0	0.2 ± 0.1	0.2 ± 0.1	0.1 ± 0.0	0.4 ± 0.0	1.1 ± 0.1	3.4 ± 0.1
C20:0	0.4 ± 0.4	0.4 ± 0.1	0.3 ± 0.0	0.8 ± 0.2	2.2 ± 0.6	12.0 ± 0.5
C21:0	0.1 ± 0.0	0.1 ± 0.0	0.1 ± 0.0	0.3 ± 0.1	0.8 ± 0.3	5.0 ± 0.2
fluorenone (flo)	0.02 ± 0.01	0.02 ± 0.01	0.01 ± 0.01	0.01 ± 0.00	0.02 ± 0.00	0.14 ± 0.09
phenanthraquinone (pheno)	0.10 ± 0.12	0.12 ± 0.12	0.08 ± 0.08	0.07 ± 0.04	0.10 ± 0.03	0.81 ± 0.47
anthracenequinone (anto)	0.03 ± 0.03	0.04 ± 0.04	0.03 ± 0.02	0.03 ± 0.02	0.03 ± 0.02	0.22 ± 0.11
benzo[a]fluorenone (baflo)	0.02 ± 0.03	0.04 ± 0.04	0.02 ± 0.01	0.01 ± 0.01	0.03 ± 0.02	0.59 ± 0.31
benzo[b]fluorenone (bbflo)	0.02 ± 0.03	0.04 ± 0.05	0.01 ± 0.01	0.01 ± 0.01	0.03 ± 0.03	0.79 ± 0.25
benzanthrenone (bao)	0.04 ± 0.05	0.08 ± 0.10	0.03 ± 0.01	0.03 ± 0.03	0.07 ± 0.07	1.15 ± 0.17
phenanthrene (phe)	0.02 ± 0.02	0.03 ± 0.03	0.02 ± 0.01	0.01 ± 0.01	0.02 ± 0.01	0.26 ± 0.12
anthracene (ant)	0.00 ± 0.00	0.05 ± 0.01				
fluoranthene (fla)	0.08 ± 0.08	0.14 ± 0.13	0.06 ± 0.03	0.05 ± 0.02	0.08 ± 0.03	1.23 ± 0.73
pyrene (pyr)	0.09 ± 0.08	0.17 ± 0.16	0.07 ± 0.03	0.06 ± 0.02	0.10 ± 0.05	1.63 ± 0.92
retene (ret)	0.25 ± 0.30	0.43 ± 0.48	0.19 ± 0.17	0.12 ± 0.00	0.22 ± 0.01	2.03 ± 1.49
benz[a]anthracene (baa)	0.05 ± 0.05	0.15 ± 0.18	0.03 ± 0.01	0.03 ± 0.03	0.10 ± 0.11	1.43 ± 0.71
chrysene (chry)	0.07 ± 0.08	0.18 ± 0.21	0.05 ± 0.02	0.05 ± 0.04	0.12 ± 0.12	1.55 ± 0.82
benzo[b+j]fluoranthenene (bbjfla)	0.09 ± 0.10	0.24 ± 0.29	0.05 ± 0.01	0.08 ± 0.09	0.22 ± 0.26	2.02 ± 0.47
benzo[k]fluoranthenene (bkfla)	0.02 ± 0.03	0.07 ± 0.09	0.01 ± 0.00	0.02 ± 0.03	0.06 ± 0.07	0.73 ± 0.20
benzo[e]pyrene (bep)	0.07 ± 0.07	0.15 ± 0.16	0.05 ± 0.01	0.06 ± 0.06	0.13 ± 0.13	1.04 ± 0.27
benzo[a]pyrene (bap)	0.07 ± 0.07	0.17 ± 0.21	0.04 ± 0.00	0.06 ± 0.07	0.16 ± 0.20	0.99 ± 0.27
indeno[123cd]pyrene (ip)	0.06 ± 0.06	0.14 ± 0.16	0.04 ± 0.00	0.06 ± 0.07	0.14 ± 0.16	1.14 ± 0.29
dibenz[ah]anthracene (dba)	0.02 ± 0.02	0.04 ± 0.04	0.01 ± 0.00	0.01 ± 0.02	0.03 ± 0.04	0.35 ± 0.09
benzo[ghi]perylene (bgp)	0.06 ± 0.06	0.13 ± 0.13	0.05 ± 0.00	0.06 ± 0.06	0.13 ± 0.14	0.82 ± 0.19
coronene (cor)	0.03 ± 0.02	0.06 ± 0.06	0.02 ± 0.00	0.03 ± 0.03	0.07 ± 0.07	0.44 ± 0.09
17a(H)21β(H)-29-norhopane (norHop)	0.04 ± 0.02	0.05 ± 0.01	0.03 ± 0.01	0.02 ± 0.01	0.04 ± 0.00	0.12 ± 0.00
17a(H)21β(H)-hopane (Hop)	0.03 ± 0.02	0.03 ± 0.01	0.02 ± 0.00	0.02 ± 0.00	0.03 ± 0.01	0.13 ± 0.01
nC20	0.10 ± 0.04	0.11 ± 0.10	0.07 ± 0.04	0.04 ± 0.01	0.07 ± 0.01	0.65 ± 0.42
nC21	0.18 ± 0.00	0.24 ± 0.09	0.19 ± 0.10	0.12 ± 0.10	0.13 ± 0.04	1.40 ± 1.07
nC22	0.17 ± 0.11	0.28 ± 0.30	0.09 ± 0.05	0.07 ± 0.03	0.12 ± 0.04	2.16 ± 1.60
nC23	0.24 ± 0.10	0.38 ± 0.39	0.11 ± 0.02	0.09 ± 0.07	0.16 ± 0.11	2.71 ± 1.27

nC24	0.22 ± 0.16	0.38 ± 0.43	0.09 ± 0.03	0.08 ± 0.07	0.16 ± 0.13	2.05 ± 0.75
nC25	0.29 ± 0.15	0.45 ± 0.47	0.12 ± 0.04	0.12 ± 0.09	0.20 ± 0.15	1.74 ± 0.33
nC26	0.25 ± 0.18	0.42 ± 0.49	0.11 ± 0.04	0.11 ± 0.08	0.20 ± 0.18	1.12 ± 0.18
nC27	0.31 ± 0.13	0.50 ± 0.35	0.19 ± 0.01	0.17 ± 0.15	0.27 ± 0.19	1.39 ± 0.11
nC28	0.24 ± 0.16	0.38 ± 0.42	0.11 ± 0.04	0.12 ± 0.09	0.19 ± 0.17	0.96 ± 0.02
nC29	0.43 ± 0.21	0.64 ± 0.33	0.35 ± 0.01	0.29 ± 0.24	0.52 ± 0.28	2.48 ± 1.06
nC30	0.17 ± 0.15	0.28 ± 0.29	0.09 ± 0.04	0.07 ± 0.05	0.16 ± 0.13	0.60 ± 0.16
nC31	0.30 ± 0.21	0.49 ± 0.28	0.25 ± 0.04	0.22 ± 0.20	0.48 ± 0.34	2.43 ± 1.80
nC32	0.17 ± 0.09	0.22 ± 0.22	0.07 ± 0.04	0.06 ± 0.01	0.12 ± 0.09	0.44 ± 0.05
nC33	0.17 ± 0.06	0.22 ± 0.21	0.08 ± 0.04	0.04 ± 0.01	0.13 ± 0.06	0.60 ± 0.08
nC34	0.14 ± 0.05	0.16 ± 0.16	0.06 ± 0.02	0.04 ± 0.00	0.06 ± 0.03	0.19 ± 0.09

Table S2c-d. Summary of organic tracer compound concentrations in Warm and Cold sampling periods in the Urban site.

URBAN (ng/m ³)	Warm period					
	>7.2 µm	7.2 - 3.0 µm	3.0 - 1.5 µm	1.5 - 1.0 µm	1.0 - 0.5 µm	<0.5 µm
succinic acid (SA)	0.8 ± 0.6	1.2 ± 0.4	2.6 ± 1.0	3.9 ± 0.2	6.2 ± 2.2	9.5 ± 6.5
glutaric acid (GA)	0.4 ± 0.3	0.4 ± 0.1	0.6 ± 0.1	1.0 ± 0.1	1.4 ± 0.4	2.6 ± 2.0
adipic acid (AdA)	0.2 ± 0.0	0.2 ± 0.0	0.3 ± 0.1	0.3 ± 0.1	0.5 ± 0.2	1.1 ± 0.4
pimelic acid (PA)	0.4 ± 0.1	0.4 ± 0.1	0.4 ± 0.1	0.4 ± 0.1	0.4 ± 0.1	1.0 ± 0.5
suberic acid (SbA)	0.1 ± 0.1	0.1 ± 0.0	0.2 ± 0.0	0.3 ± 0.0	0.4 ± 0.2	1.2 ± 0.0
azelaic acid (AzA)	0.9 ± 0.1	0.8 ± 0.0	1.1 ± 0.0	1.8 ± 0.3	2.8 ± 1.2	10.2 ± 1.6
glyceric acid (GyA)	1.0 ± 0.8	0.7 ± 0.0	0.9 ± 0.4	1.4 ± 0.6	1.5 ± 0.6	3.0 ± 1.1
malic acid (MA)	0.2 ± 0.1	0.3 ± 0.0	0.7 ± 0.2	1.0 ± 0.0	1.3 ± 0.4	16.0 ± 7.3
3-hydroxyglutaric acid (3HGA)	0.1 ± 0.0	0.1 ± 0.0	0.1 ± 0.0	0.1 ± 0.1	0.2 ± 0.1	5.7 ± 1.0
MBTCA	0.1 ± 0.0	0.1 ± 0.0	0.1 ± 0.0	0.1 ± 0.0	0.1 ± 0.0	7.4 ± 4.2
cis-pinonic acid (CPA)	6.6 ± 2.0	8.9 ± 2.6	12.6 ± 3.8	12.6 ± 4.9	12.0 ± 5.9	10.1 ± 12.5
pinic acid (PNA)	0.6 ± 0.4	0.4 ± 0.3	0.6 ± 0.2	1.5 ± 1.0	2.7 ± 1.7	11.4 ± 4.1
2-methylglyceric acid (2MGA)	1.7 ± 1.4	4.5 ± 3.8	7.4 ± 8.8	7.0 ± 6.0	5.4 ± 3.8	10.2 ± 11.3
C5-alkene triols (C5T)	0.4 ± 0.3	0.4 ± 0.2	0.8 ± 0.7	1.7 ± 1.6	5.1 ± 5.3	21.5 ± 20.5
2-methylthreitol (2MT1)	2.1 ± 1.6	8.3 ± 8.1	7.0 ± 6.0	2.9 ± 2.2	1.9 ± 1.4	5.0 ± 4.4
2-methylerythritol (2MT2)	8.6 ± 6.6	26.0 ± 25.0	30.0 ± 29.7	15.1 ± 12.7	9.9 ± 7.5	21.4 ± 19.2
phthalic acid (PhA)	0.7 ± 0.3	1.1 ± 0.4	3.3 ± 1.3	5.4 ± 1.1	6.7 ± 1.9	4.9 ± 1.5

terephthalic acid (TPhA)	8.7 ± 4.4	4.9 ± 2.0	8.0 ± 2.1	25.6 ± 10.6	38.4 ± 11.7	39.5 ± 14.1
nicotine (NIC)	0.2 ± 0.1	0.3 ± 0.1	0.4 ± 0.2	0.6 ± 0.5	1.6 ± 1.7	12.7 ± 7.2
galactosan (G)	0.1 ± 0.0	0.2 ± 0.1	0.3 ± 0.2	0.2 ± 0.2	0.3 ± 0.3	0.3 ± 0.4
mannosan (M)	0.0 ± 0.0	0.1 ± 0.1	0.2 ± 0.2	0.2 ± 0.3	0.4 ± 0.4	0.6 ± 0.8
levoglucosan (L)	0.4 ± 0.1	0.8 ± 0.4	1.5 ± 1.1	2.4 ± 2.5	4.4 ± 6.0	8.2 ± 10.9
xylitol (X)	20.3 ± 10.0	23.3 ± 5.2	16.1 ± 4.6	4.1 ± 0.6	1.5 ± 0.2	5.7 ± 3.2
mannitol (MaOL)	6.6 ± 1.5	10.5 ± 3.3	6.9 ± 2.3	1.6 ± 0.4	0.5 ± 0.0	2.0 ± 0.4
α-glucose (αGL)	35.4 ± 17.4	32.1 ± 1.7	18.1 ± 4.0	6.1 ± 1.1	2.3 ± 0.1	11.6 ± 8.0
β-glucose (βGL)	35.1 ± 11.4	30.6 ± 2.3	18.9 ± 4.0	6.6 ± 1.4	2.5 ± 0.1	12.6 ± 8.1
dehydrabietic acid (DHA)	1.9 ± 1.0	1.1 ± 0.4	0.4 ± 0.1	0.3 ± 0.0	0.3 ± 0.1	1.3 ± 0.9
sucrose (S)	180.7 ± 58.7	102.5 ± 28.2	51.7 ± 21.6	10.9 ± 3.1	2.9 ± 1.1	63.1 ± 37.0
mycose (My)	35.3 ± 22.1	34.2 ± 13.1	14.3 ± 5.4	2.6 ± 1.0	0.6 ± 0.3	4.0 ± 2.0
C16:0	22.5 ± 5.4	23.7 ± 6.0	16.5 ± 3.7	16.5 ± 2.5	19.8 ± 5.6	37.4 ± 10.8
C17:0	1.6 ± 0.9	0.8 ± 0.2	0.7 ± 0.2	0.8 ± 0.2	0.8 ± 0.3	1.8 ± 0.4
C18:1	8.8 ± 6.0	3.5 ± 1.3	3.0 ± 1.3	2.8 ± 0.9	5.6 ± 4.4	2.8 ± 2.0
C18:0	16.6 ± 4.1	14.4 ± 5.4	9.4 ± 3.7	8.8 ± 3.5	15.0 ± 11.2	14.9 ± 4.2
C19:0	3.8 ± 3.4	1.4 ± 1.7	0.2 ± 0.1	0.2 ± 0.1	0.3 ± 0.1	0.9 ± 0.2
C20:0	2.9 ± 0.8	2.2 ± 0.7	1.2 ± 0.4	0.9 ± 0.3	1.3 ± 0.8	2.5 ± 0.2
C21:0	0.2 ± 0.0	0.2 ± 0.0	0.2 ± 0.1	0.2 ± 0.1	0.2 ± 0.1	0.9 ± 0.1
fluorenone (flo)	0.00 ± 0.00	0.01 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.04 ± 0.02
phenanthraquinone (pheno)	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.03 ± 0.00
anthracenequinone (anto)	0.01 ± 0.00	0.01 ± 0.00	0.00 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.06 ± 0.01
benzo[a]fluorenone (baflo)	0.00 ± 0.00	0.01 ± 0.00	0.00 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.07 ± 0.01
benzo[b]fluorenone (bbflo)	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.05 ± 0.01
benzanthrenone (bao)	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.01 ± 0.00	0.06 ± 0.00
phenanthrene (phe)	0.01 ± 0.01	0.02 ± 0.01	0.01 ± 0.01	0.01 ± 0.01	0.02 ± 0.02	0.12 ± 0.04
anthracene (ant)	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.02 ± 0.00
fluoranthene (fla)	0.02 ± 0.01	0.03 ± 0.01	0.02 ± 0.01	0.02 ± 0.01	0.03 ± 0.02	0.19 ± 0.04
pyrene (pyr)	0.05 ± 0.02	0.06 ± 0.04	0.03 ± 0.02	0.03 ± 0.02	0.05 ± 0.04	0.33 ± 0.08
retene (ret)	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.01 ± 0.00
benz[a]anthracene (baa)	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.01	0.01 ± 0.01	0.07 ± 0.01
chrysene (chry)	0.02 ± 0.01	0.02 ± 0.01	0.01 ± 0.01	0.02 ± 0.01	0.03 ± 0.02	0.12 ± 0.02
benzo[b+j]fluoranthenene (bbjfla)	0.02 ± 0.01	0.02 ± 0.01	0.01 ± 0.01	0.02 ± 0.01	0.04 ± 0.03	0.14 ± 0.02
benzo[k]fluoranthenene (bkfla)	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.01 ± 0.00	0.04 ± 0.01
benzo[e]pyrene (bep)	0.04 ± 0.03	0.05 ± 0.02	0.03 ± 0.02	0.03 ± 0.02	0.05 ± 0.04	0.17 ± 0.02
benzo[a]pyrene (bap)	0.03 ± 0.02	0.03 ± 0.01	0.02 ± 0.01	0.02 ± 0.01	0.03 ± 0.02	0.09 ± 0.02
indeno[123cd]pyrene (ip)	0.02 ± 0.01	0.02 ± 0.01	0.01 ± 0.01	0.02 ± 0.01	0.03 ± 0.02	0.12 ± 0.03

dibenz[ah]anthracene (dba)	0.01 ± 0.01	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.01	0.04 ± 0.01
benzo[ghi]perylene (bgp)	0.07 ± 0.04	0.06 ± 0.03	0.03 ± 0.02	0.04 ± 0.02	0.06 ± 0.04	0.17 ± 0.02
coronene (cor) 17a(H)21β(H)-29-norhopane (norHop)	0.05 ± 0.03	0.04 ± 0.02	0.02 ± 0.01	0.02 ± 0.01	0.03 ± 0.02	0.08 ± 0.01
17a(H)21β(H)-hopane (Hop)	0.26 ± 0.19	0.22 ± 0.10	0.11 ± 0.10	0.10 ± 0.08	0.13 ± 0.13	0.27 ± 0.05
nC20	0.15 ± 0.08	0.19 ± 0.09	0.14 ± 0.08	0.15 ± 0.10	0.19 ± 0.13	0.12 ± 0.02
nC21	0.22 ± 0.10	0.16 ± 0.14	0.16 ± 0.09	0.16 ± 0.10	0.18 ± 0.12	0.20 ± 0.06
nC22	0.17 ± 0.09	0.25 ± 0.13	0.16 ± 0.10	0.11 ± 0.10	0.15 ± 0.11	0.16 ± 0.04
nC23	0.54 ± 0.34	0.56 ± 0.24	0.32 ± 0.29	0.25 ± 0.20	0.29 ± 0.26	0.43 ± 0.11
nC24	0.32 ± 0.12	0.46 ± 0.32	0.18 ± 0.13	0.16 ± 0.12	0.20 ± 0.18	0.27 ± 0.03
nC25	1.20 ± 0.49	1.28 ± 0.61	0.60 ± 0.25	0.49 ± 0.17	0.57 ± 0.40	0.85 ± 0.19
nC26	0.42 ± 0.09	0.61 ± 0.49	0.20 ± 0.09	0.20 ± 0.09	0.27 ± 0.19	0.32 ± 0.08
nC27	1.40 ± 0.43	1.59 ± 0.67	0.84 ± 0.11	0.70 ± 0.09	0.66 ± 0.27	1.03 ± 0.26
nC28	0.36 ± 0.03	0.60 ± 0.47	0.23 ± 0.04	0.20 ± 0.03	0.22 ± 0.12	0.19 ± 0.03
nC29	1.64 ± 0.49	2.40 ± 0.97	1.56 ± 0.28	1.28 ± 0.32	0.88 ± 0.21	0.83 ± 0.19
nC30	0.31 ± 0.08	0.41 ± 0.29	0.17 ± 0.05	0.15 ± 0.04	0.19 ± 0.14	0.18 ± 0.03
nC31	1.39 ± 0.44	2.22 ± 0.99	1.47 ± 0.23	1.10 ± 0.18	0.83 ± 0.28	0.91 ± 0.14
nC32	0.22 ± 0.05	0.29 ± 0.15	0.16 ± 0.05	0.13 ± 0.04	0.17 ± 0.11	0.16 ± 0.02
nC33	0.38 ± 0.12	0.57 ± 0.32	0.35 ± 0.10	0.26 ± 0.08	0.29 ± 0.23	0.37 ± 0.04
nC34	0.14 ± 0.02	0.18 ± 0.08	0.10 ± 0.03	0.07 ± 0.03	0.09 ± 0.07	0.05 ± 0.00

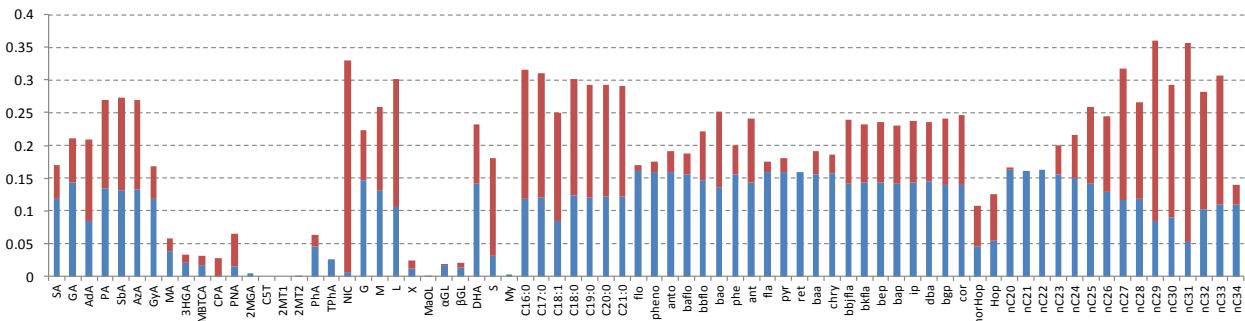
(ng/m ³)	Cold period					
	>7.2 µm	7.2 - 3.0 µm	3.0 - 1.5 µm	1.5 - 1.0 µm	1.0 - 0.5 µm	<0.5 µm
succinic acid (SA)	2.0	1.5	1.6	1.7	3.7	36.0
glutaric acid (GA)	0.3	0.3	0.3	0.5	1.2	6.7
adipic acid (AdA)	0.5	0.2	0.2	0.3	0.5	1.7
pimelic acid (PA)	0.4	0.3	0.3	0.3	0.5	1.6
suberic acid (SbA)	0.7	0.1	0.2	0.2	0.3	1.4
azelaic acid (AzA)	2.3	1.2	0.9	1.2	2.4	10.6
glyceric acid (GyA)	0.8	0.4	0.9	1.9	3.1	14.2
malic acid (MA)	0.2	0.1	0.1	0.2	0.6	33.4
3-hydroxyglutaric acid (3HGA)	0.1	0.1	0.1	0.1	0.1	7.0
MBTCA	0.1	0.1	0.1	0.1	0.1	2.8
cis-pinonic acid (CPA)	2.3	3.4	3.9	3.7	4.3	8.3
pinic acid (PNA)	0.5	0.2	0.4	0.8	1.2	9.0

	1	2	3	4	5	6
2-methylglyceric acid (2MGA)	1.5	0.7	0.8	1.1	1.5	2.9
C5-alkene triols (C5T)	1.0	0.1	0.1	0.2	0.2	1.2
2-methylthreitol (2MT1)	0.3	0.1	0.1	0.3	0.3	0.8
2-methylerythritol (2MT2)	1.0	0.4	0.6	0.7	1.4	9.7
phthalic acid (PhA)	0.6	0.7	0.8	1.4	3.5	11.5
terephthalic acid (TPhA)	26.2	10.7	20.5	38.9	53.0	21.4
nicotine (NIC)	0.1	0.1	0.1	0.4	0.6	14.6
galactosan (G)	0.2	0.4	0.9	1.3	2.9	9.5
mannosan (M)	0.1	0.2	0.4	0.7	1.8	10.1
levoglucosan (L)	1.4	2.5	4.5	9.9	27.0	110.2
xylitol (X)	3.0	4.8	4.2	1.6	1.1	3.2
mannitol (MaOL)	0.7	0.7	0.5	0.3	0.2	0.9
α -glucose (α GL)	14.8	14.5	8.4	4.2	1.8	5.3
β -glucose (β GL)	17.7	16.5	10.9	4.9	2.2	5.6
dehydrabietic acid (DHA)	3.2	2.7	1.1	0.9	1.8	13.5
sucrose (S)	52.0	60.1	45.9	10.0	6.0	16.1
mycose (My)	1.4	1.9	1.3	0.4	0.2	0.4
C16:0	40.3	23.5	13.3	10.1	12.2	44.1
C17:0	1.6	1.0	0.6	0.5	0.6	2.1
C18:1	7.8	4.2	3.5	0.9	1.1	13.1
C18:0	26.8	20.9	12.1	4.7	5.0	34.1
C19:0	0.1	0.3	0.1	0.1	0.2	0.9
C20:0	1.7	1.1	0.6	0.4	0.6	4.1
C21:0	0.2	0.1	0.1	0.1	0.2	1.5
fluorenone (flo)	0.01	0.01	0.01	0.01	0.01	0.07
phenanthraquinone (pheno)	0.00	0.01	0.01	0.01	0.01	0.10
anthracenequinone (anto)	0.01	0.01	0.01	0.01	0.01	0.11
benzo[a]fluorenone (baflo)	0.01	0.01	0.01	0.01	0.02	0.21
benzo[b]fluorenone (bbflo)	0.00	0.01	0.01	0.01	0.01	0.18
benzanthrenone (bao)	0.00	0.01	0.01	0.01	0.02	0.18
phenanthrene (phe)	0.02	0.02	0.01	0.01	0.02	0.16
anthracene (ant)	0.00	0.00	0.00	0.00	0.00	0.04
fluoranthene (fla)	0.03	0.03	0.03	0.03	0.04	0.36
pyrene (pyr)	0.05	0.06	0.05	0.04	0.06	0.62
retene (ret)	0.01	0.01	0.01	0.01	0.01	0.08
benz[a]anthracene (baa)	0.01	0.01	0.01	0.01	0.02	0.27
chrysene (chry)	0.01	0.02	0.02	0.03	0.05	0.44

benzo[b+j]fluoranthene (bbjfla)	0.01	0.02	0.02	0.03	0.07	0.48
benzo[k]fluoranthene (bkfla)	0.00	0.00	0.00	0.01	0.02	0.15
benzo[e]pyrene (bep)	0.03	0.04	0.03	0.04	0.08	0.43
benzo[a]pyrene (bap)	0.02	0.02	0.02	0.03	0.06	0.33
indeno[123cd]pyrene (ip)	0.02	0.02	0.02	0.02	0.05	0.40
dibenz[ah]anthracene (dba)	0.01	0.01	0.01	0.01	0.02	0.11
benzo[ghi]perylene (bgp)	0.05	0.05	0.04	0.04	0.08	0.43
coronene (cor) 17a(H)21 β (H)-29-norhopane (norHop)	0.04	0.03	0.02	0.02	0.04	0.22
17a(H)21 β (H)-hopane (Hop)	0.22	0.20	0.11	0.08	0.08	0.45
nC20	0.21	0.21	0.11	0.07	0.08	0.41
nC21	0.14	0.14	0.10	0.09	0.08	0.32
nC22	0.17	0.22	0.14	0.14	0.11	0.45
nC23	0.18	0.19	0.11	0.09	0.12	0.63
nC24	0.28	0.30	0.17	0.16	0.20	1.13
nC25	0.22	0.25	0.15	0.16	0.22	1.10
nC26	0.35	0.40	0.23	0.26	0.35	1.55
nC27	0.26	0.28	0.16	0.16	0.22	0.66
nC28	0.50	0.59	0.35	0.36	0.48	1.46
nC29	0.29	0.36	0.19	0.14	0.15	0.26
nC30	0.51	0.70	0.56	0.38	0.45	0.91
nC31	0.31	0.32	0.19	0.12	0.11	0.24
nC32	0.53	0.67	0.52	0.33	0.37	1.11
nC33	0.32	0.32	0.19	0.11	0.09	0.21
nC34	0.29	0.28	0.22	0.15	0.13	0.46
	0.18	0.16	0.13	0.07	0.05	0.09

Figure S1. Two potential Biomass Burning Organic Aerosol component loadings (1) and scores (2) from separate MCR-ALS analysis of the data from the Rural site. R_COLD_1.x are the fall samples, while R_COLD_2.x are the winter samples. The x.6 samples are the PM $<0.5\mu\text{m}$ fraction of the samples.

1)



2)

