Supplemental Information

Development of a Volatility and Polarity Separator (VAPS) for Volatility- and Polarity-Resolved Organic Aerosol Measurement

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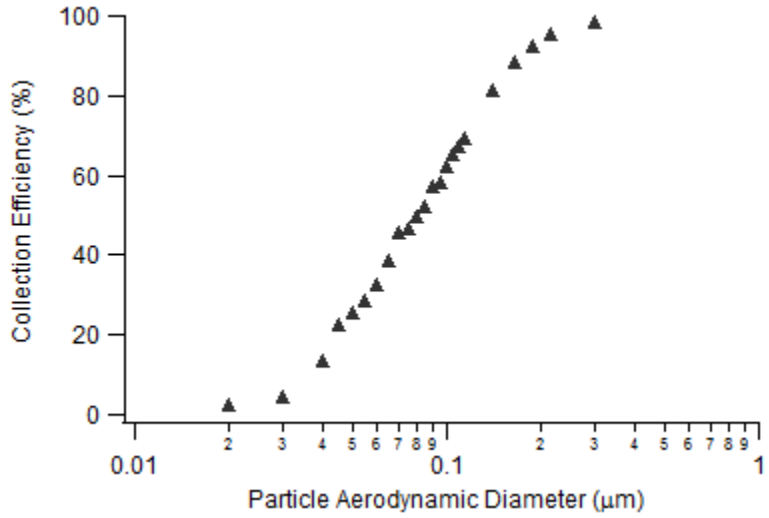

Figure S1. Collection efficiency curve for 15-jet impactor using ammonium nitrate particles.

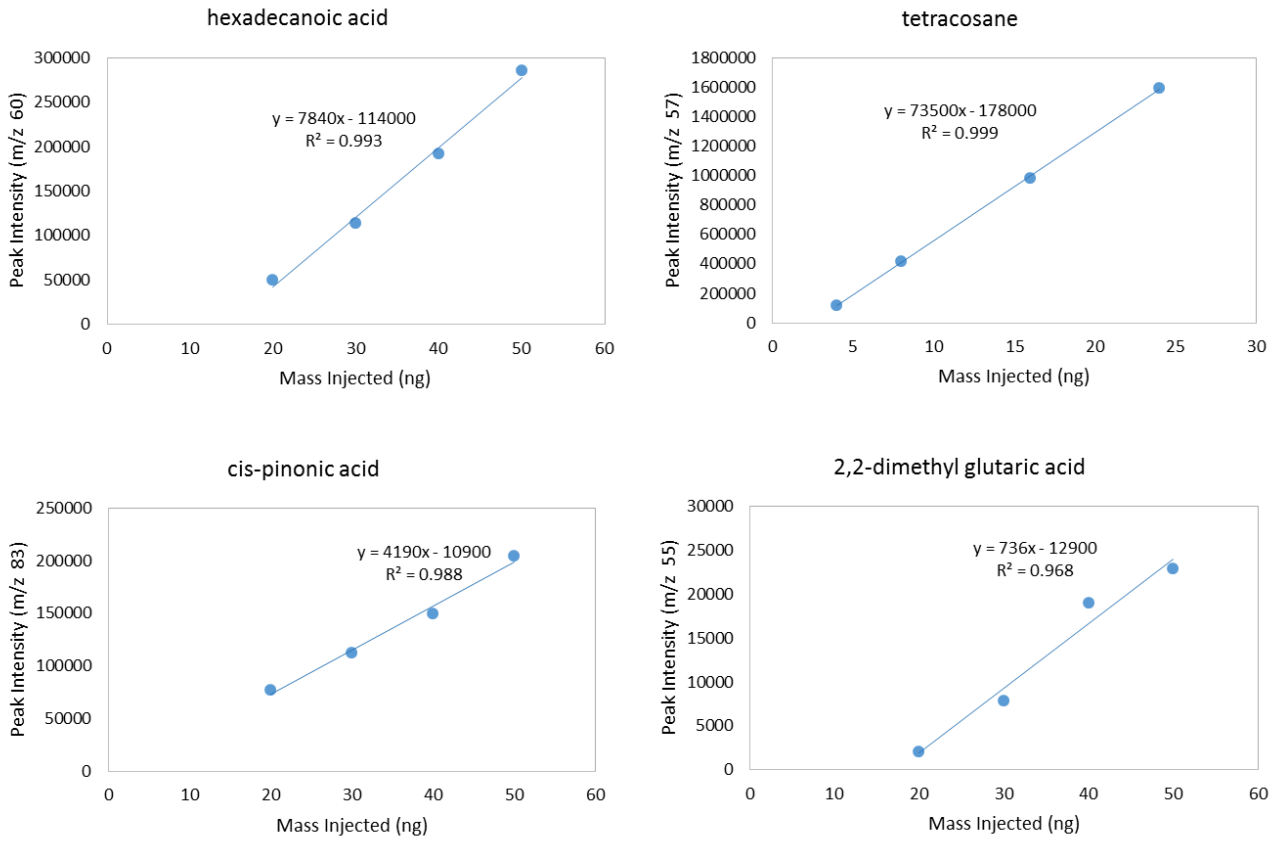

Figure S2. Linearity of VAPS system as indicated by peak areas (y-axis) vs concentration in ng (x-axis) for 4 compounds tested.

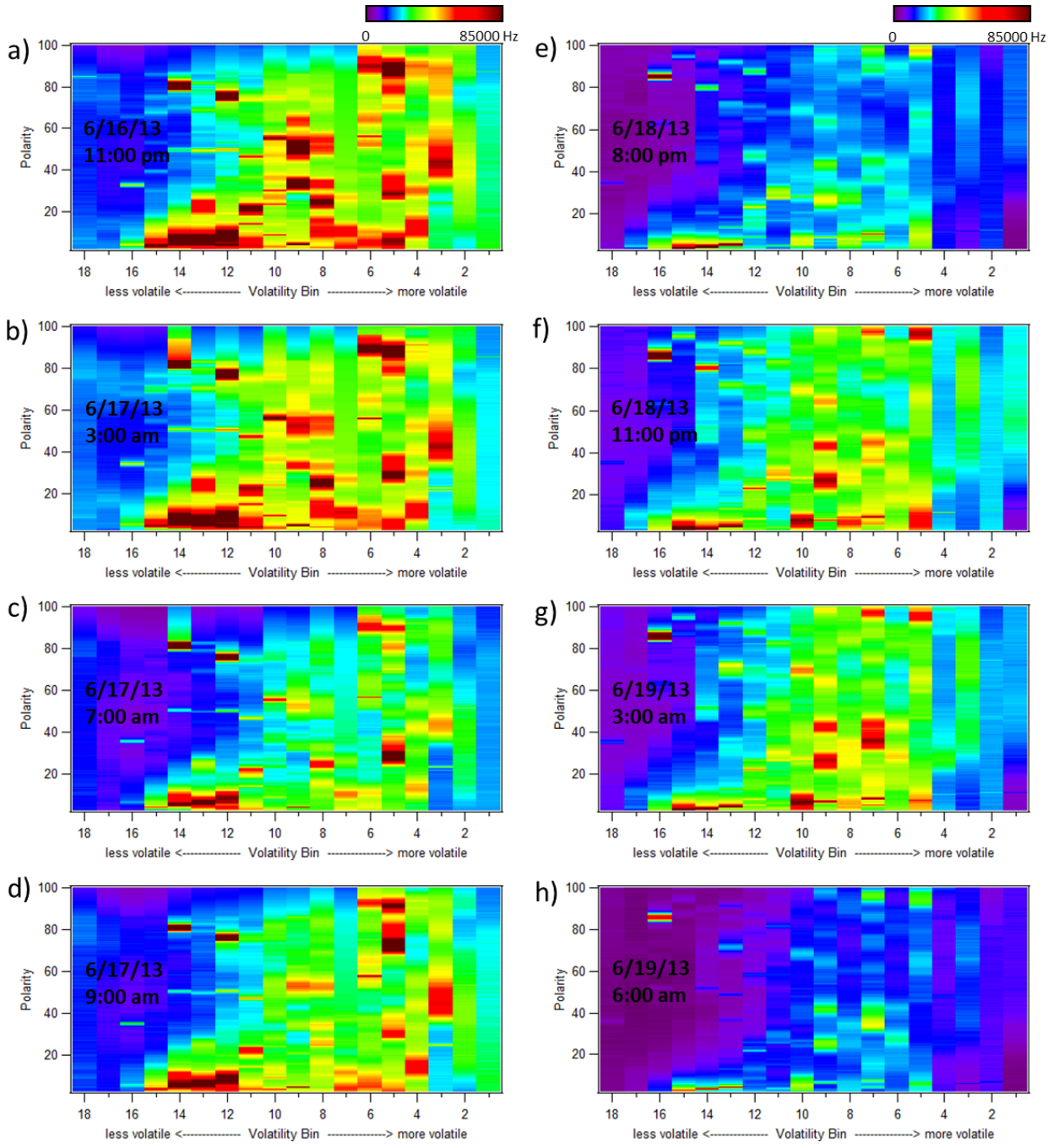

Figure S3. Vapograms showing evolution of organic aerosol as recorded by VAPS for two different overnight periods during SOAS in Brent, Al. Sample times are shown in local time (CDT).

Table S1. FID ion responses and percentage increase when using SGE unions vs VICI unions.

Compound	Total Signal w/ VICI unions	Total Signal w/ SGE unions	Percentage Increase
Octanoic Acid	6.37E+08	6.95E+08	9.1 +/- 0.6
Dodecanoic Acid	5.11E+07	6.23E+07	21.9 +/- 1.5
Octadecanoic Acid	4.99E+05	6.56E+05	31.5 +/- 4.0
Alkane & PAH mix	8.30E+08	9.85E+08	18.6 +/- 1.0

Table S2. Volatility bin where each even n-alkane is found and the corresponding saturation concentration.

Volatility Bin #	n-alkanes	C* @ 298K ($\mu g\ m^{-3}$)
1		
2		
3	C12	1.92E+06
4	C14	3.04E+05
5	C16	5.51E+04
6	C16	5.51E+04
7	C18	1.05E+04
8	C20	2.13E+03
9	C22	4.56E+02
10	C24	1.04E+02
11	C24, C26	1.04E+02
12	C26, C28	2.49E+01
13	C28	6.29E+00
14	C30	1.68E+00
15	C32	4.71E-01
16	C32, C34	1.38E-01
17	C34	1.38E-01
18	C36	4.25E-02

Table S3. List of select compounds found in samples shown in Figure 5.

Number (Figure 5)	Compound	Formula	Major Ions	O:C	Uncertainty of ID
1	levoglucosenone	C6H6O3	98,96,39	0.50	low
2	2(5H)-Furanone, 3,5,5-trimethyl-	C7H10O2	43,83,111	0.29	low
3	(1R,2R,3S,5R)-(-)-2,3-Pinanediol	C10H18O2	43,83,69	0.20	high
4	3-Hydroxy-4,4-dimethyldihydro-2(3H)-furanone	C6H10O3	71,43,41	0.50	high
5	4-Methoxy-4-methyl-2-pentanol	C7H16O2	73,43,45	0.29	mid
6	3-Methyl-3-cyclohexen-1-one	C7H10O	67,68,53	0.14	high
7	4s,6s-Dimethyl-7R-acetoxy-3-nonanone	C13H24O3	43,57,86	0.23	high
8	2(5H)-Furanone, 5-(1-methylethyl)-	C7H12O2	43,55,84	0.29	high
9	5,6-Dihydropyran-2-one, 5-acetoxy-6-(1,2-epoxypropyl)-	C10H12O5	43,84,127	0.50	high
10	phthalic acid	C8H6O4	76,104,50	0.50	mid
11	tetracosane	C24H50	43,57,85	0.00	low
12	octacosane	C28H58	43,57,85	0.00	low
13	dibutyl phthalate	C16H22O4	149,57,104	0.25	low
14	diisooctyl phthalate	C24H38O4	149,167,57	0.17	low