Supplement to "Wintertime VOC concentration measurements in the Northern traffic supersite demonstrate the strong role of anthropogenic terpene emissions on VOC chemistry"

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Table S1: Concentrations of C_2-C_5 NMHCs during 24-hour canister sampling periods with means of other compounds groups measured with in situ TD-GC-MS for the same measurement periods

ng m-3		Canister1	Canister2 E2	Canister3	Canister4 E3	MEAN
Sampling started (UTC+2)		27/01/22 10:45	03/02/22 09:51	10/02/22 10:10	14/02/22 10:30	
Sampling stopped (UTC+2)		27/01/22 23:37	04/02/22 10:24	11/02/22 10:23	15/02/22 10:11	
Ethane	C2	3497	6552	2822	4190	4265
Ethene	C2	1214	3441	1014	1811	1870
Propane	C3	2216	6854	2002	2740	3453
Propene	C3	419	1123	565	272	595
2-Methylpropane	C4	691	2021	729	798	1060
Butane	C4	1332	3721	1394	1683	2033
Ethyne	C2	865	2734	1003	1570	1543
t-but-2-ene	C4	0	0	0	0	0
but-1-ene	C4	0	0	0	0	0
Cis-but-2-ene	C4	0	0	0	0	0
2-Methylbutane	C5	850	2355	587	941	1183
n-pentane/1,3butadiene	C5	669	2221	503	645	1009

t-pent-2-ene	C5	0	0	0	0	0
Pent-1-ene	C5	0	0	0	0	0
2-Methylpentane	C5	0	808	156	0	241
Other compound groups:						
Terpenes		271	346	116	69	200
C_6-C_{15} Alkanes		1265	831	961	541	900
C_6-C_9 Aromatic HCs		2416	4829	1996	1681	2730
C_{10}-C_{20} Aromatic HCs		91	88	92	40	78
Other VOCs		41	27	153	92	78
Gaseous PAHs		38	46	55	64	51

Table S2: Mean concentrations of VOCs (ng m^{-3}) at Mäkelänkatu traffic supersite, at residential site and at UB supersite (bgr) site 14th -18th February 2022.

ng m^{-3}	Traffic	Residential	Urban background	Traffic/ residential	Traffic/ urban bgr
Terpenes					
α-pinene	50	31	10	1.6	4.9
camphene	12	18	10	0.6	1.2
Myrcene	12	0	6	-	2.0
β-pinene	6	4	2	1.2	2.7
Δ3-carene	23	5	1	4.9	18.6
p-cymene	15	17	12	0.9	1.2
limonene	36	5	3	7.4	13.6
1,8-cineol	12	25	16	0.5	0.7
terpinolene	2	4	2	0.6	1.6
β-caryophyllene	3	0	0	-	-
SUM	169	110	62	1.5	2.7
Aromatic HCs					
benzene	570	1177	1084	0.5	0.5
toluene	662	801	645	0.8	1.0
ethylbenzene	133	185	148	0.7	0.9
p/m-xylene	346	417	375	0.8	0.9
styrene	27	25	16	1.1	1.8
o-xylene	136	175	150	0.8	0.9
propylbenzene	16	30	18	0.5	0.8
3-ethyltoluene	51	65	42	0.8	1.2

4-ethyltoluene	27	24	19	1.1	1.4
135-TMB	23	23	16	1.0	1.5
2-ethyltoluene	20	28	16	0.7	1.2
124-TMB	102	110	77	0.9	1.3
123-TMB	24	28	16	0.9	1.5
13-diethylbenzene	5	13	13	0.4	0.4
14-diethylbenzene	21	19	12	1.1	1.7
2-propyltoluene	4	5	3	0.9	1.7
2-ethyl-p-xylene	7	3	4	2.3	1.9
1245-TMB	5	4	3	1.2	2.0
135-triethylbenzene	1	0	0	-	-
14-dibutylbenzene	1	0	0	-	-
SUM	2182	3132	2656	0.7	0.8
Alkanes					
Hexane	194	504	554	0.4	0.4
Heptane	88	229	209	0.4	0.4
Octane/2-octene	119	86	66	1.4	1.8
Nonane	46	41	42	1.1	1.1
Decane	147	51	66	2.9	2.2
Undecane	56	43	63	1.3	0.9
Dodecane	37	29	46	1.3	0.8
Tridecane	29	21	39	1.4	0.7
Tetradecane	19	16	28	1.2	0.7
Pentadecane	14	9	13	1.6	1.1
SUM	749	1029	1126	0.7	0.7
Others					
Furfural	14	76	27	0.2	0.5
Benzylalcohol	18	31	19	0.6	0.9
o-cresol	5	5	0	1.0	-
p-cresol	6	22	12	0.3	0.5
SUM	43	135	58	0.3	0.7
Gaseous PAHs					
Naphthalene	38	76	54	0.5	0.7
Acenaphthylene	2	0	0	-	-
Acenaphthene	1	0	1	-	1.8
Fluorene	4	3	2	1.5	1.8
Anthracene	5	6	4	0.8	1.3
Phenanthrene	1	1	0	0.9	2.9

Fluoranthene	2	3	1	0.9	1.7
Pyrene	1	1	1	1.0	1.4
SUM	54	91	64	0.6	0.9
Other pollutants					
NO	12	0.7		17	
NO_2	23	9.2		2.5	
$PM_{2.5}$	9	14		0.6	

Table S3: Molar mass (M) and reaction rate coefficients of studied compounds for OH-radical (K_{OH}), ozone (K_{O3}) and nitrate radical (K_{NO3}) reactions. Coefficients were obtained from Praplan et al. (2017), Hakola et al. (2017), Ng et al. (2017) and NIST chemical kinetics database (https://kinetics.nist.gov/kinetics/)

	M (g/mol)	k_{OH} (cm^3 s^{-1})	k_{O3} (cm^3 s^{-1})	k_{NO3} (cm^3 s^{-1})
Terpenes				
α-pinene	136.24	5.25E-11	9.4E-17	6.2E-12
camphene	136.24	7.83E-11	6.8E-19	6.2E-13
Myrcene	136.24	2.13E-10	4.44E-16	
β-pinene	136.24	7.43E-11	1.9E-17	2.5E-12
Δ3-carene	136.24	8.8E-11	4.8E-17	9.1E-12
p-cymene	125.24	1.51E-11	5E-20	
limonene	136.24	1.61E-10	2.11E-16	1.2E-11
1,8-cineol	154.24	1.11E-11	1.5E-19	
terpinolene	136.24	2.26E-10	1.6E-15	9.7E-11
β-caryophyllene	204.35	2.01E-10	1.2E-14	1.90E-11
Aromatic HCs				
benzene	78.12	1.32E-12		3.01E-17
toluene	92.15	5.96E-12		6.79E-17
ethylbenzene	106.17	7.1E-12		
p/m-xylene	106.17	1.9E-11		
styrene	104.15	5.8E-11		
o-xylene	106.17	1.37E-11		
propylbenzene	120.16	6E-12		
3-ethyltoluene	120.16	1.92E-11		
4-ethyltoluene	120.16	1.21E-11		
135-TMB	120.16	5.72E-11		
2-ethyltoluene	120.16	1.23E-11		
124-TMB	120.16	3.25E-11		
123-TMB	120.169	3.27E-11		
13-diethylbenzene	134.218	1.42E-11		
14-diethylbenzene	134.22	8.11E-12		
2-propyltoluene	134.218	8.8E-12		
2-ethyl-p-xylene	134.218	1.69E-11		

1245-TMB	134.218	2.05E-11		
135-triethylbenzene	162.271	3.32E-11		
14-dibutylbenzene	190.324	1.37E-11		
<u>C_6-C_{15} alkanes</u>				
Hexane	86.178	5.61E-12		
Heptane	100.21	7.2E-12		
Octane/2-octene	114.232	8.7E-12		
Nonane	128.2	1.02E-11		
Decane	142.286	1.16E-11		
Undecane	156.31	1.23E-11		
Dodecane	170.33	1.32E-11		
Tridecane	184.4	1.51E-11		
Tetradecane	253.6	1.67E-11		
Pentadecane	270.6	1.81E-11		
<u>Others</u>				
Furfural	96.084	3.74E-11		
Benzylalcohol	108.138	2.61E-11		
o-cresol	108.0575	4.11E-11		
p-cresol	108.138	4.11E-11		
<u>PAHs</u>				
Naphthalene	128.171	2.87E-11		2.00E-11
Acenaphthylene	152.192	7.55E-11	2.52E-16	
Acenaphthene	154.208	6.69E-11		
Fluorene	166.219	8.85E-12		1.52E-14
Anthracene	178.229	4E-11		
Phenanthrene	178.229	1.3E-11		
Fluoranthene	202.251	2.92E-11		
Pyrene	202.251	5E-11		
PAH SUM				
<u>C_2-C_5 NMHCs</u>				
Ethane	30.068	2.57E-13		1E-17
Ethene	28.052	8.52E-12	1.48E-18	2.1E-16
Propane	44.094	1.15E-12		
Propene	42.078	2.63E-11	9.6E-18	9.54E-15
2-Methylpropane	58.12	2.33E-12		
Butane	58.12	2.52E-12		
Ethyne	26.036	8.15E-13		1E-16
but-1-ene	56.104	3.14E-11		
2-Methylbutane	72.15	3.9E-12		
n-pentane	72.146	3.96E-12		
2-Methylpentane	86.17	5.6E-12		

References to Table S3:

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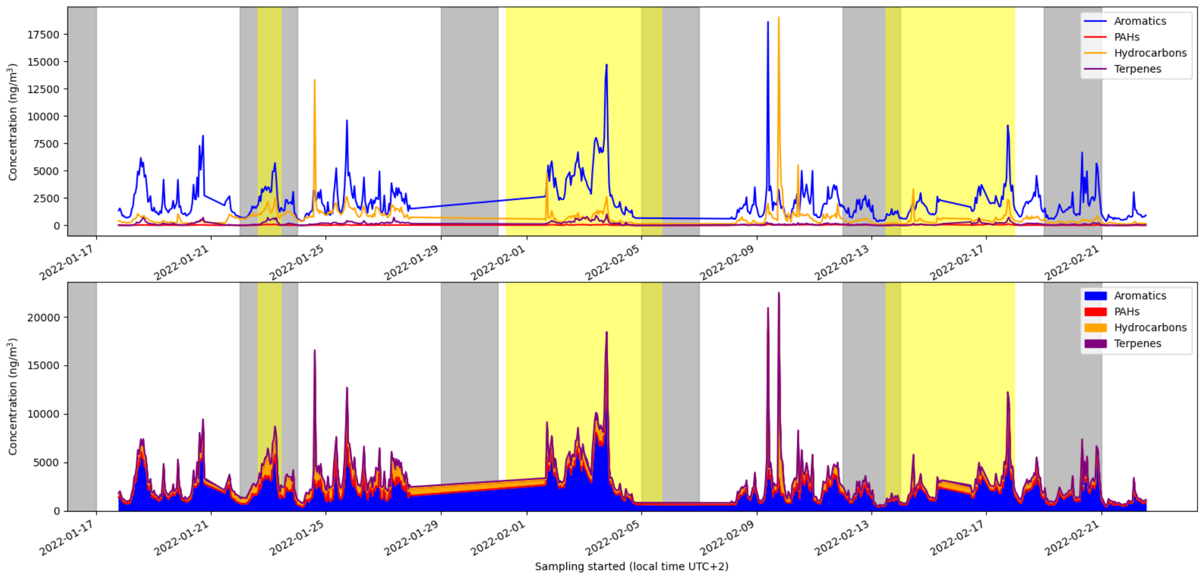

Figure S1: Time series of C_6-C_{15} compound groups (top) and cumulative contributions (bottom). Grey bars show the weekends and yellow bars show the episodes.