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Supplement of

Measurement report: High contributions of halocarbon and aromatic compounds to atmospheric volatile organic compounds in an industrial area

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Table S1: OH reaction rate constant (k_{OH}) of VOCs and list of VOCs constrained in the F0AM model

Compounds	k_{OH} (cm^3 $molecule^{-1}$ s^{-1}) (Carter, 2010)	Constrained in F0AM model
Ethane	2.54E-13	Yes
propane	1.11E-12	Yes
isobutane	2.14E-12	Yes
n-butane	2.38E-12	Yes
isopentane	3.60E-12	Yes
n-pentane	3.84E-12	Yes
2,2 dimethylbutane	2.27E-12	
2,3 dimethyl butane	5.79E-12	
2-methyl pentane	5.20E-12	Yes
cyclopentane	5.02E-12	
3-methylpentane	5.20E-12	
n-hexane	5.25E-12	Yes
2,4-dimethylpentane	4.77E-12	
methylcyclopentane	5.68E-12	
isoheptane	6.81E-12	Yes
cyclohexane	7.02E-12	
2,3-dimethylpentane	7.15E-12	
3-methylhexane	7.17E-12	Yes
2,2,4-trimethylpentane	3.38E-12	
heptane	6.81E-12	Yes
methylcyclohexane	9.64E-12	
2-methylheptane	8.31E-12	
n-octane	8.16E-12	Yes
n-nonane	9.75E-12	Yes
Decane	1.10E-11	Yes
n-hendecane	1.23E-11	Yes
dodecane	1.32E-11	Yes
ethylene	8.15E-12	Yes
Propylene	2.60E-11	Yes
trans-2-butene	6.32E-11	Yes
cis-2-butene	5.58E-11	
1-butene	3.11E-11	Yes
1,3- butadeine	6.59E-11	
1-pentene	3.14E-11	Yes
tran-2-pentene	6.70E-11	
isoprene	9.96E-11	Yes
cis-2-pentene	6.50E-11	Yes

1-hexene	3.70E-11	Yes
acetylene	7.56E-13	Yes
benzene	1.22E-12	Yes
toluene	5.58E-12	Yes
ethylbenzene	7.00E-12	Yes
m,p-xylene	2.31E-11	Yes
o-xylene	1.36E-11	Yes
Styrene	5.80E-11	Yes
Cumene	6.30E-12	Yes
n-propylbenzene	5.80E-12	Yes
3-ethyltoulene	1.86E-11	Yes
4-ethyltoulene	1.18E-11	Yes
Mesitylene	5.67E-11	Yes
2-ethyltoulene	1.19E-11	Yes
1,2,4-trimethylbenzene	3.25E-11	Yes
1,2,3-trimethylbenzene	3.27E-11	Yes
1,3-diethylbenzene	2.55E-11	
1,4-diethylbenzene	1.64E-11	Yes
Naphthalene	2.30E-11	
Chloromethane	4.48E-14	Yes
vinyl chloride	6.90E-12	Yes
methyl bromide	4.12E-14	
Chloroethene	0	Yes
trichlorofloromethane	0	
Vinylidene chloride	0	
1,1,2-Trichlor-1,2,2-trifluorethan	0	
Dichloromethane	1.45E-13	Yes
trans-1,2-dichloroethylene	0	
1,1-dichloroethane	2.60E-13	Yes
cis-1,2-dichloroethylene	0	
Chloroform	1.06E-13	Yes
carbon tetrachloride	0	
1,2-dichloroethane	2.53E-13	Yes
Trichloroethylene	2.34E-12	Yes
1,2-dichloropropane	4.50E-13	Yes
bromodichloromethane	0	
trans-1,3-dichloropropene	1.44E-11	
cis-1,3-dichloropropene	8.45E-12	
1,1,2-trichloroethane	2.00E-13	Yes
tetrachloroethylene	0	Yes

1,2-dibromoethane	2.27E-13	Yes
Chlorobenzene	7.70E-13	
Bromoform	0	
1,1,2,2-tetrachloroethane	0	Yes
1,3-dichlorobenzene	5.55E-13	
1,4 dichlorobebezne	5.55E-13	
benzyl chloride	0	
1,2-dichlorobenzene	5.55E-13	
1,2,4-trichlorobenzene	0	
hexachloro-1,3-butadiene	0	
carbon disulfide	2.76E-12	
Acrolein	1.99E-11	Yes
Acetone	1.91E-13	Yes
Isopropanol	5.09E-12	Yes
MTBE	0	Yes
vinyl acetate	3.16E-11	
MEK	1.20E-12	Yes
ethyl acetate	1.60E-12	Yes
Tetrahydrofuran	1.61E-11	
methyl methacrylate	5.25E-11	
1,4-dioxane	3.83E-11	
4-methyl-2-pentanone	1.27E-11	Yes
2-hexanone	9.10E-12	Yes

Table S2: VOC concentrations (ppbv) measured in the industrial area in Nanjing. VOC concentrations (ppbv) observed in previous studies in Nanjing are also listed.

Compounds	Current study										(An et al., 2017), Nanjing (industrial suburban)		(Wu et al., 2020), Nanjing (nonindustrial suburban)
	Summer		Autumn		Winter		Spring		Yearly		Summer	Winter	Yearly
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Mean	Mean
ethane	2.81	0.58	8.06	1.77	7.66	1.39	4.76	1.25	5.82	2.49	2.76	7.66	2.89
propane	3.12	0.63	6.09	1.21	4.92	0.91	2.73	0.92	4.22	1.57	1.70	4.51	3.29
isobutane	0.75	0.16	1.25	0.26	1.16	0.15	0.48	0.14	0.91	0.36	1.04	2.25	0.9
n-butane	1.75	0.39	2.61	0.63	2.32	0.26	0.87	0.29	1.89	0.76	1.09	2.35	1.53
isopentane	1.59	0.29	1.56	0.47	1.63	0.31	0.42	0.19	1.30	0.59	0.86	1.13	1.26
n-pentane	0.66	0.17	1.06	0.29	1.36	0.25	0.31	0.10	0.85	0.46	0.50	0.86	0.78
2,2 dimethylbutane	0.08	0.01	0.06	0.01	0.06	0.01	0.06	0.01	0.06	0.01	0.28	0.03	0.04
2,3 dimethyl butane	0.13	0.03	0.18	0.03	0.11	0.00	0.20	0.02	0.16	0.04	0.12	0.35	0.04
2-methyl pentane	0.26	0.08	0.32	0.10	0.44	0.11	0.29	0.06	0.33	0.08	0.25	0.41	0.16
cyclopentane	0.15	0.03	0.10	0.02	0.08	0.01	0.22	0.03	0.14	0.06	0.08	0.12	0.08
3-methylpentane	0.25	0.06	0.38	0.09	0.37	0.12	0.25	0.08	0.31	0.07	0.22	0.31	0.26
n-hexane	0.17	0.04	0.33	0.09	0.41	0.17	0.21	0.06	0.28	0.11	0.41	0.48	0.47
2,4-	0.06	0.00	0.06	0.01	0.06	0.00	0.13	0.01	0.08	0.03	0.05	0.08	0.01

dimethylpentane													
methylcyclopentane	0.12	0.03	0.16	0.04	0.14	0.04	0.13	0.03	0.14	0.02	0.08	0.13	0.26
isoheptane	0.13	0.04	0.12	0.04	0.11	0.04	0.16	0.03	0.13	0.02			
cyclohexane	0.44	0.29	0.37	0.15	0.43	0.31	0.21	0.13	0.36	0.10	0.41	0.60	0.15
2,3-dimethylpentane	0.86	0.59	0.73	0.30	0.85	0.63	0.42	0.25	0.72	0.21	0.11	0.20	0.02
3-methylhexane	0.10	0.02	0.12	0.03	0.09	0.02	0.14	0.02	0.11	0.02	0.04	0.05	0.08
2,2,4-trimethylpentane	1.59	0.37	2.81	0.82	3.26	0.78	1.16	0.74	2.21	0.99	0.03	0.02	0.03
heptane	0.10	0.01	0.12	0.02	0.12	0.01	0.10	0.01	0.11	0.01	1.92	0.2	0.11
methylcyclohexane	0.18	0.02	0.18	0.04	0.19	0.03	0.16	0.03	0.18	0.01	0.08	0.12	0.08
2-methylheptane	0.08	0.00	0.08	0.01	0.08	0.00	0.17	0.01	0.10	0.04	0.01	0.05	0.02
n-octane	0.09	0.01	0.08	0.01	0.09	0.01	0.20	0.01	0.11	0.06	0.19	0.21	0.05
n-noane	0.06	0.00	0.08	0.02	0.08	0.02	0.07	0.00	0.07	0.01	0.03	0.05	0.03
decane	0.05	0.00	0.06	0.01	0.06	0.01	0.05	0.00	0.06	0.01	0.05	0.06	0.04
n-hendecane	0.04	0.01	0.16	0.01	0.22	0.01	0.17	0.01	0.15	0.07	0.06	0.09	0.02
dodecane	0.08	0.00	0.36	0.02	0.50	0.01	0.22	0.02	0.29	0.18	0.07	0.13	0.03
ethylene	2.02	0.58	3.80	0.89	4.71	1.09	1.25	0.71	2.95	1.59	3.08	6.62	1.21
Propylene	0.41	0.34	0.91	0.46	0.97	0.31	0.44	0.58	0.68	0.30	0.98	2.09	0.70
trans-2-butene	0.02	0.00	0.06	0.02	0.23	0.01	0.03	0.01	0.09	0.10	0.07	0.14	0.07
cis-2-butene	0.07	0.00	0.16	0.03	0.33	0.03	0.09	0.01	0.16	0.12	0.06	0.10	0.05

1-butene	0.07	0.00	0.10	0.02	0.43	0.02	0.31	0.13	0.22	0.17	0.18	0.23	0.15
1,3- butadeine	0.31	0.07	0.34	0.05	0.30	0.03	0.28	0.00	0.31	0.02			
1-pentene	0.16	0.03	0.14	0.03	0.08	0.03	0.10	0.03	0.12	0.04	0.04	0.05	0.04
tran-2-pentene	0.09	0.03	0.06	0.02	0.05	0.01	0.09	0.02	0.07	0.02	0.03	0.04	0.03
isoprene	0.51	0.37	0.15	0.06	0.09	0.02	0.19	0.02	0.23	0.19	0.58	0.07	0.18
cis-pentene	0.07	0.02	0.06	0.01	0.07	0.01	0.17	0.02	0.09	0.05	0.03	0.02	0.02
1-hexene	0.05	0.03	0.06	0.02	0.06	0.03	0.24	0.01	0.10	0.09	0.03	0.02	0.01
acetylene	1.02	0.15	1.77	0.24	1.59	0.15	1.20	0.13	1.40	0.35	2.63	6.46	
benzene	0.80	0.19	1.41	0.41	1.63	0.39	0.58	0.37	1.10	0.50	1.86	3.21	0.82
toulene	0.84	0.40	1.88	0.51	1.67	0.31	0.49	0.12	1.22	0.66	1.47	3.20	1.07
ethylbenzene	0.22	0.05	0.83	0.21	0.65	0.15	0.20	0.10	0.48	0.32	1.27	1.79	0.43
m,p-xylene	0.24	0.07	0.86	0.24	0.80	0.17	0.19	0.07	0.52	0.36	0.46	0.59	0.67
o-xylene	0.43	0.09	1.67	0.42	1.30	0.29	0.40	0.21	0.95	0.63	0.28	0.39	0.21
styrene	0.47	0.15	1.71	0.49	1.58	0.35	0.36	0.15	1.03	0.71	0.17	0.30	0.12
cumene	0.87	0.19	3.34	0.84	2.60	0.59	0.80	0.41	1.90	1.27			
n-propylbenzene	0.04	0.01	0.13	0.02	0.14	0.01	0.08	0.11	0.10	0.05	0.09	0.08	0.03
3-ethyltoulene	0.10	0.02	0.29	0.06	0.26	0.05	0.18	0.21	0.21	0.09	0.05	0.05	0.03
4-ethyltoulene	0.07	0.00	0.08	0.01	0.08	0.01	0.10	0.06	0.08	0.01	0.19	0.29	0.03
mesitylene	0.03	0.00	0.06	0.02	0.08	0.03	0.04	0.00	0.05	0.02			
2-ethyltoulene	0.04	0.01	0.07	0.02	0.07	0.02	0.06	0.07	0.06	0.02	0.51	0.08	
1,2,4-trimethylbenzen	0.06	0.01	0.06	0.02	0.08	0.03	0.13	0.11	0.08	0.03	0.33	0.42	0.09

e													
1,2,3-trimethylbenzene	0.08	0.01	0.20	0.03	0.22	0.01	0.10	0.01	0.15	0.07	0.05	0.05	0.05
1,3-diethylbenzene	0.09	0.00	0.18	0.02	0.17	0.01	0.16	0.01	0.15	0.04	0.03	0.05	0.01
1,4-diethylbenzene	0.09	0.00	0.17	0.02	0.20	0.01	0.17	0.01	0.16	0.05	0.04	0.10	0.04
naphthalene	0.13	0.02	3.09	0.98	2.14	0.22	1.35	0.29	1.68	1.25			
chloromethane	0.16	0.02	0.56	0.08	1.21	0.33	0.15	0.01	0.52	0.50			
vinyl chloride	0.05	0.00	0.07	0.02	0.09	0.02	0.16	0.01	0.09	0.05			
methyl briomide	0.04	0.00	0.05	0.01	0.04	0.01	0.03	0.00	0.04	0.01			
chloroethene	0.08	0.01	0.08	0.02	0.10	0.03	0.05	0.01	0.08	0.02			
trichloroflorome thane	0.23	0.01	0.18	0.01	0.30	0.02	0.21	0.04	0.23	0.05			
Vinylidene chloride	0.05	0.01	0.05	0.01	0.04	0.00	0.05	0.01	0.05	0.00			
1,1,2-Trichlor-1,2,2-trifluorethan	0.08	0.00	0.08	0.01	0.10	0.00	0.08	0.01	0.08	0.01			
dichloromethane	1.26	0.09	3.09	0.54	2.62	0.47	1.97	0.53	2.23	0.80			
trans-1,2-dichloroethylene	0.05	0.00	0.05	0.01	0.05	0.01	0.14	0.01	0.07	0.05			
1,1-dichloroethane	0.33	0.08	0.65	0.18	0.82	0.34	0.41	0.13	0.55	0.22			

cis-1,2-dichloroethylene	0.07	0.00	0.07	0.01	0.03	0.00	0.20	0.01	0.09	0.07
chloroform	0.17	0.02	0.57	0.16	0.53	0.18	0.18	0.04	0.36	0.22
carbon tetrachloride	0.12	0.01	0.18	0.02	0.17	0.03	0.18	0.02	0.16	0.03
1,2-dichloroethane	0.95	0.14	3.19	0.40	2.95	0.43	1.15	0.31	2.06	1.17
trichloroethylene	0.13	0.02	0.14	0.02	0.10	0.02	0.06	0.00	0.11	0.04
1,2-dichloropropane	0.57	0.21	1.48	0.53	0.96	0.23	0.14	0.05	0.79	0.57
bromodichloromethane	0.06	0.00	0.03	0.01	0.03	0.00	0.06	0.00	0.04	0.01
trans-1,3-dichloropropene	0.10	0.00	0.08	0.01	0.13	0.00	0.17	0.01	0.12	0.04
cis-1,3-dichloropropene	1.68	0.79	3.76	1.02	3.35	0.62	0.98	0.23	2.44	1.33
1,1,2-trichloroethane	0.06	0.01	0.12	0.04	0.11	0.07	0.05	0.05	0.09	0.03
tetrachloroethylene	0.06	0.00	0.09	0.02	0.08	0.02	0.06	0.01	0.07	0.01
1,2-dibromoethane	0.03	0.00	0.02	0.01	0.02	0.00	0.02	0.00	0.02	0.01
chlorobenzene	0.31	0.18	1.89	0.91	1.73	1.14	0.20	0.16	1.03	0.90
bromoform	0.02	0.00	0.02	0.01	0.02	0.00	0.02	0.00	0.02	0.00
1,1,2,2-tetrachloroethan	0.94	0.30	3.43	0.97	3.16	0.70	0.73	0.30	2.06	1.43

e										
1,3-dichlorobenzene	0.02	0.00	0.09	0.03	0.14	0.05	0.04	0.01	0.07	0.05
1,4 dichlorobebezne	0.11	0.01	0.65	0.20	0.40	0.05	0.09	0.01	0.31	0.27
benzyl chloride	0.12	0.02	0.10	0.05	0.13	0.07	0.24	0.23	0.15	0.06
1,2-dichlorobenzene	0.03	0.01	0.25	0.11	0.15	0.04	0.08	0.01	0.13	0.10
1,2,4-trichlorobenzene	0.04	0.00	0.17	0.04	0.25	0.01	0.14	0.02	0.15	0.09
hexachloro-1,3-butadiene	0.02	0.00	0.17	0.04	0.15	0.04	0.02	0.00	0.09	0.08
carbon disulfide	0.42	0.11	0.59	0.13	0.66	0.15	0.21	0.07	0.47	0.20
Acrolein	0.09	0.02	0.07	0.02	0.05	0.01	0.07	0.02	0.07	0.01
acetone	1.60	0.29	2.98	0.25	1.94	0.22	2.61	0.61	2.28	0.63
isopropanol	0.46	0.07	2.34	0.60	1.28	0.34	0.44	0.10	1.13	0.90
MTBE	0.37	0.11	0.66	0.23	0.35	0.11	0.35	0.13	0.43	0.15
vinyl acetate	0.17	0.04	0.33	0.09	0.42	0.18	0.26	0.08	0.30	0.11
MEK	0.69	0.06	1.14	0.10	0.73	0.09	0.77	0.43	0.84	0.21
ethyl acetate	1.06	0.17	1.56	0.25	1.43	0.18	1.34	0.95	1.35	0.21
tetrahydrofuran	0.41	0.56	0.08	0.11	0.43	0.45	0.24	0.03	0.29	0.16
methyl methacrylate	0.11	0.01	0.21	0.01	0.20	0.01	0.32	0.00	0.21	0.09
1,4-dioxane	0.05	0.00	0.07	0.01	0.09	0.00	0.26	0.01	0.12	0.10

4-methyl-2-pentanone	0.23	0.08	0.31	0.07	0.28	0.06	0.30	0.03	0.28	0.03
2-hexanone	0.15	0.00	0.23	0.01	0.28	0.01	0.29	0.02	0.23	0.07
TVOC	**38.81**	**10.21**	**83.05**	**20.07**	**77.51**	**16.77**	**39.62**	**13.12**	**59.75**	**28.57**

S1. Source apportionment of VOCs

Figure S1 shows the source profile of summertime VOCs. The resolved factors were identified as biomass/biofuel burning, LPG/NG usage, gasoline evaporation, gasoline vehicle exhaust, diesel vehicle exhaust, industrial production, paint solvent usage, and biogenic source. Factor 1 was characterized by high concentrations of ethane and ethylene. These compounds are tracers of incomplete combustion emitted from vehicle exhaust and biomass/biofuel burning (An et al., 2017). Benzene, toluene, pentane, and decane concentrations were low in factor 1, therefore, it was identified as biomass/biofuel burning. Factor 2 was distinguished by a significant presence of LPG/NG VOCs such as propane, isobutene, and n-butane (Shao et al., 2016). So, factor 2 was identified as LPG/NG usage. Factor 3 was dominated by high concentrations of isopentane, n-pentane, and MTBE. Therefore, factor 3 was identified as gasoline evaporation (Song et al., 2018; Wang et al., 2016). Factor 4 had high concentrations of vehicle exhaust VOCs, benzene and toluene (Song et al., 2018). These VOCs are also emitted by industrial processes. But the contribution of benzene was several folds higher than toluene. Therefore, factor 4 was related to vehicle exhaust emissions, and it was assigned to gasoline vehicle exhaust (An et al., 2017). Factor 5 was characterized by high concentrations of acetylene, n-heptane, and decane. These are related to vehicle emissions. As diesel engines produce more acetylene than gasoline engines (Song et al., 2018; An et al., 2017), factor 5 was attributed to diesel vehicle exhaust. Factor 6 was dominated by toluene and the sampling site was beside an industrial area. So, we identified this factor as industrial production. Due to the high contribution of o-xylene, m,p-xylene, ethylbenzene and styrene, factor 7 was assigned to paint solvent usage sources (Li et al., 2018). Factor 8 was attributed to the biogenic source, which was mainly distinguished by a high concentration of isoprene (Song et al., 2018).

During autumn, the possible VOC sources were biomass/biofuel burning, multiple sources, gasoline vehicle exhaust, vehicle emissions, LPG/NG usage, paint solvent usage and gasoline evaporation (Fig.S2). Factor 1 was represented by a high concentration of ethane and ethylene, so, it was identified as a biomass/biofuel burning source (An et al., 2017). Factor 2 was dominated by isoprene, n-heptane, decane, and acetylene. Among these compounds, isoprene is mainly emitted by trees and the rest of the compounds are related to diesel vehicle exhaust emission. Therefore, Factor 2 was identified as multiple sources. Factor 3 was identified as gasoline vehicle exhaust due to the high contribution of benzene and toluene. In factor 3, benzene was several folds higher than toluene. The 4th factor was mainly composed of vehicle emission-related compounds such as 2-methyl pentane, n-hexane, n-heptane, n-pentane, and isopentane, therefore, identified as vehicle emissions (Song et al., 2018). Factor 5 was assigned to LPG/NG usage as propane, isobutene, and n-butane were the main contributors (Shao et al., 2016). Factor 6 was characterized by a high concentration of o-xylene, m,p-xylene, ethylbenzene and styrene, which are typical tracers of paint solvent usage sources. Factor 7 was identified as gasoline evaporation, it was dominated by high concentrations of isopentane, n-pentane, and MTBE (Song et al., 2018).

During winter, the source factors were gasoline vehicle exhaust, vehicle exhaust, gasoline evaporation, biomass/biofuel burning, multiple sources, LPG/NG usage, and paint solvent usage (Fig. S3). Factor 1 was assigned to gasoline vehicle exhaust. It was dominated by benzene and toluene; the contribution of benzene was twice that of toluene. Factor 2 was characterized by isobutene, n-butane, acetylene, ethylene, ethane, n-heptane and decane. Isobutene and n-butane are related to LPG/NG usage. But, the contribution of propane was zero in factor 2. Acetylene, ethylene, and ethane are emitted from combustion sources like vehicle exhaust and biomass burning. Decane and n-heptane are also related to vehicle emissions. By considering the above information, factor 2 was identified as vehicle exhaust. Factor 3 was characterized by high concentrations of isopentane and n-pentane and, therefore, was identified as a gasoline evaporation source. Factor 4 was characterized by a high contribution of ethylene and ethane; therefore, it was identified as a biomass/biofuel burning source. Factor 5 was characterized by high concentrations of isoprene, propane, n-hexane and n-heptane. Propane is related to LPG/NG usage, isoprene is mainly emitted from trees (evergreen trees in winter), and n-hexane and n-heptane are related to vehicle emissions. By considering the above information, factor 5 was assigned to multiple sources. Factor 6 was dominated by high concentrations of propane. Therefore, it was identified as LPG/NG usage. Factor 7 was identified as paint solvent usage due to the high contribution of o-xylene, m,p-xylene, ethylbenzene and styrene (Zhang et al., 2018; Song et al., 2020).

During spring, the possible VOC sources were biomass/biofuel burning, paint solvent usage, multiple sources, gasoline evaporation, gasoline vehicle exhaust, LPG/NG usage, and diesel vehicle exhaust (Fig. S4). Factor 1 was identified as a biomass/biofuel burning source for the high loading of ethylene and ethane and the relatively lower contribution from the vehicle emission-related compounds. Due to the high contribution of o-xylene, styrene, m,p-xylene, and ethylbenzene, factor 2 was assigned to paint solvent usage sources (Li et al., 2018). Factor 3 had a high contribution of isoprene, n-hexane, n-heptane, decane, MTBE, toluene, ethylbenzene, and o-xylene. Therefore, factor 3 was identified as multiple sources. Factor 4 was represented by a high concentration of isopentane, n-pentane, and MTBE. Therefore, factor 4 was identified as gasoline evaporation. Factor 5 was represented by high concentrations of benzene, therefore, identified as gasoline vehicle exhaust. Factor 6 was assigned to LPG/NG usage due to the high contribution of propane, n-butane, and isobutane (Shao et al., 2016). Factor 7 was identified as diesel vehicle exhaust due to the high contribution of acetylene, n-heptane, and decane.

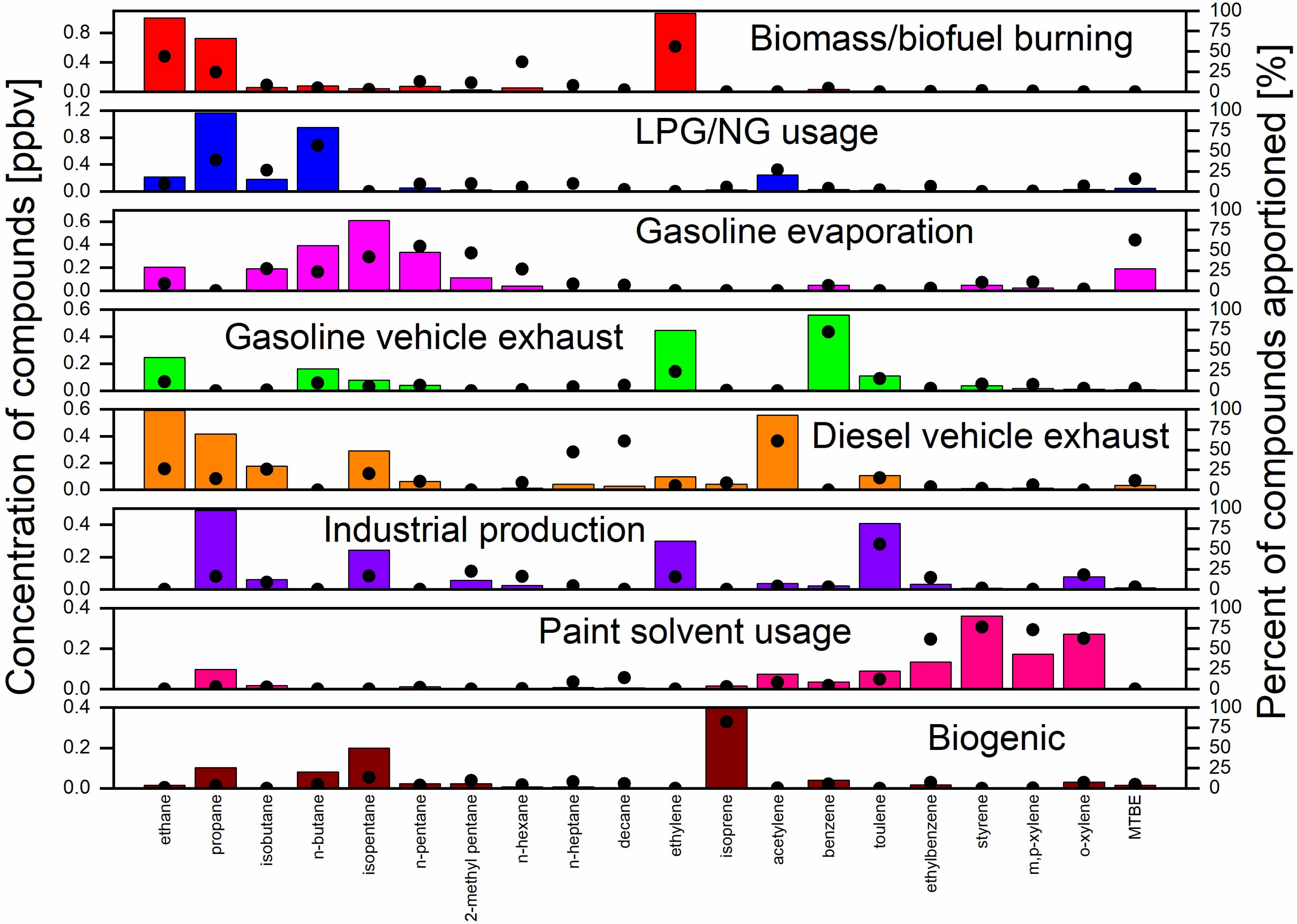

Figure S1: Source profile of VOCs during summer in Nanjing industrial area. Bars and dots represent the concentrations and percentages of the compounds, respectively.

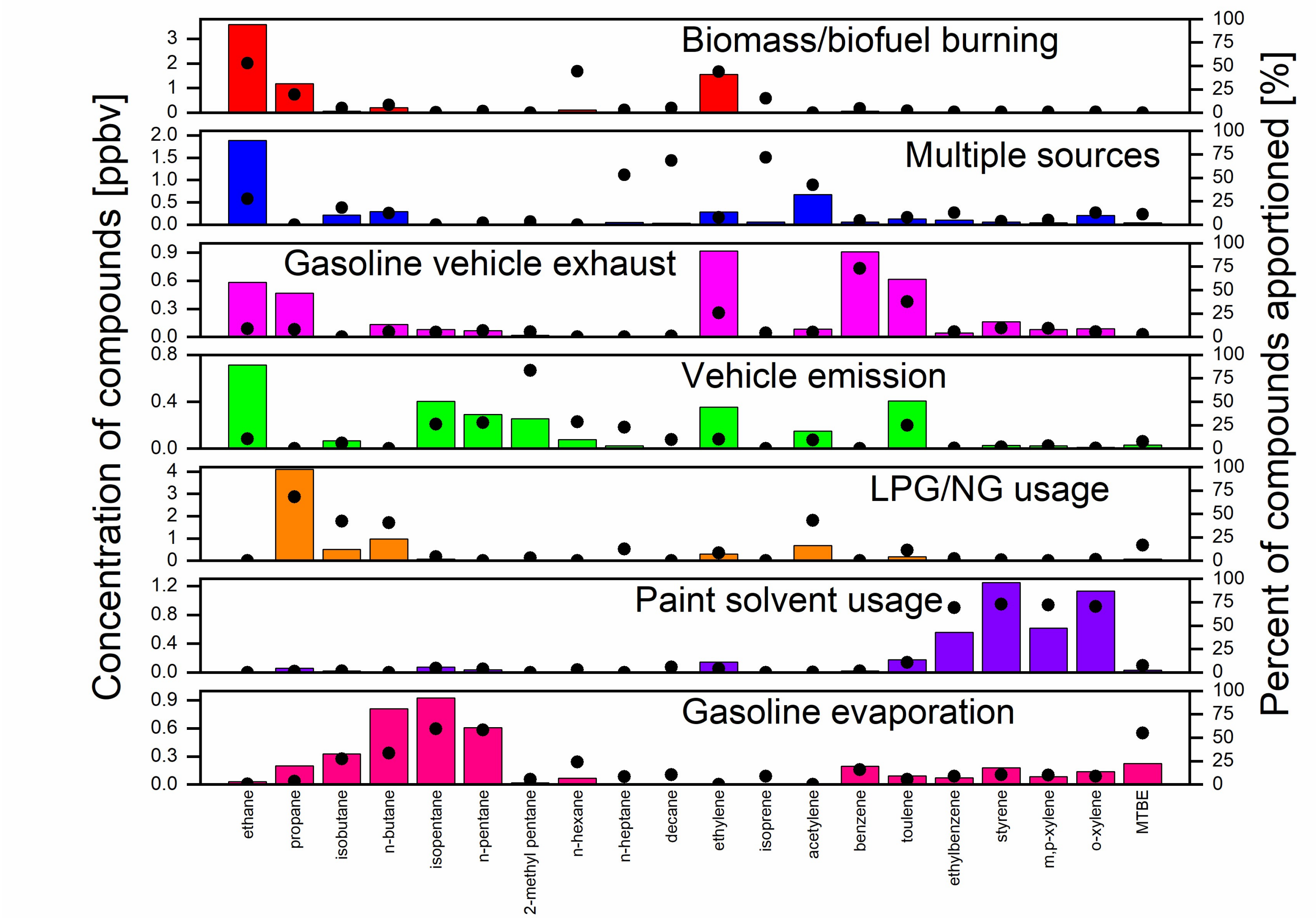

Figure S2: Source profile of VOCs during autumn in Nanjing industrial area. Bars and dots represent the concentrations and percentages of the compounds, respectively.

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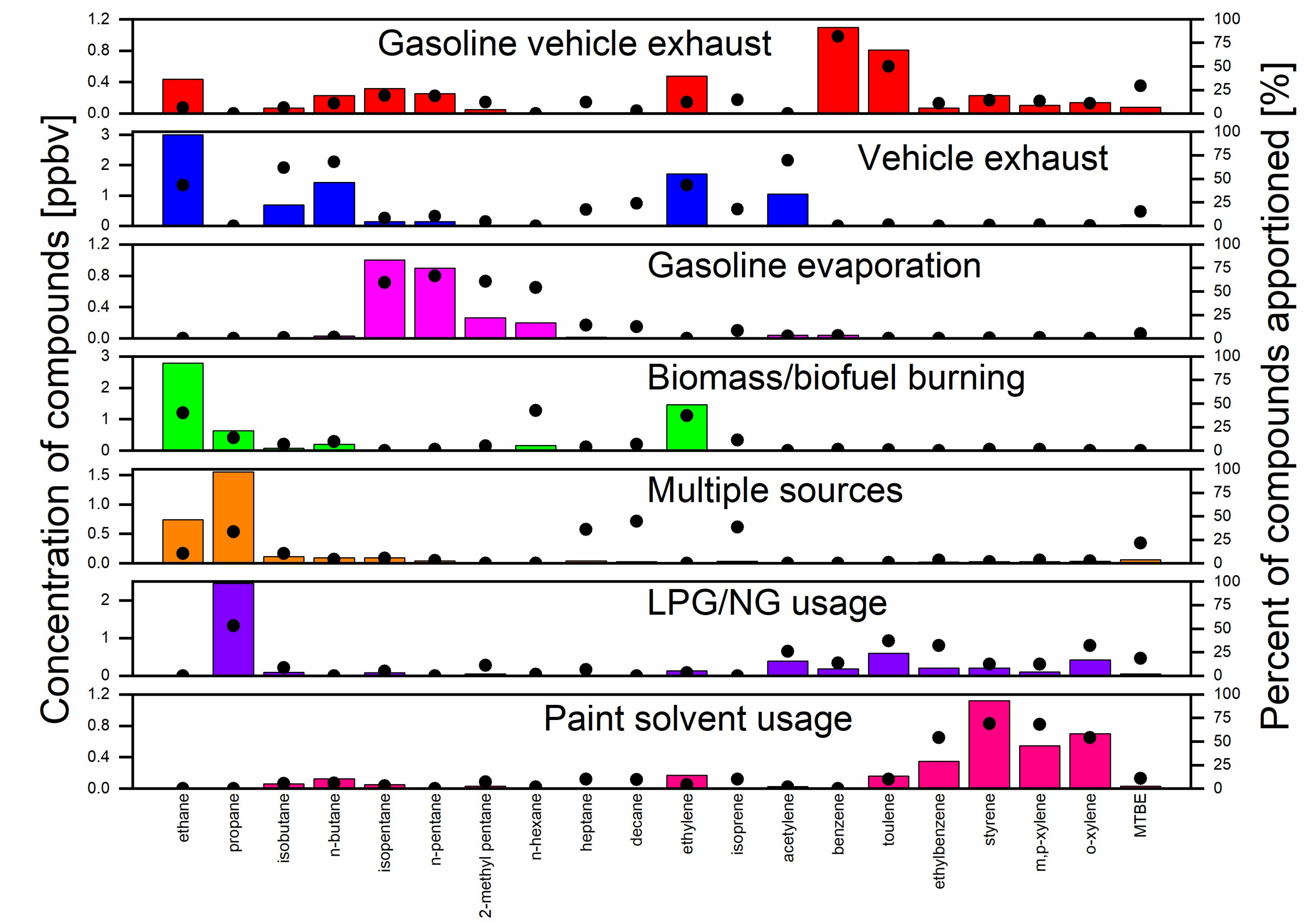

86 **Figure S3: Source profile of VOCs during winter in Nanjing industrial area. Bars and dots represent the concentrations and**
87 **percentages of the compounds, respectively.**

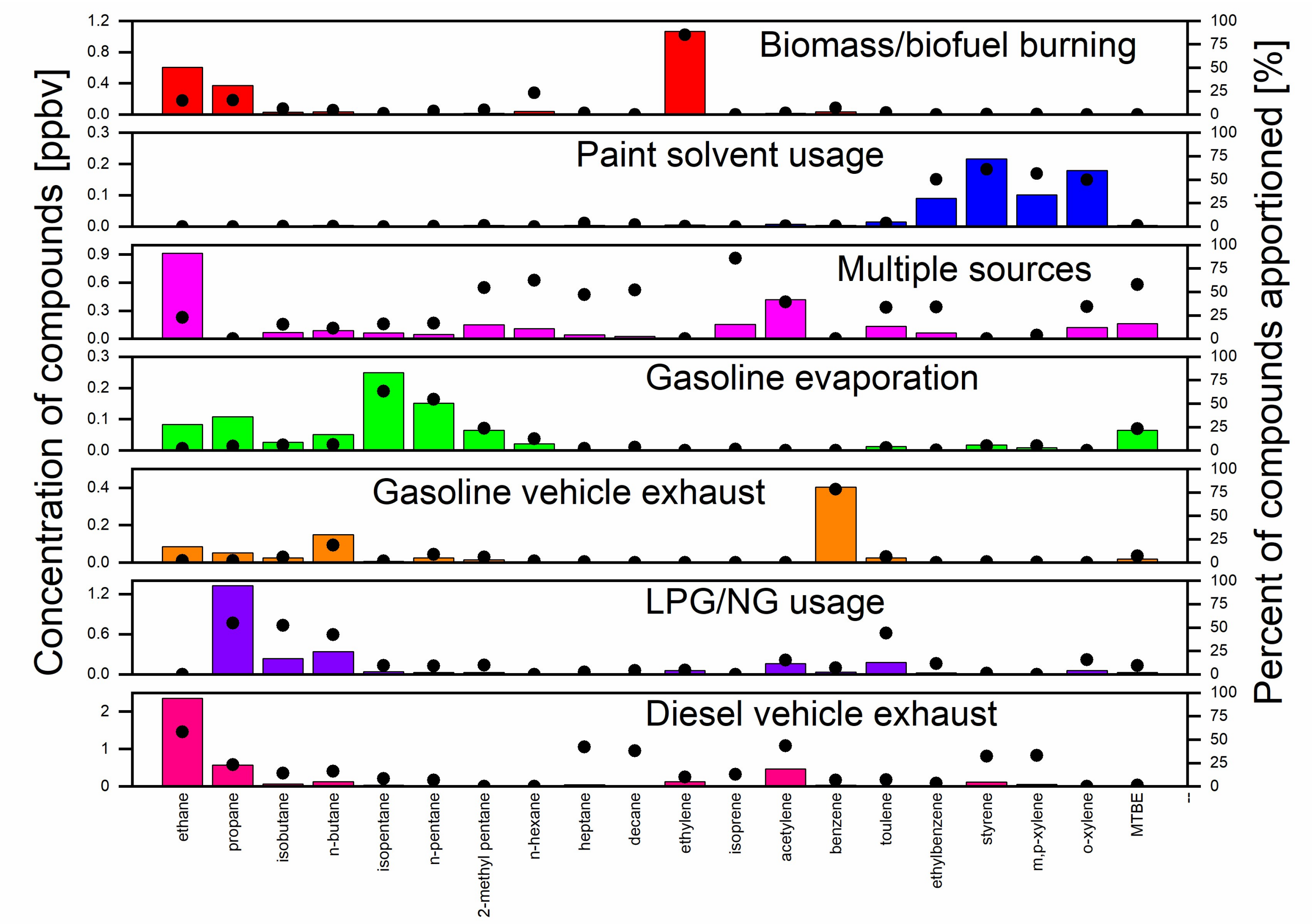

Figure S4: Source profile of VOCs during spring in Nanjing industrial area. Bars and dots represent the concentrations and percentages of the compounds, respectively.

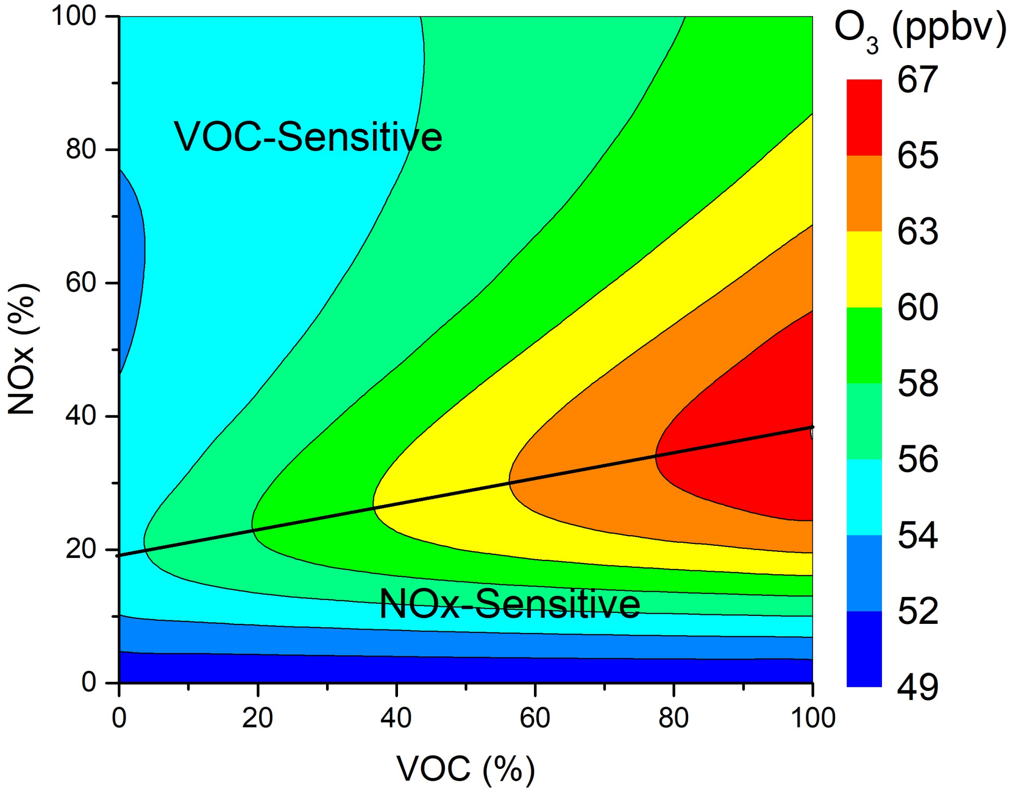

Figure S5: O_3 isopleth diagram on a high O_3 episode day (July 29 2018) in Nanjing industrial area.

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