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Supplementary Material

# Source apportionment of volatile organic compounds (VOCs) during ozone polluted days in Hangzhou, China

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**Table S1.** Location and O<sub>3</sub> exceedance information about the three sites.

Site	Latitude(°N)	Longitude(°E)	Function classification	O <sub>3</sub> exceedance days
HP	30.25	120.12	Botanic garden	July 20 <sup>th</sup> , August 24 <sup>th</sup>
XS	30.30	120.34	Industrial parks	May 17 <sup>th</sup> , August 24 <sup>th</sup>
ZH	30.23	120.16	Urban mixed areas	August 24 <sup>th</sup>

**Table S2.** Detailed information about emission sources sampling in this study.

Source categories	Sampling sites	Sampling time	Number of samples
Solvent utilization	Paint workshop	November 15th	8
Biomass burning	Combustion laboratory	November 21th	6
Vehicle exhaust	Vehicle administration	November 01th	8

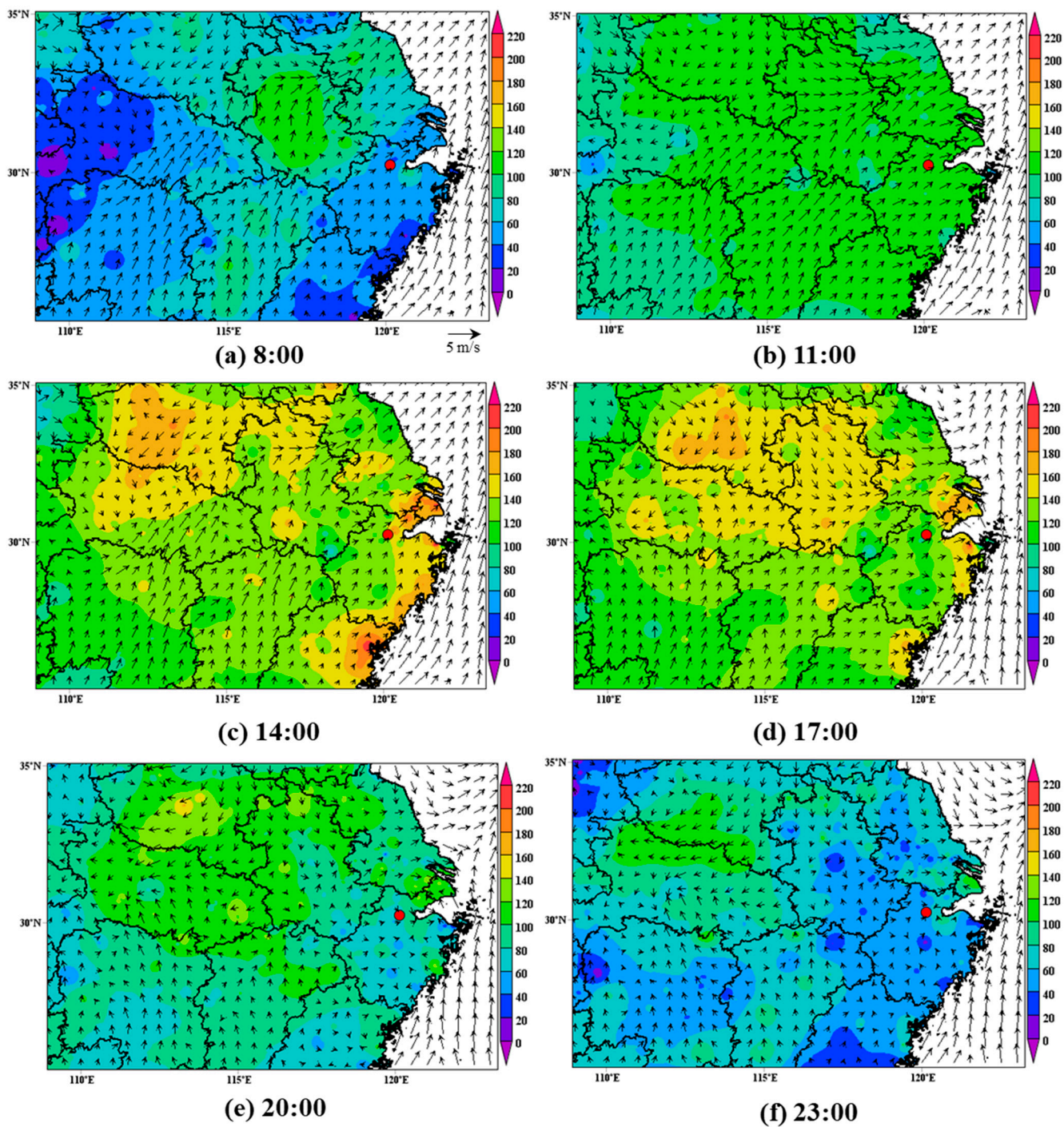


Figure S1. Spatial and temporal distribution of wind fields and O<sub>3</sub> concentration ( $\mu\text{g}/\text{m}^3$ ) on May 17<sup>th</sup>.

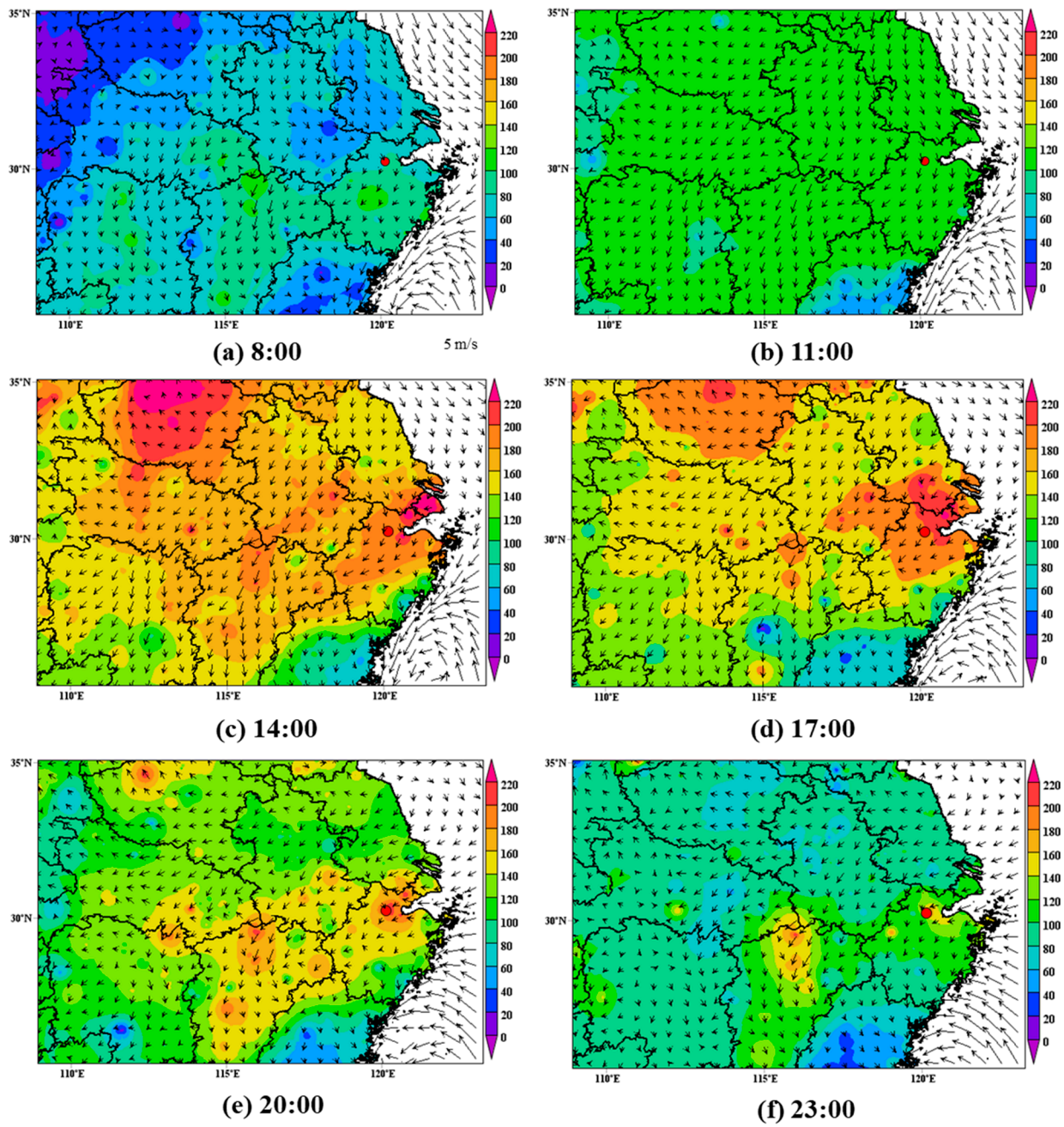


Figure S2. Spatial and temporal distribution of wind fields and O<sub>3</sub> concentration ( $\mu\text{g}/\text{m}^3$ ) on August 24<sup>th</sup>.

**Table S3.** Comparison of the major volatile organic compound (VOC) species concentrations measured in Hangzhou with other cities in China (ppbv).

<b>Cities</b>	<b>Beijing</b>	<b>Shanghai</b>	<b>Guangzhou</b>	<b>Wuhan</b>	<b>Hangzhou</b>
Sampling time	2014.10.18-11.22	2009.8.25-9.20	2004.10.4-11.3	2016.9-2017.8	2018.5-9
Sampling sites	Residential	Commercial	Downtown	Urban	Scenic/ industrial/ traffic and residential
Number of species	102	93	134	100	107
Ethane	9.94	-	5.58	4.27	2.85
Propane	5.41	4.81	10.35	5.40	2.33
Isobutane	1.88	1.43	2.93	1.14	1.34
n-Butane	2.47	2.03	5.07	1.71	2.01
Isopentane	1.57	2.29	2.62	1.08	0.92
n-Pentane	1.11	0.13	1.19	0.54	0.92
Ethylene	7.97	-	6.55	2.62	1.98
Acetylene	6.24	-	7.30	2.35	0.36
Propylene	1.64	0.84	3.02	0.56	0.46
1-Butene	0.99	0.26	1.33	0.17	0.15
Isoprene	0.08	0.12	0.22	0.12	1.27
Chloromethane	0.05	-	1.18	0.37	1.12
Methylene chloride	2.79	-	-	1.27	1.48
1,2-Dichloroethane	0.98	-	-	0.37	1.18
Benzene	1.62	1.81	2.39	0.73	0.37
Toluene	2.42	4.70	7.01	0.95	1.09
Ethylbenzene	0.79	1.23	1.16	0.43	0.27
m/p-Xylene	0.73	1.40	1.46	0.37	0.48
o-Xylene	0.51	0.49	0.52	0.25	0.24
Acetone	2.99	-	5.56	2.27	8.75

Ethyl acetate	1.46	2.09	-	-	1.51
MTBE	0.56	0.29	0.96	0.10	0.13
TVOCs	69.14	32.35	70.12	32.66	39.66
Reference	[1]	[2]	[3]	[4]	This study

-: Not detected or not listed.

**Table S4.** Species with concentrations below the method detection limit.

<b>Alkanes</b>	<b>Alkenes</b>	<b>Others</b>
2,2-Dimethylbutane	trans-2-Butene	Dichlorotetrafluoroethane
2,4- Dimethylpentane	cis-2-Butene	cis-1,3-Dichloropropene
2,3,4-Trimethylpentane	1-Pentene	m-Diethylbenzene
	1-Hexene	1,4-Dioxane



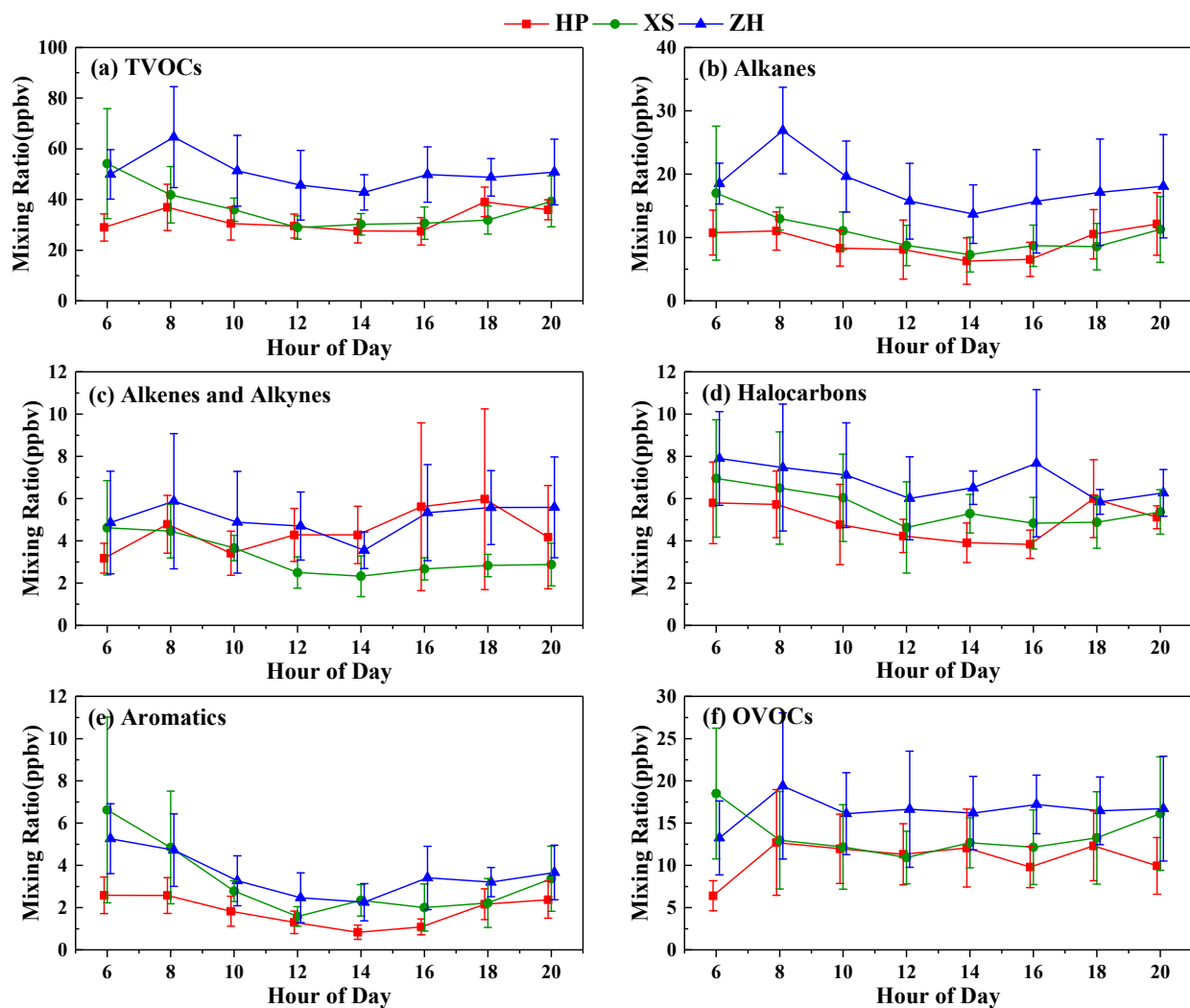
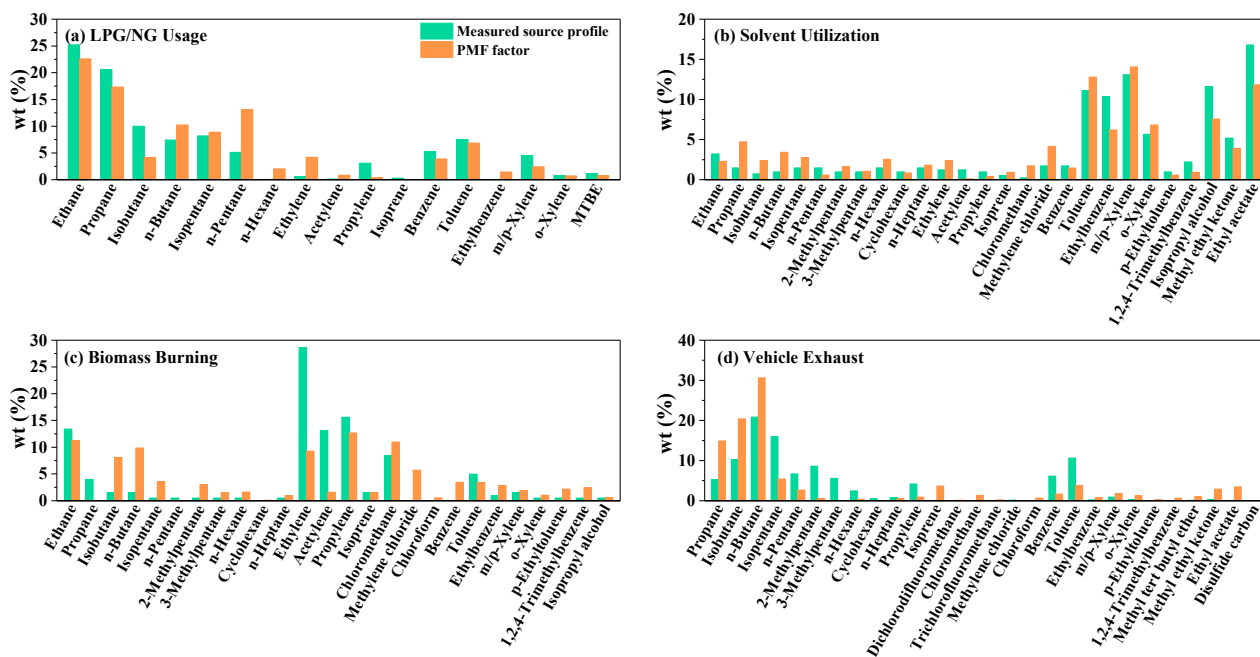
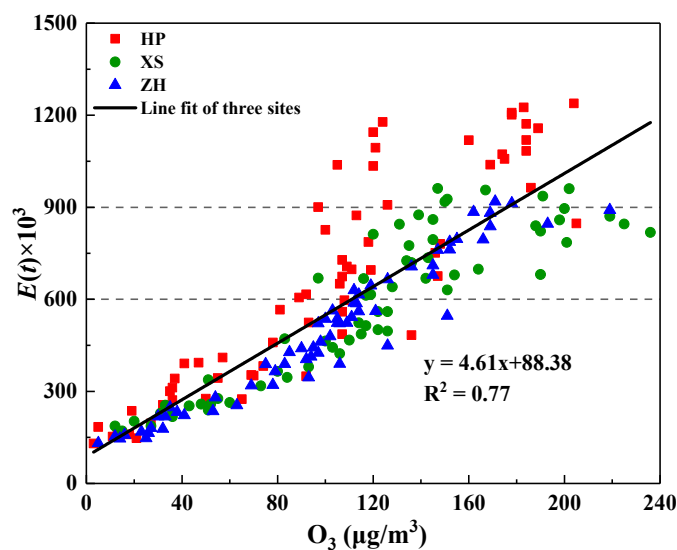


Figure S3. Diurnal variation of ((a) total volatile organic compounds (TVOCs) and different groups ((b) alkanes, (c) alkenes and alkynes, (d) halocarbons, (e) aromatics and (f) oxygenated volatile organic compounds (OVOCs)) at the three sites.



**Figure S4.** Comparison between measured source profiles and Positive Matrix Factorization (PMF) factors of primary emission: (a) liquefied petroleum gas/natural gas (LPG/NG) usage [5]; (b) Solvent utilization; (c) Biomass burning; (d) Vehicle exhaust.



**Figure S5.** Correlation analysis relating  $E(t)$  with  $O_3$  concentration at the three sites

## References

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