Supplement of

Measurement report: Simultaneous multi-site observations of VOC in Shanghai, East China: characteristics, sources and secondary formation potentials

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Table S1. MIR and MDL of measured VOCs species at three sampling sites.

Species	MIR	MDL (ppb)
ethane	0.28	0.74
propane	0.49	0.11
iso-butane	1.23	0.10
n-butane	1.15	0.11
iso-pentane	1.45	0.03
n-pentane	1.31	0.05
n-hexane	1.24	0.18
2, 4-dimethylpentane	1.46	0.06
cyclohexane	1.25	0.06
2, 2, 4-trimethylpentane	1.26	0.17
2, 3, 4-trimethylpentane	1.60	0.05
n-heptane	1.07	0.55
2-methylheptane	1.07	0.14
3-methylheptane	1.24	0.15
octane	0.90	0.13
n-nonane	0.78	0.09
ethylene	7.40	0.60
propylene	11.66	0.24
trans-2-butene	15.16	0.14
cis-2-butene	14.24	0.04
1-amylene	7.21	0.07
trans-2-amylene	10.56	0.09
cis-2-2amylene	14.24	-
isoprene	10.61	0.09
1-hexene	5.35	0.11
1, 3-butadiene	12.61	0.17
benzene	0.72	0.11
toluene	4.00	0.14
ethylbenzene	3.04	0.04
m/p-xylene	7.40	0.09
o-xylene	7.64	0.08
styrene	1.73	0.06
isopropylbenzene	2.52	0.12
n-propylbenzene	2.03	0.07
m-ethyltoluene	7.39	0.15
p-ethyltoluene	4.44	0.15
o-ethyltoluene	5.59	0.10
1, 3, 5-trimethylbenzene	11.76	0.09
1, 2, 4-trimethylbenzene	8.87	0.12
1, 2, 3-trimethylbenzene	11.97	0.13
m-diethylbenzene	7.10	0.19
p-diethylbenzene	4.43	0.23
ethyne	0.95	0.27

Table S2. Comparison of TVOCs, OFP and SOAFP with other cities.

Sampling location	Site type	Sampling time	Quantifies species	TVOCs (ppb)	OFP (ppb)	SOAFP ($\mu g\ m^{-3}$)	References
Shanghai	Industrial area	Nov. 2013-Jan. 2014	69	94.14	220.49	-	Zhang et al. (2018a)
Shanghai	Suburban area	May 2016	-	58.09	-	-	Zhang et al. (2018b)
Shanghai	Dianshan Lake	Apr. 7-Sep. 25, 2018	55	15.41	-	-	Zhang et al. (2020a)
Jinan	Suburban area	2014	56	50.58	-	0.2-5.56	Zhang et al. (2017)
Wuhan	Urban area	Sep. 2016-Aug. 2017	58	34.65	7.81-634.27	-	Hui et al. (2018)
Taiwan	Industrial and urban area	Feb. 2017	109	36-327	66-831	0.12-5.55	Vo et al. (2018)
Nanjing	Industrial area	Mar. 2011-Feb. 2012	56	43.5	-	-	An et al. (2017)
Nanjing	Suburban area	Jul. 2018	89	35	86.62	0.36	Mozaffar et al. (2020)
Xi'an	20 sites	Jun.-Jul. 2019	106	29.1	53.9	-	Song et al. (2021)
India	Urban (two) and rural (one) area	2013-2014	12	43.71; 54.59; 22.4	177.05; 218.49; 68.22	-	Kumar et al. (2018)
Houston	Industrial area	Wintertime of 2018	48	33.92	-	-	Sadeghi et al. (2021)
Shanghai	Urban area	Jan.-Mar. 2019	43	22.64; 21.36; 11.93	50.89; 33.94; 24.26	1.00; 0.46; 0.41	this study

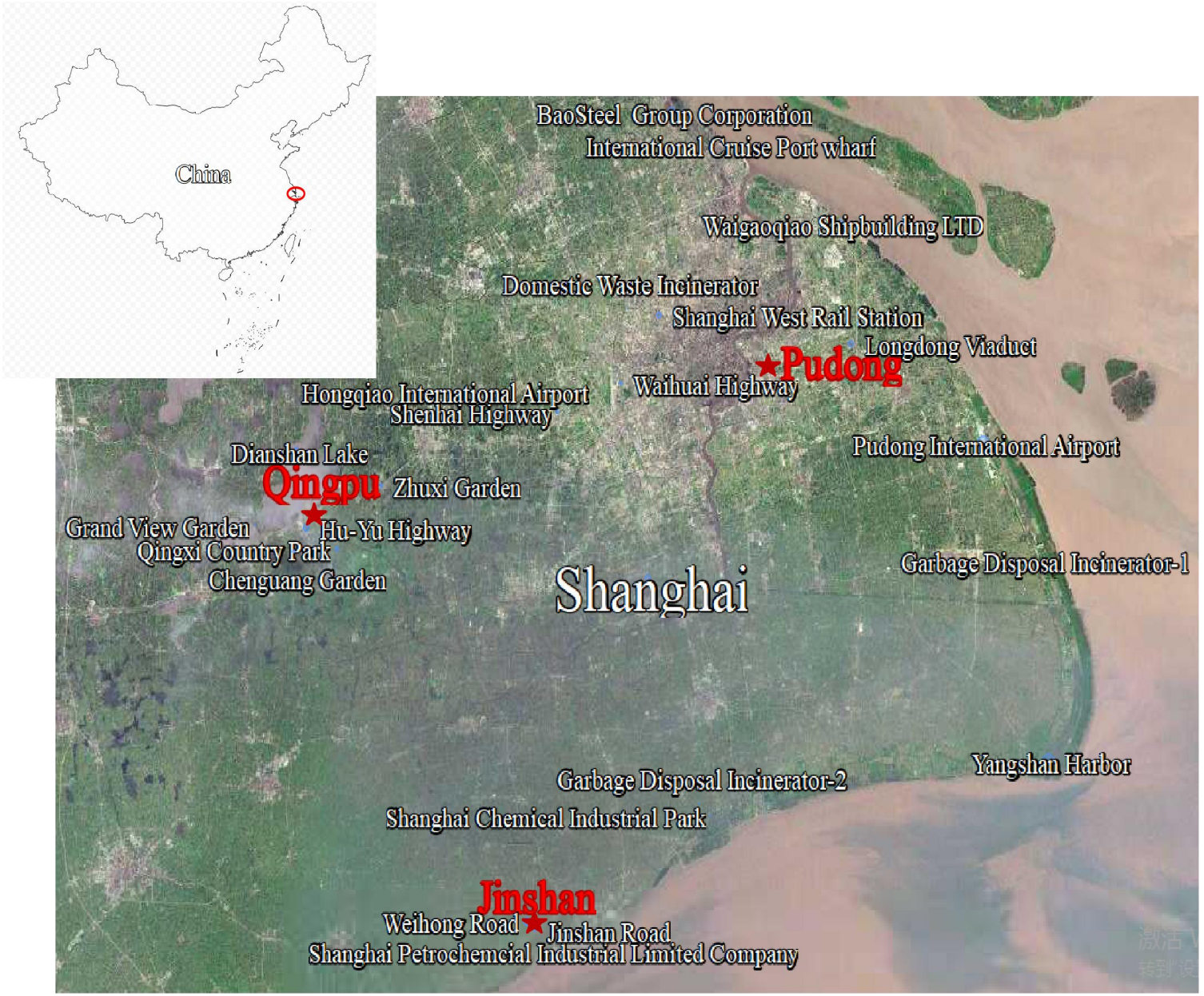


Figure S1. Locations of three sampling sites (from © Google Earth).

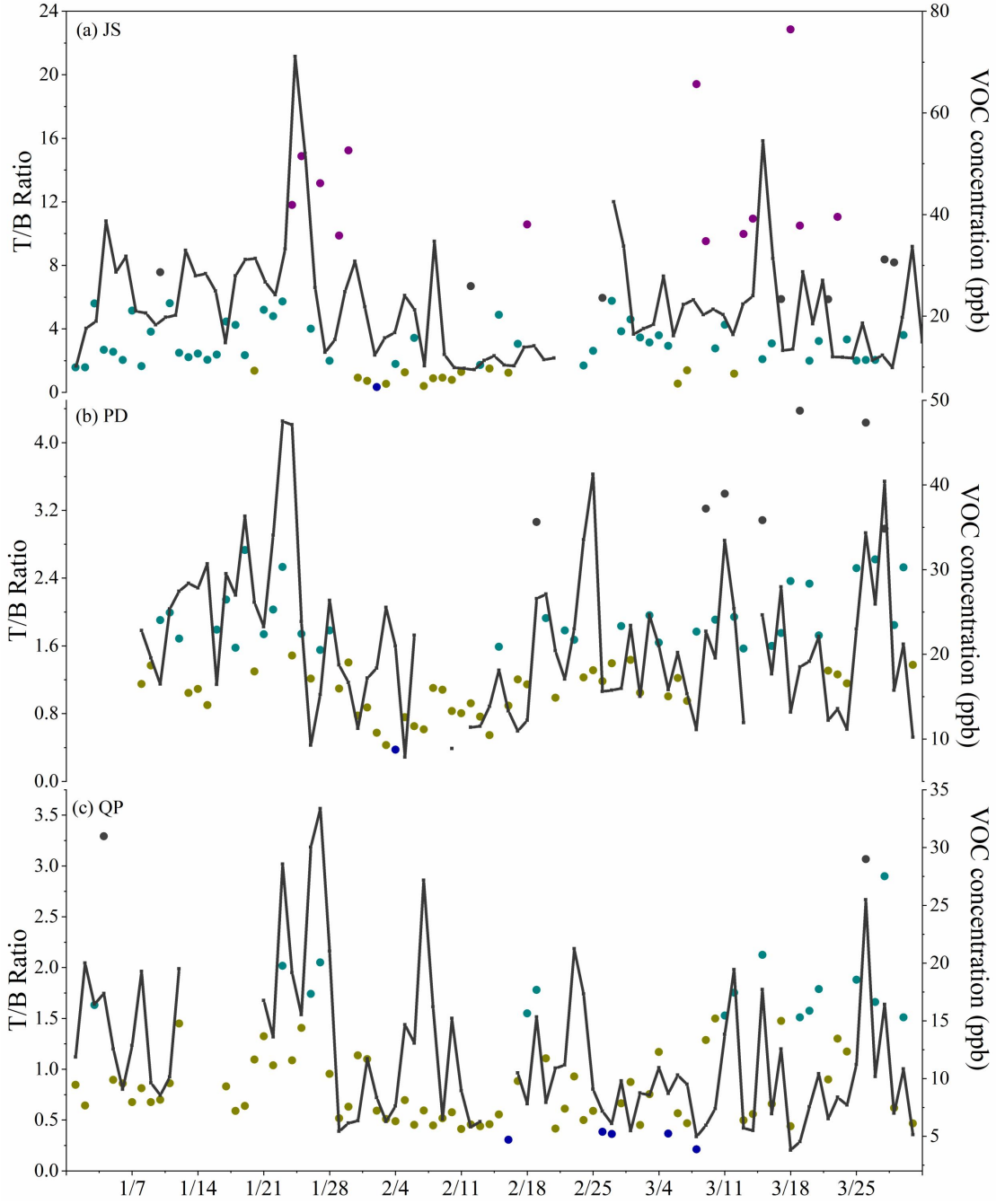


Figure S2. The spatio-temporal variations of T/B ratios at the JS (a), PD (b) and QP (c) sites.

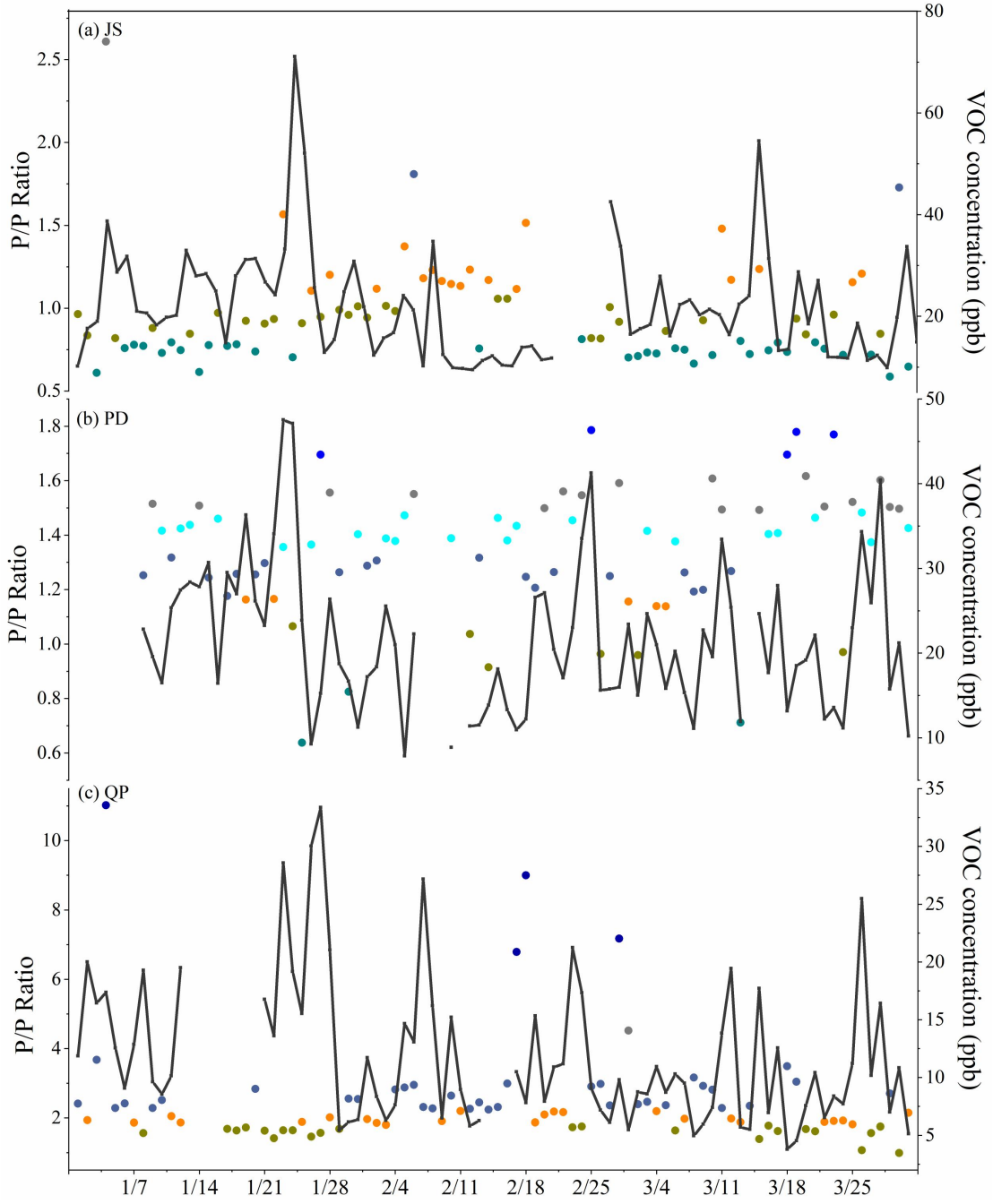


Figure S3. The spatio-temporal variations of P/P ratios at the JS (a), PD (b) and QP (c) sites.

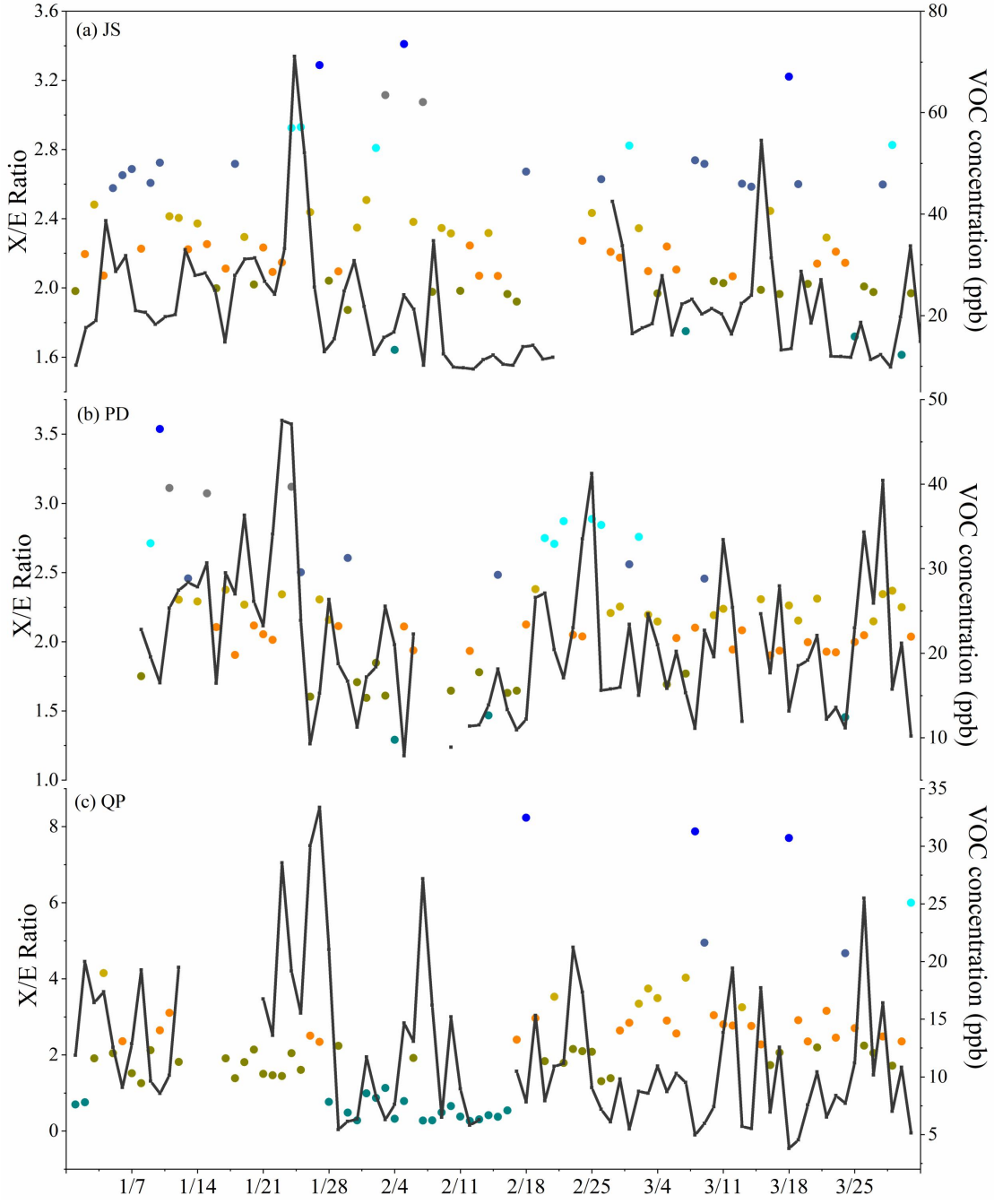


Figure S4. The spatio-temporal variations of X/E ratios at the JS (a), PD (b) and QP (c) sites.

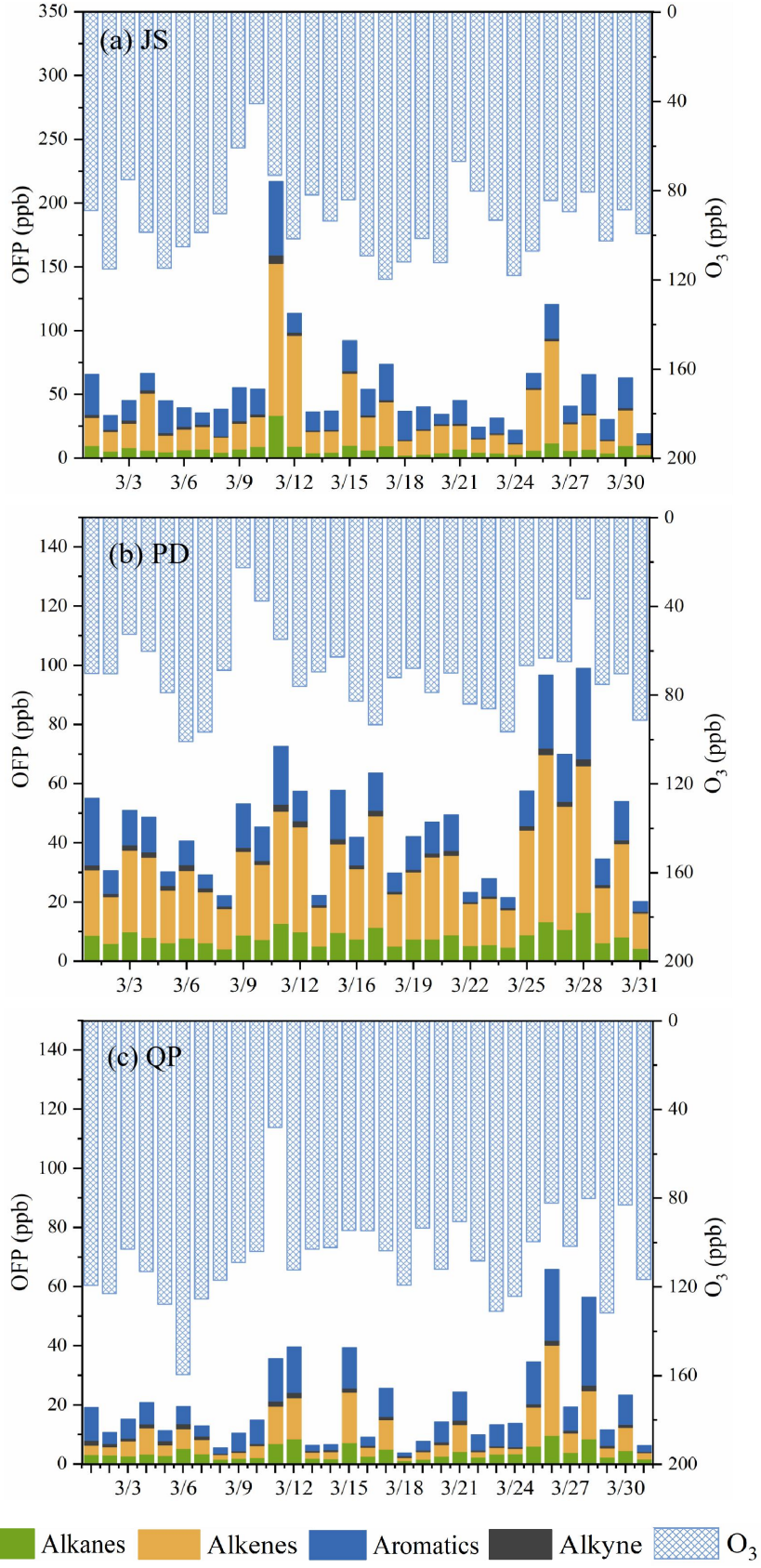
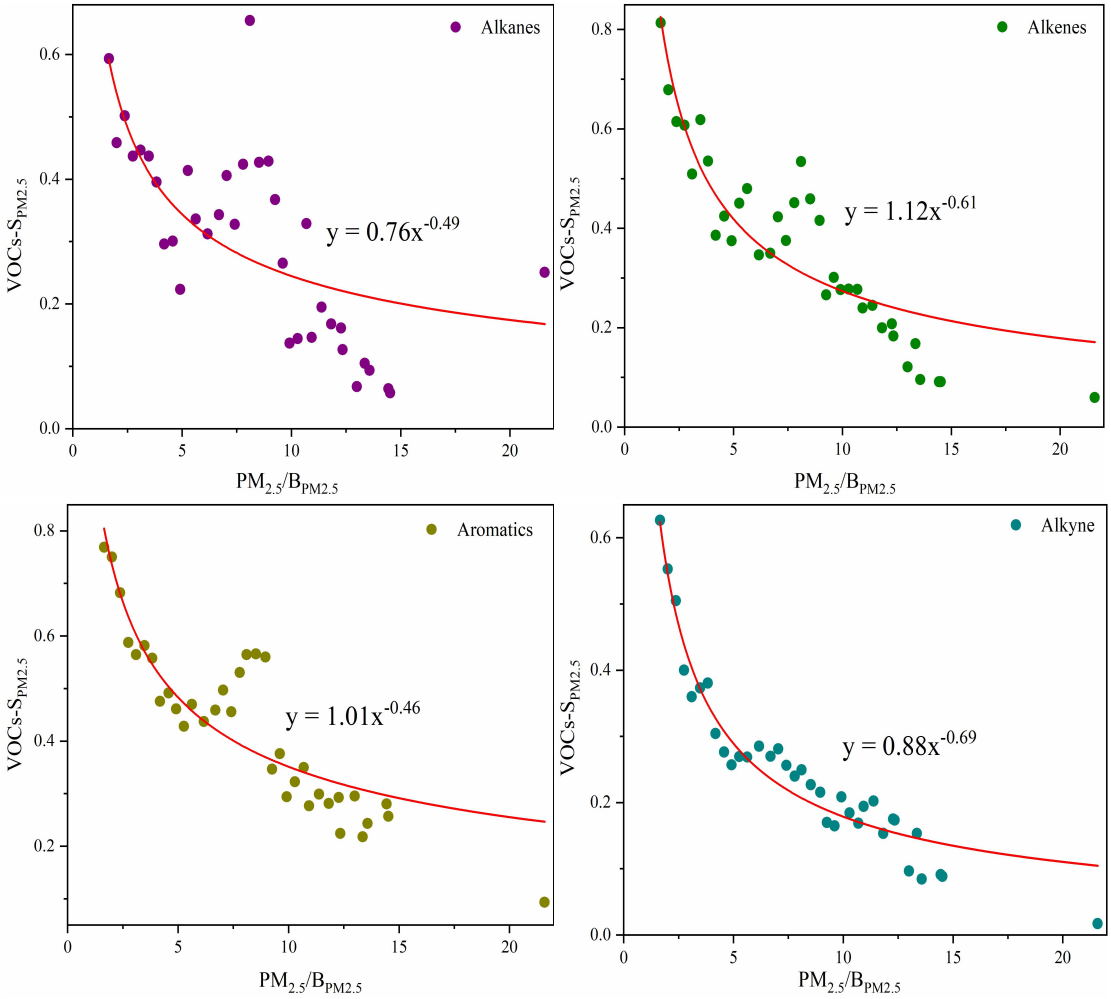
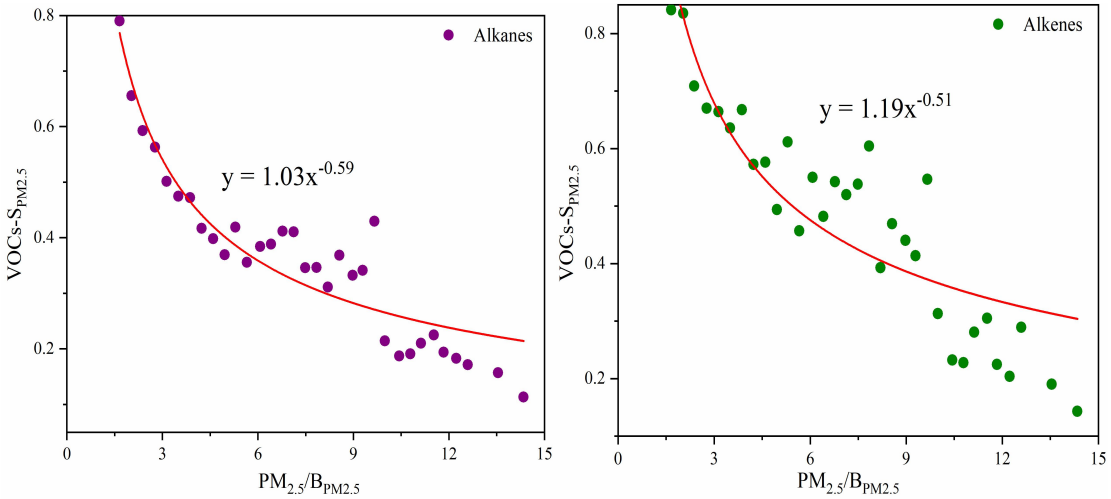


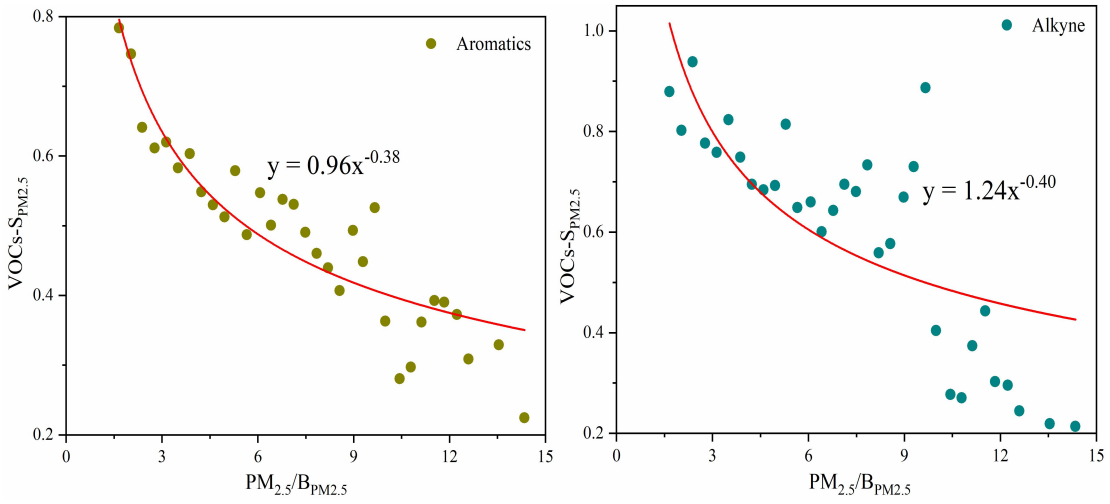
Figure S5. The spatio-temporal variations of OFP in four groups and concentrations of O_3 in March at the JS (a), PD (b) and QP (c) sites.

(a) JS


Alkanes
y = 0.76x^-0.49
Alkenes
y = 1.12x^-0.61
Aromatics
y = 1.01x^-0.46
Alkyne
y = 0.88x^-0.69
VOCs-S_PM2.5
PM_2.5/B_PM2.5

(b) PD


Alkanes
y = 1.03x^-0.59
Alkenes
y = 1.19x^-0.51
VOCs-S_PM2.5
PM_2.5/B_PM2.5



(c) QP

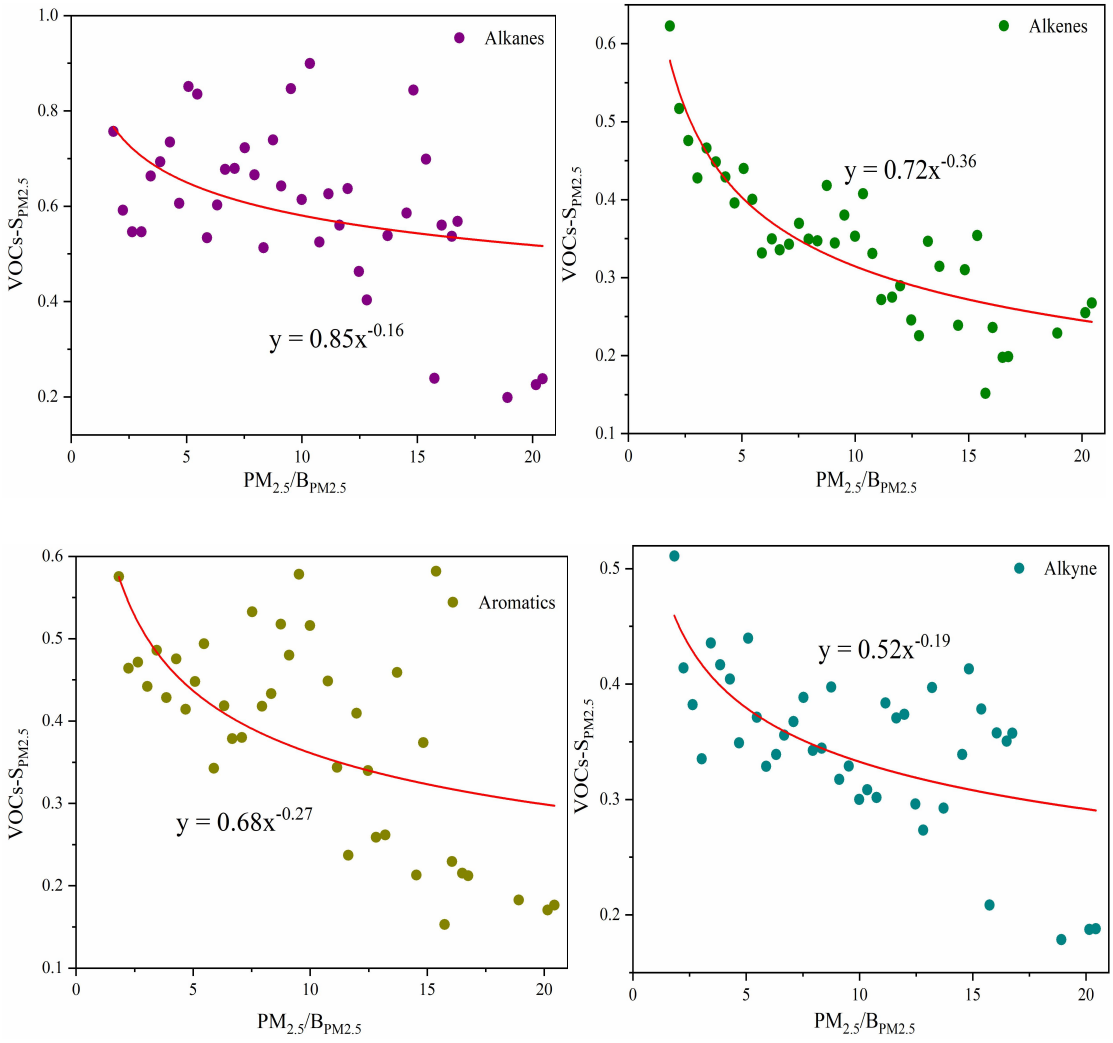
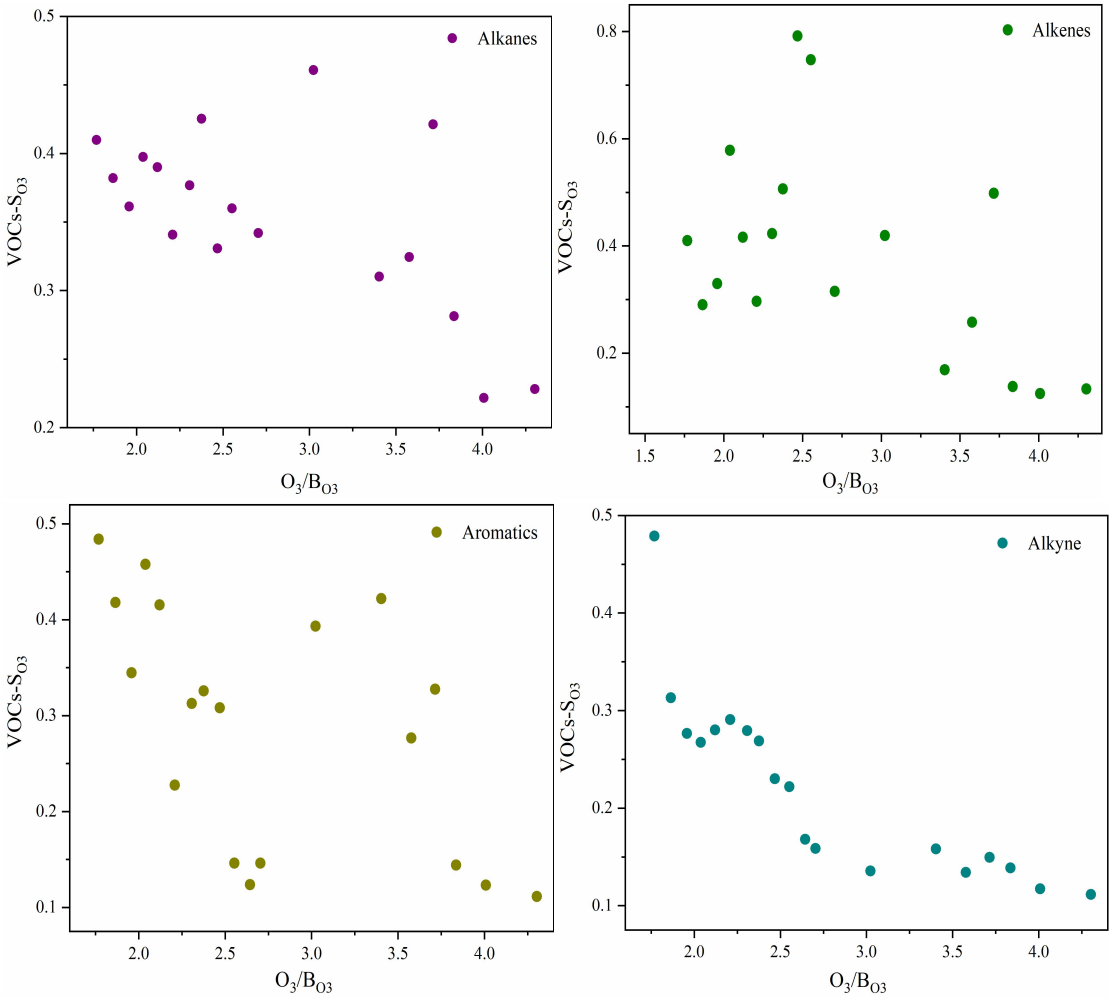
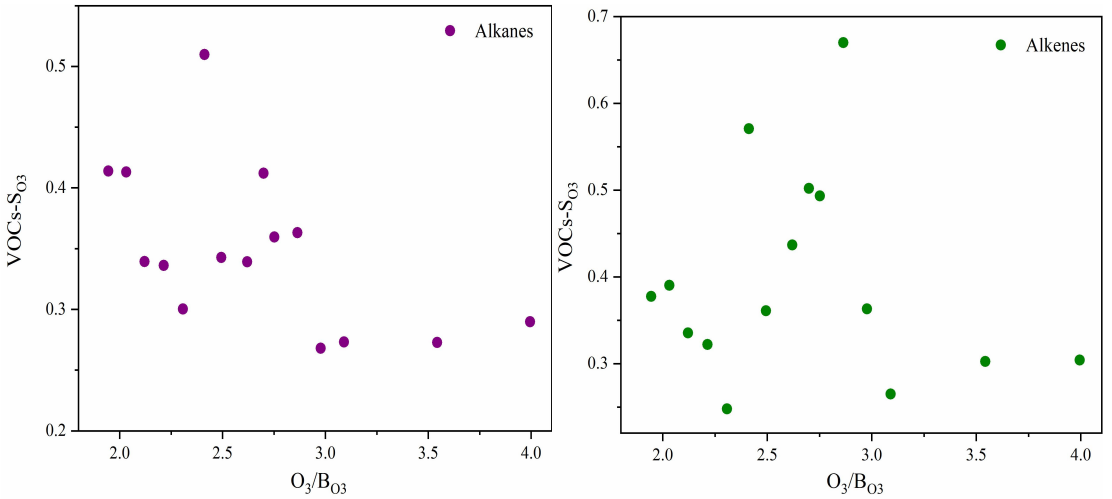


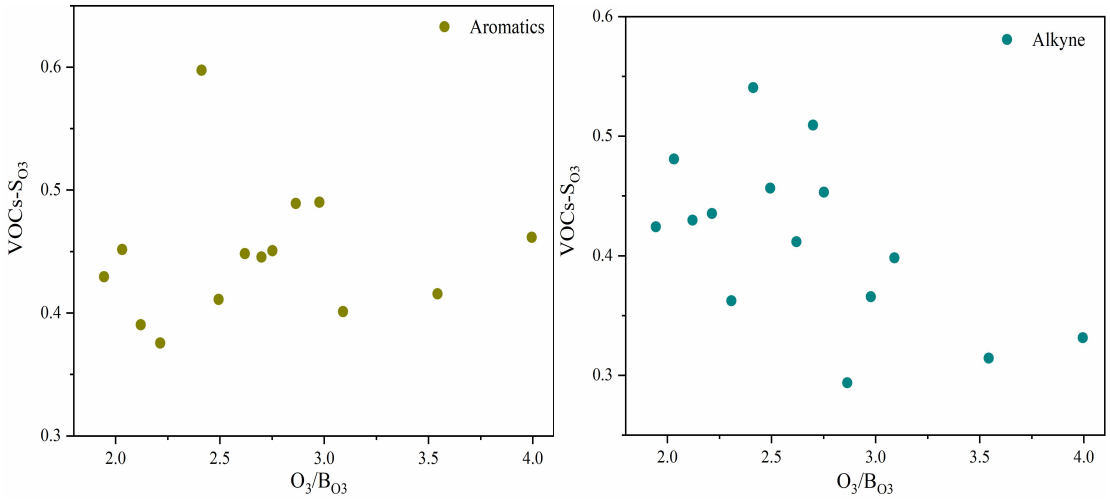
Figure S6. VOCs-$S_{PM2.5}$ values for alkanes (purple), alkenes (green), aromatics (yellow) and alkyne (blue) at the JS (a), PD (b) and QP (c) sites.

(a) JS


Alkanes
Alkenes
Aromatics
Alkyne
VOCs-S$_{O3}$
O$_3$/B$_{O3}$

(b) PD


Alkanes
Alkenes
VOCs-S$_{O3}$
O$_3$/B$_{O3}$



(c) QP

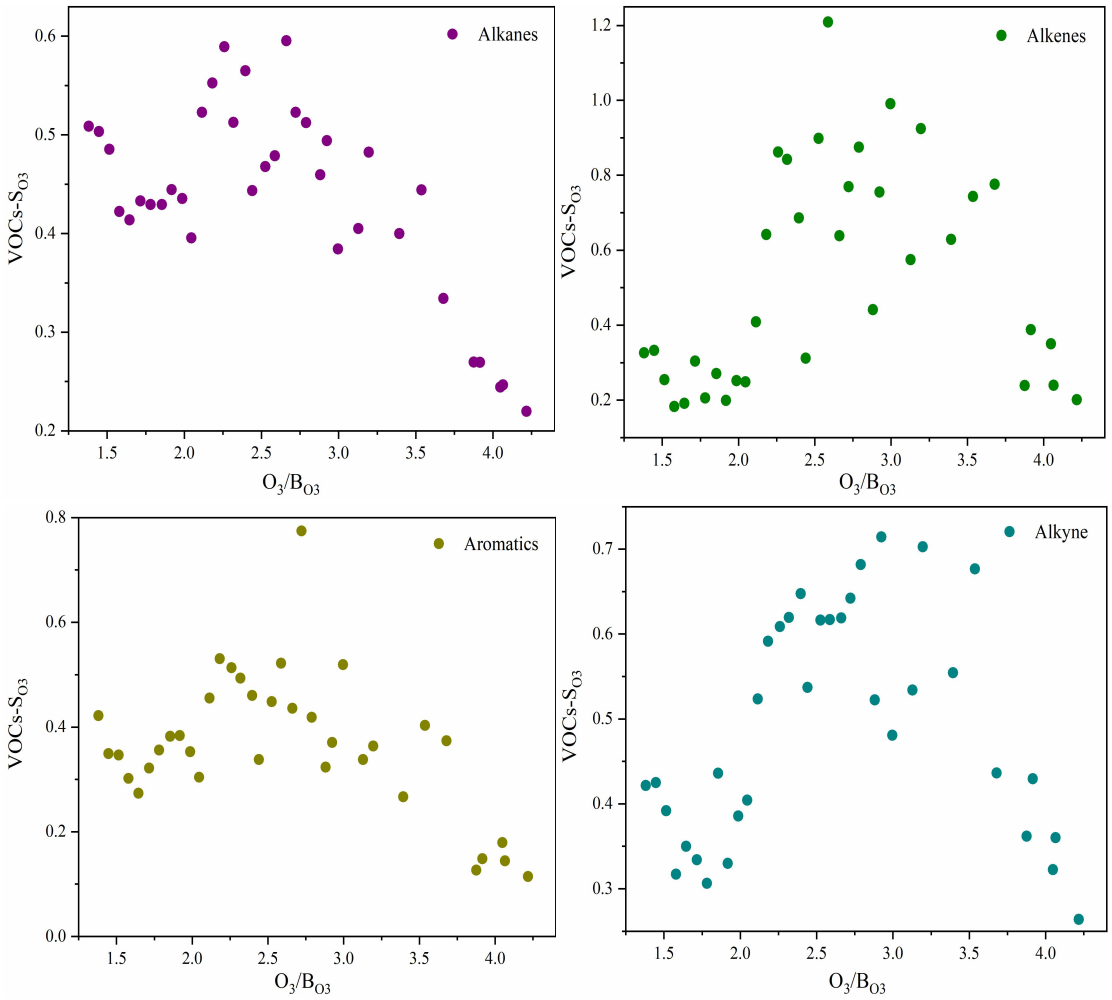


Figure S7. VOCs-S_{O3} values for alkanes (purple), alkenes (green), aromatics (yellow) and alkyne (blue) at the JS (a), PD (b) and QP (c) sites.

References

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