TableS1. Statistics analysis for meteorological parameters and pollutants during the the study period.

Species	2018	2019	2020	Average
NO/(ppbv)	4.3	6	5.2	5.1
CO/(ppbv)	1.5	1.6	1.7	1.6
SO_2/(ppbv)	1.8	2	3.3	2
O_3/(ppbv)	61.9	75.5	66.4	68.2
NO_2/(ppbv)	25.4	19.4	15	20.3
TVOC/(ppbv)	13	34.7	17.8	21.8
RH/(%)	66.6	61.4	65.4	64.4
WS/(m/s)	1.7	1.6	1.5	1.6
TSRI/(w/m^2)	348.6	378.7	375.9	367.5
P/(KPa)	100.7	100.7	100.8	100.7
Pre/(mm)	0.1	0.1	0.1	0.1
Vis/(km)	26.9	32.3	29.8	29.6
T/(℃)	24.3	23.6	23.2	23.7

Table S2 O_3 episodes between 1th April, and 31th August from 2018 to 2020

Year	Haze-episodes	Date	Duration	Average concentration	Heavy pollution duration	Peak concentration
2018	1	2th April	1d	108	5h	191
	2	1th June to 2th June	2d	101	15h	248
	3	4th June to 6th June	3d	129	19h	239
	4	12th June	1d	114	7h	205
	5	14th June	1d	95	4h	194
	6	16th June	1d	114	6h	190
	7	18th June	1d	118	8h	206
	8	4th July to5th July	2d	98	11h	191
	9	12th July	1d	84	6h	208
	10	19th July	1d	120	6h	228
	11	21th July to 22th July	2d	138	22h	268
	12	28th July	1d	106	5h	184
	13	30th July to 4th August	6d	108	45h	250
	14	9th August to 13th August	5d	125	43h	344
	15	17th August	1d	94	7h	205
2019	1	16th May	1d	114	4h	184
	2	23th May	1d	95	5h	210
	3	29th May	1d	104	6h	213
	4	2th June	1d	113	6h	177
	5	12th June	1d	122	9h	213
	6	14th June	1d	113	9h	239
	7	18th June	1d	90	3h	194
	8	20th June	1d	109	6h	258
	9	22th June	1d	139	7h	199
	10	24th June to 25th June	2d	120	17h	222
	11	27th June	1d	110	7h	184
	12	2th July to 3th July	2d	117	12h	198
	13	12th July	1d	114	9h	193
	14	14th July to 15th July	2d	114	11h	204

	15	21th July to 28th July	8d	121	57h	245
	16	31th July to 1th August	2d	127	17h	235
	17	8th August	1d	92	6h	178
2020	1	30th April to 1th May	2d	117	12h	208
	2	7th June	1d	106	9h	211
	3	13th June	1d	104	4h	167
	4	15th June	1d	87	5h	190

Table S3 Estimated degree of freedom (Edf), degree of reference (Ref. df), P-value, F-value (which measures the relative importance of smoothed variable) for the smoothed variables in the GAM model.

Year	Index	Edf	Ref.df	F	P-value
2018	vis	5.377	6.518	16.659	$<2\times10^{-16}$
	RH	5.93	7.083	15.333	$<2\times10^{-16}$
	NO	8.656	8.91	14.341	$<2\times10^{-16}$
	T	8.077	8.629	13.104	$<2\times10^{-16}$
	P	8.033	8.717	7.311	1.82×10^{-9}
	ws	7.782	8.612	6.846	1.58×10^{-8}
	CO	5.09	6.136	6.603	1.13×10^{-6}
	NO2	1	1	5.489	0.019778
	TSRI	7.951	8.683	4.101	5.09×10^{-5}
	Alkenes	6.056	7.032	3.677	0.000792
	SO2	7.74	8.579	2.979	1.86×10^{-3}
	acetylene	8.114	8.758	2.609	0.006165
2019	T	5.273	6.431	70.659	$<2\times10^{-16}$
	NO2	8.016	8.73	22.872	$<2\times10^{-16}$
	Wd	1	1	22.782	2.29×10^{-6}
	vis	2.749	3.422	21.959	1.66×10^{-14}
	RH	5.217	6.317	17.003	$<2\times10^{-16}$
	TSRI	1	1	16.314	6.08×10^{-5}
	ws	3.251	4.104	13.781	7.17×10^{-11}
	NO	5.938	7.097	9.622	1.84×10^{-11}
	CO	4.009	5.021	8.529	7.88×10^{-8}
	Alkenes	2.24	2.755	4.692	0.00507
	pre	1.811	2.099	3.333	0.03321
	P	5.888	7.016	2.709	8.35×10^{-3}
2020	T	6.963	8	81.806	$<2\times10^{-16}$
	NO2	6.919	7.871	39.793	$<2\times10^{-16}$
	vis	2.995	3.654	24.806	1.37×10^{-13}
	ws	1.7	2.126	24.382	1.90×10^{-9}
	acetylene	1	1	11.068	1.37×10^{-3}
	Alkanes	8.897	8.989	7.916	1.38×10^{-8}
	TSRI	4.375	5.31	7.159	1.02×10^{-5}
	Aromatics	6.906	7.924	5.742	7.62×10^{-6}

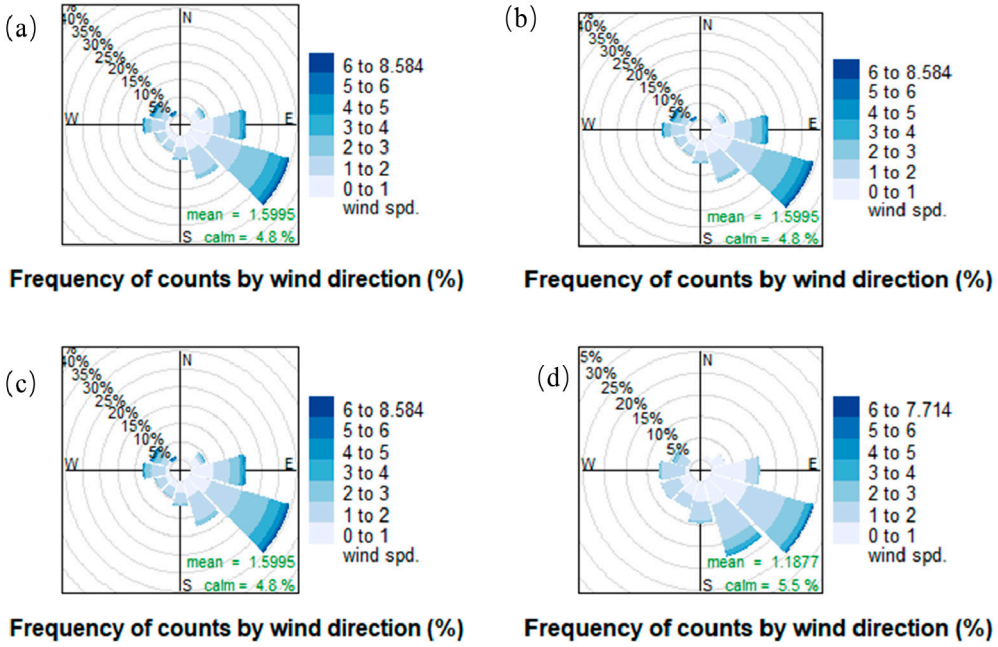

Fig. S1. Wind roses during study period in 2018(**a**),2019(**b**),2020(**c**) and during O_3 episodes from 2018 to 2020(**d**)

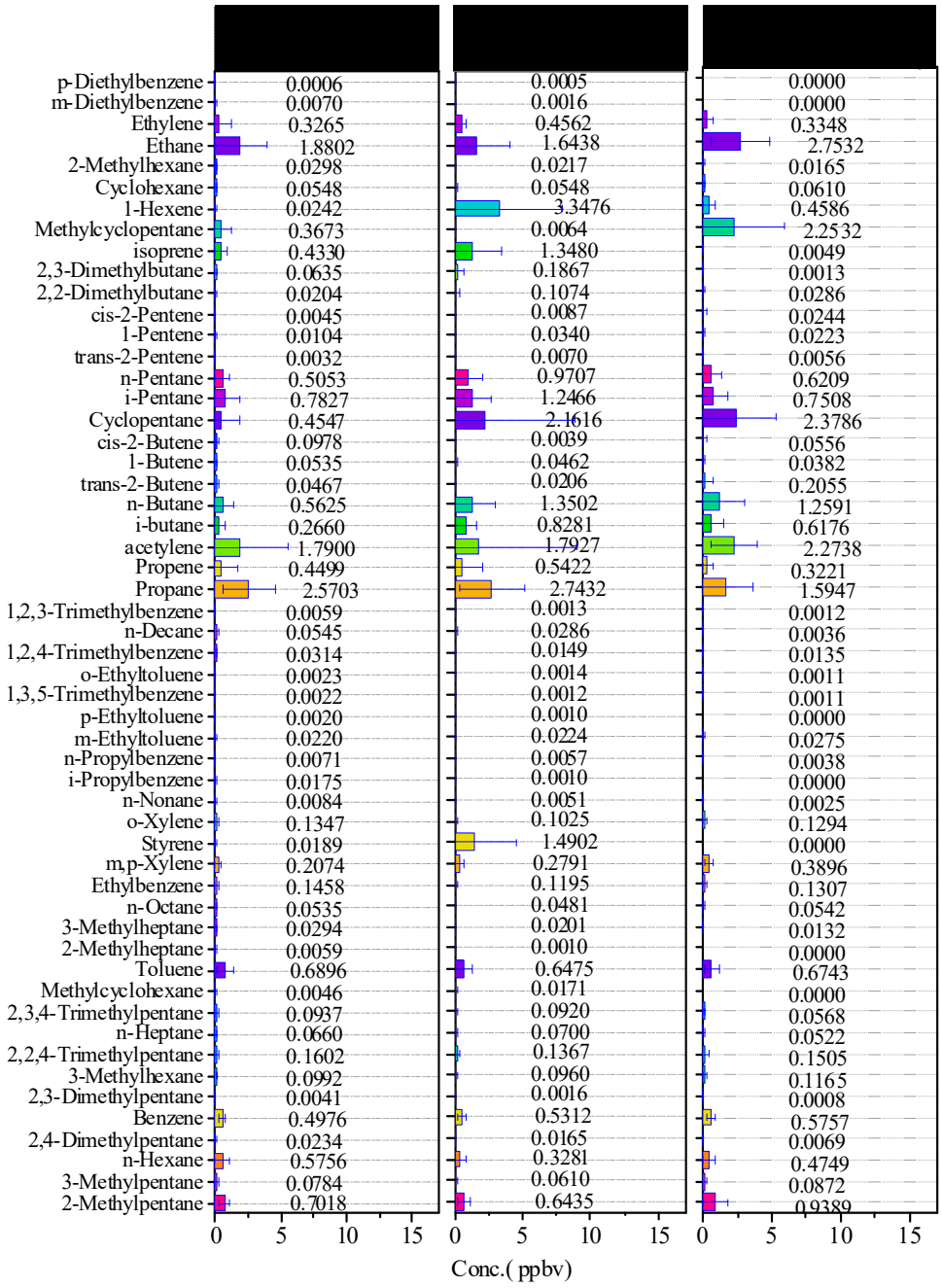

Fig. S2 The mean concentrations of VOCs during the O_3 episodes in this study.

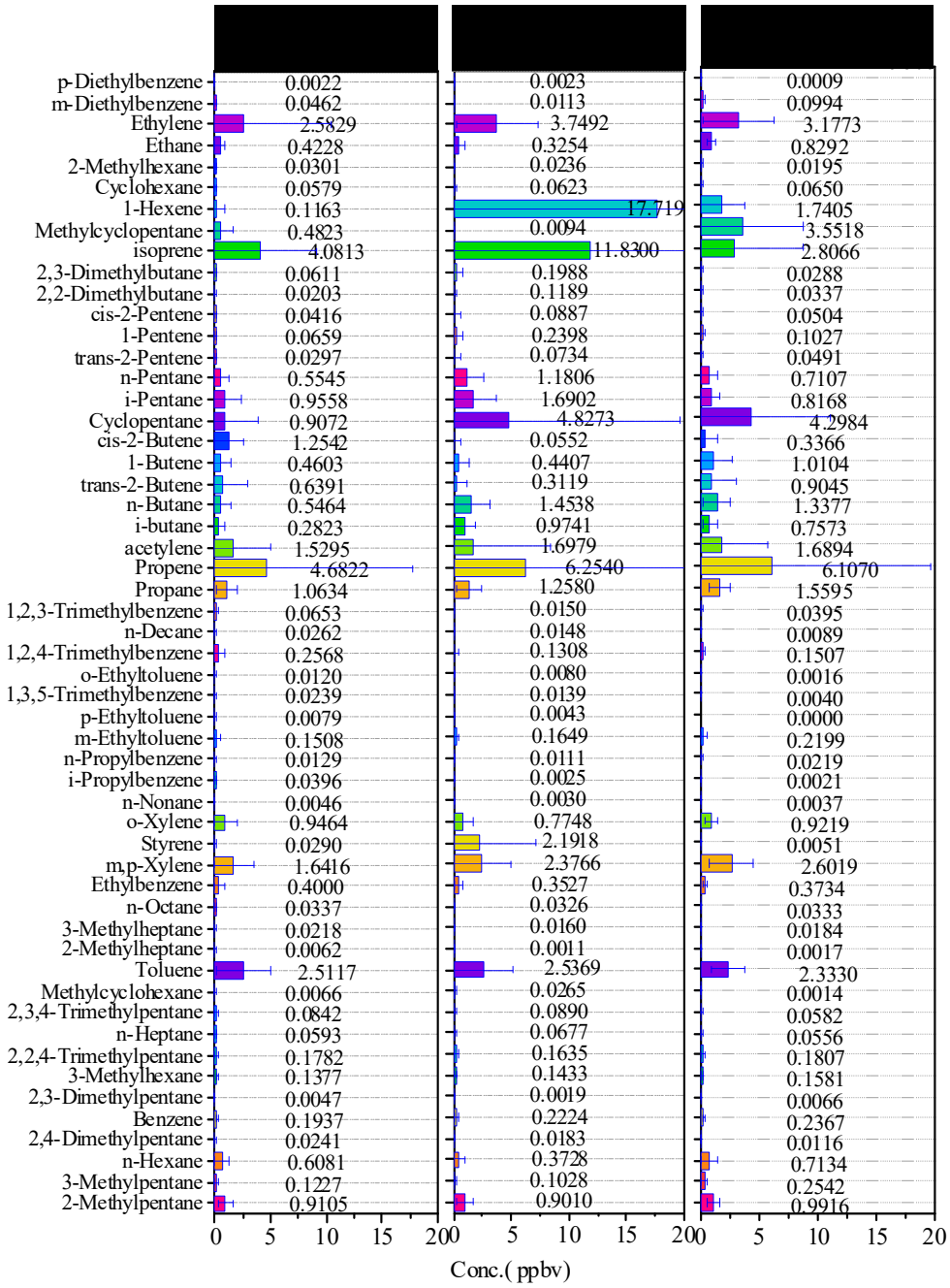

Fig. S3 The mean OFP during the O_3 episodes in this study.

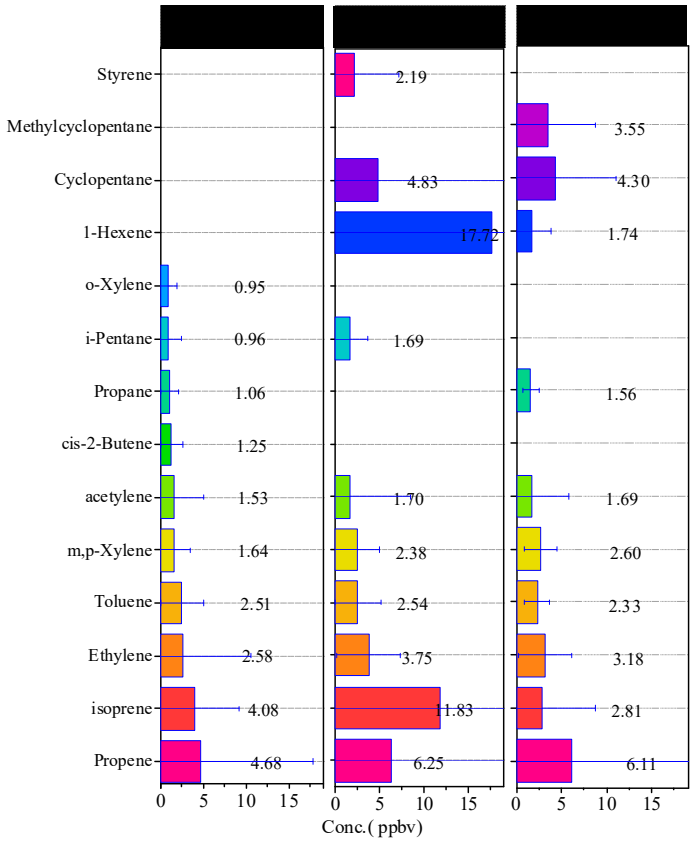

Fig. S4 TOP 10 OFP species in this study during O_3 episodes.

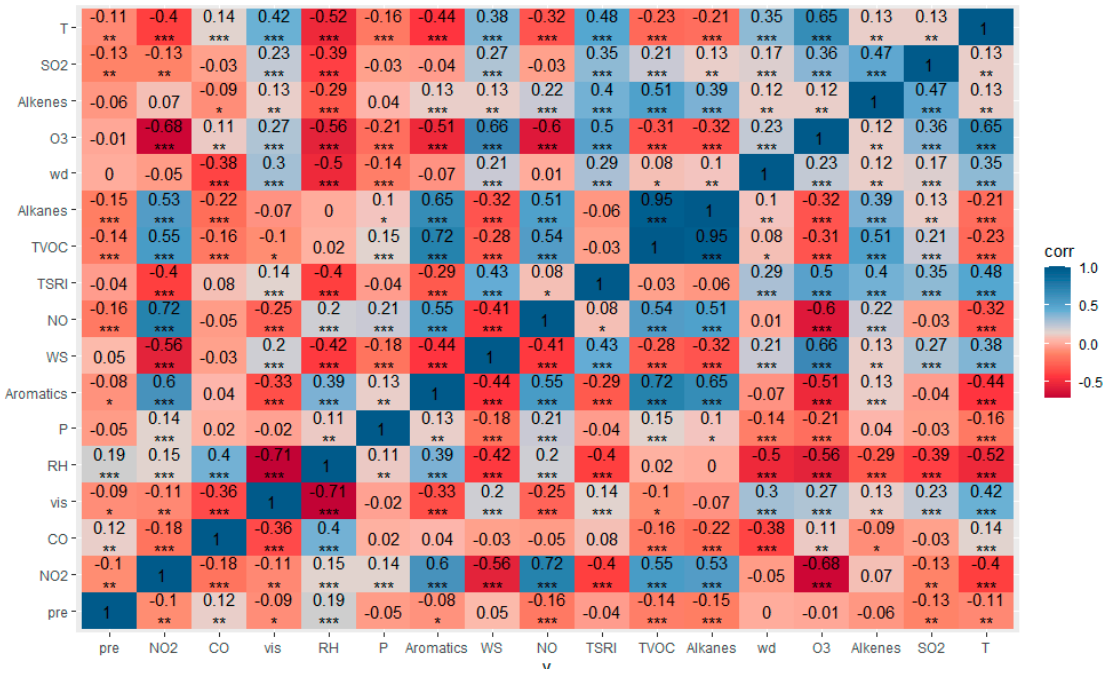

Fig. S5 The spearman correlation coefficients during O_3 episodes in 2018(*** This indicates $p < 0.001$.** This indicates $p < 0.01$. * This indicates $p < 0.05$.)

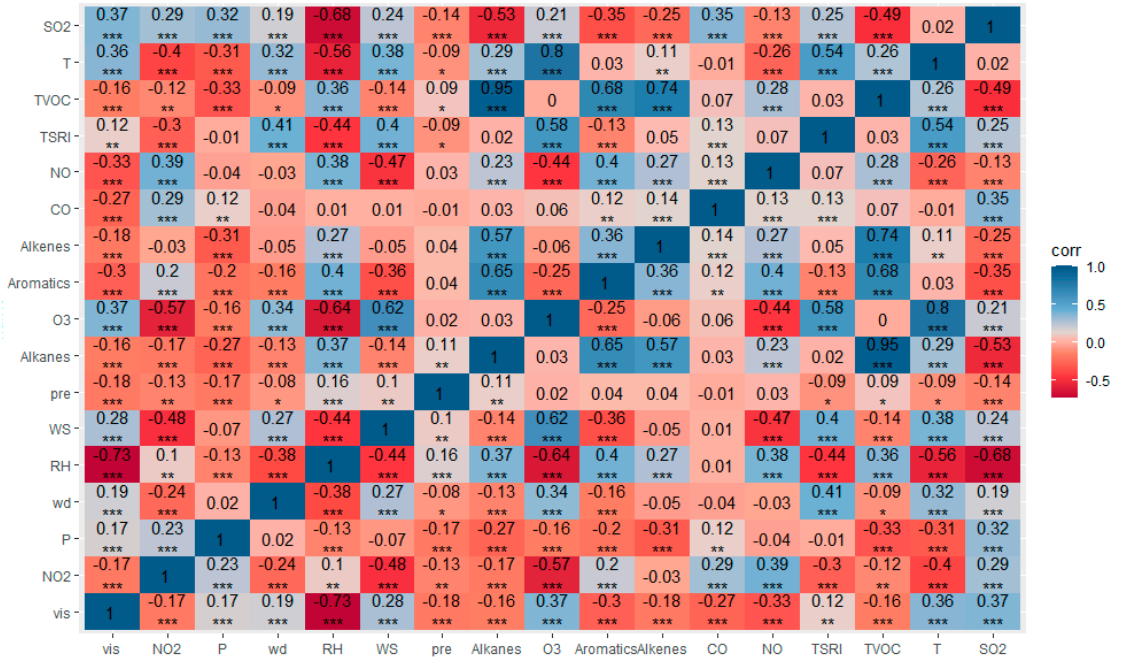

Fig. S6 The spearman correlation coefficients during O_3 episodes in 2019(*** This indicates $p < 0.001$.** This indicates $p < 0.01$. * This indicates $p < 0.05$.)

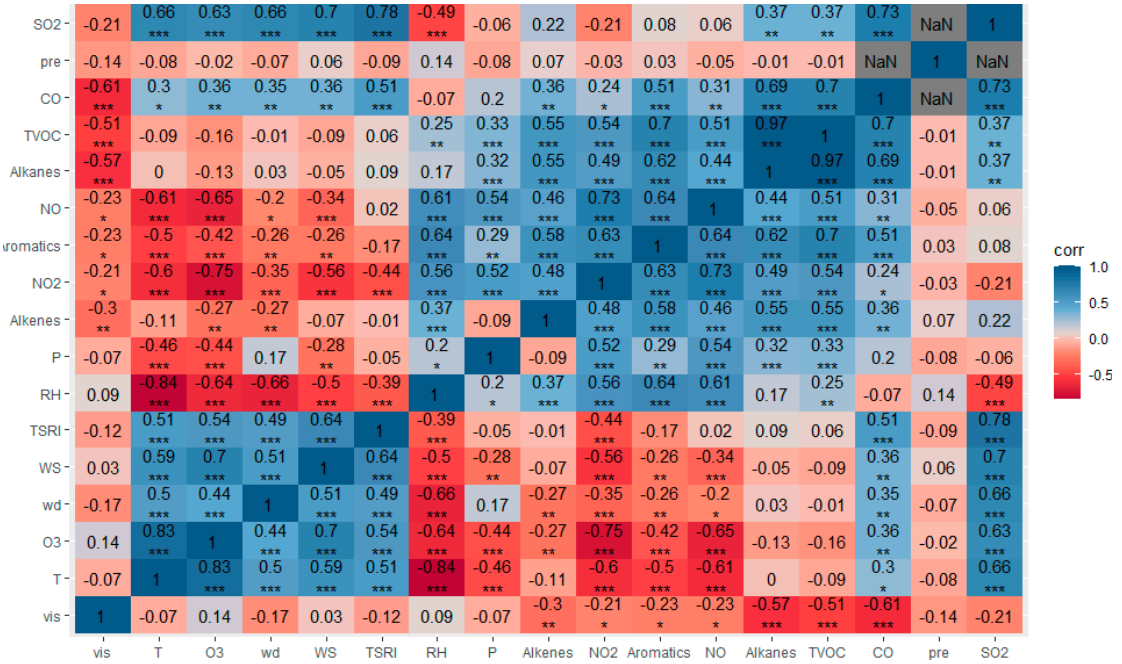

Fig. S7 The spearman correlation coefficients during O_3 episodes in 2020(*** This indicates $p < 0.001$.** This indicates $p < 0.01$. * This indicates $p < 0.05$.)

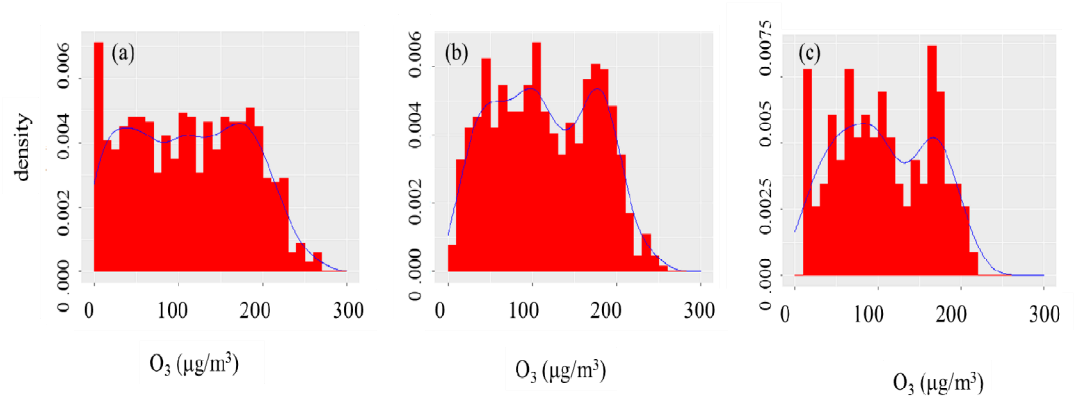

Fig. S8 Density plot of O_3 in 2018(**a**);2019(**b**);2020(**c**)

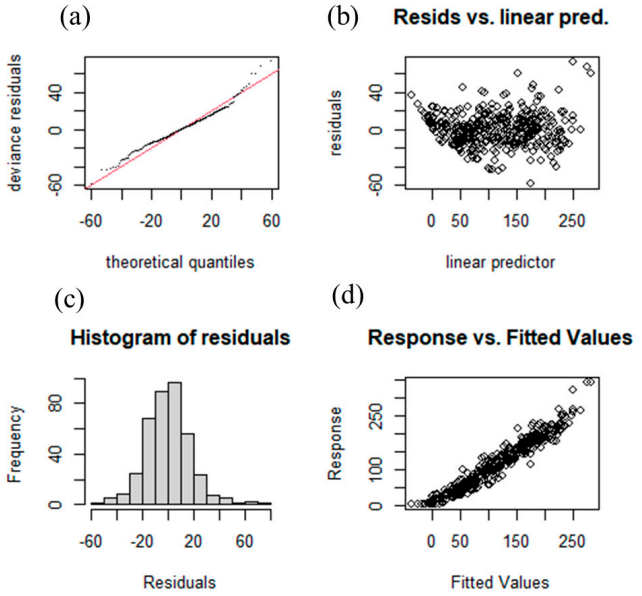

Fig. S9 Residual error result test ((**a**) Residual QQ plot,(**b**) Residual histogram,(**c**) Scatter plot of residuals and predictions,(**d**) Scatter plot of observed and fitted values) in GAM model during O_3 episodes in 2018

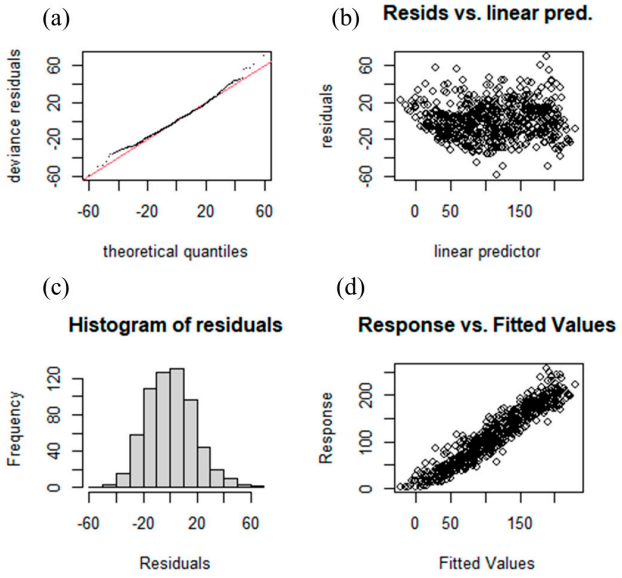

Fig. S10 Residual error result test ((**a**) Residual QQ plot,(**b**) Residual histogram,(**c**) Scatter plot of residuals and predictions,(**d**) Scatter plot of observed and fitted values) in GAM model during O_3 episodes in 2019

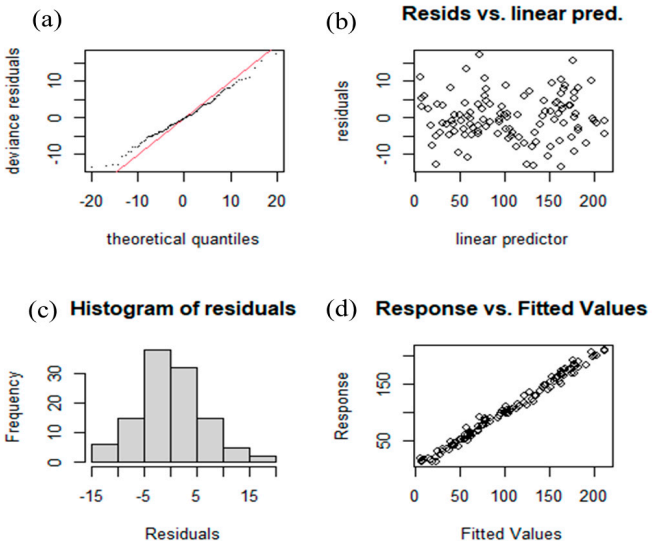

Fig. S11 Residual error result test ((**a**) Residual QQ plot, (**b**) Residual histogram, (**c**) Scatter plot of residuals and predictions,(**d**) Scatter plot of observed and fitted values) in GAM model during O_3 episodes in 2020