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Changes in ozone and precursors during two aged wildfire smoke events in the Colorado Front Range in summer 2015

Jakob Lindaas et al.

Correspondence to: Jakob Lindaas (jlindaas@rams.colostate.edu) and Emily V. Fischer (evf@rams.colostate.edu)

Section S3

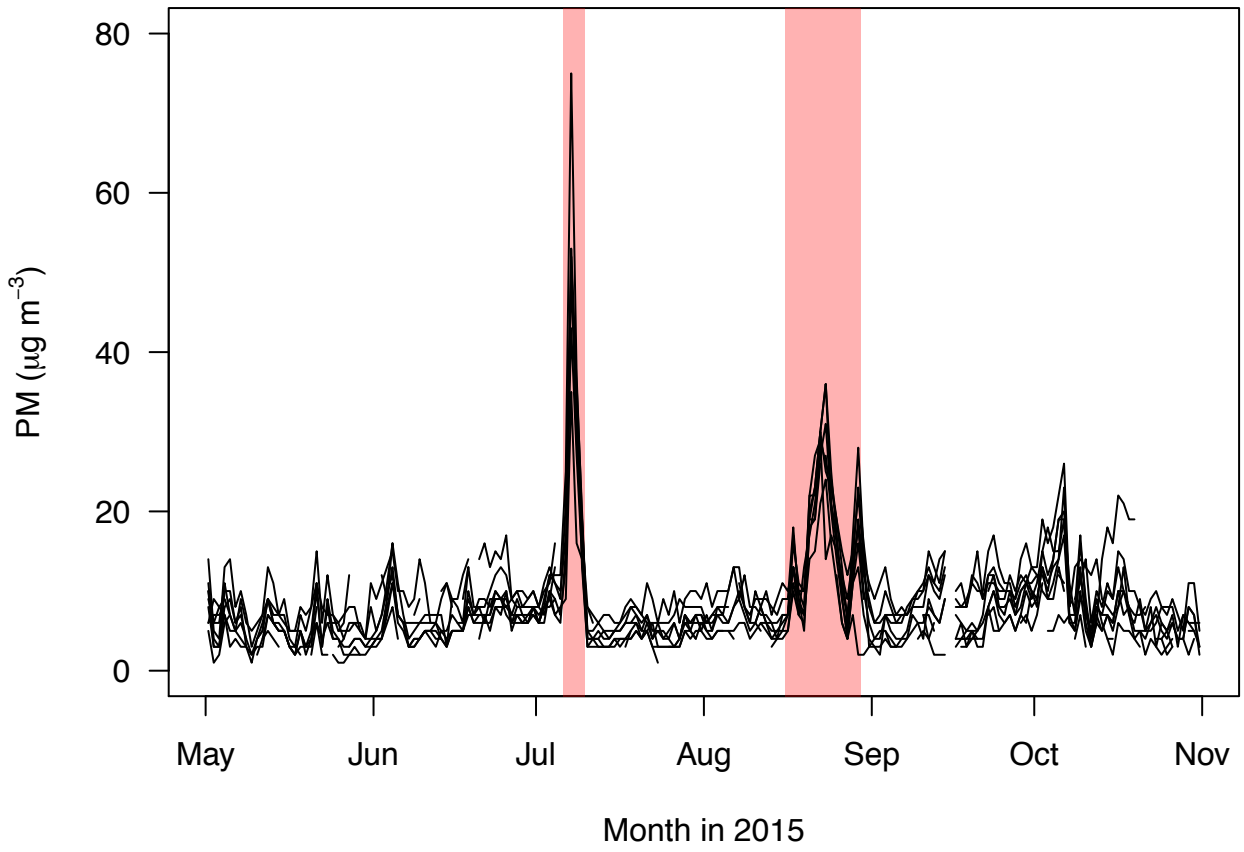


Figure S1. Timeseries of daily average PM measurements for May – November 2015 from 10 PM monitors in the Front Range: CAMP, BOU, CASA, CHAT, COMM, FTCF, GREH, I25, LNGM, NJH. All monitors show similar and consistent excursions during the same smoke-impacted time periods defined at BAO (shown in red shading).

Section S4.1

Table S1. Summary of Statistics for GC measurements at the Boulder Atmospheric Observatory in summer 2015.

[a] Standard deviation in parentheses

[*] Indicates statistically significant change in mean during August smoke-impacted period as compared to the smoke-free period

	Smoke-free period				August smoke-impacted period			
Compound	min	median	mean[a]	max	min	median	mean[a]	max
ethane	0.341	12.4	23 (32.3)	338	0.981	11.5	20.5 (33.7)	362
propane	0.04	4.37	8.09 (11.2)	149	0.218	5.02	8.88 (12.9)	135
i-butane	0.002	0.841	1.52 (1.89)	14	0.028	0.952	1.75 (2.98)	36.3
n-butane	0.023	1.92	3.8 (5.67)	78.2	0.072	2.17	4.16 (7.01)	82.5
i-pentane	0.001	1.63	2.93 (4.94)	82.2	0.048	1.65	2.74 (4.39)	54.6
n-pentane	0.029	1.45	2.84 (5.03)	81.6	0.053	1.42	2.8 (6.6)	91.6
cyclopentane	0.001	0.115	0.679 (0.977)	3.74	0.001	0.104	0.43 (0.665)	3.33
n-hexane	0.001	0.208	0.365 (0.511)	6.82	0.01	0.222	0.387 (0.634)	7.83
cyclohexane	0.005	0.108	0.178 (0.208)	2.15	0.007	0.123	0.194 (0.26)	2.64
2,3-dimethylpentane	0.002	0.057	0.0865 (0.0928)	0.758	0.006	0.073	0.111 (0.144)	1.42
2-methylhexane	0.002	0.055	0.085 (0.092)	0.72	0	0.031	0.046 (0.053)	0.46
3-methylhexane	0.001	0.046	0.0847 (0.121)	1.26	0.007	0.093	0.148 (0.191)	1.86
n-heptane	0.001	0.082	0.129 (0.149)	1.52	0.004	0.085	0.136 (0.188)	1.98
methylcyclohexane	0.005	0.104	0.186 (0.235)	2.33	0.004	0.113	0.2 (0.3)	3.17
2,2,4-trimethylpentane	0.001	0.048	0.061 (0.063)	0.66	0.004	0.048	0.056 (0.055)	0.5
2,2,3-trimethylpentane	0.002	0.017	0.028 (0.044)	0.55	0.002	0.006	0.023 (0.029)	0.24
2-methylheptane	0	0.033	0.044 (0.052)	0.54	0.003	0.027	0.04 (0.054)	0.47
3-methylheptane	0.003	0.045	0.063 (0.067)	0.56	0.005	0.051	0.074 (0.091)	0.77
n-octane	0.005	0.038	0.059 (0.065)	0.54	0.004	0.036	0.057 (0.078)	0.6
ethene[*]	0.001	0.2	0.253 (0.212)	1.94	0.001	0.001	0.0464 (0.128)	0.918
propene[*]	0.002	0.041	0.051 (0.04)	0.41	0.002	0.008	0.011 (0.012)	0.086
cis-2-butene	0.001	0.018	0.0236 (0.0292)	0.345	0.001	0.014	0.023 (0.07)	1.08

isoprene*	0.003	0.141	0.223 (0.268)	2.02	0.001	0.048	0.0804 (0.114)	1.16
benzene*	0.009	0.143	0.175 (0.131)	1.12	0.042	0.241	0.292 (0.189)	1.48
toluene	0.008	0.252	0.297 (0.215)	1.5	0.008	0.237	0.298 (0.26)	1.68
ethylbenzene	0	0.026	0.035 (0.053)	0.95	0.002	0.017	0.028 (0.037)	0.35
ortho-xylene	0.003	0.037	0.045 (0.046)	0.46	0.003	0.022	0.035 (0.041)	0.22
ethyne*	0.002	0.203	0.242 (0.168)	2.09	0.092	0.357	0.405 (0.255)	2.43
acetaldehyde	0.202	1.82	1.86 (0.614)	5.7	0.463	1.79	1.78 (0.509)	3.88
acetone	0.297	3.39	3.46 (1.05)	7.68	0.061	3.56	3.62 (1.21)	7.2
methyl ethyl ketone	0.021	0.353	0.407 (0.25)	2.47	0.021	0.399	0.45 (0.256)	1.6
$CFCl_3$ (CFC-11)	0.11	0.19	0.2 (0.022)	0.36	0.15	0.19	0.19 (0.024)	0.35
CCl_2FCClF_2 (CFC-113)	0.002	0.061	0.061 (0.007)	0.11	0.047	0.064	0.063 (0.006)	0.087
CH_2Cl_2	0.002	0.025	0.029 (0.019)	0.2	0.002	0.022	0.025 (0.013)	0.086
$MeCCl_3$	0	0.014	0.013 (0.0015)	0.022	0.01	0.014	0.014 (0.0014)	0.018
$CHCl_3$	0	0.008	0.0087 (0.0031)	0.022	0.001	0.008	0.0087 (0.0026)	0.018
C_2Cl_4	0	0.005	0.0057 (0.0036)	0.025	0.001	0.004	0.006 (0.0049)	0.036
CH_2Br_2	0	0.001	0.0011 (4e-04)	0.003	0	0.001	0.0011 (5e-04)	0.004
$CHBrCl_2$	0	0.001	0.00074 (9e-04)	0.006	0	0.001	0.00066 (8e-04)	0.004
methylnitrate*	0.001	0.003	0.003 (0.0017)	0.021	0	0.004	0.0042 (0.002)	0.016
ethylnitrate*	0	0.002	0.0024 (0.0018)	0.023	0.001	0.003	0.0032 (0.0013)	0.008
2-propylnitrate	0.001	0.009	0.011 (0.0062)	0.045	0.004	0.011	0.012 (0.0061)	0.035
2-butylnitrate	0.001	0.014	0.018 (0.016)	0.12	0.002	0.015	0.021 (0.015)	0.078
3-pentylnitrate	0	0.003	0.0048 (0.0047)	0.035	0	0.004	0.006 (0.0049)	0.025
2-pentylnitrate	0	0.005	0.0072 (0.0072)	0.055	0	0.007	0.009 (0.0075)	0.039

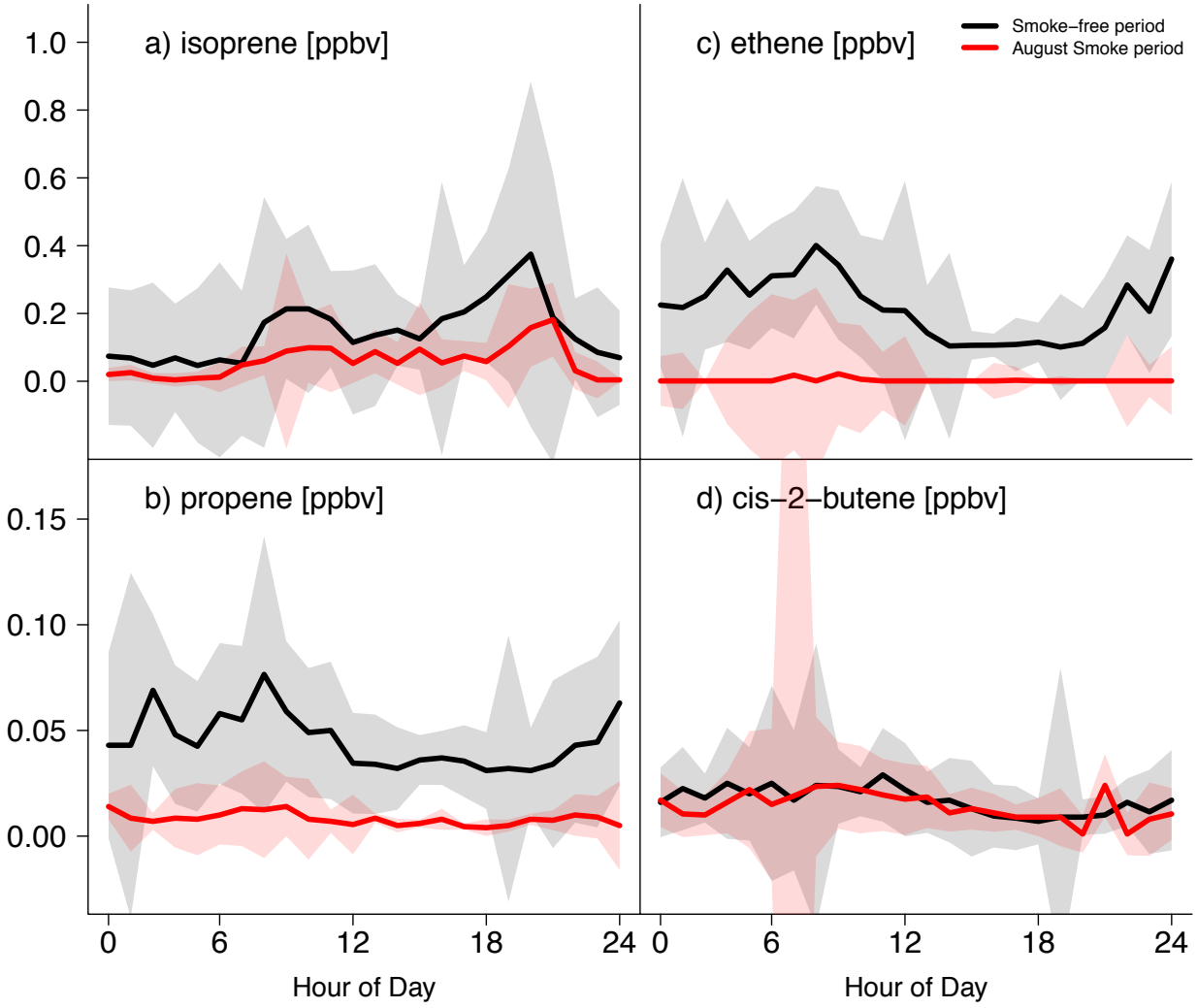


Figure S2. Diurnal cycles of a) isoprene, b) propene, c) ethene, and d) cis-2-butene, during the smoke-free period (black lines and shading) and the August smoke-impacted period (red lines and shading) at the Boulder Atmospheric Observatory in summer 2015. Lines show median values for 2 hour bins, and shading represents ± one standard deviation.

Section S4.3

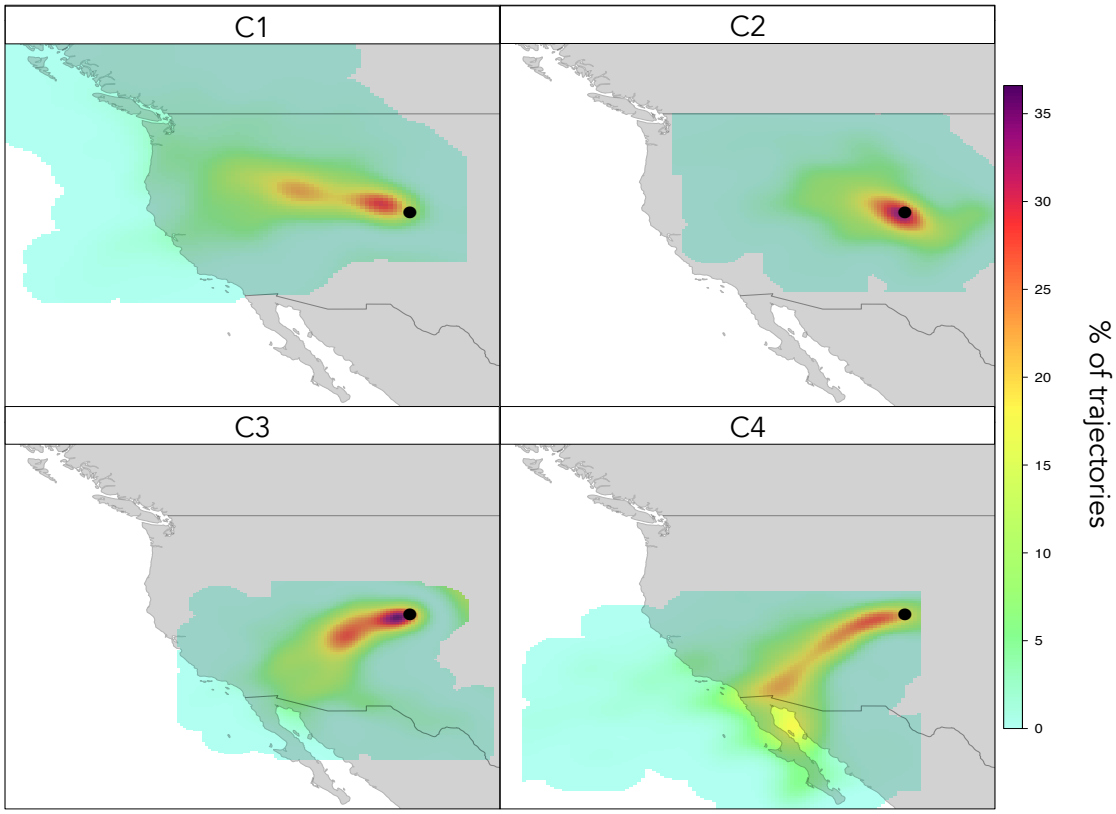


Figure S3. Trajectory clusters calculated for hourly HYSPLIT back trajectories initiated from BAO. Clusters are calculated using k-means cluster analysis. 66% of all hours during the campaign were able to be clustered. C1 shows northwesterly flow, and contains the majority of the smoke-impacted hours. C2 shows stagnant or uncertain flow. C3 shows weak southwesterly flow, and C4 shows strong westerly/southwesterly flow.

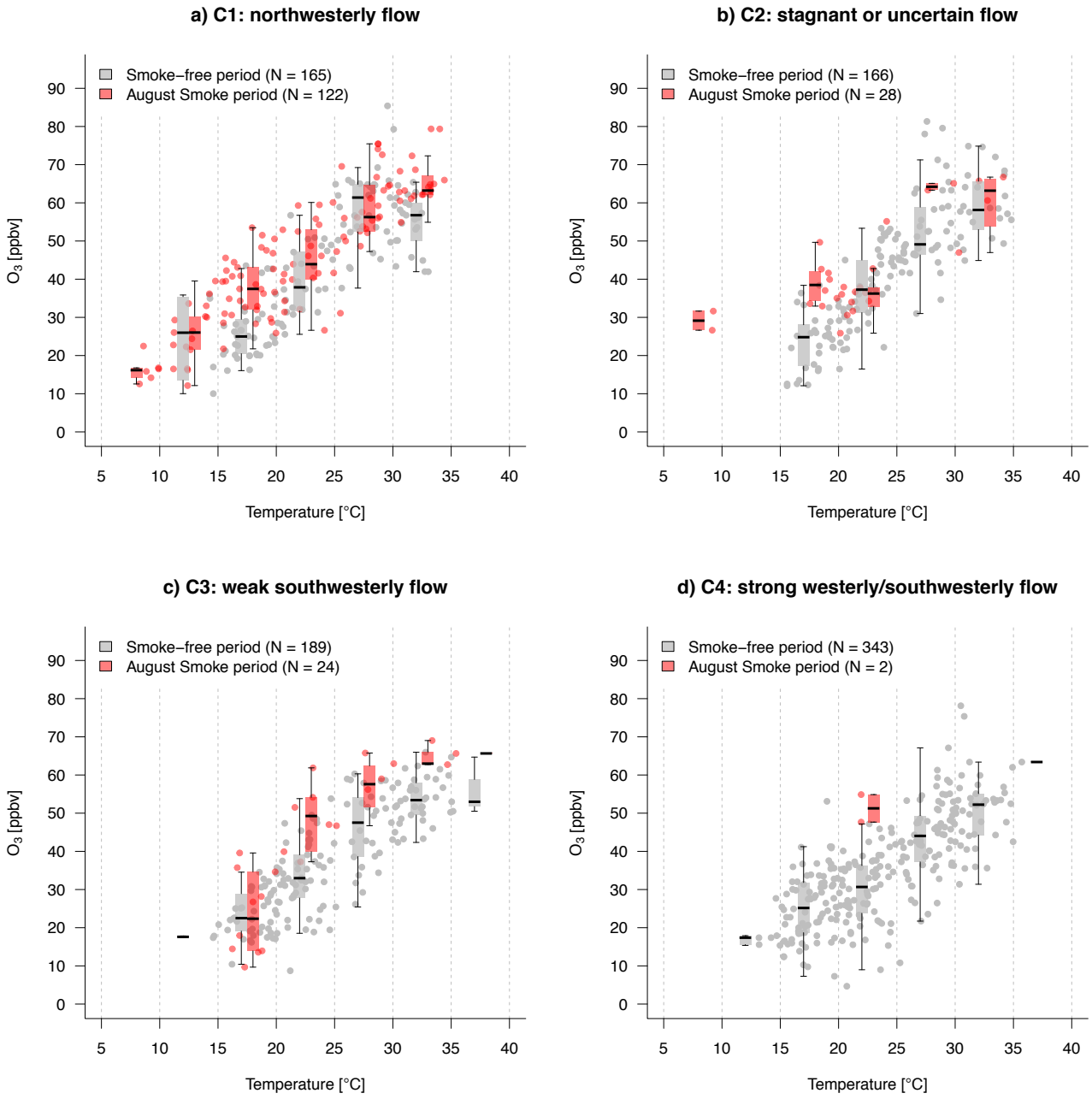
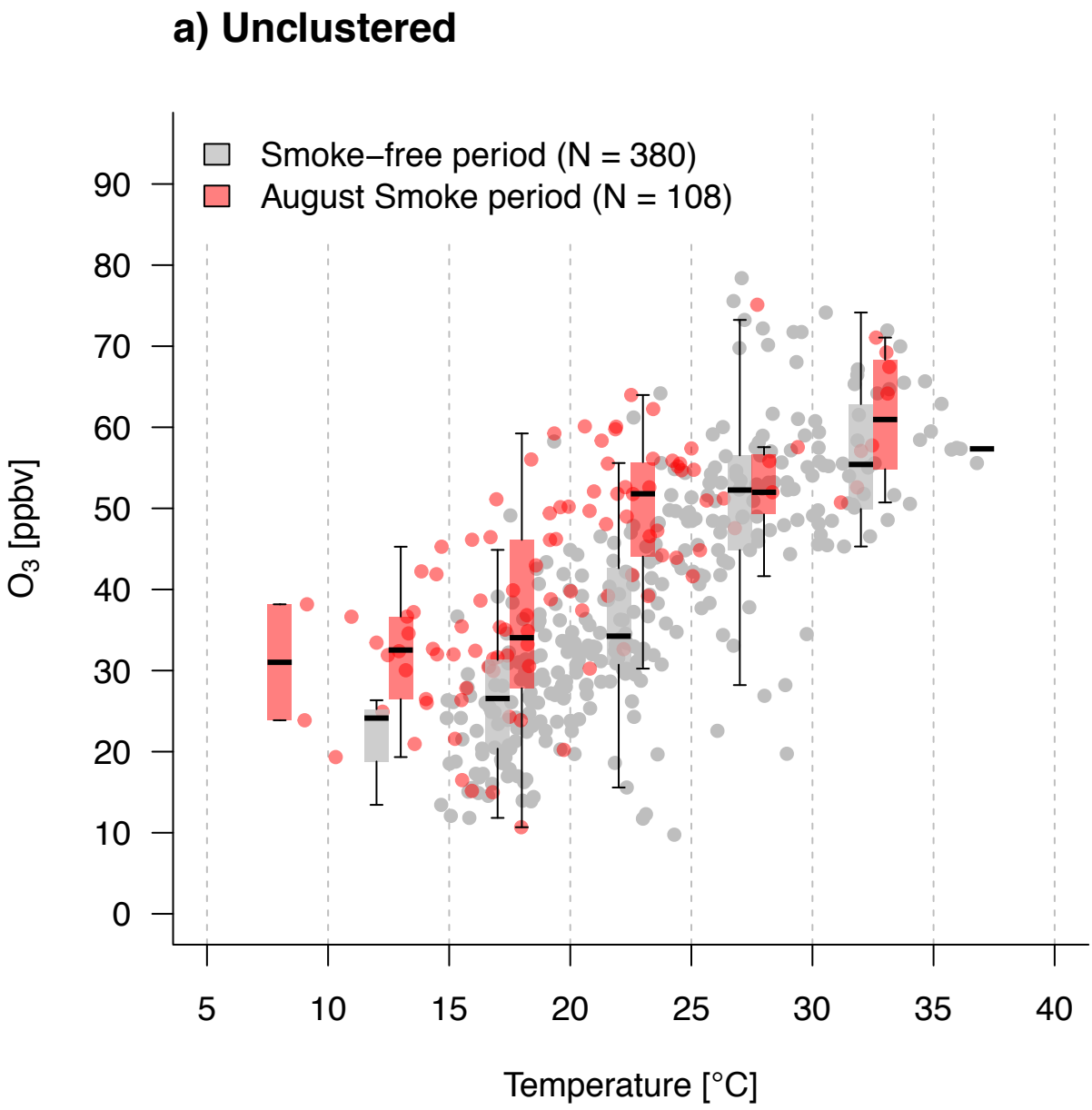


Figure S4. Hourly O_3 versus temperature for the four k-means trajectory clusters: a) C1: northwesterly flow, b) C2: stagnant or uncertain flow, c) C3: weak southwesterly flow, and d) C4: strong westerly/southwesterly flow. Plotted here are hourly data, with boxplots showing standard percentiles of 5 °C binned O_3 data. Smoke-free days are shown in black and August smoke-impacted days are shown in red as in Figure 6 and Figure 8.



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50 **Figure S5. Hourly O_3 versus temperature for the unclustered HYSPLIT trajectory hours. Plotted here are hourly data, with**
51 **boxplots showing standard percentiles of 5 °C binned O_3 data the same as is shown in Figure 6 and Figure 8.**

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