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Supplement of

Burning conditions and transportation pathways determine biomass-burning aerosol properties in the Ascension Island marine boundary layer

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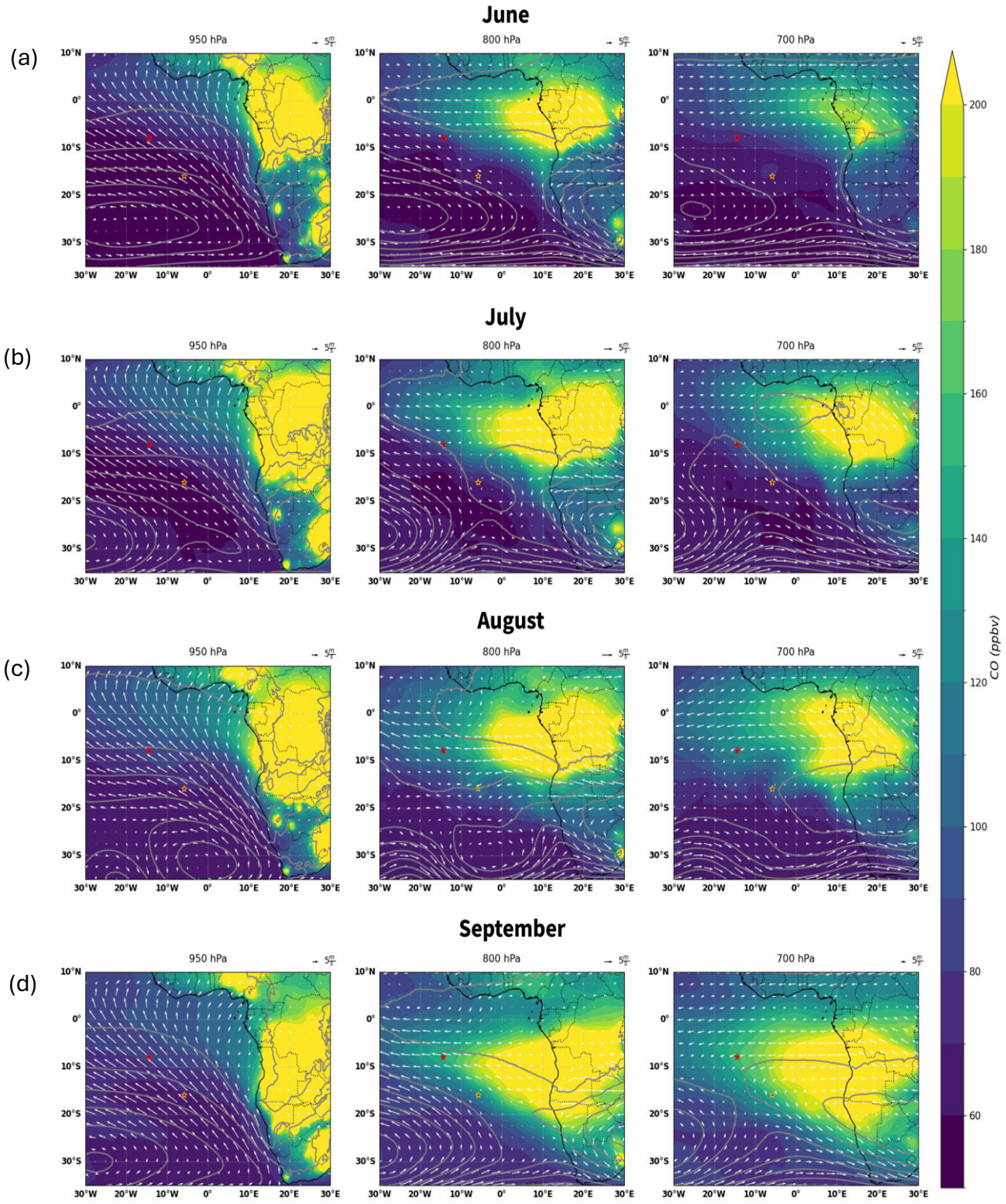
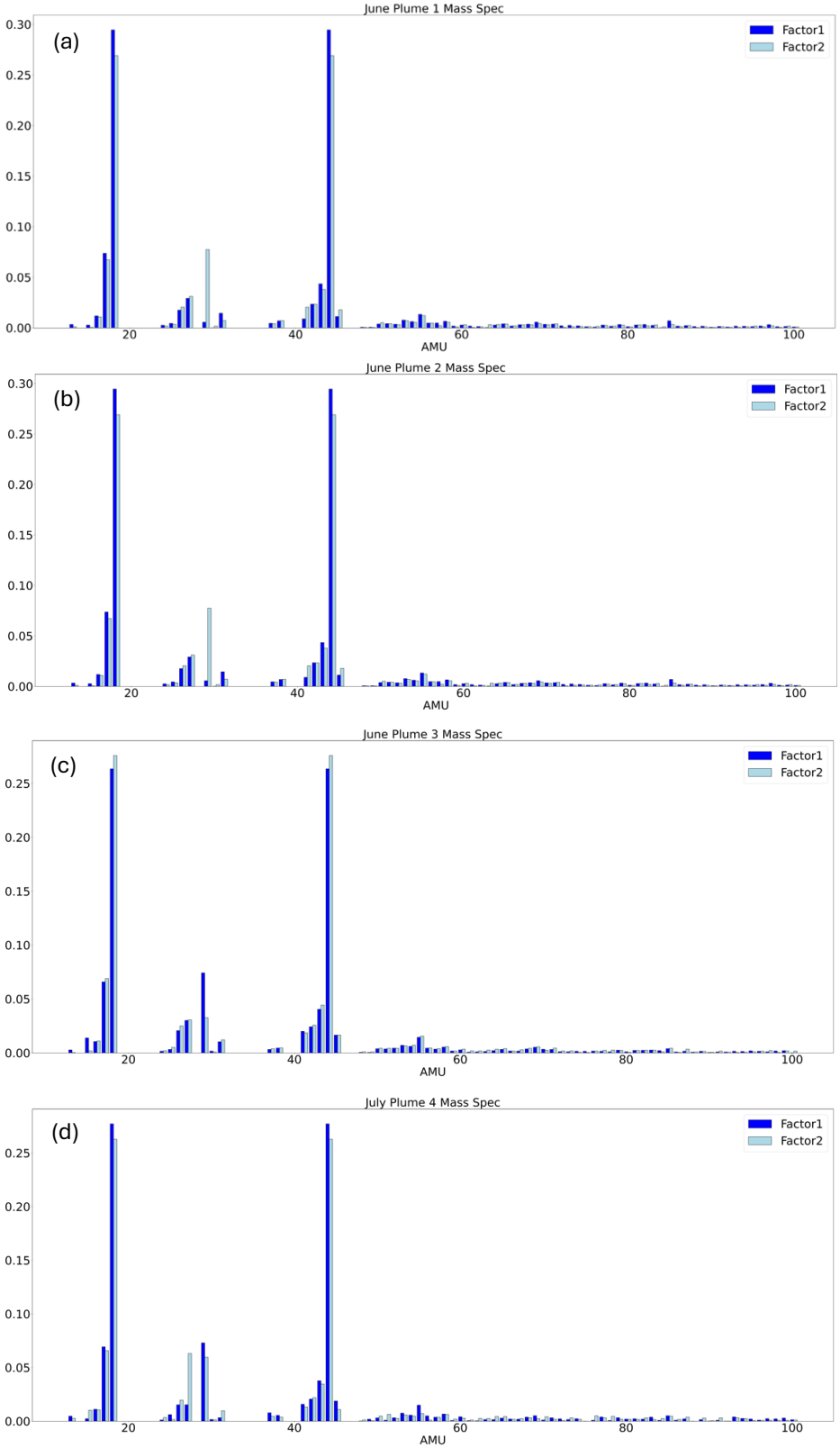
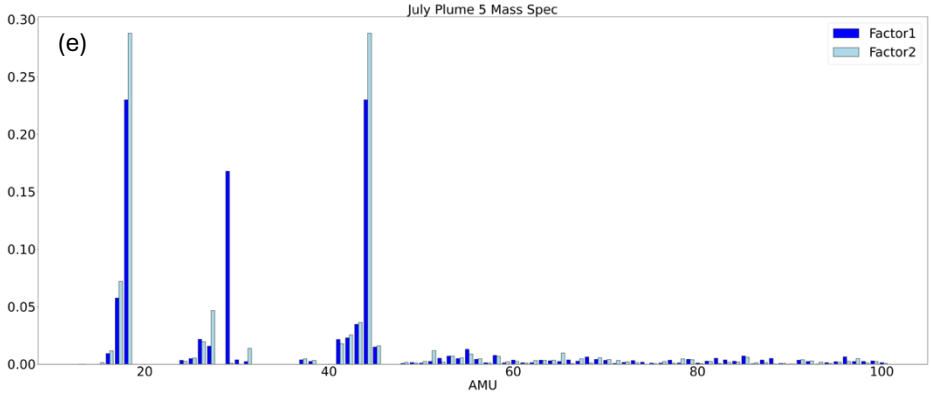
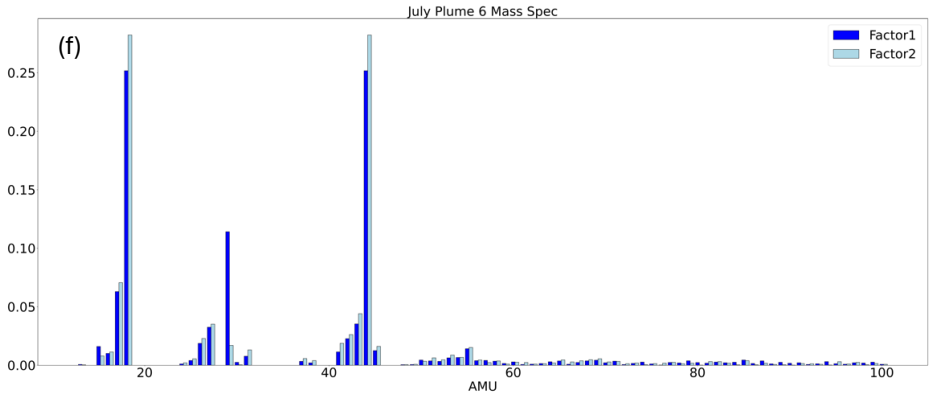
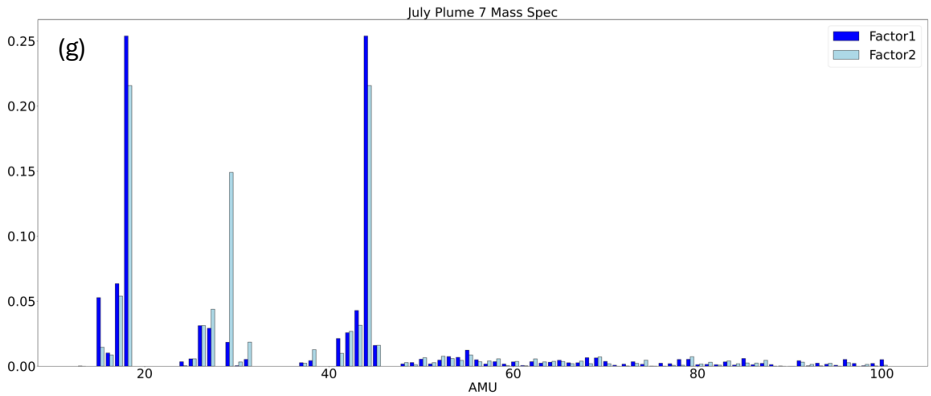


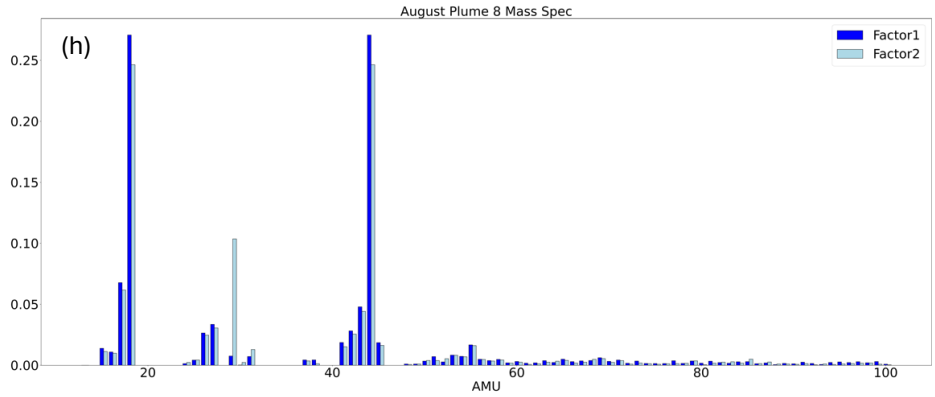
Figure S1. Monthly ERA 5 winds (m s^{-1}) with monthly mean CAMS CO (ppb) at 950 hPa, 800 hPa, and 700 hPa illustrate aerosol transportation in a) June, b) July, c) August, and d) September. Red and orange stars denote the locations of Ascension Island and St. Helena Island. Grey contour lines denote sea-surface pressure (950 hPa) and geopotential height (800 hPa and 700 hPa).


June Plume 1 Mass Spec
(a)
Factor1
Factor2
0.30
0.25
0.20
0.15
0.10
0.05
0.00
20
40
60
80
100
AMU
June Plume 2 Mass Spec
(b)
Factor1
Factor2
0.30
0.25
0.20
0.15
0.10
0.05
0.00
20
40
60
80
100
AMU
June Plume 3 Mass Spec
(c)
Factor1
Factor2
0.25
0.20
0.15
0.10
0.05
0.00
20
40
60
80
100
AMU
July Plume 4 Mass Spec
(d)
Factor1
Factor2
0.25
0.20
0.15
0.10
0.05
0.00
20
40
60
80
100
AMU


July Plume 5 Mass Spec
(e)
Factor1
Factor2
0.30
0.25
0.20
0.15
0.10
0.05
0.00
20
40
60
80
100
AMU


July Plume 6 Mass Spec
(f)
Factor1
Factor2
0.25
0.20
0.15
0.10
0.05
0.00
20
40
60
80
100
AMU


July Plume 7 Mass Spec
(g)
Factor1
Factor2
0.25
0.20
0.15
0.10
0.05
0.00
20
40
60
80
100
AMU


August Plume 8 Mass Spec
(h)
Factor1
Factor2
0.25
0.20
0.15
0.10
0.05
0.00
20
40
60
80
100
AMU

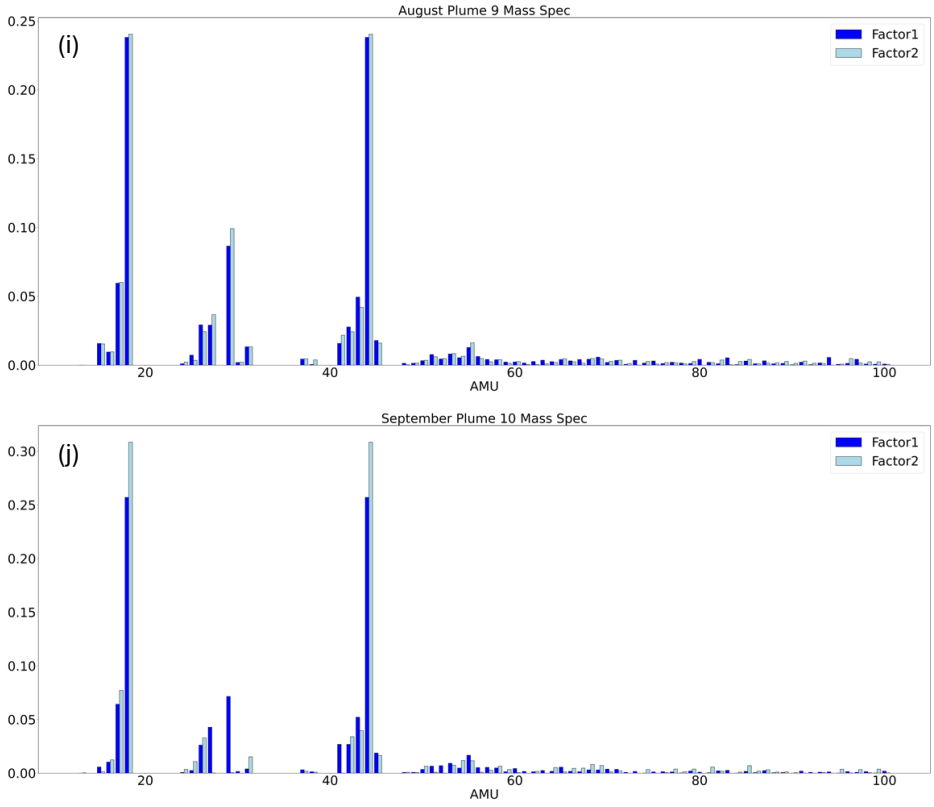


Figure S2. a-j. Average mass spectra from the ten selected plume events comparing factor 1(dark blue) and factor 2 (light blue).

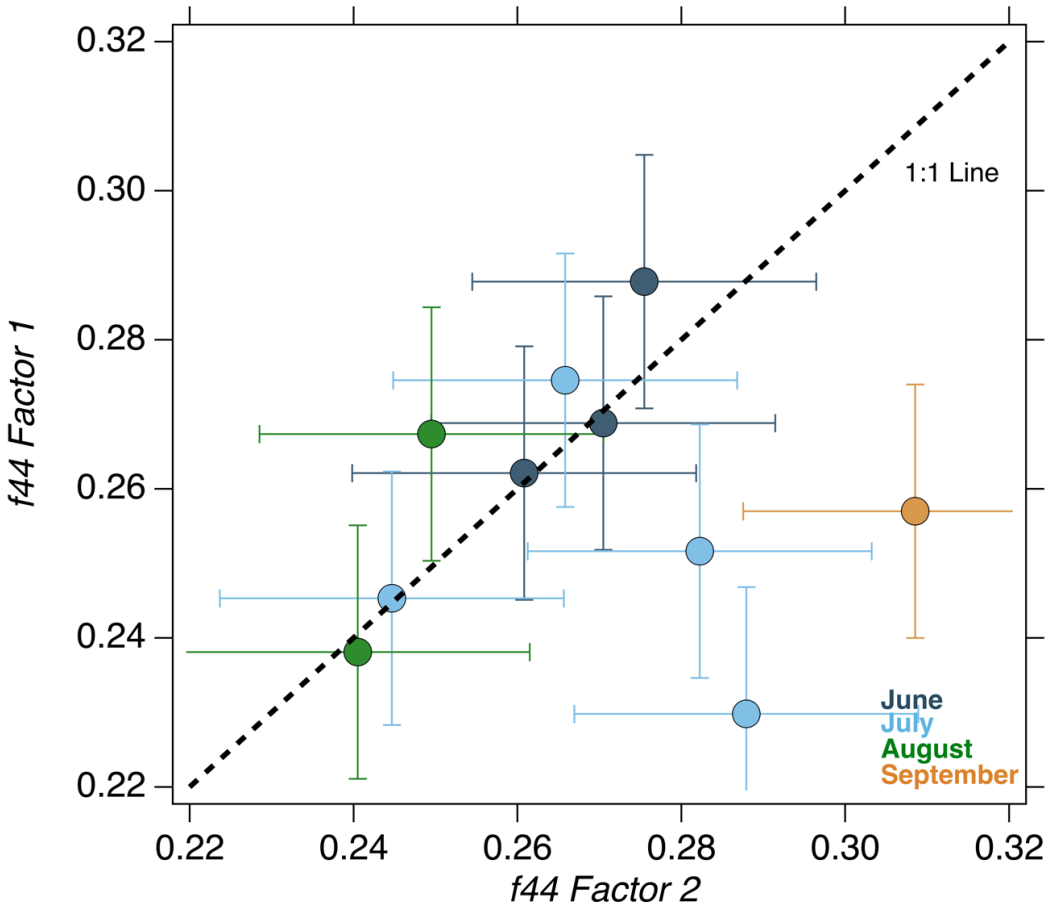
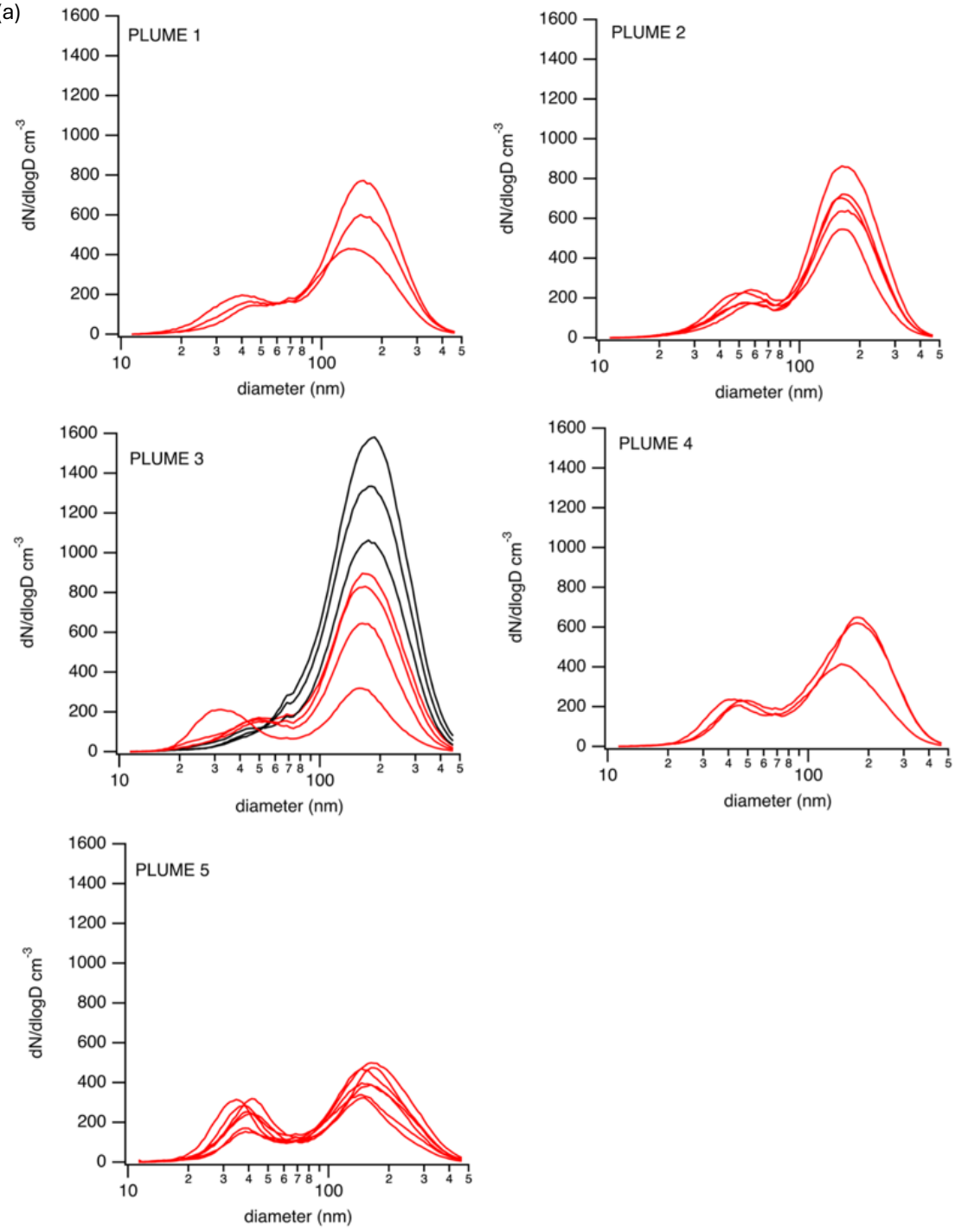
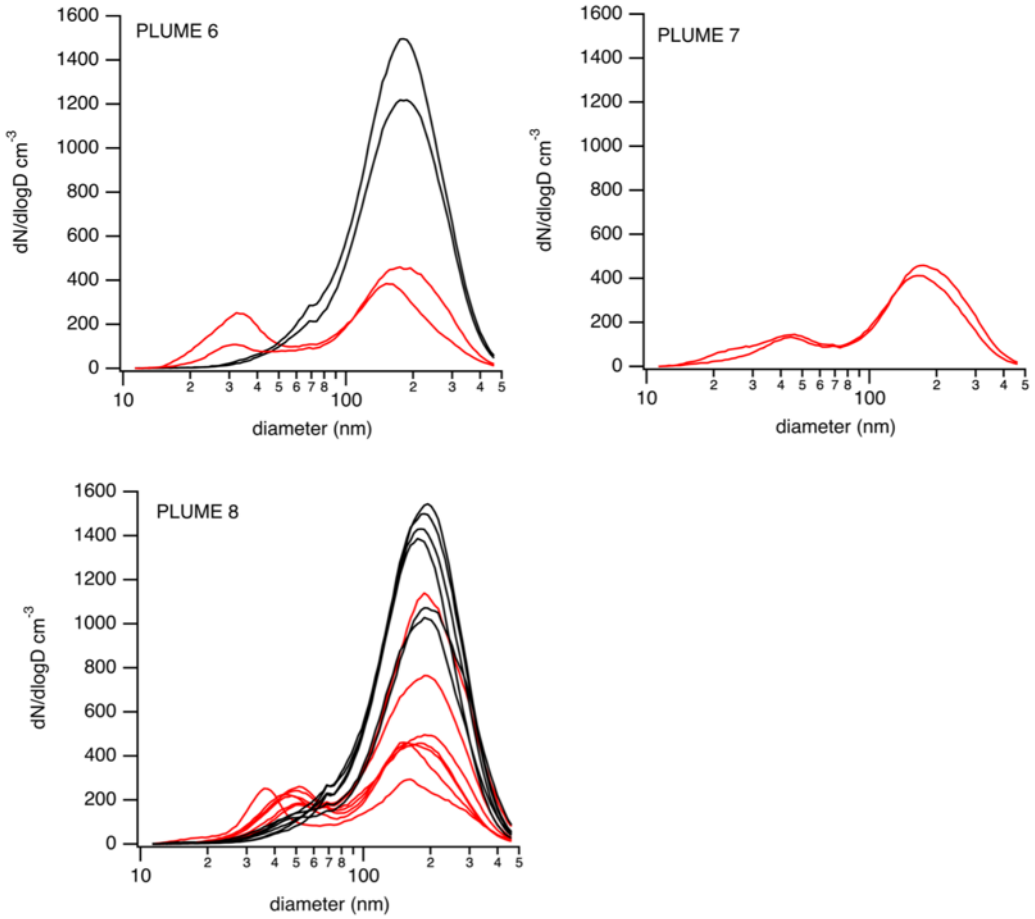


Figure S3. *f44* factor 1 versus *f44* factor 2 for the 10 selected plume events. Markers are colored by month and error bars represent the standard deviation of the data set. The black dashed line represents the 1:1 relationship.

(a)


PLUME 1
PLUME 2
PLUME 3
PLUME 4
PLUME 5
dN/dlogD cm-3
diameter (nm)
0
200
400
600
800
1000
1200
1400
1600
10
100

(b)


PLUME 6
PLUME 7
PLUME 8
dN/dlogD cm-3
diameter (nm)
0
200
400
600
800
1000
1200
1400
1600
10
100

(c)

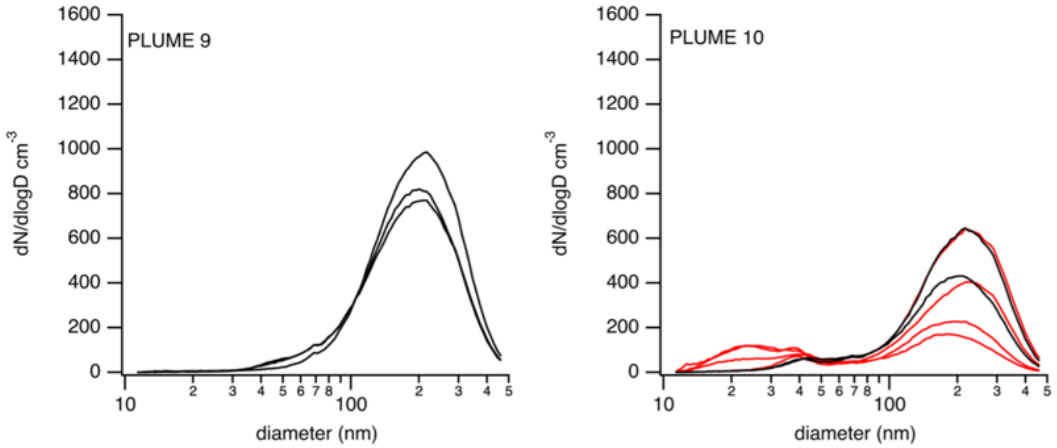


Figure S4. Daily average size for a) Regime 2, b) Regime 2, c) Regime 3. Red (black) size distributions represent bimodal (unimodal) distributions.

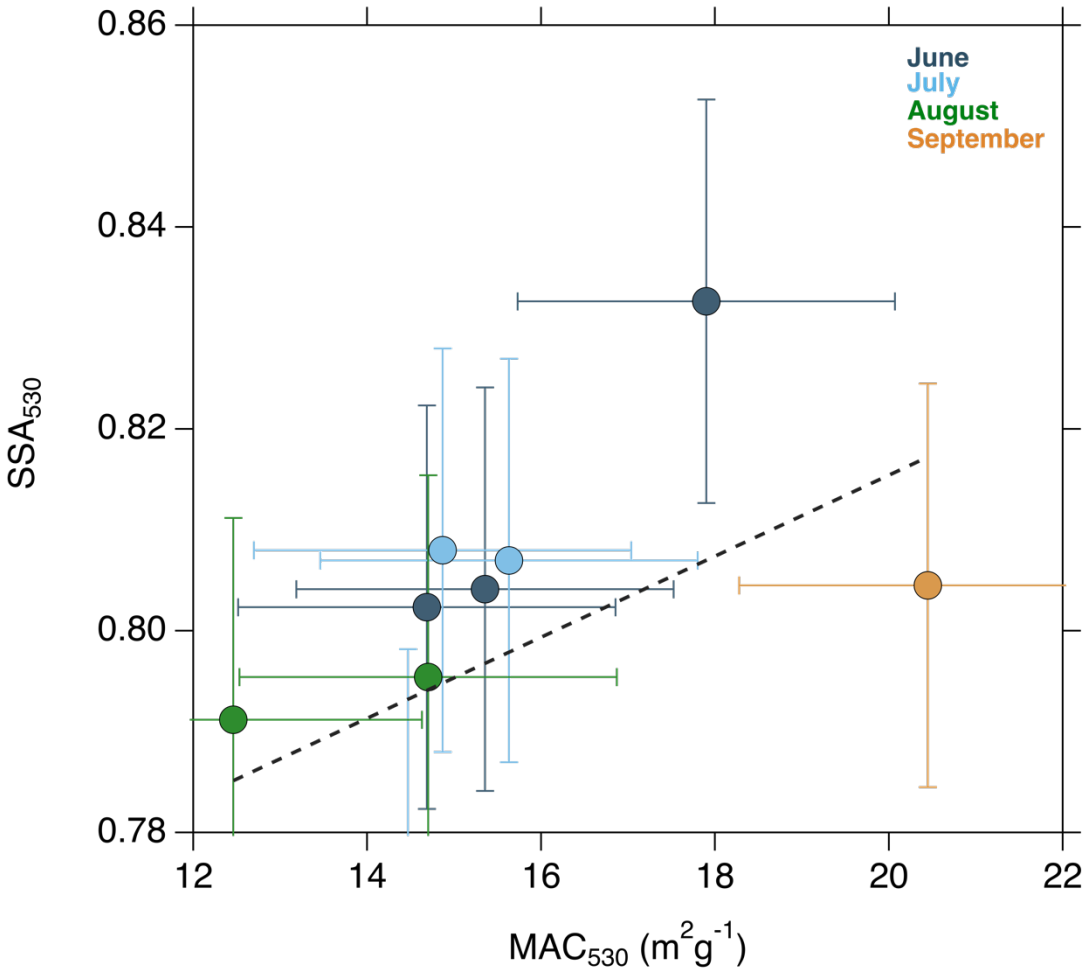


Figure S5. SSA_{530} versus MAC_{530} for the 10 selected plume events. Markers are colored by month and error bars represent the standard deviation of the data set. The black dashed line represents the best-fit line.

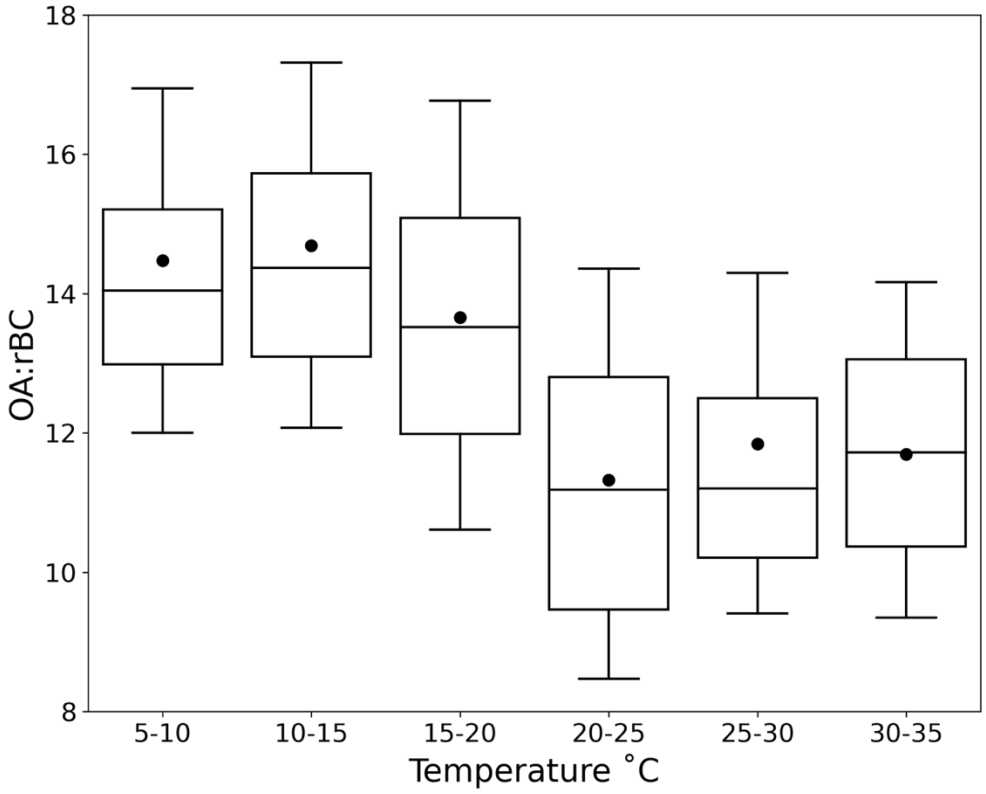


Figure S6. Box-whisker distributions using ORACLES aircraft data from 09/24/16 where OA>20µg m^{-1} to illustrate the dependence of OA:rBC on temperature (˚C). The FT data is used to demonstrate potential evaporation processes in the warm MBL. The lowest whisker is at the 10^{th} percentile, with the lowest bar at 25^{th} percentile, the middle bar at 50^{th} percentile, the upper bar at 75^{th} percentile, and the highest whisker at 90^{th} percentile. Filled circles represent the mean.

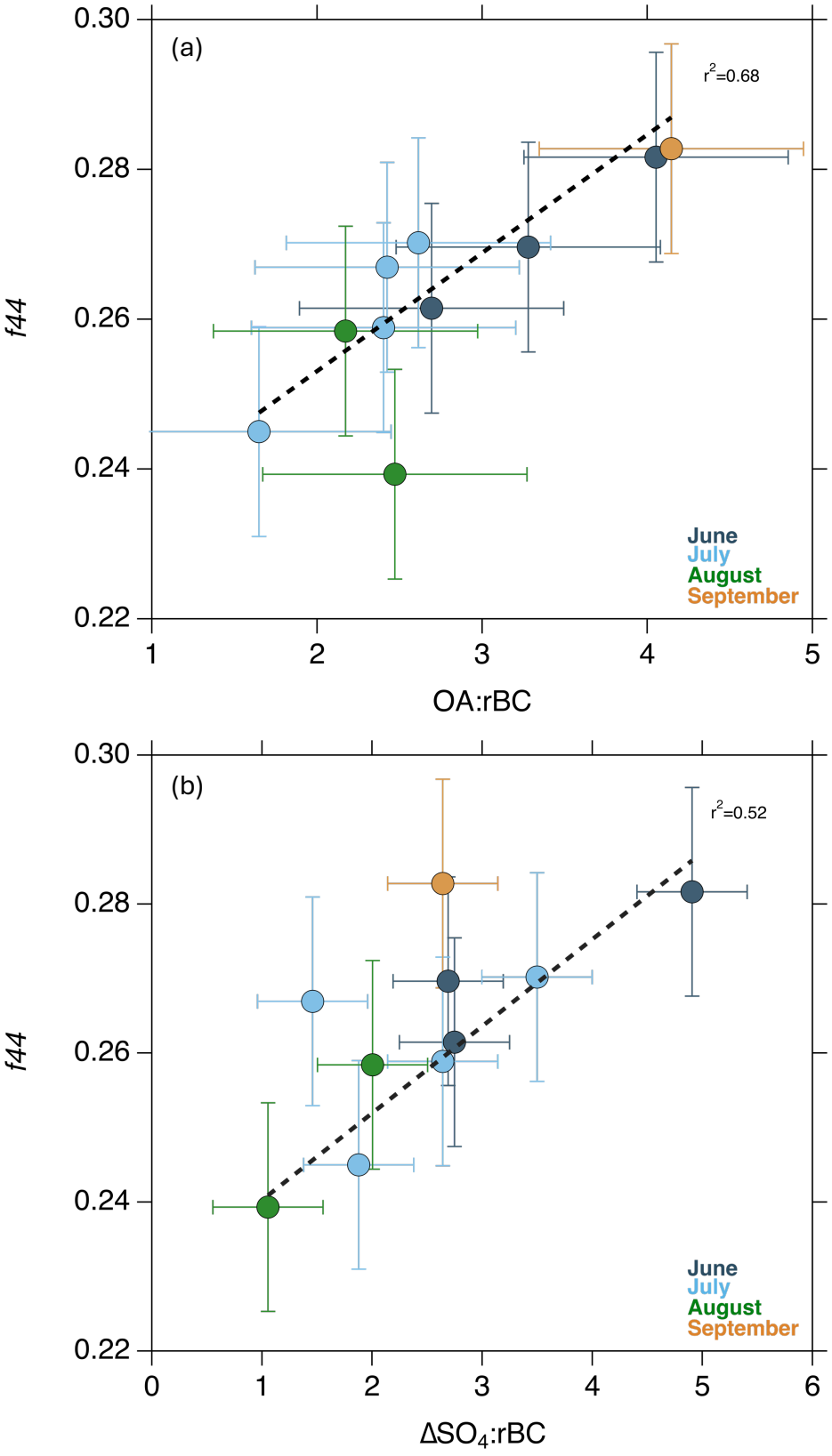


Figure S7. a) *f44* versus OA:rBC for the ten major plume events. b) *f44* versus SO_4:rBC for the ten major plume events. Markers are colored by month and error bars represent the standard deviation of the data set. The black dashed line represents the best-fit line.

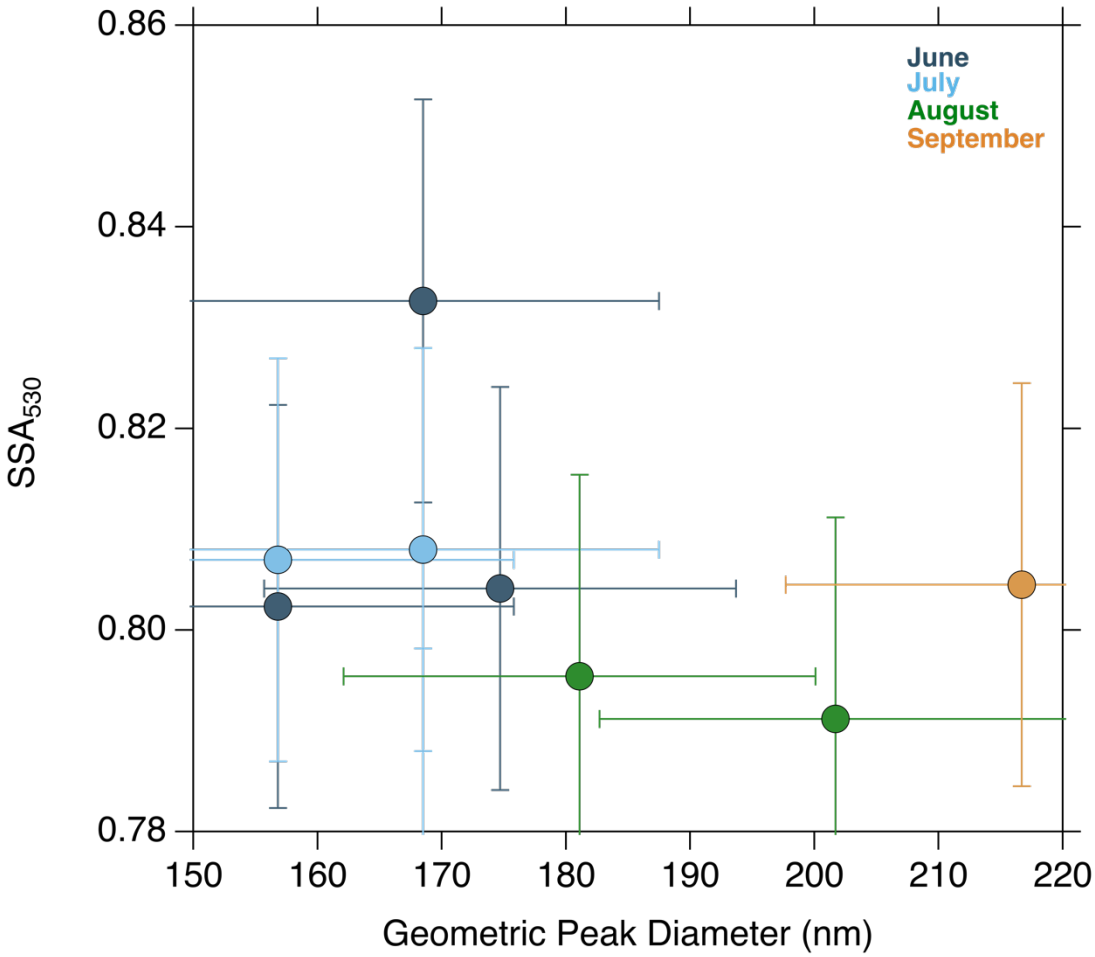


Figure S8. SSA_{530} versus the geometric peak diameter of the accumulation mode (determined from the SMPS) for the ten plume events. Markers are colored by month and error bars represent the standard deviation of the data set.

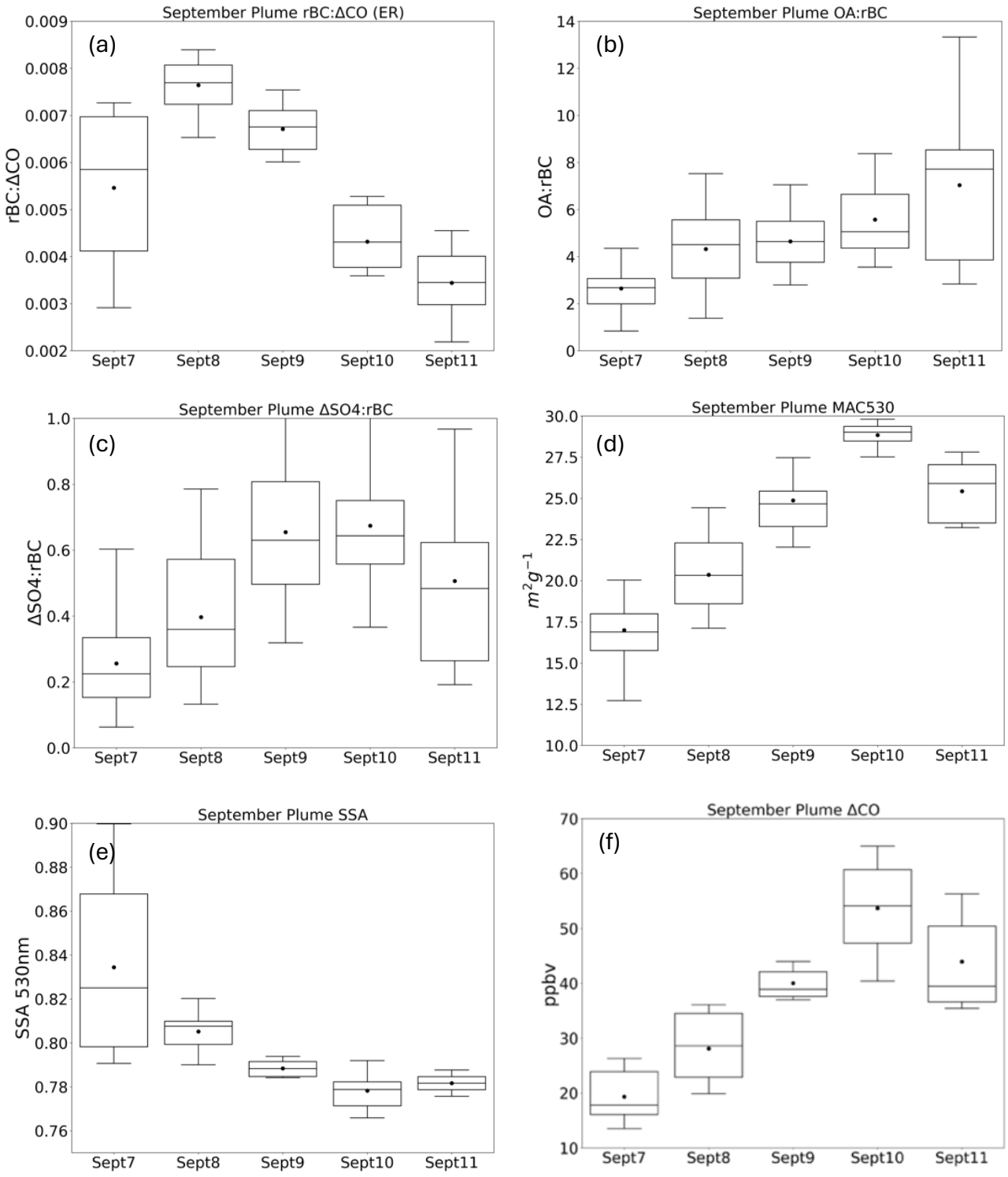


Figure S9. Daily averaged box-whisker distributions for a) rBC:ΔCO, b) OA:rBC, c) ΔSO_4:rBC, d) MAC_{530} (m^2 g^{-1}), e) SSA_{530}, f) ΔCO (ppb) for P10. Lowest whisker at 10th percentile, lowest bar at 25th percentile, middle bar at 50th percentile, upper bar at 75th percentile, and highest whisker at 90th percentile. Filled circles represent the mean. Red dashed lines distinguish the three regimes discussed in the text.

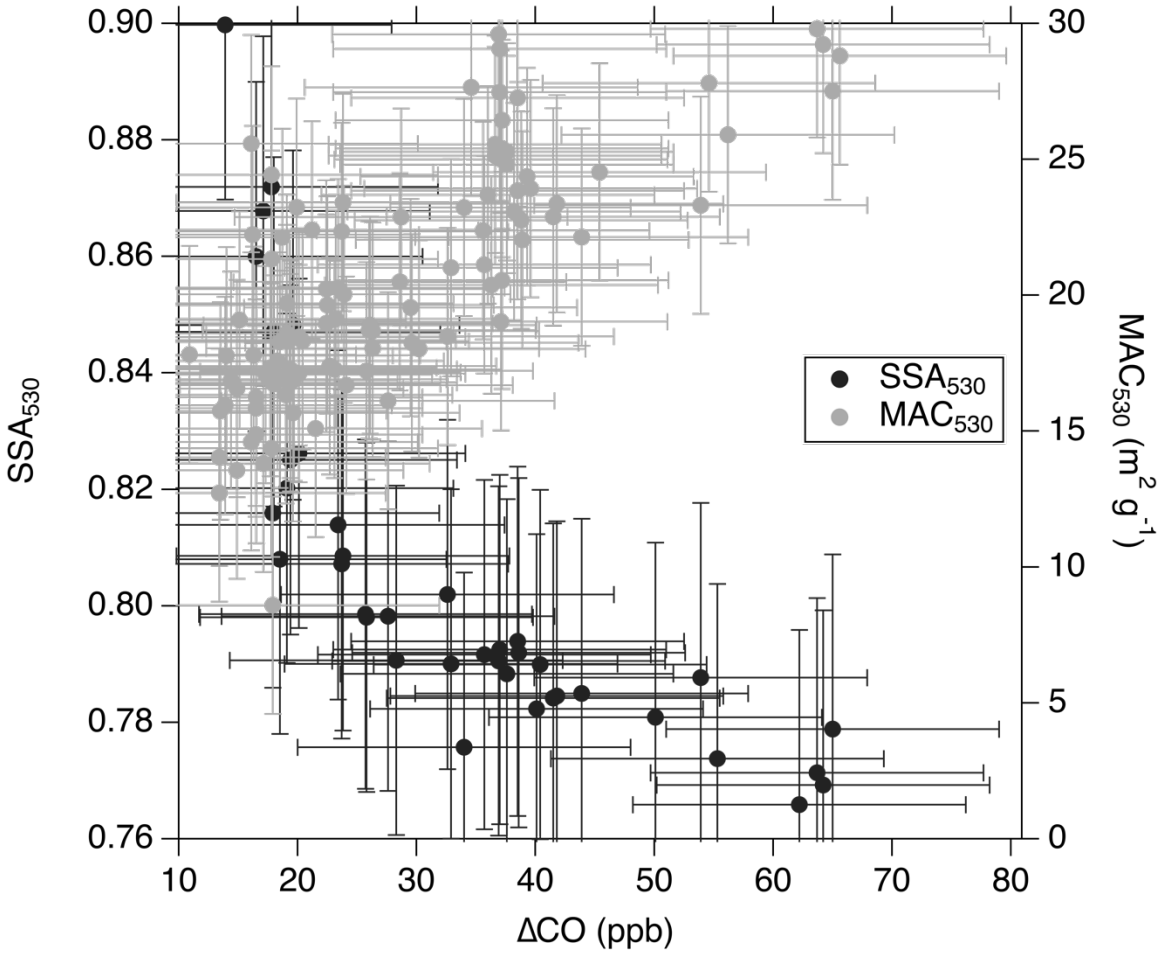


Figure S10. SSA_{530} (black) and MAC_{530} (grey) versus ΔCO for P10. Error bars represent the standard deviation of the data set.

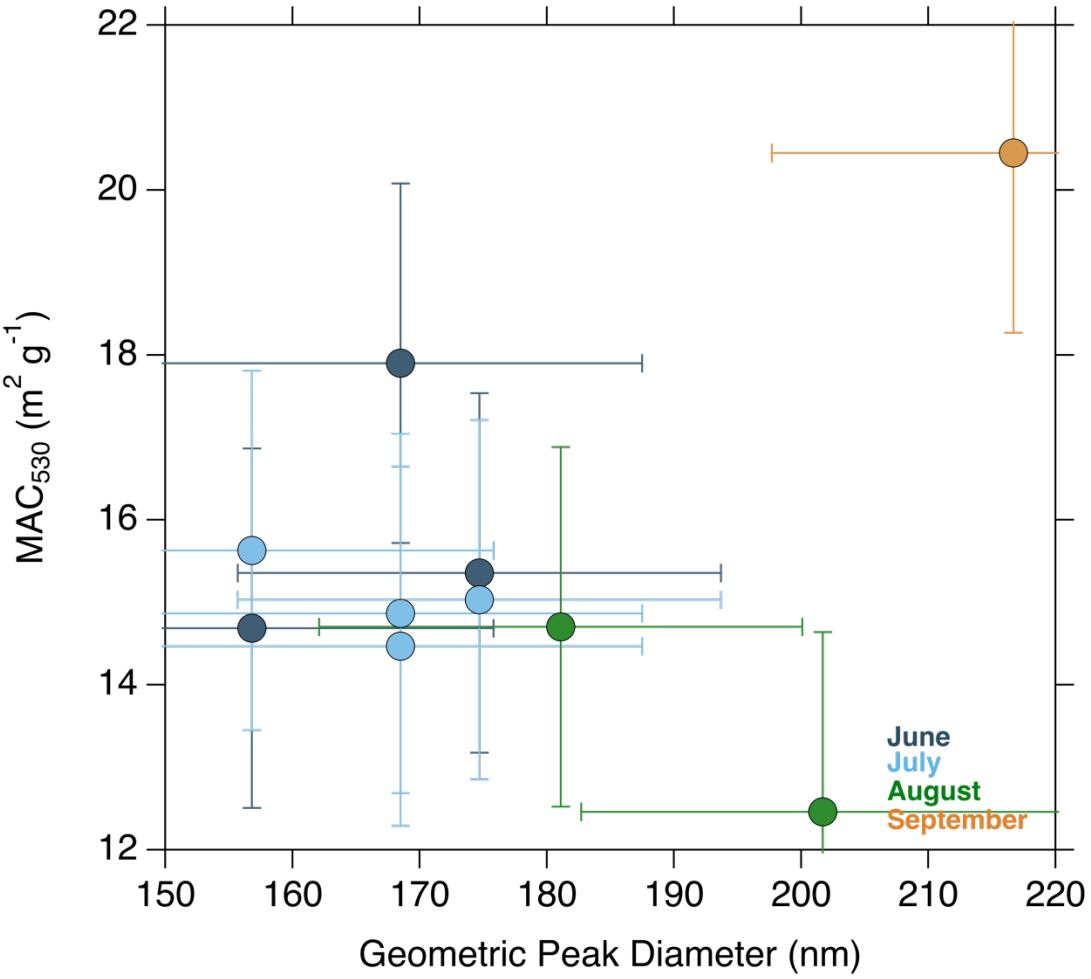
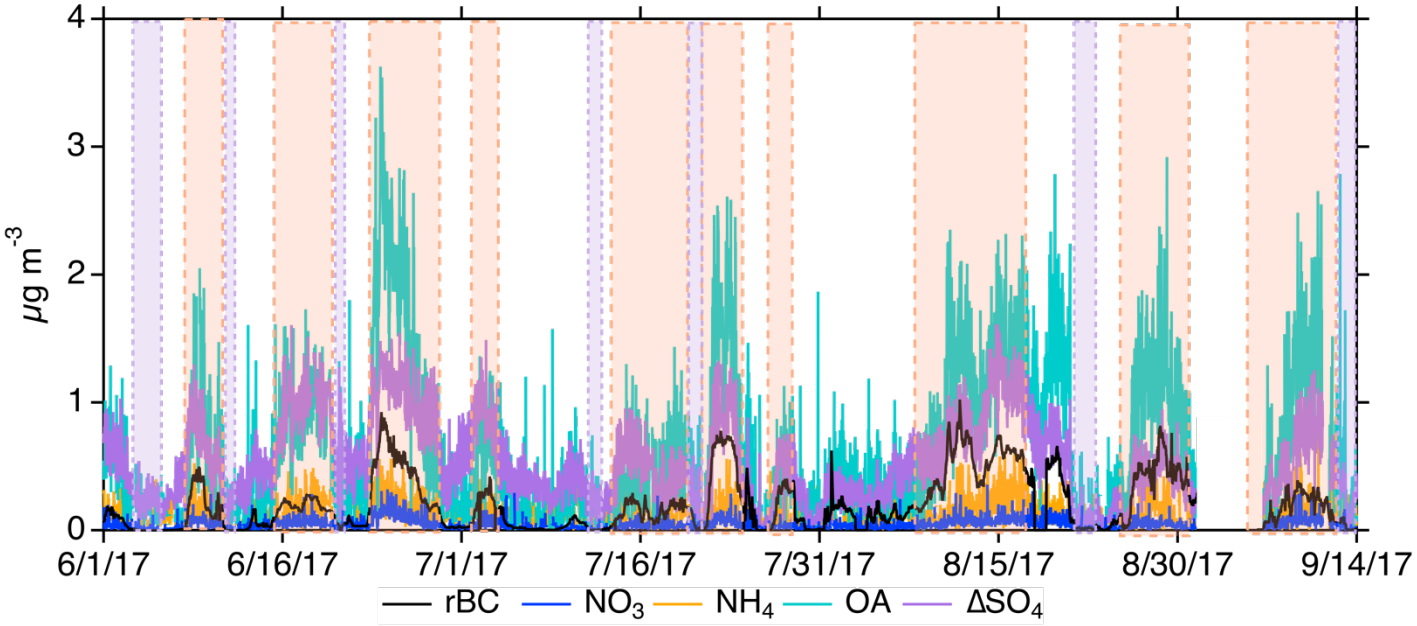


Figure S11. MAC_{530} versus the geometric peak diameter of the accumulation mode (determined from the SMPS) for the ten plume events. Markers are colored by month and error bars represent the standard deviation of the data set.



Color vision deficiency friendly version of Figure 8. Time series of the mass concentrations of bulk chemical species OA, NO_3, ΔSO_4, and NH_4 from the ACSM, and rBC from the SP2. Pink boxes indicate selected plume events and purple boxes indicate clean events. A color vision deficiency friendly version of this figure can be found in the supplement.