AEROSOL and CHEMICAL CHARACTERISTICS OF PLUMES ENCOUNTERED DURING INTEX-NA

Lee Thornhill – SAIC, Hampton, Va

Gao Chen, Bruce Anderson, Glenn Sache – NASA Langley

Antony Clarke, Cam McNaughton, Steve Howell – Univ. of Hawaii

Eddie Winstead – GATS, Hampton, Va

Rodney Weber, Greg Huey – GT

Jack Dibb – UNH

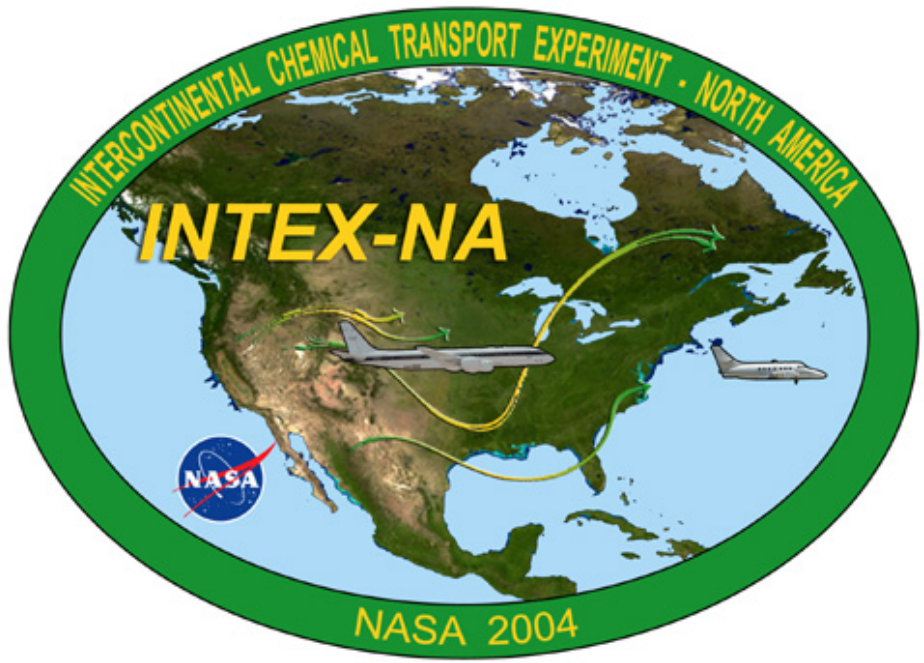
Ron Cohen – UC Berkeley

Alan Fried – NCAR

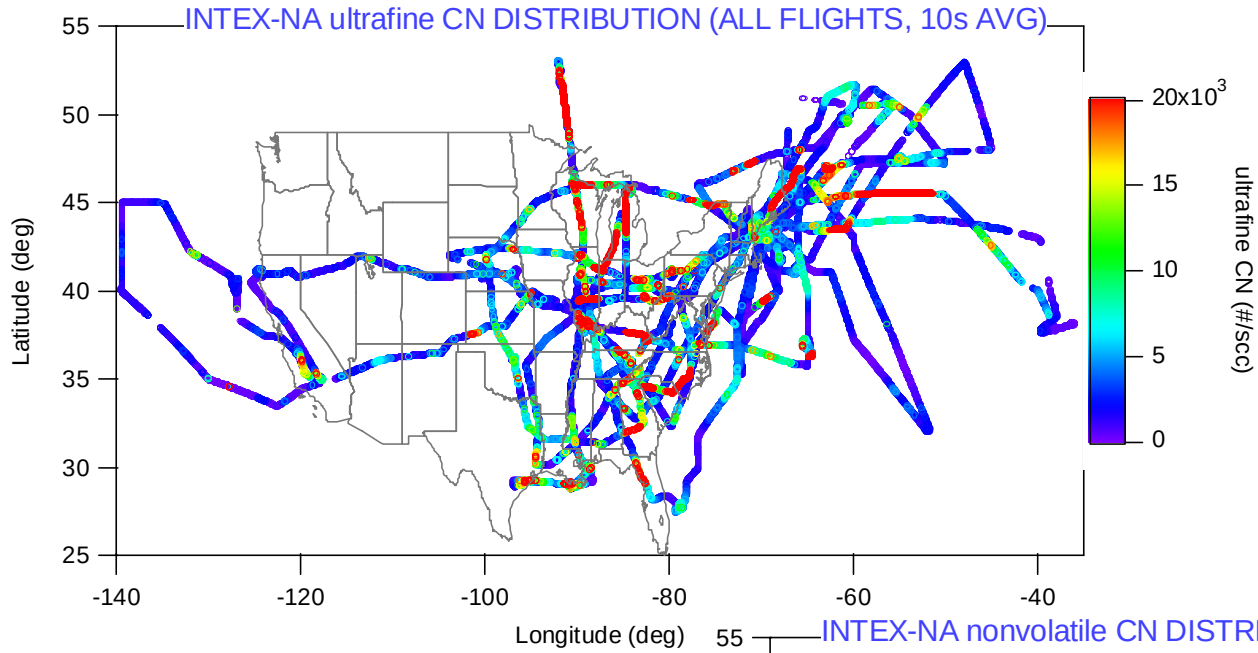
Don Blake - UCI

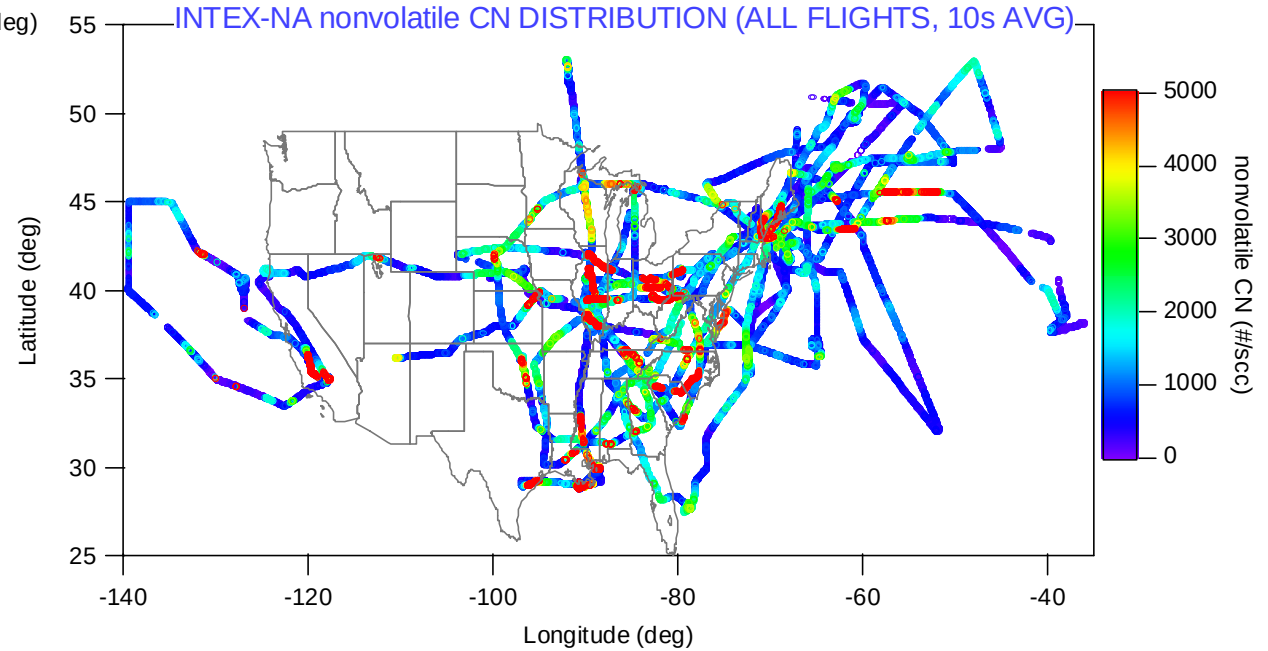
Hanwant Singh – NASA Ames

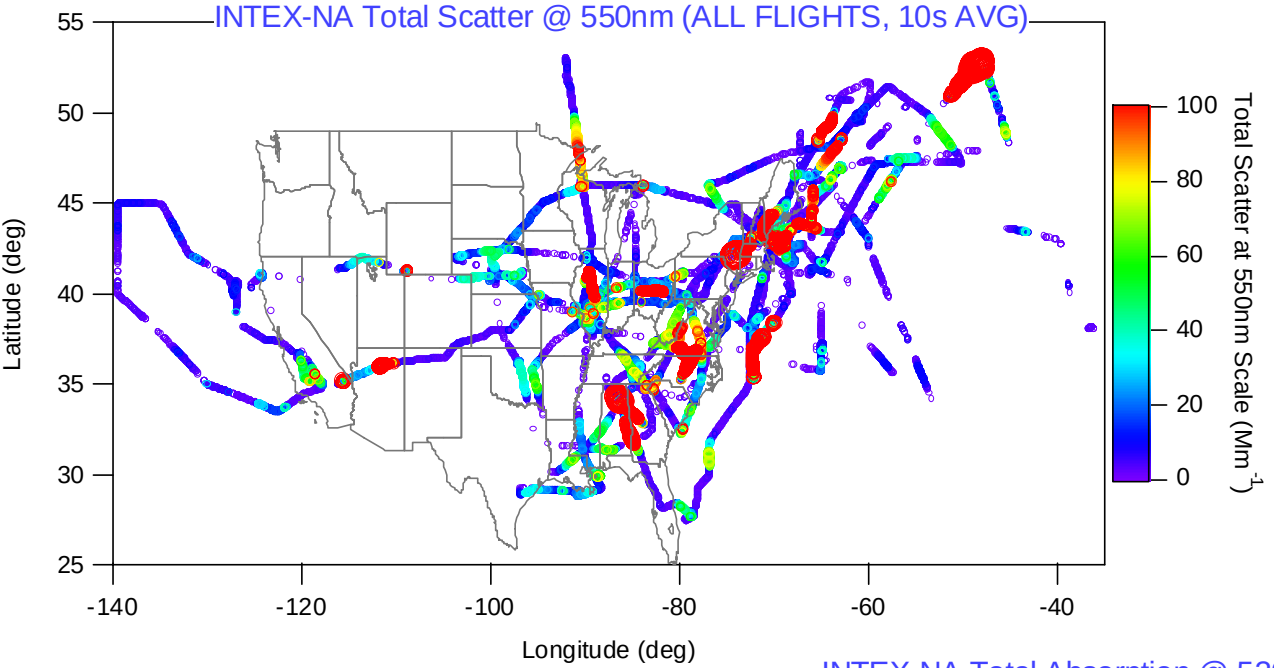
The INTEX Science Team

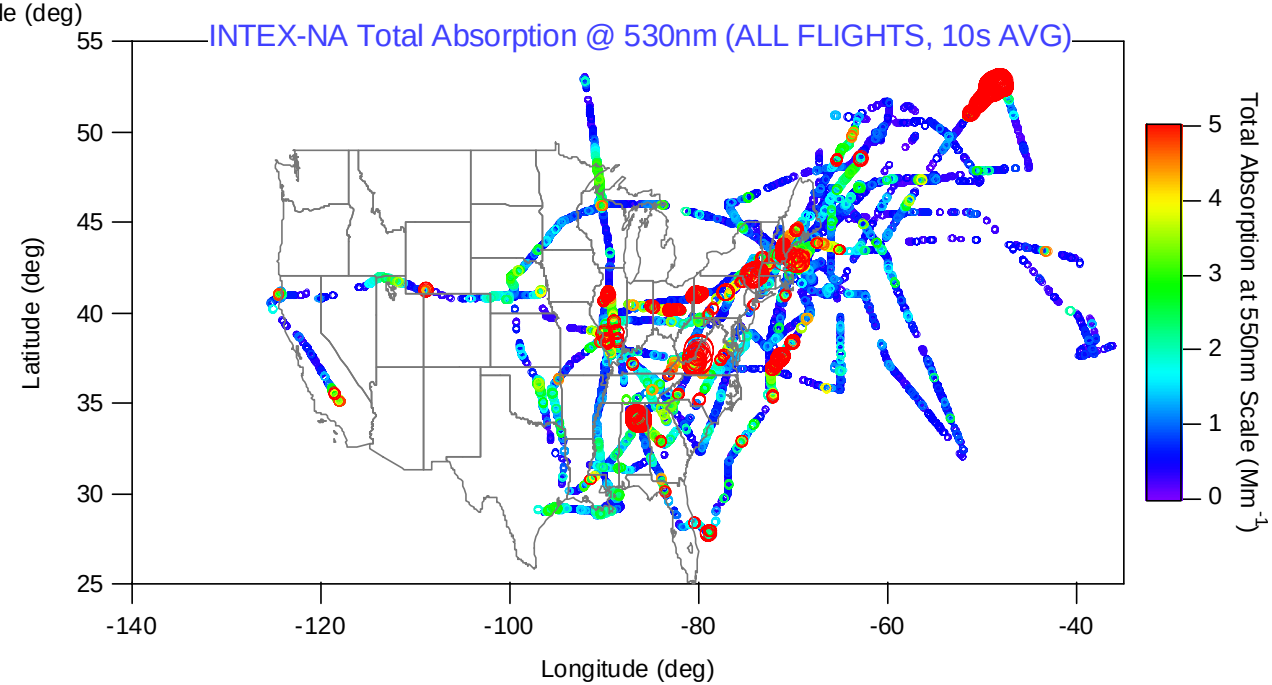


Latitude/Longitude Distributions of Aerosols Along the INTEX-NA Flight Paths

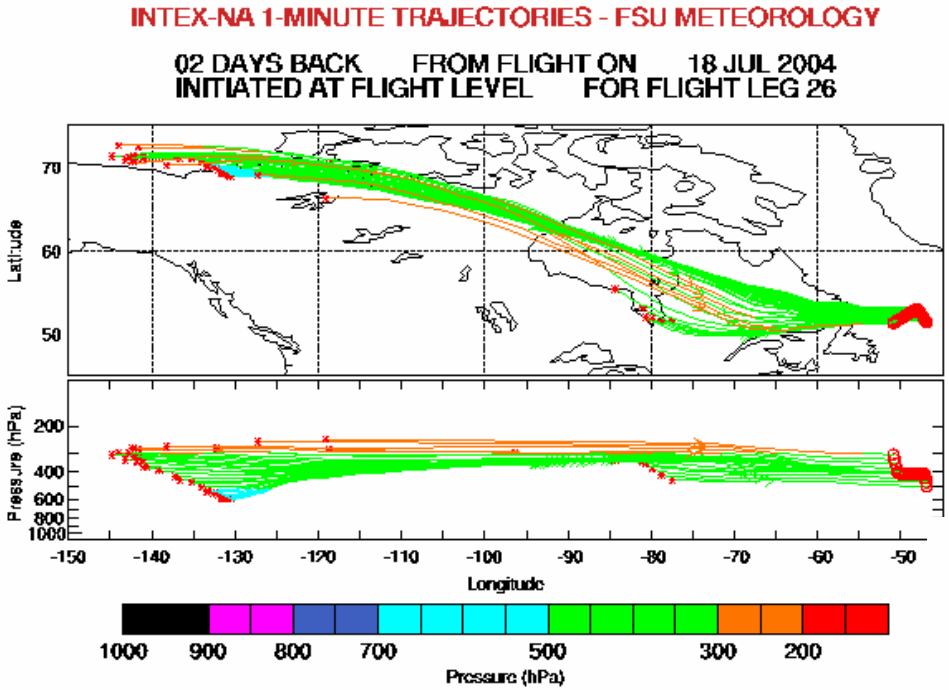





INTEX-NA Total Scatter @ 550nm (ALL FLIGHTS, 10s AVG)
Latitude (deg)
55
50
45
40
35
30
25
-140
-120
-100
-80
-60
-40
Longitude (deg)
Total Scatter at 550nm Scale (Mm-1)
100
80
60
40
20
0

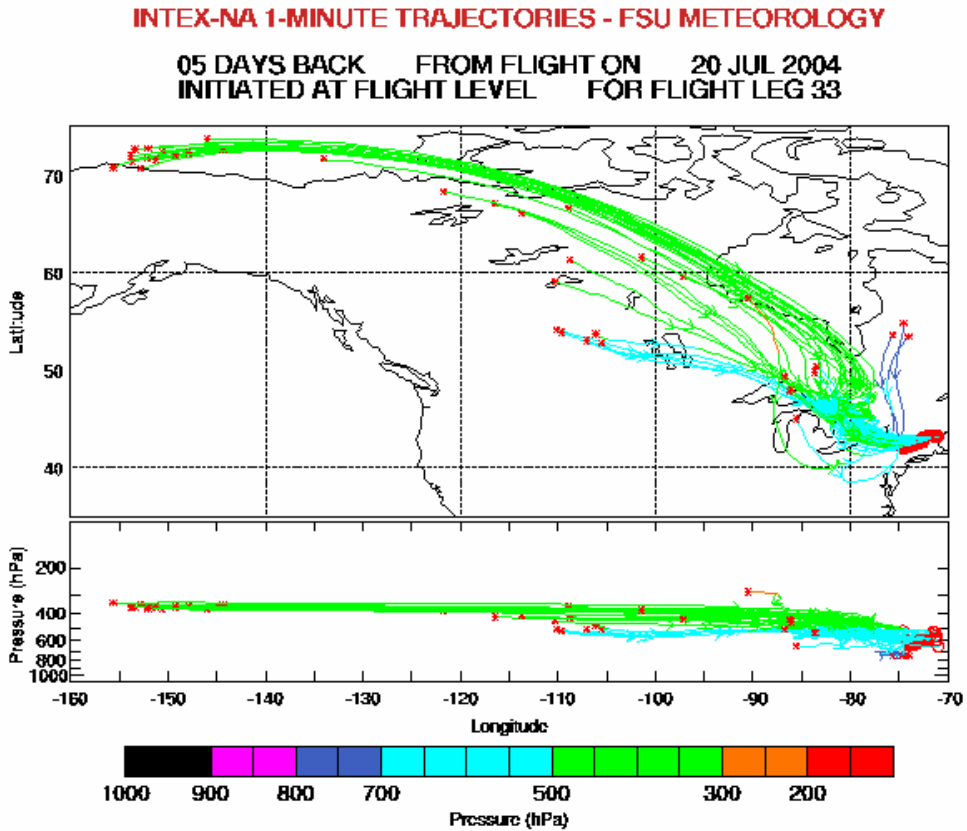

INTEX-NA Total Absorption @ 530nm (ALL FLIGHTS, 10s AVG)
Latitude (deg)
55
50
45
40
35
30
25
-140
-120
-100
-80
-60
-40
Longitude (deg)
Total Absorption at 550nm Scale (Mm-1)
5
4
3
2
1
0

1-Minute Back Trajectories for the 2 Biomass Burning Plumes (from FSU)

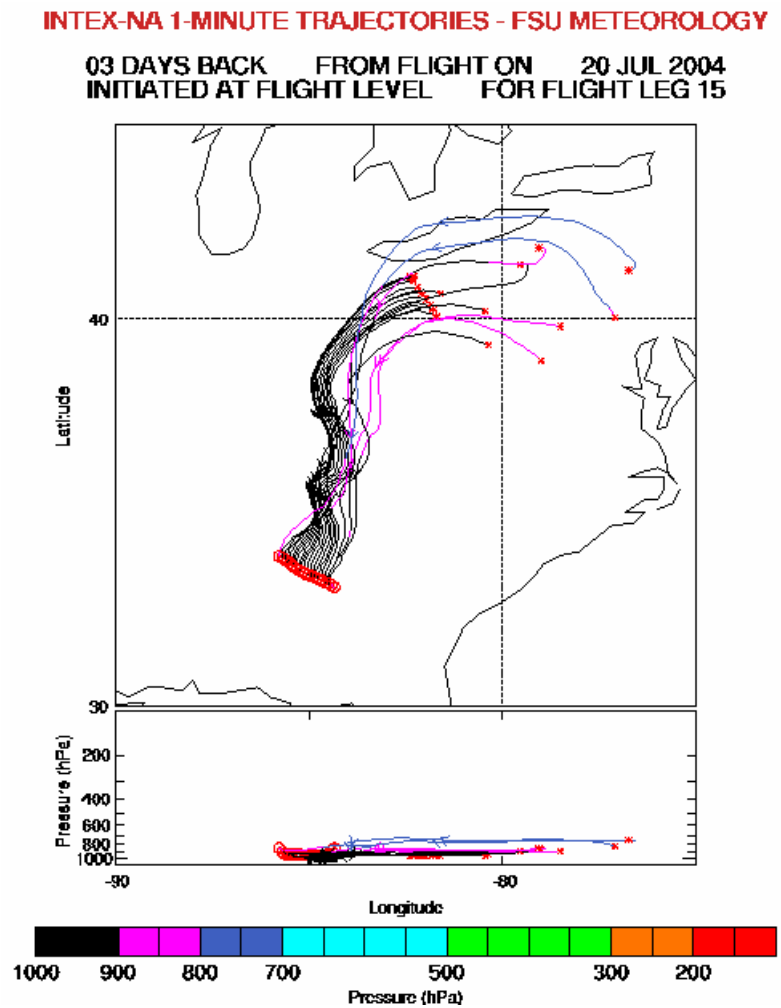


Flight 9 (18:34:40 – 19:05:50)

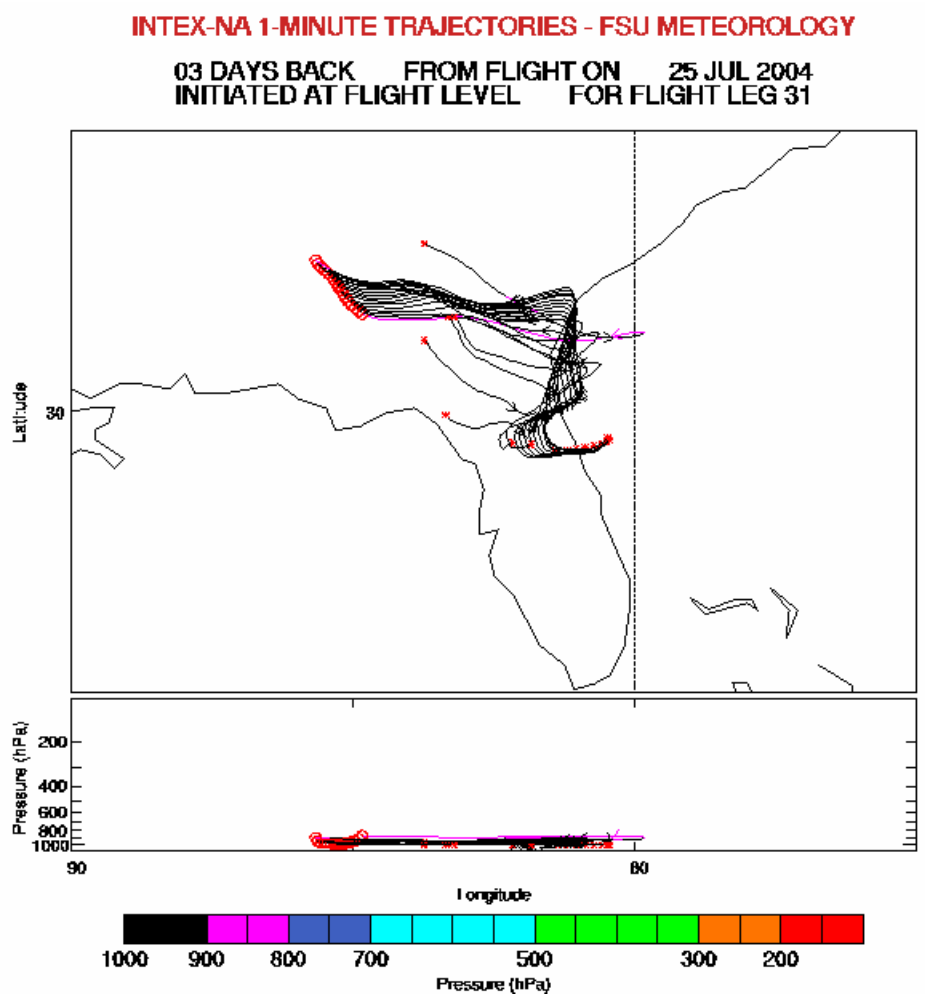
Flight 10 (17:20:20 – 17:29:30)



1-Minute Back Trajectories for the 2 Industrial Plumes (from FSU)

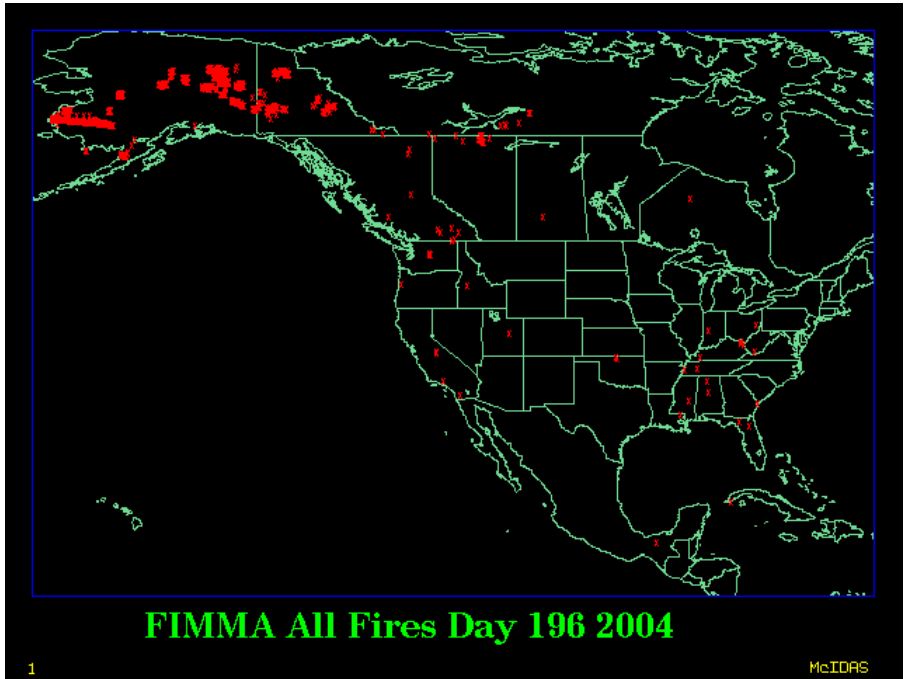


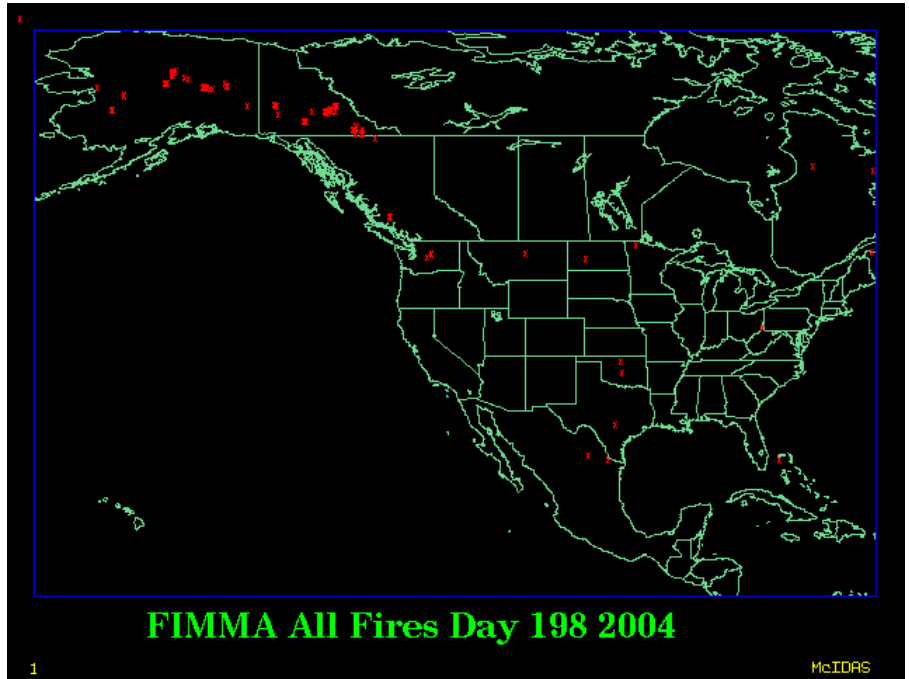
Flight 10 (16:55:50 – 17:20:10)

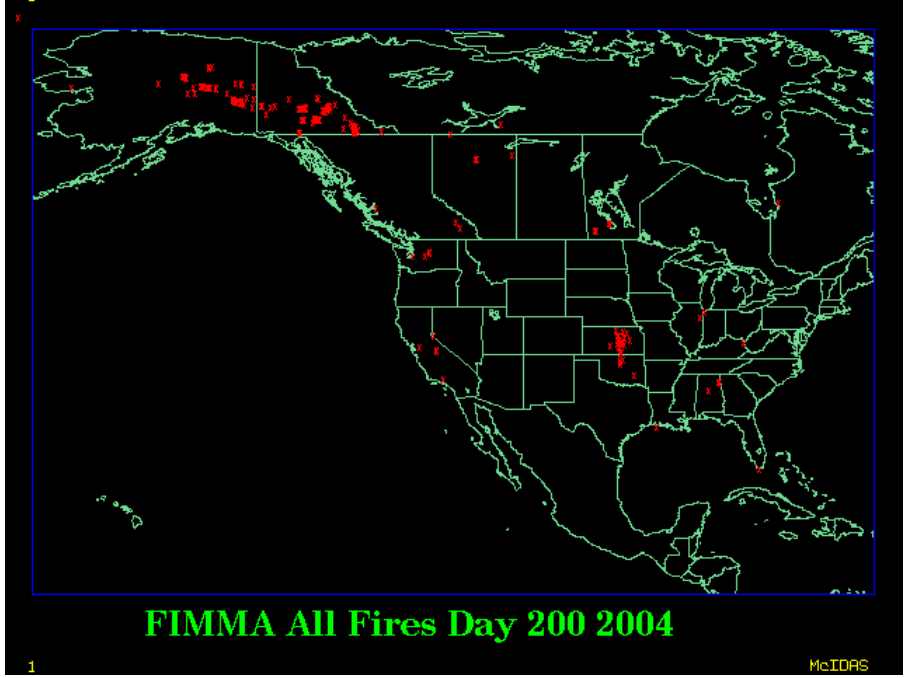


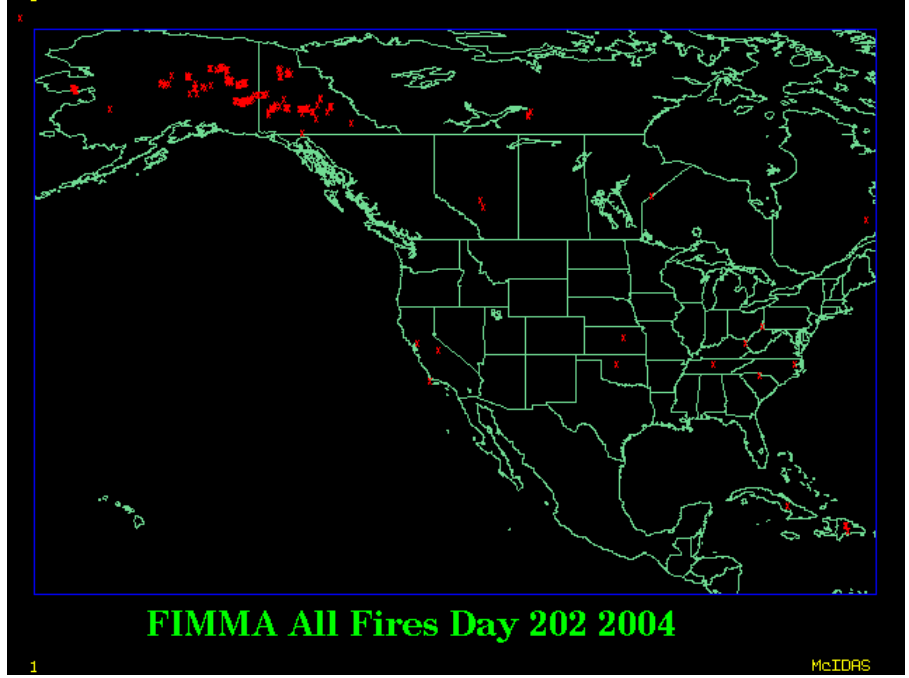
Flight 12 (18:04:30-18:34:40)

FIMMA FIRE Images For July 16-20 (for Flights 9-10) from NOAA SSD



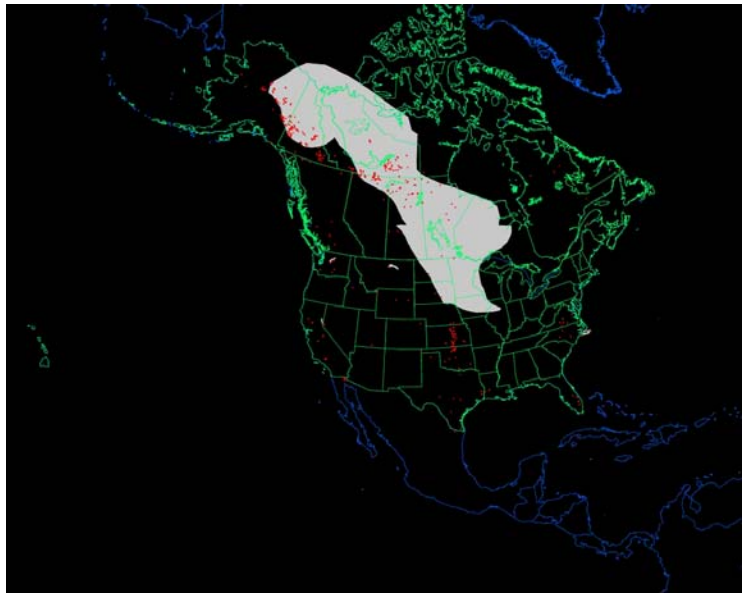




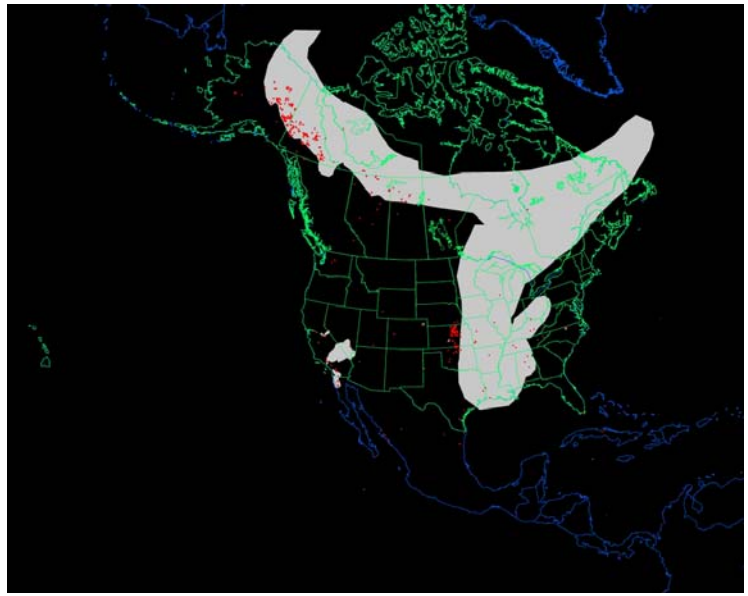


HMS FIRE Images For July 16-20 (for Flights 9-10) from NOAA SSD

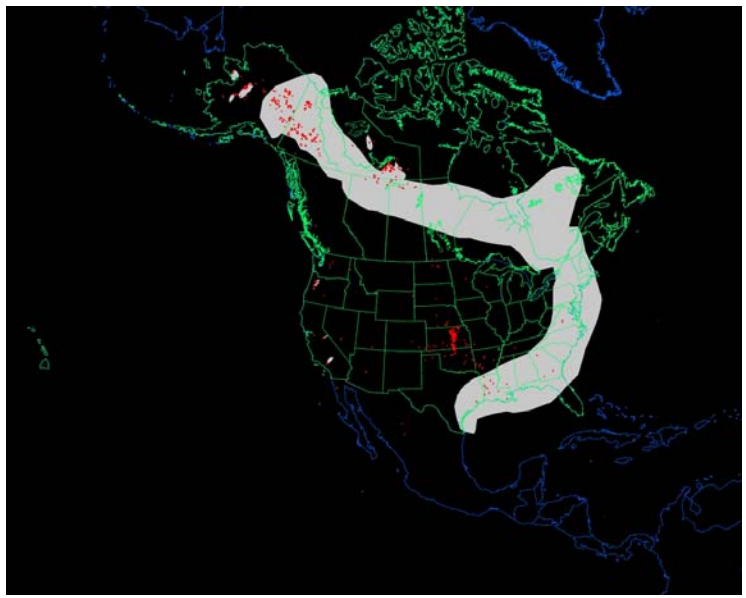
July 16



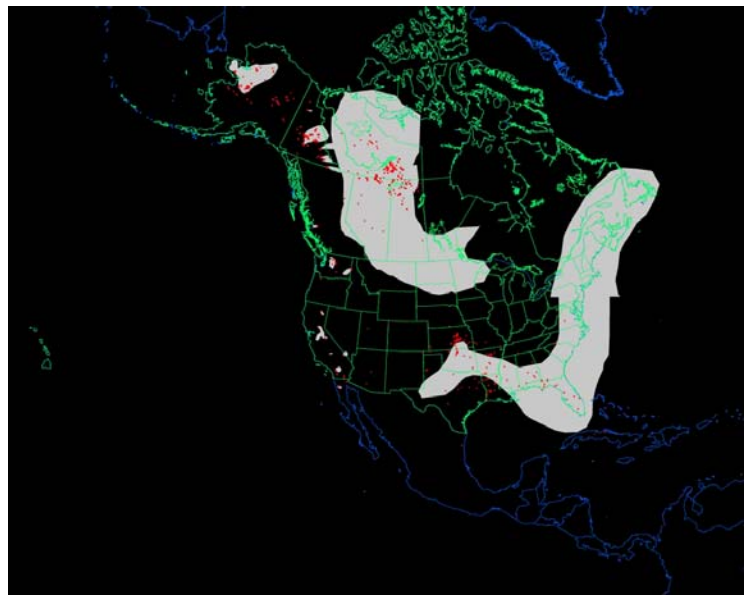
July 18



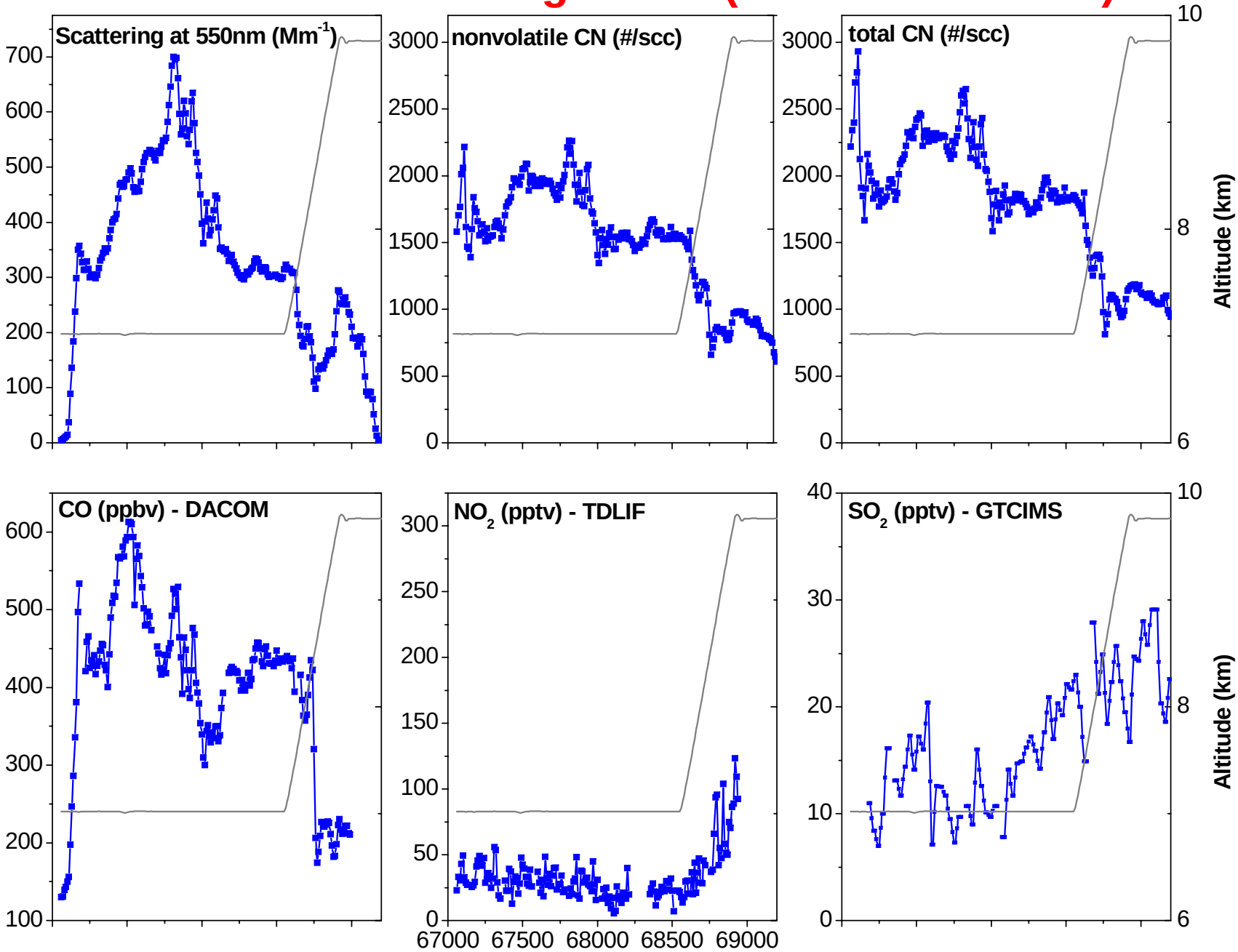
July 20

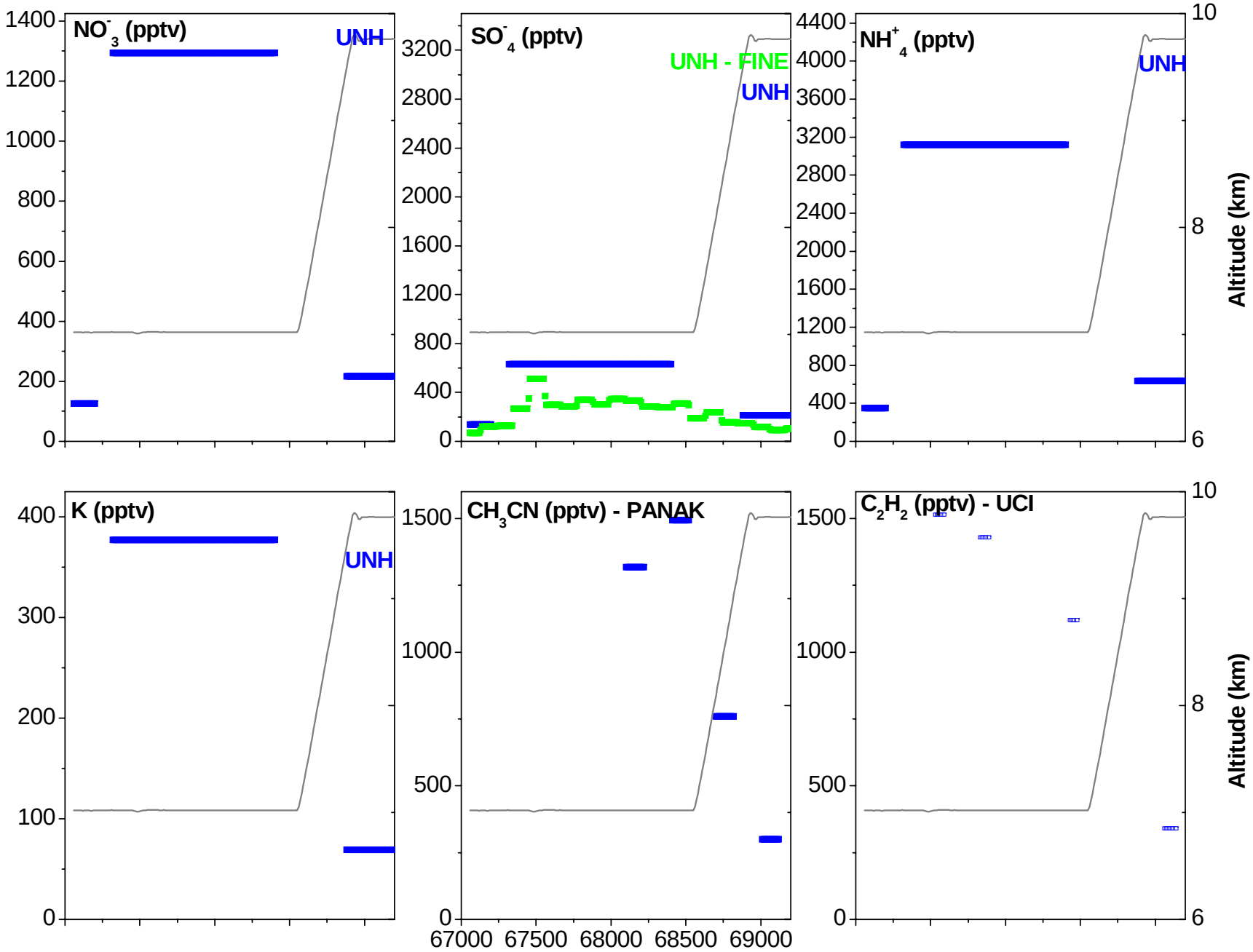


July 22

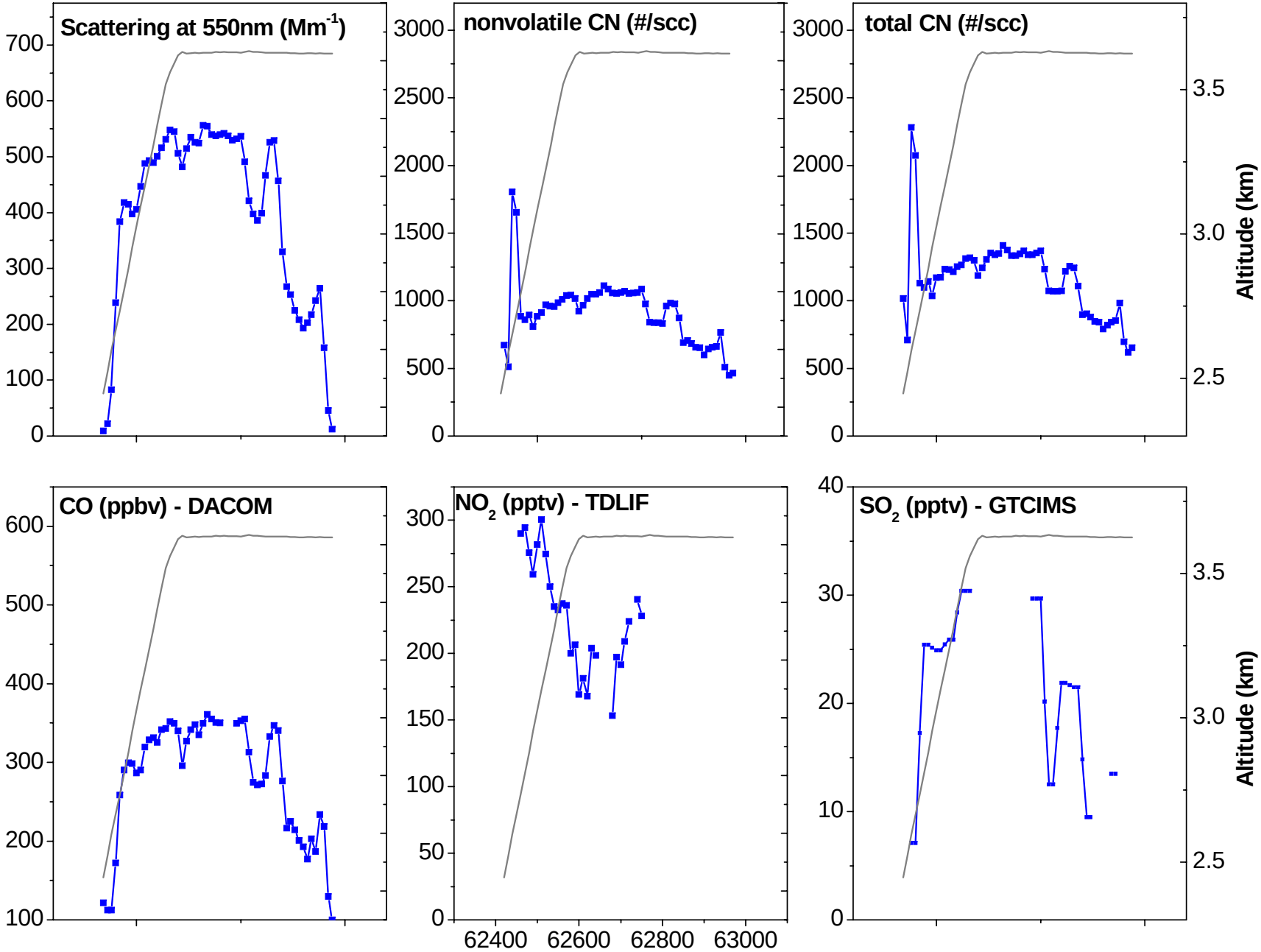


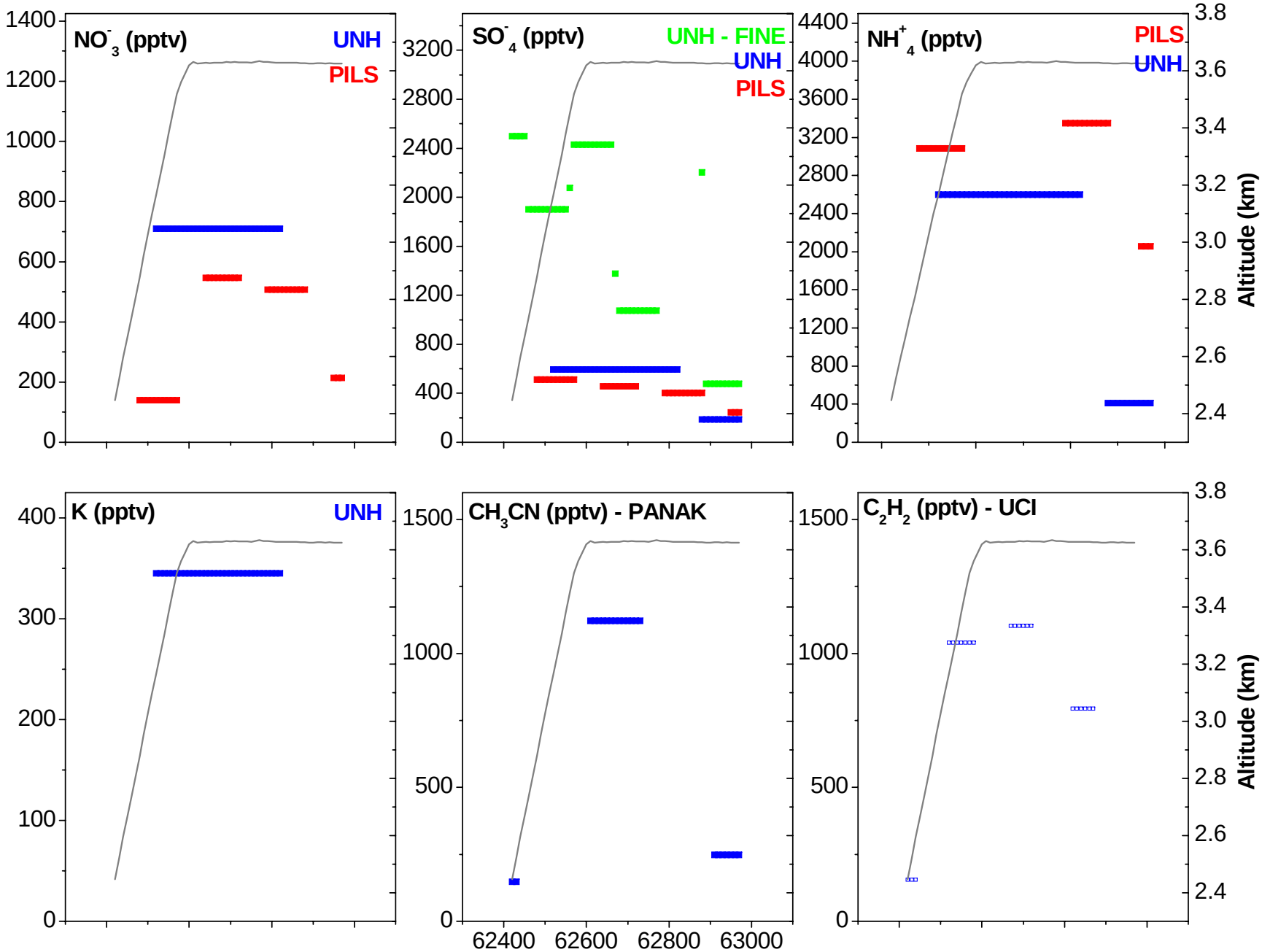
F09 - Biomass Burning Plume (18:34:40-19:05:50)



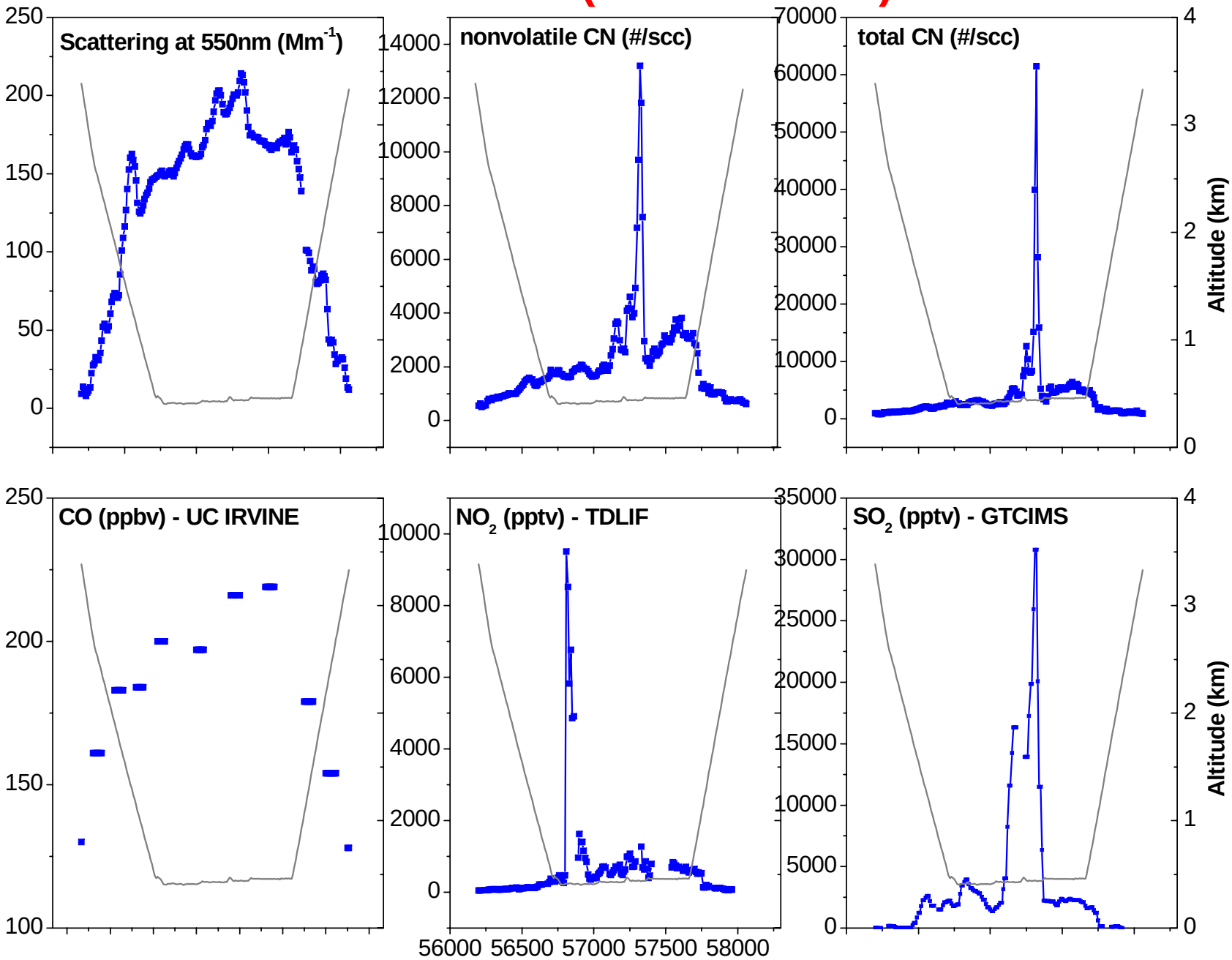

NO$^-_3$ (pptv)
UNH
SO$^-_4$ (pptv)
UNH - FINE
UNH
NH$^+_4$ (pptv)
UNH
K (pptv)
UNH
CH$_3$CN (pptv) - PANAK
C$_2$H$_2$ (pptv) - UCI
Altitude (km)
Altitude (km)
1400
1200
1000
800
600
400
200
0
3200
2800
2400
2000
1600
1200
800
400
0
4400
4000
3600
3200
2800
2400
2000
1600
1200
800
400
0
10
8
6
400
300
200
100
0
1500
1000
500
0
67000
67500
68000
68500
69000

F10 - Biomass Burning Plume (17:20:20-17:29:30)

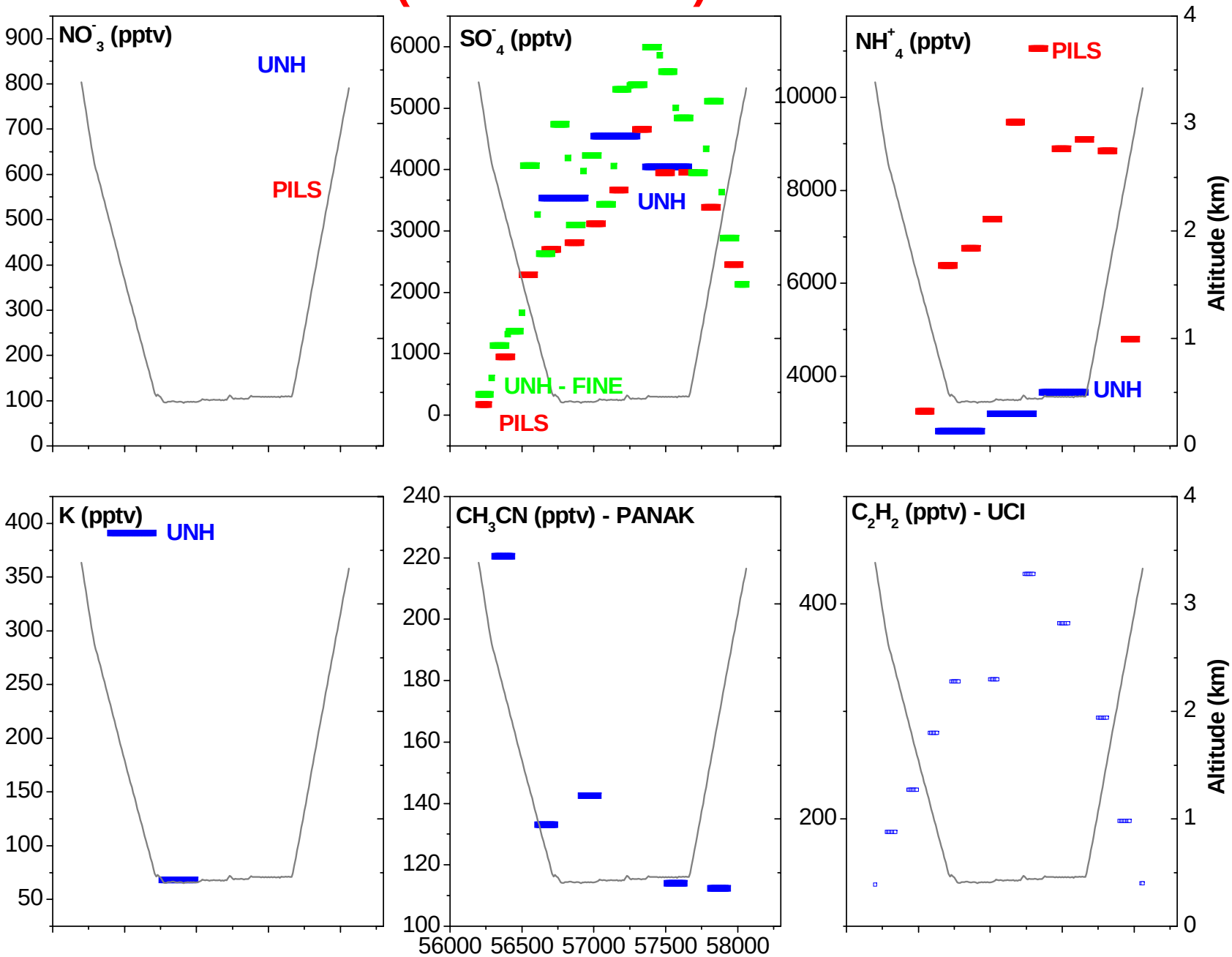



NO$^-_3$ (pptv)
UNH
PILS
SO$^-_4$ (pptv)
UNH - FINE
UNH
PILS
NH$^+_4$ (pptv)
PILS
UNH
K (pptv)
UNH
CH$_3$CN (pptv) - PANAK
C$_2$H$_2$ (pptv) - UCI
Altitude (km)
Altitude (km)
62400
62600
62800
63000

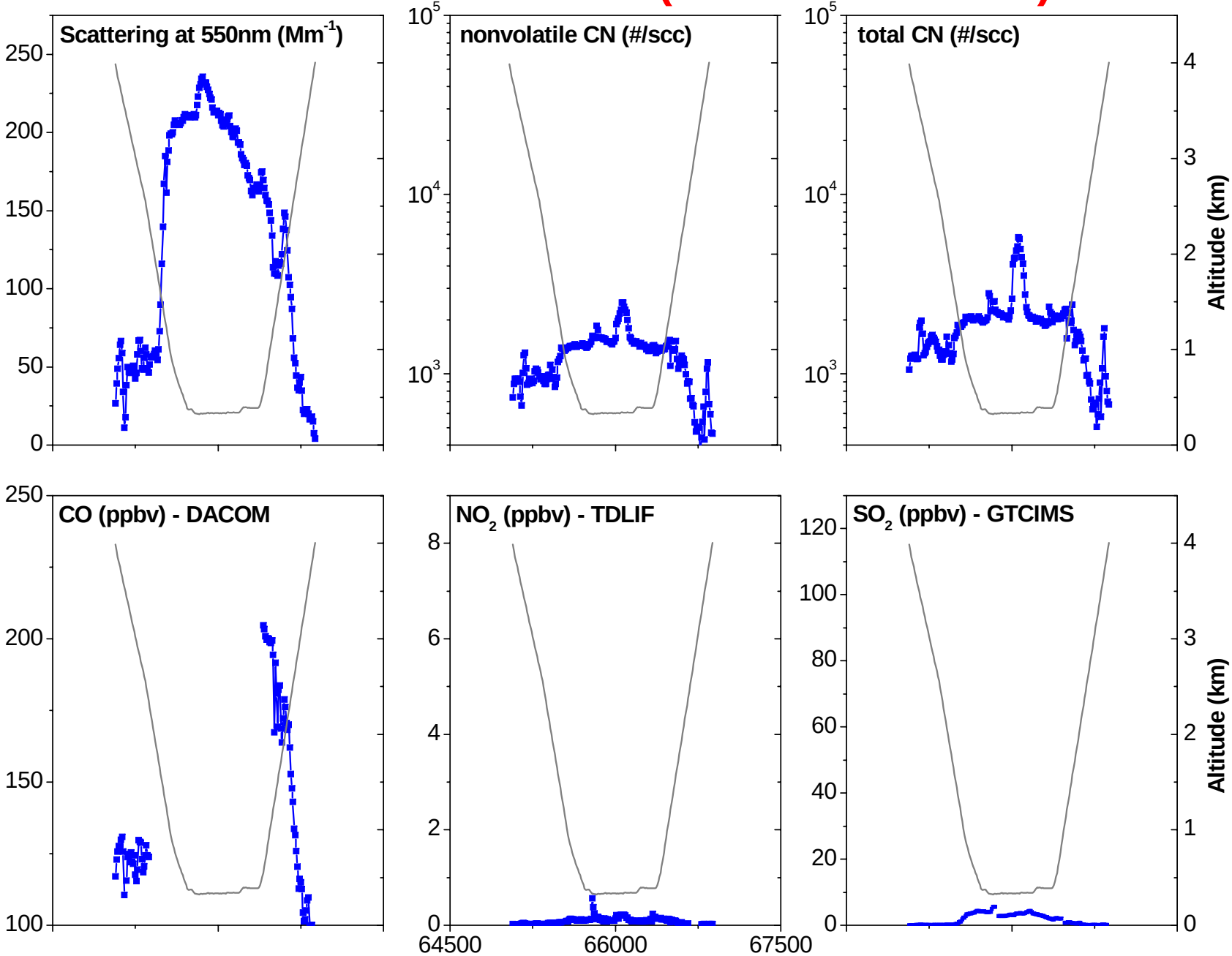
F10 - Plume (56200-58060s)

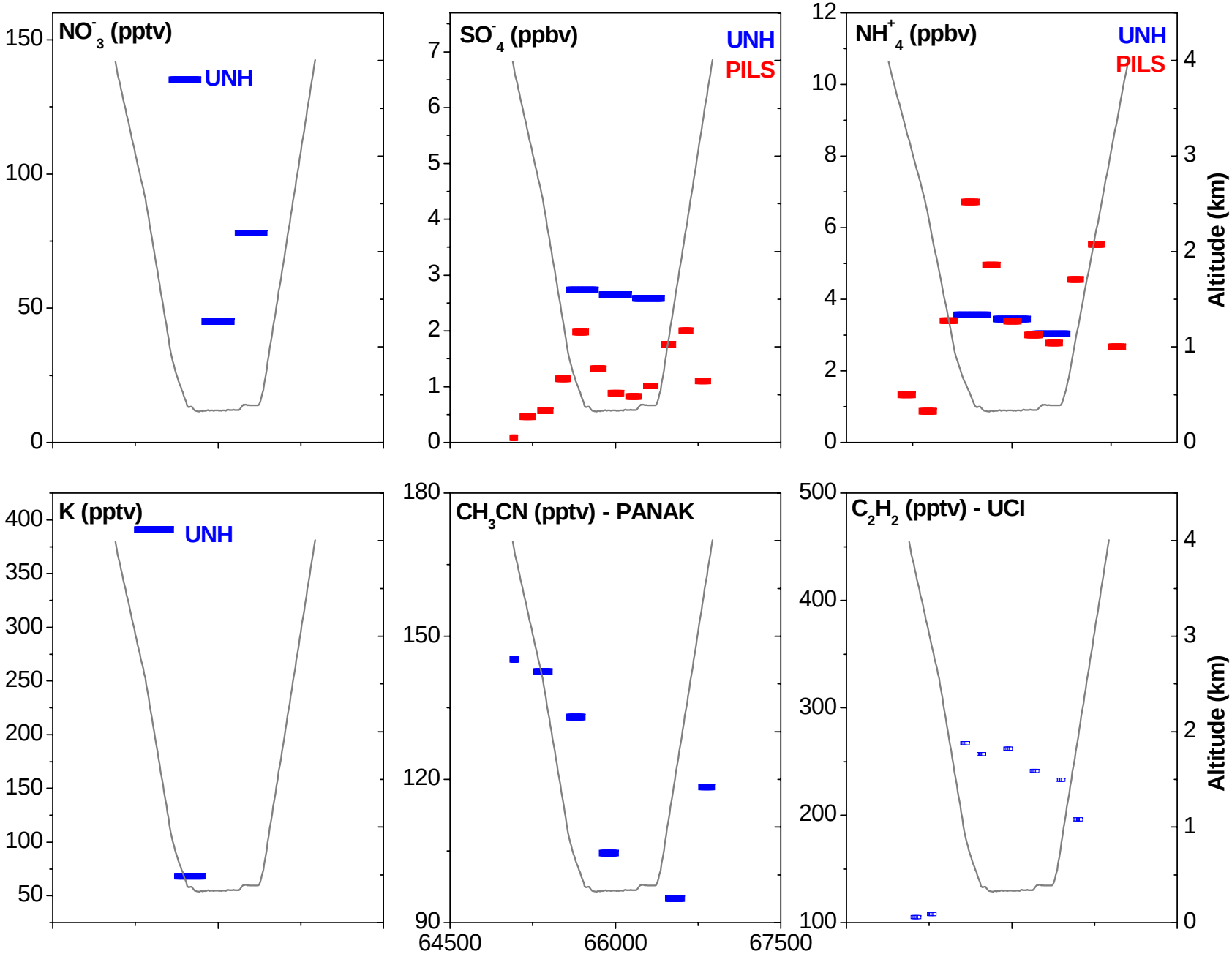


F10 - Plume (56200-58060s)

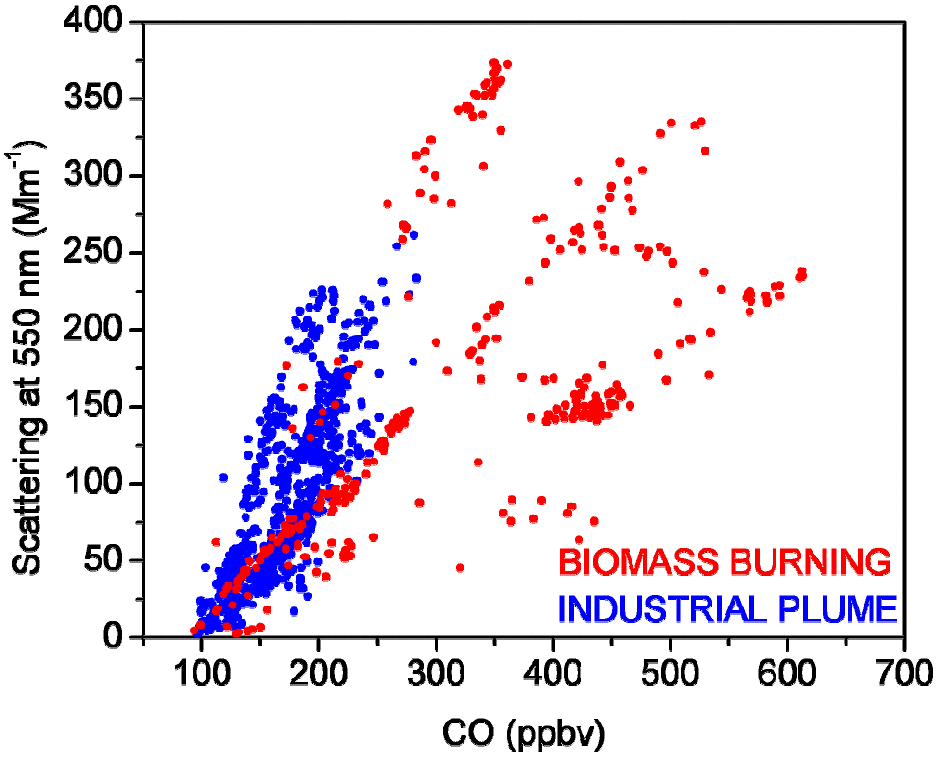


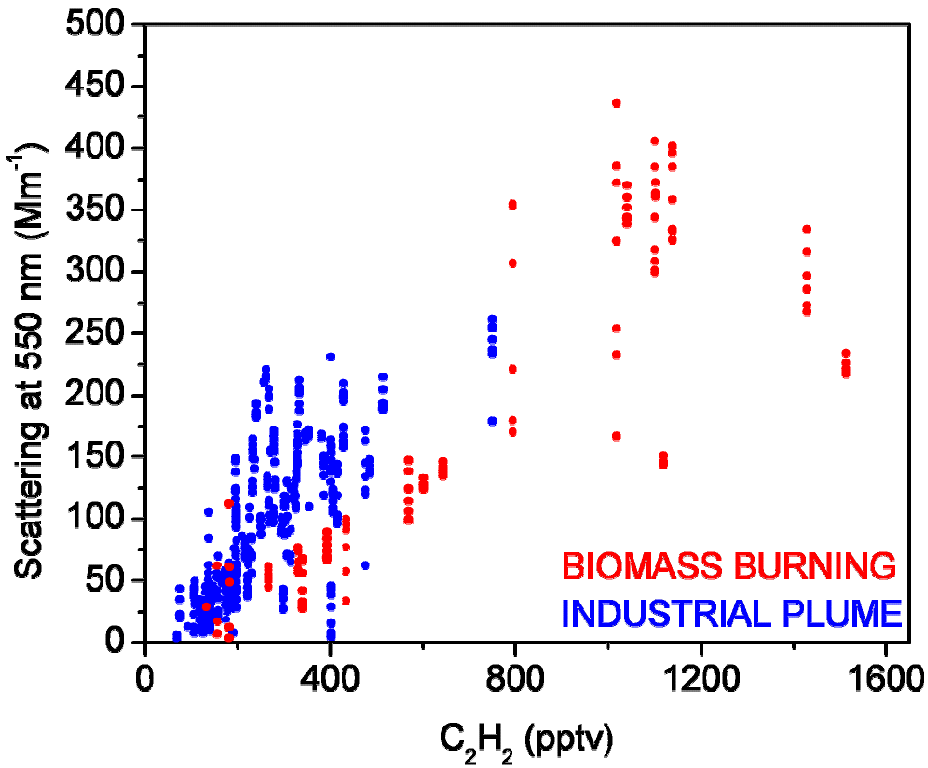
F12 - Industrial Plume (18:04:30-18:34:40)



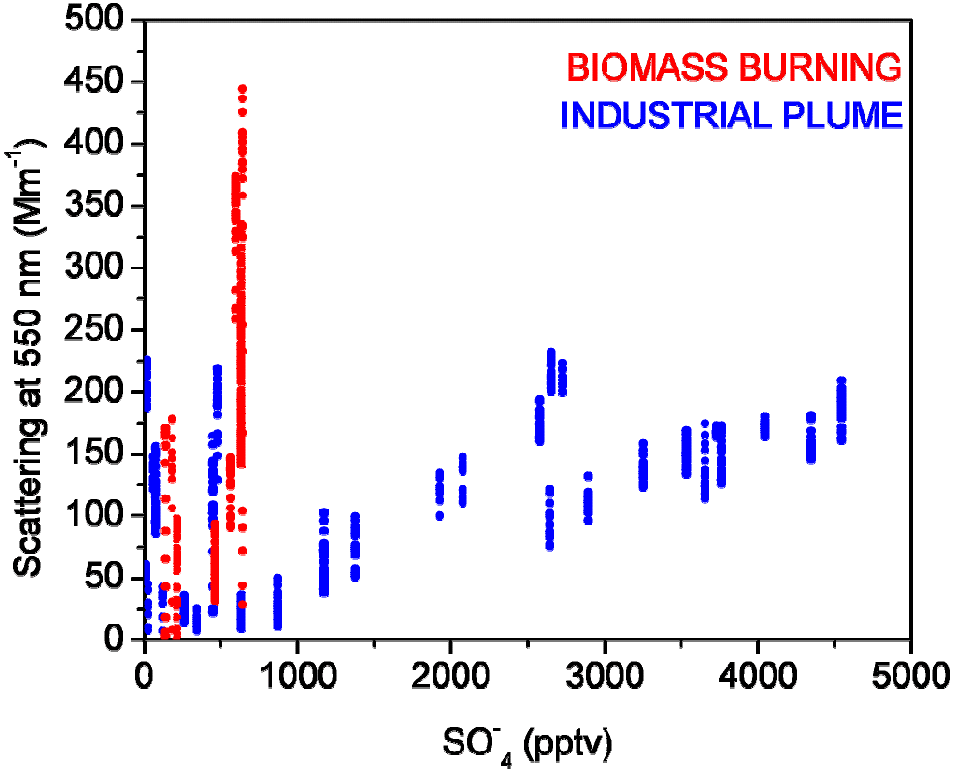

NO$^-_3$ (pptv)
UNH
SO$^-_4$ (ppbv)
UNH
PILS
NH$^+_4$ (ppbv)
UNH
PILS
Altitude (km)
K (pptv)
UNH
CH$_3$CN (pptv) - PANAK
C$_2$H$_2$ (pptv) - UCI
Altitude (km)
64500
66000
67500

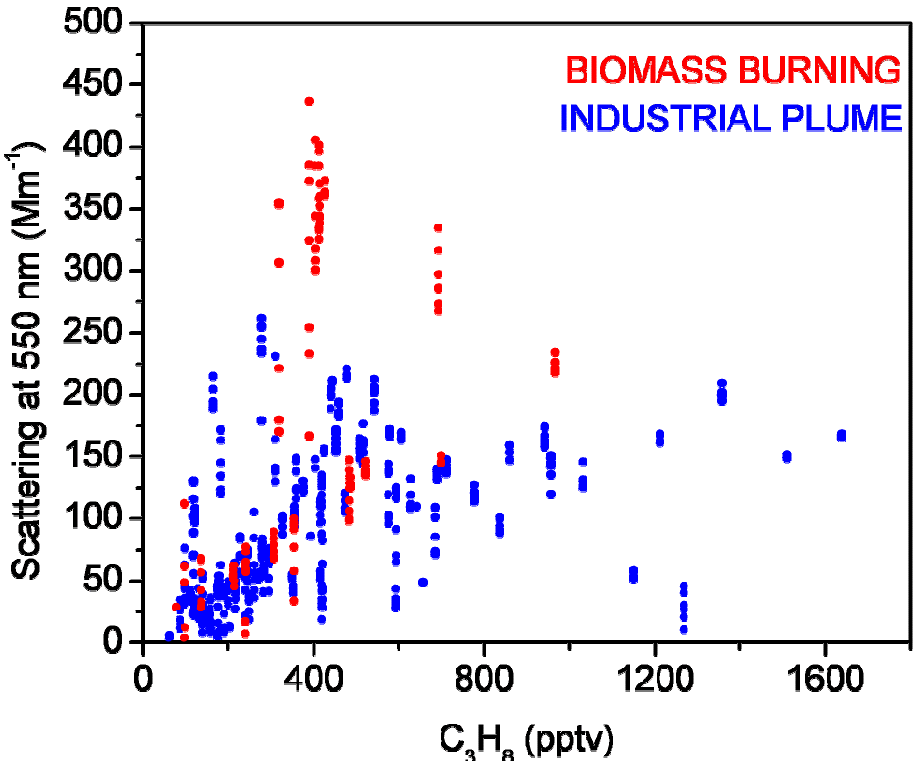
Correlation Plots of Scattering at 550nm Versus Plume Chemical Tracers



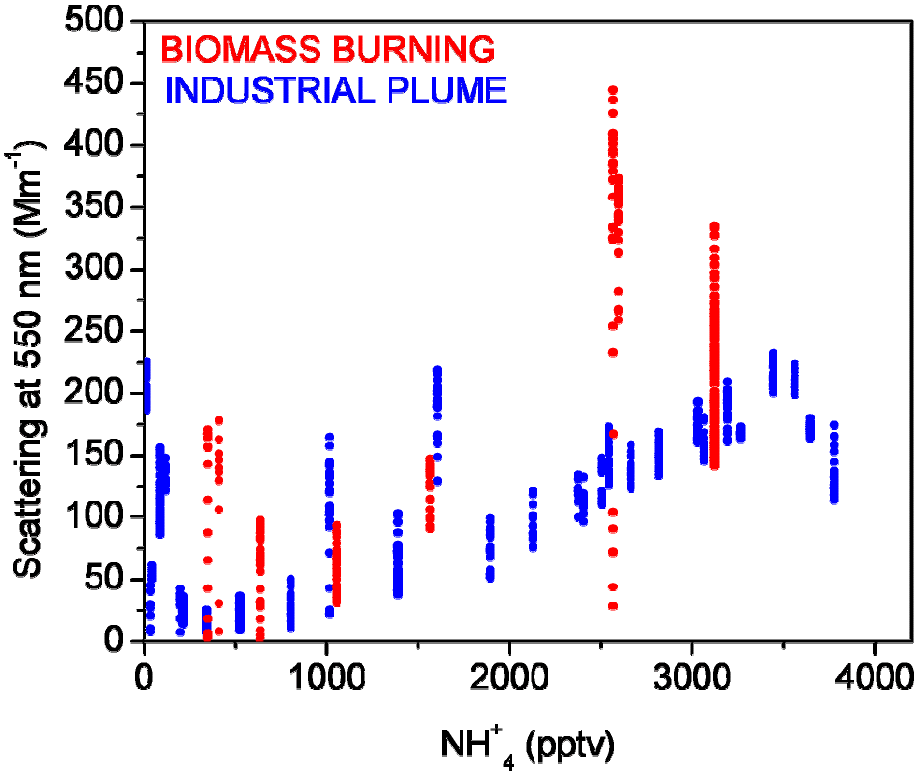


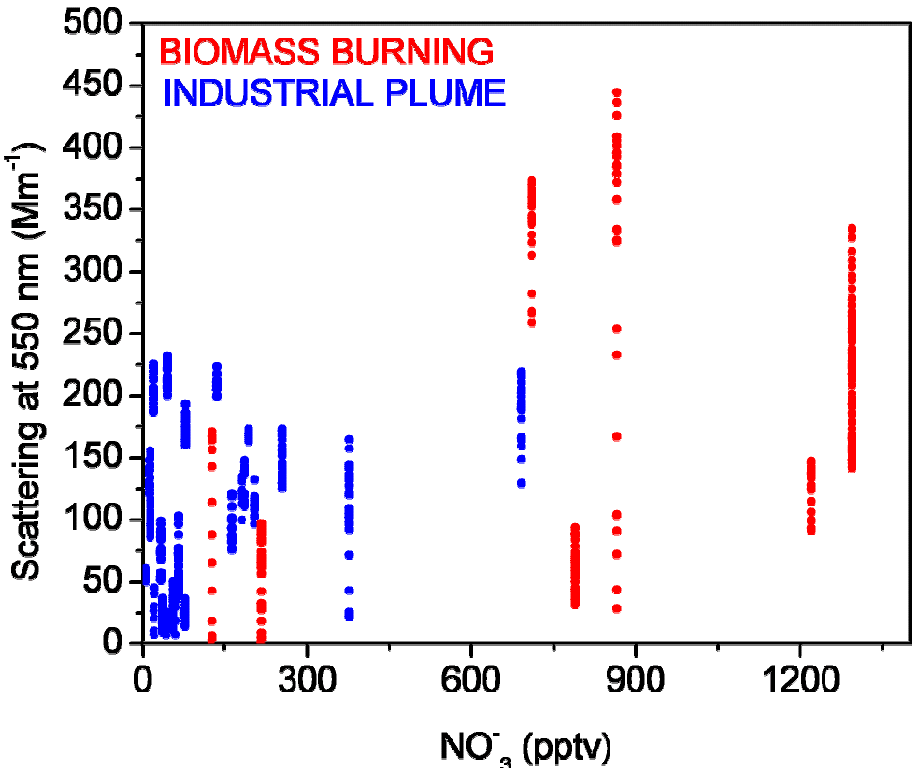
CO – DACOM
C_2H_2 - UCI



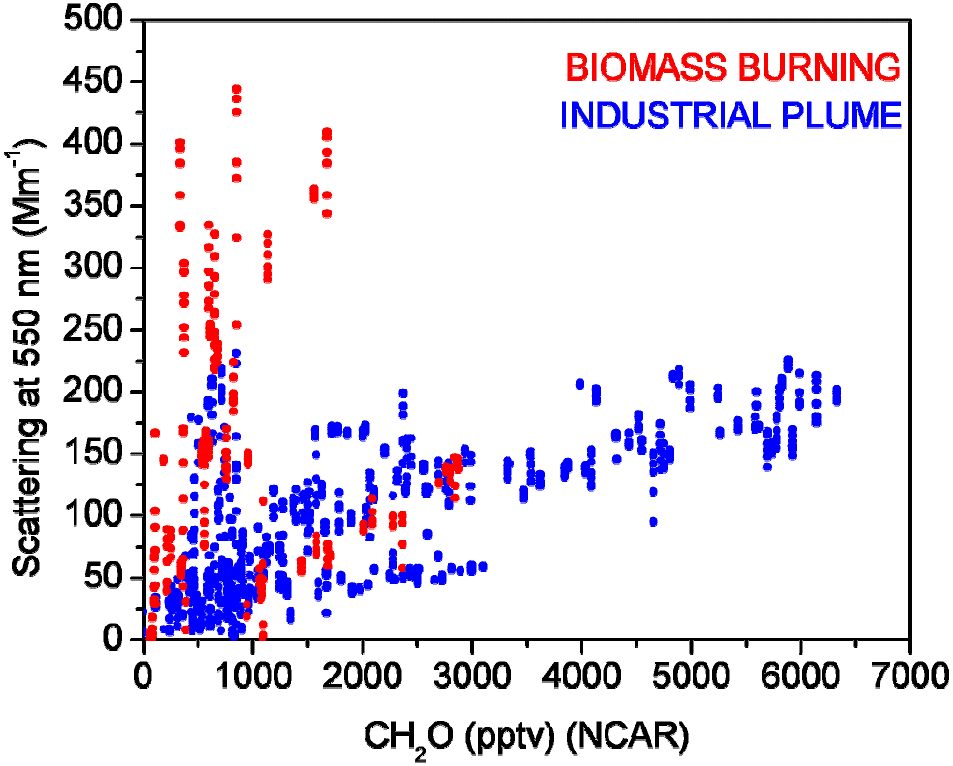


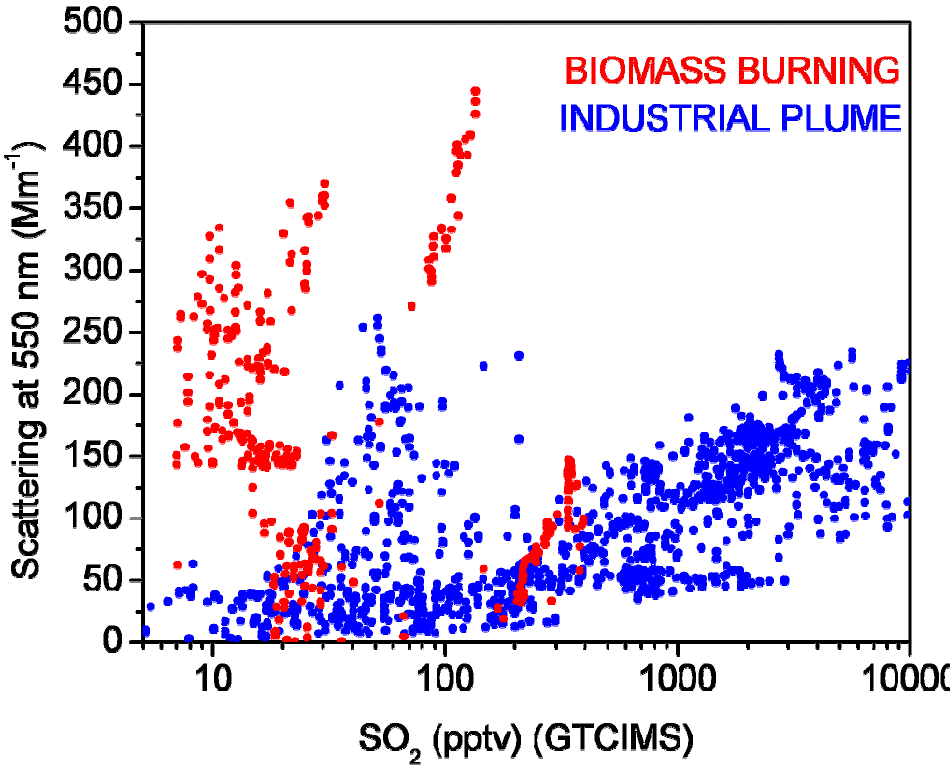
SO4 – UNH
C3H8 - UCI





NO3 – UNH
NH4 - UNH





SO2 – GTCIMS
CH2O- NCAR

Highlights

- Highly elevated particle scattering coefficients are observed in both biomass and industrial plumes, while the highest scattering was observed in biomass burning plumes.
- Correlation with CO and C2H2 suggests that the scattering enhancements are associated with emission from combustion processes.
- The single scattering albedo is estimated to be 0.95 ± 0.04 for biomass burning plume and ranges from 0.94 to 0.99 for the industrial plumes.