DRI CCN spectrometer in POST

Jim Hudson,
Stephen Noble,
Vandana Jha

Calibrations each flight. Usually done in cloud when CCN measurements are invalid due to splashing or missing CCN in droplets. Mean channel vs. Sc.

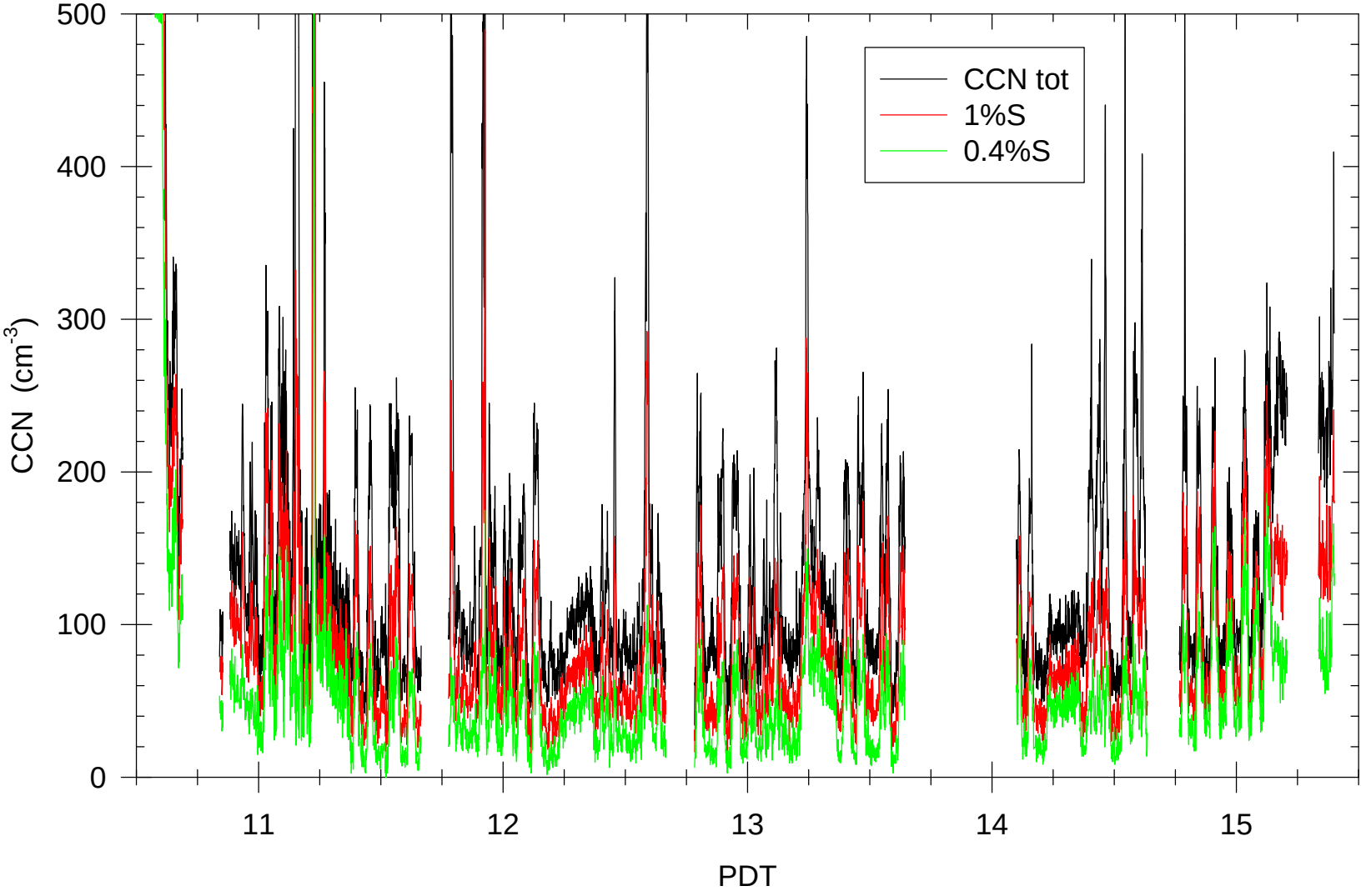
Apply calibrations to get concentrations for 10 different S plus total CCN for each record (1 to a few seconds). So up to 20000 rows and 15 columns, decimal and (hms) time (PDT) and pressure, CN for TO3, 4, 16, and 17.

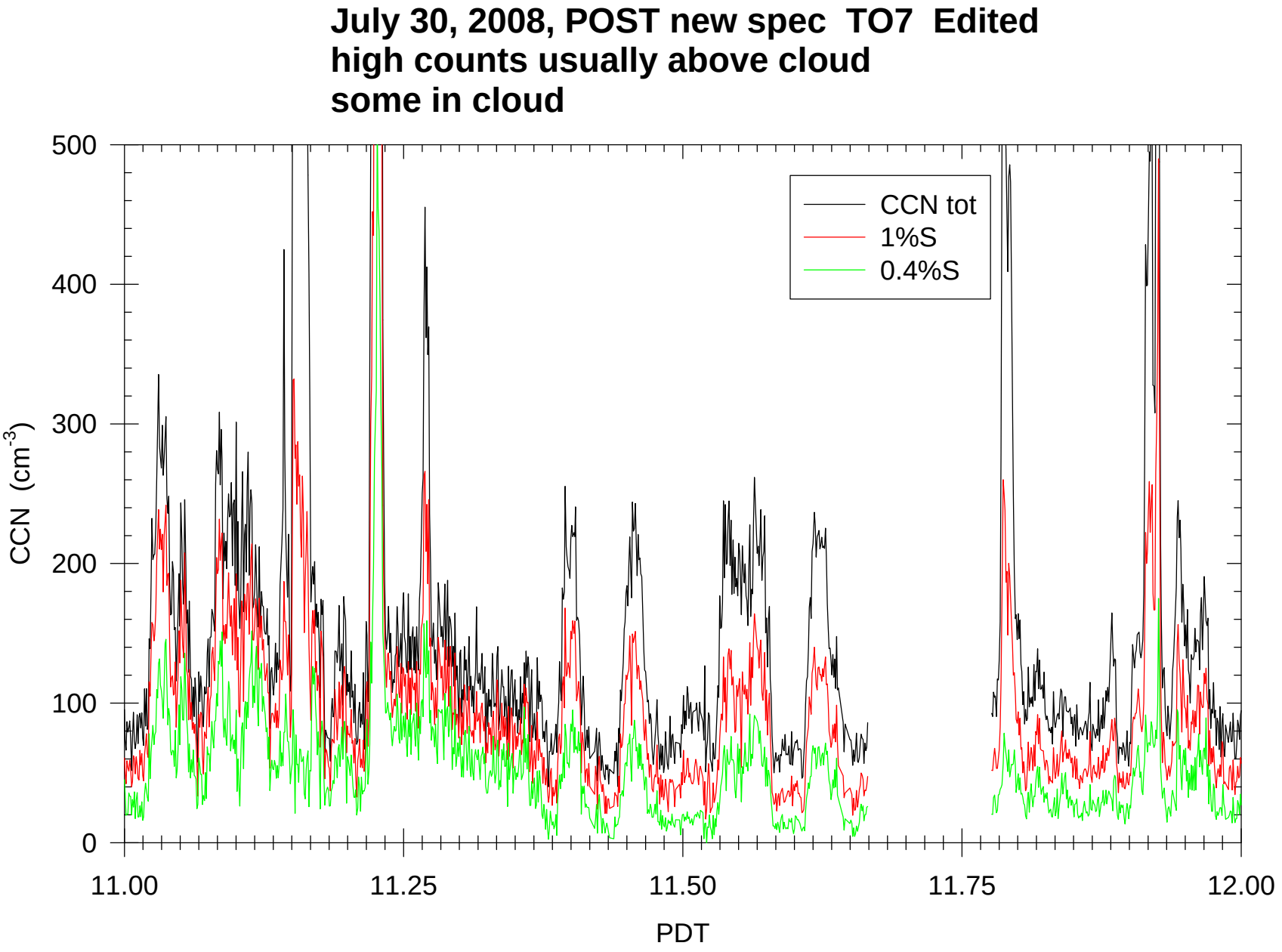
Edit/remove data during calibrations, malfunctions, and processing to obtain only ambient data.

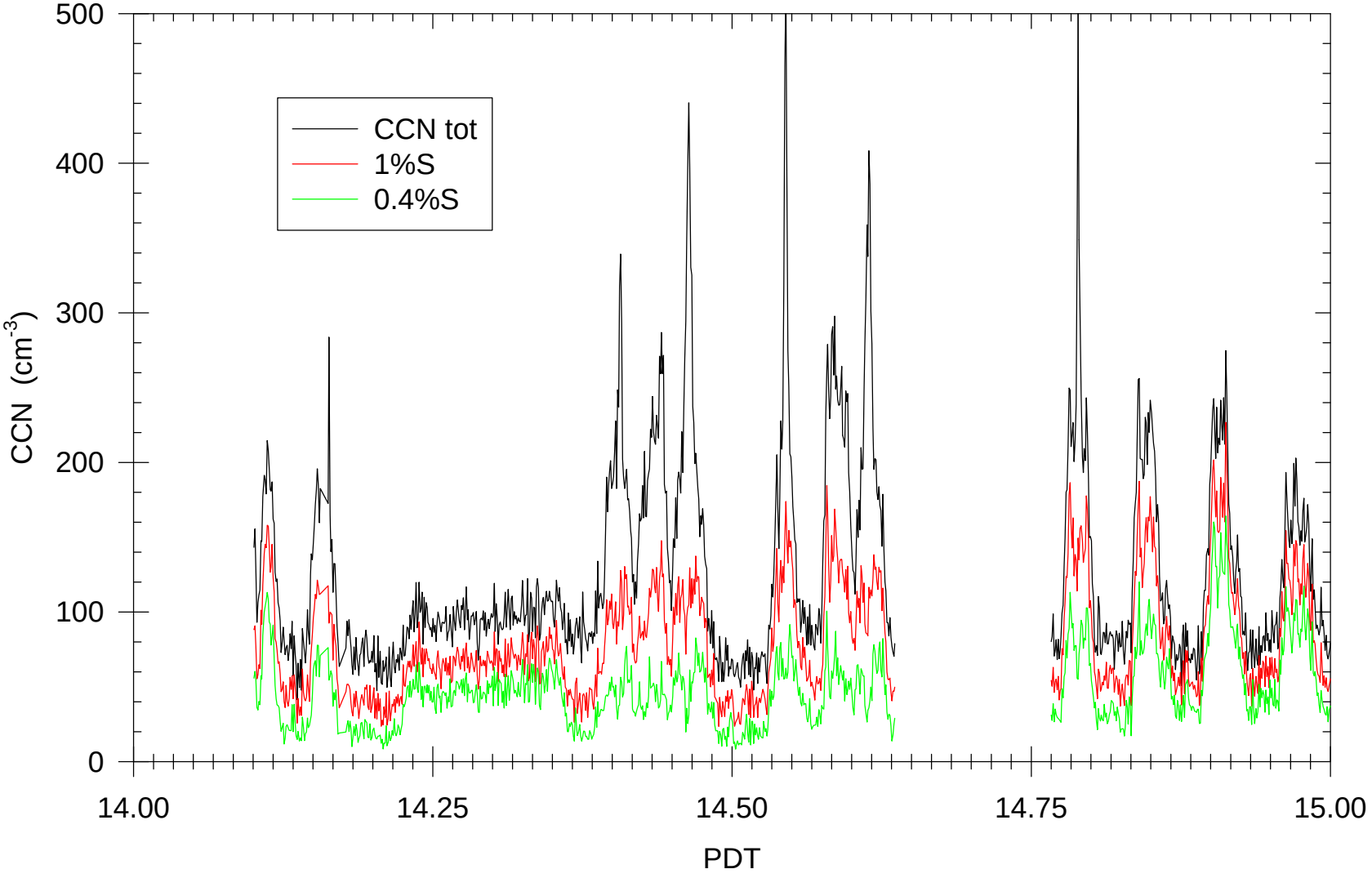
Time plots of CCN and CAS conc and LWC, CIRPAS CN.

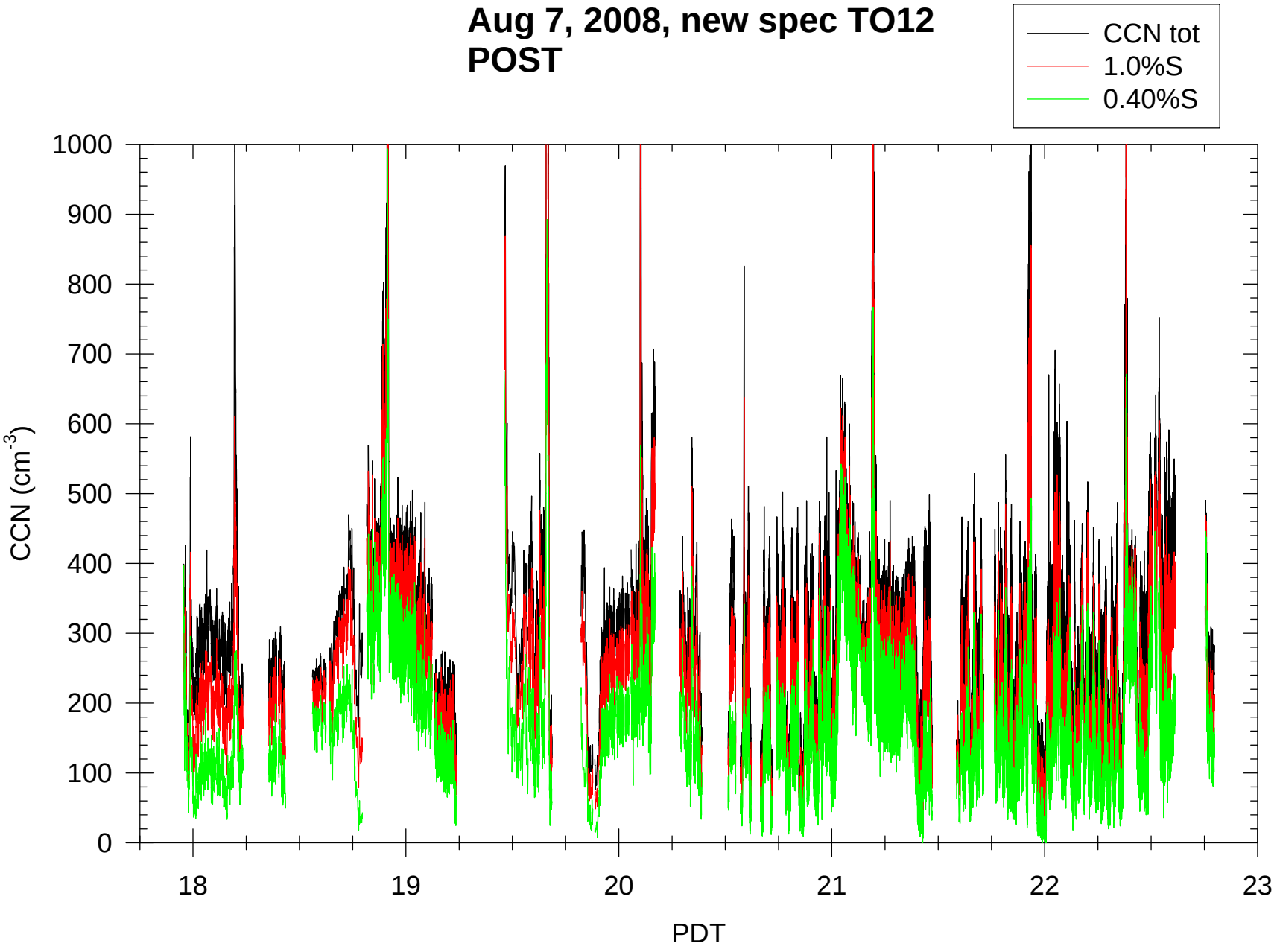
Date	flight	time	operator	cal	processing	N
July 18	TO3	night	Hudson	rack	volatility	7
July 21	TO4	day	Hudson	rack	volatility	4
July 27	TO5	night	Jha	bags		6
July 28	TO6	night	Jha	bags		6
July 30	TO7	day	Hudson	bags		9
Aug. 1	TO8	day	Hudson	bags		9
Aug. 2	TO9	day	Hudson,	bags		little
Aug. 4	TO10	day	Hudson	bags		6
Aug. 5	TO11	night	Hudson	bags		High
Aug. 7	TO12	night	Hudson	bags		7
Aug. 8	TO13	night	Hudson	bags		8
Aug. 11	TO14	night	Noble	bags		6
Aug. 12	TO15	night	Hudson	bags		8
Aug. 14	TO16	day	Hudson	rack	Vol., size-S_c	3
Aug. 15	TO17	day	Hudson	rack	Vol., size-S_c	5

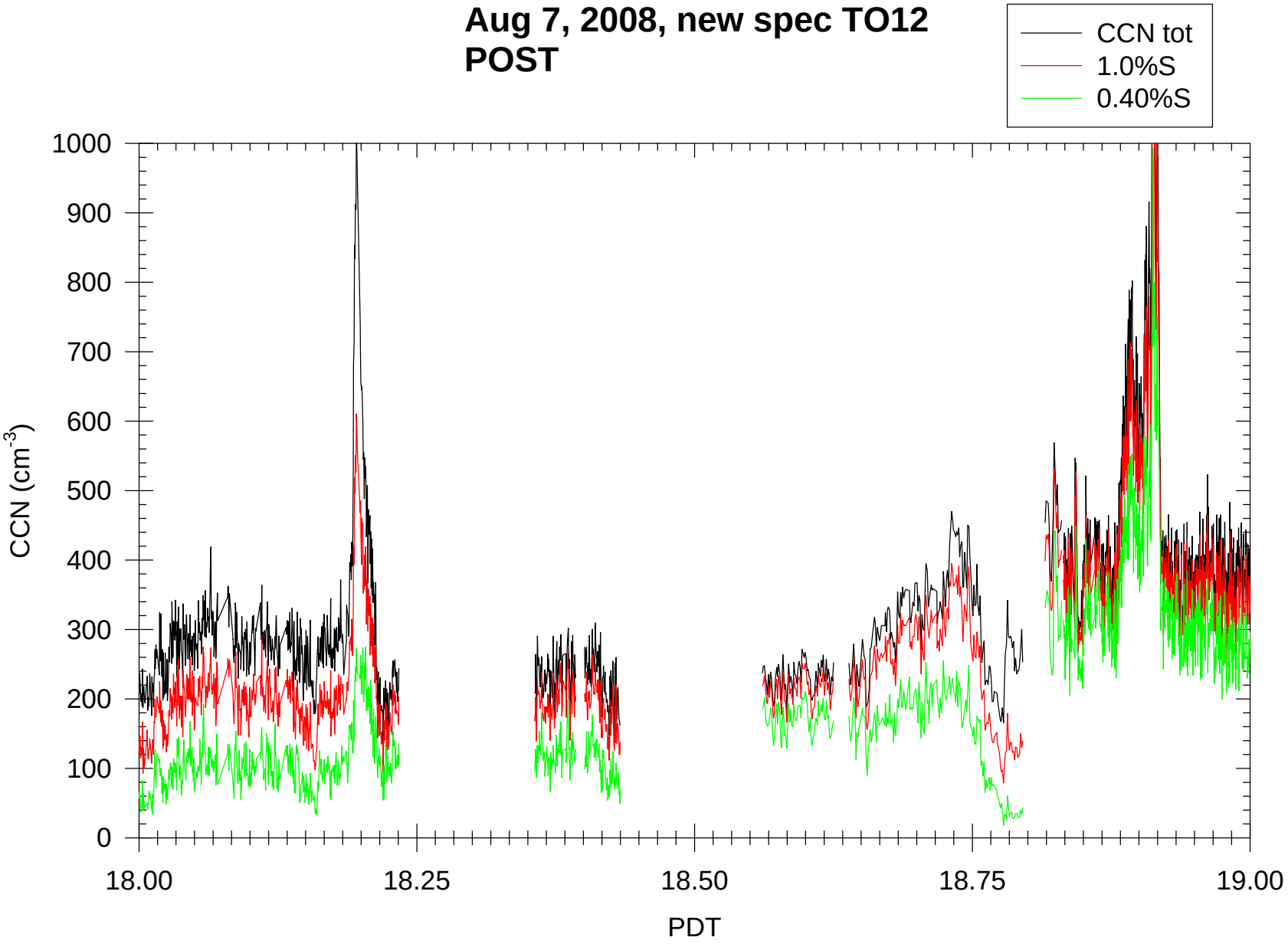
July 30, 2008, POST new spec TO7 Edited
gaps mostly due to calibrations, which were mostly done during cloud passes not yet cloud edited

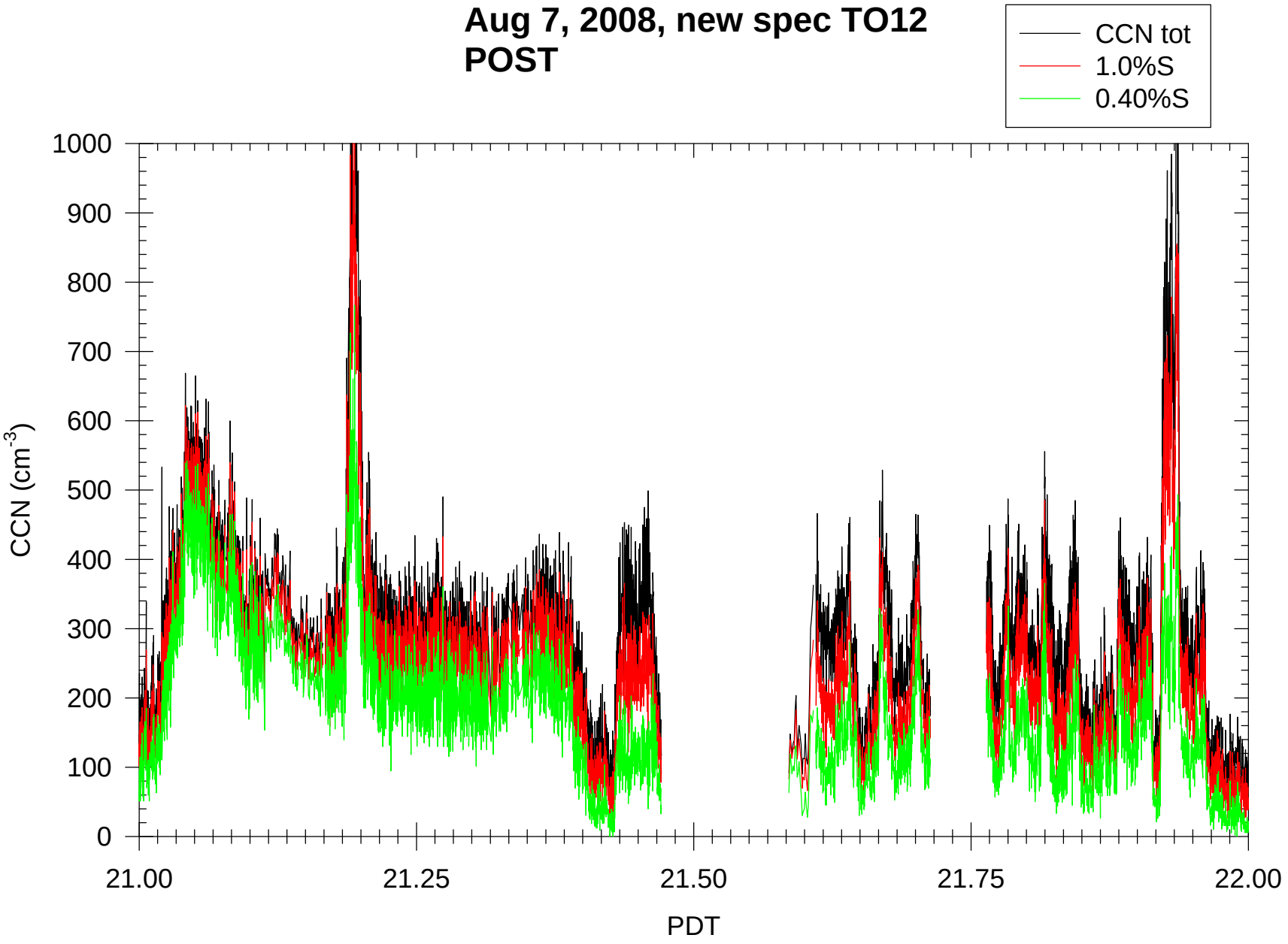


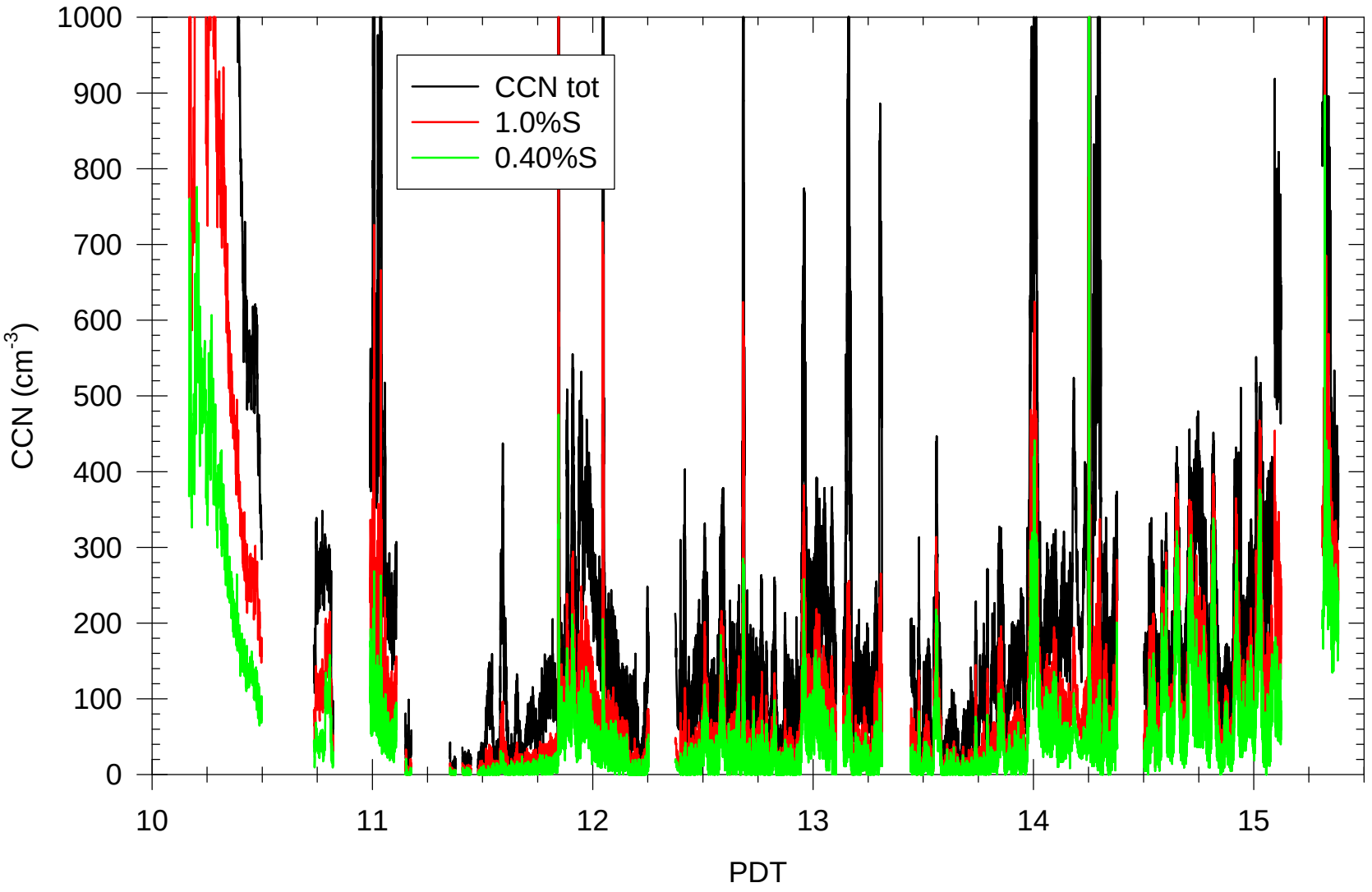

July 30, 2008, POST new spec TO7 Edited
high counts usually above cloud
some in cloud
CCN tot
1%S
0.4%S
CCN (cm-3)
500
400
300
200
100
0
11.00
11.25
11.50
11.75
12.00
PDT

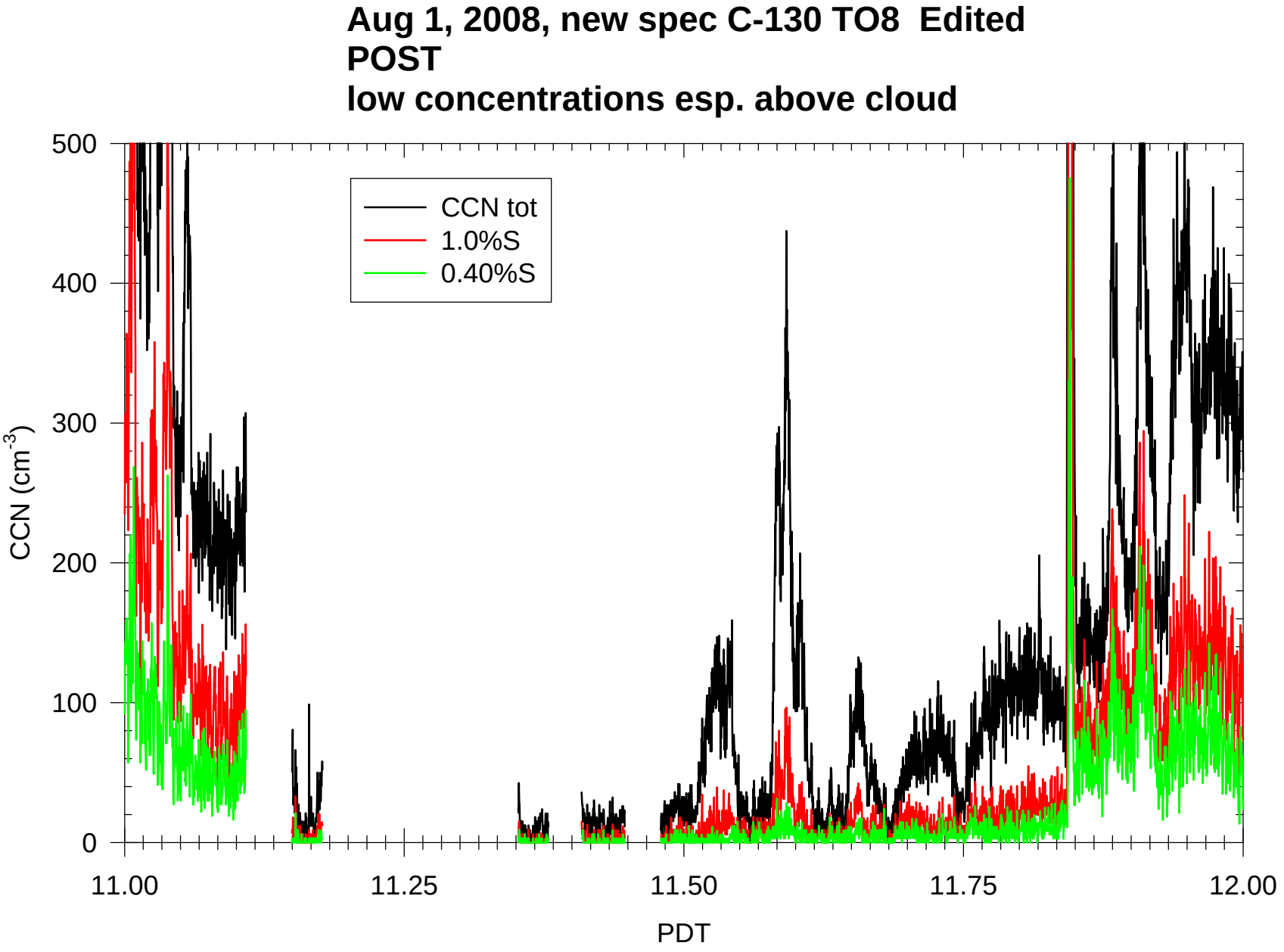

July 30, 2008, POST new spec TO7 Edited
high counts usually above cloud
some in cloud
CCN tot
1%S
0.4%S
CCN (cm-3)
500
400
300
200
100
0
14.00
14.25
14.50
14.75
15.00
PDT

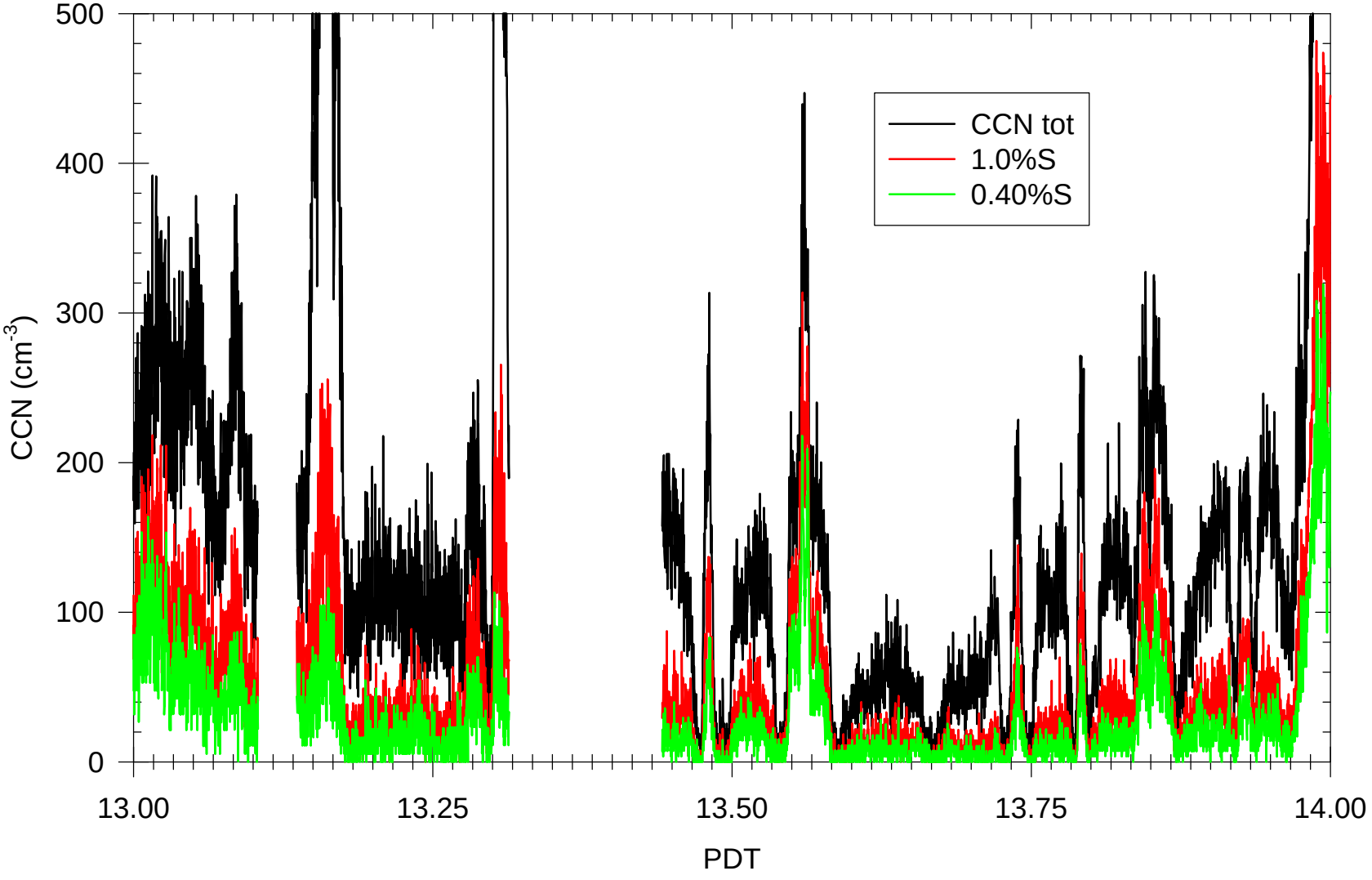

Aug 7, 2008, new spec TO12
POST
CCN tot
1.0%S
0.40%S
CCN (cm-3)
1000
900
800
700
600
500
400
300
200
100
0
18
19
20
21
22
23
PDT

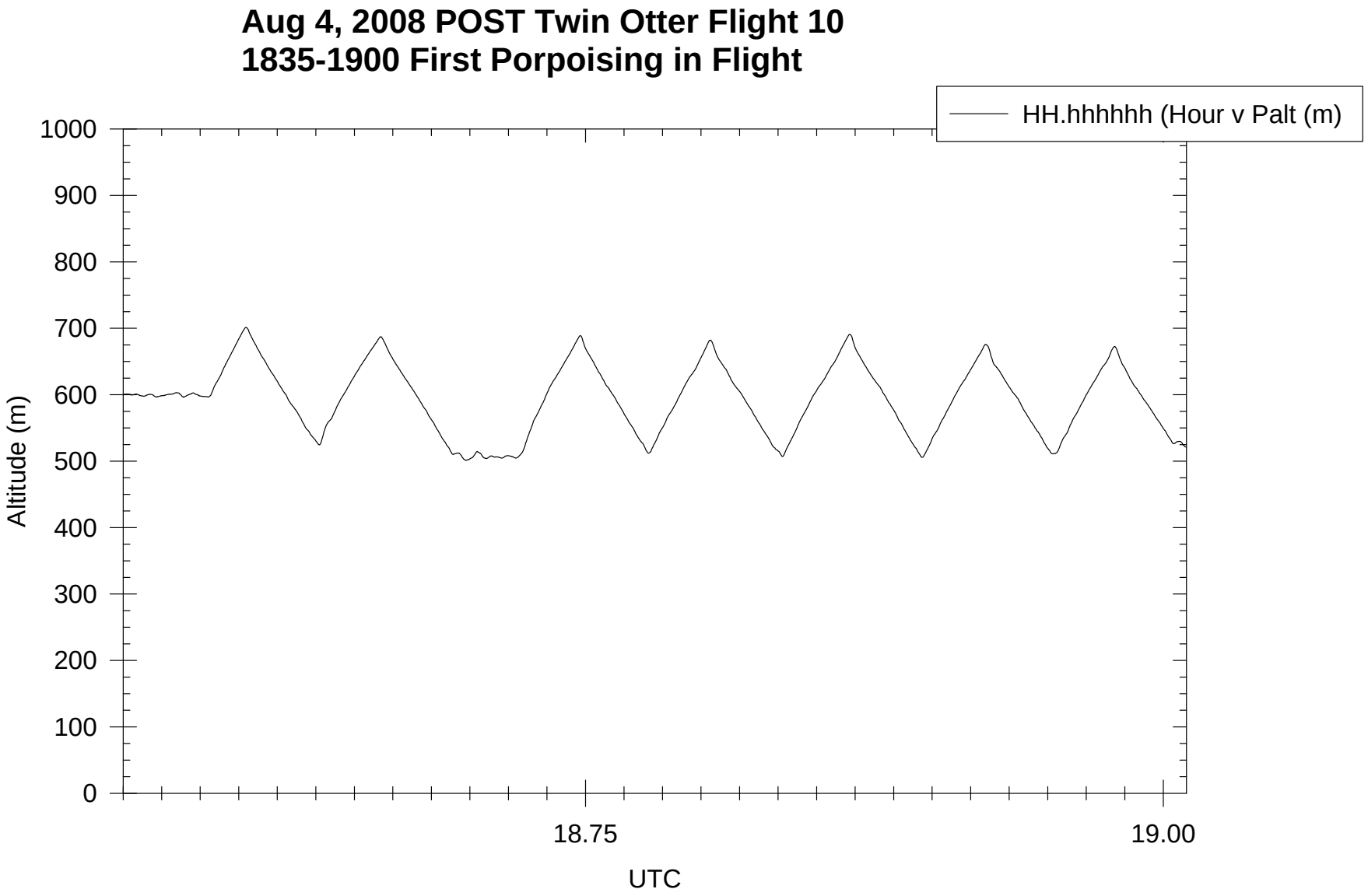

Aug 7, 2008, new spec TO12
POST
CCN tot
1.0%S
0.40%S
CCN (cm-3)
1000
900
800
700
600
500
400
300
200
100
0
18.00
18.25
18.50
18.75
19.00
PDT

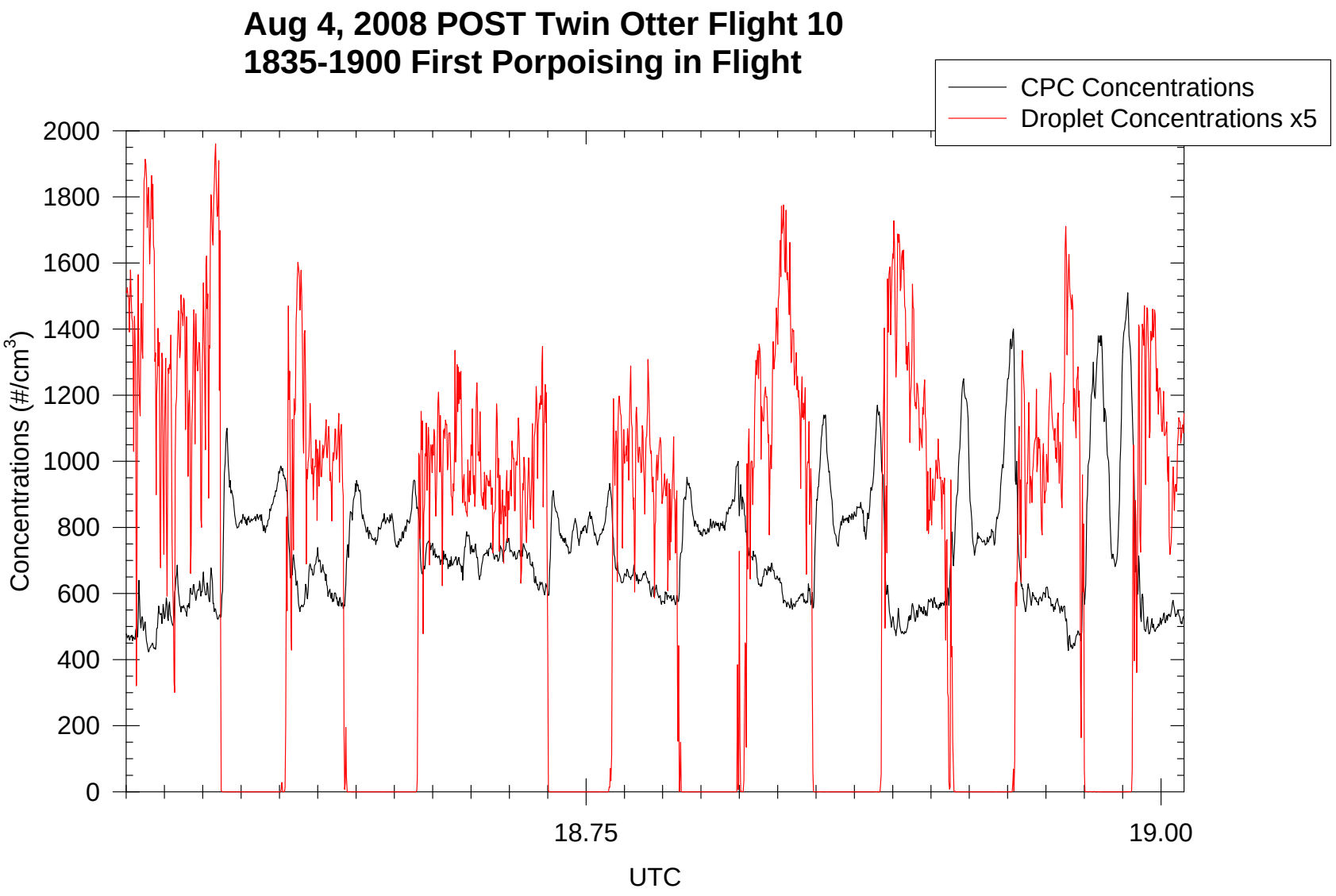

Aug 7, 2008, new spec TO12
POST
CCN tot
1.0%S
0.40%S
CCN (cm-3)
1000
900
800
700
600
500
400
300
200
100
0
21.00
21.25
21.50
21.75
22.00
PDT

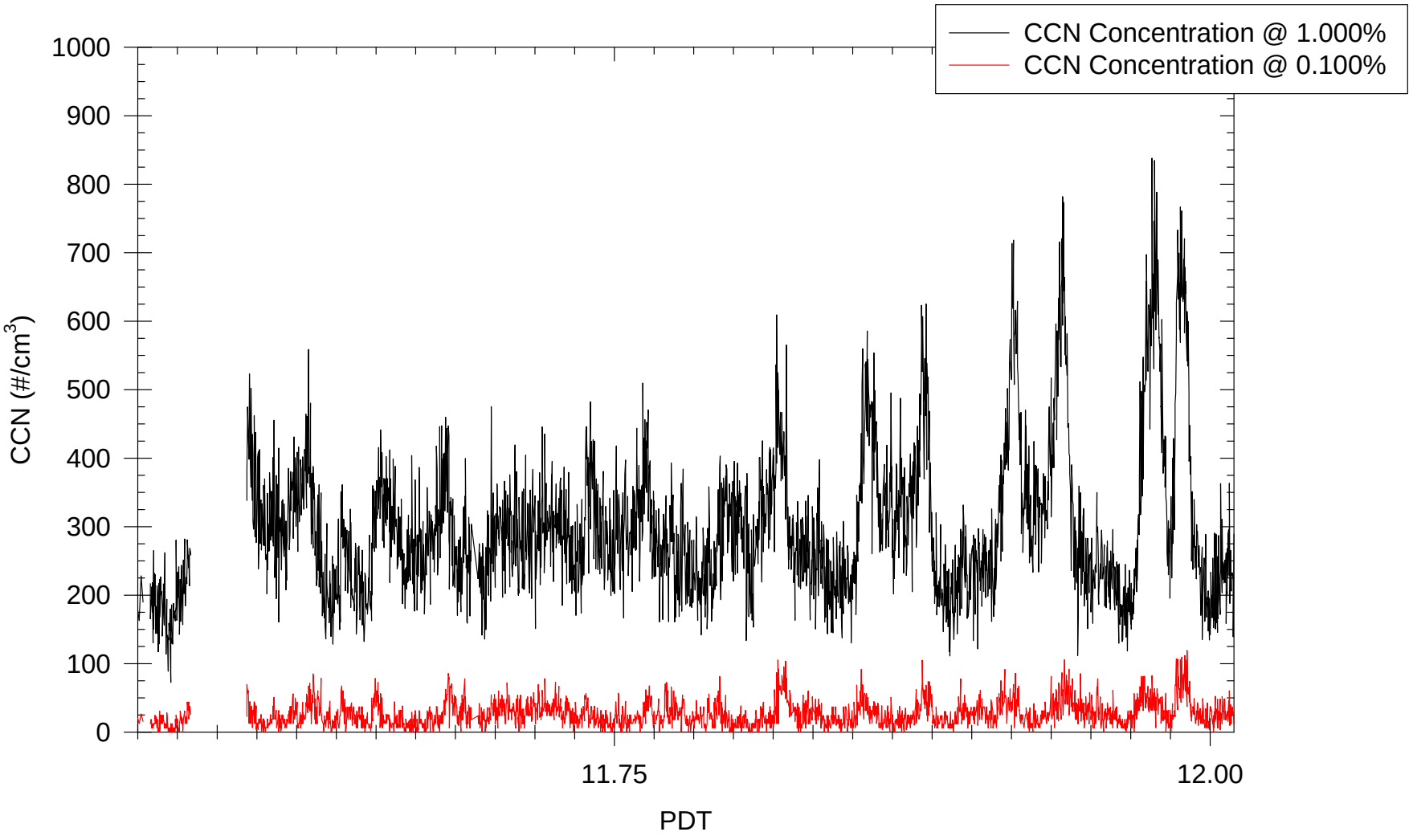

Aug 1, 2008, new spec C-130 TO8 Edited POST
low concentrations esp. above cloud
CCN tot
1.0%S
0.40%S
CCN (cm-3)
PDT
0
100
200
300
400
500
600
700
800
900
1000
10
11
12
13
14
15

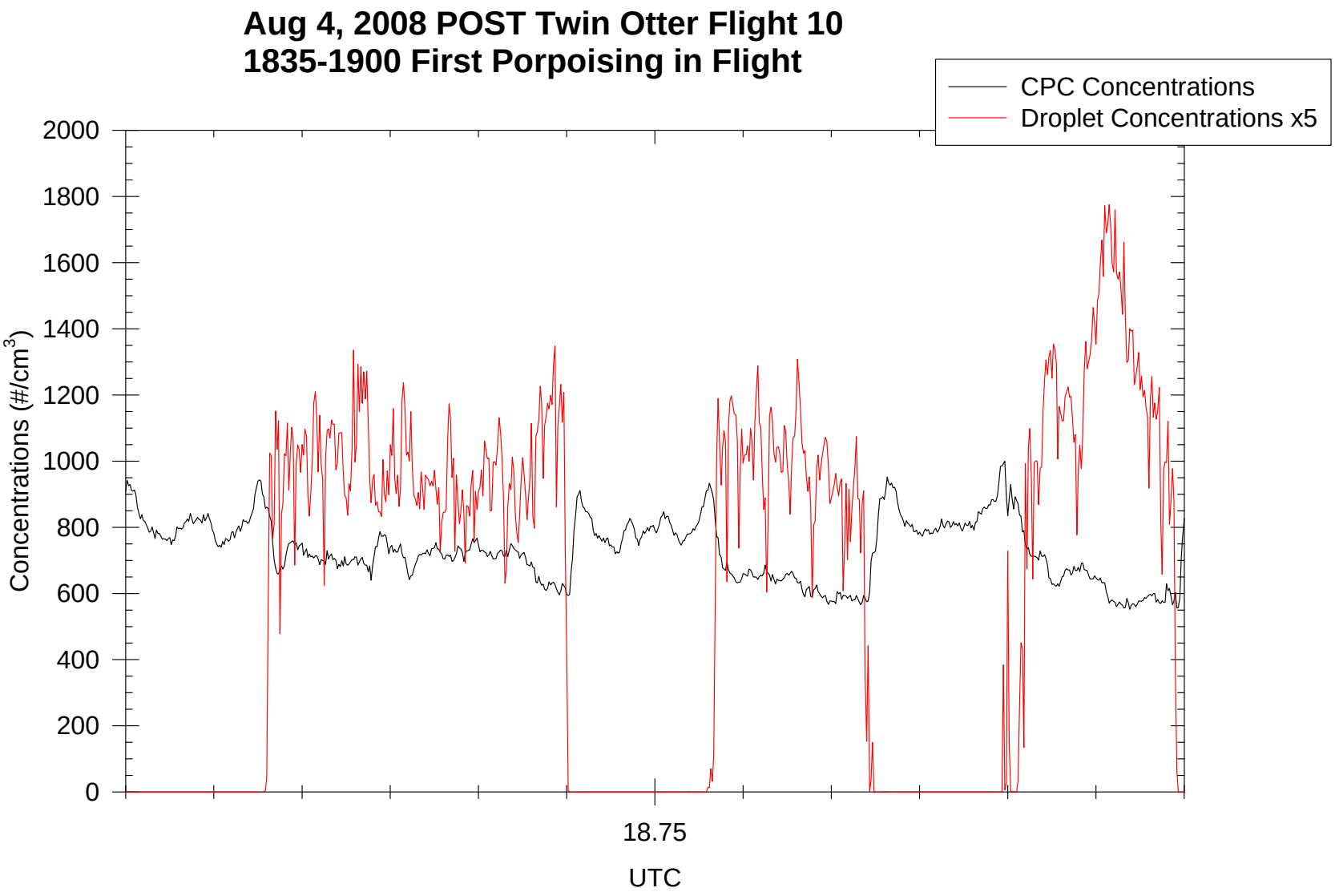

Aug 1, 2008, new spec C-130 TO8 Edited POST
low concentrations esp. above cloud
CCN tot
1.0%S
0.40%S
CCN (cm-3)
500
400
300
200
100
0
11.00
11.25
11.50
11.75
12.00
PDT

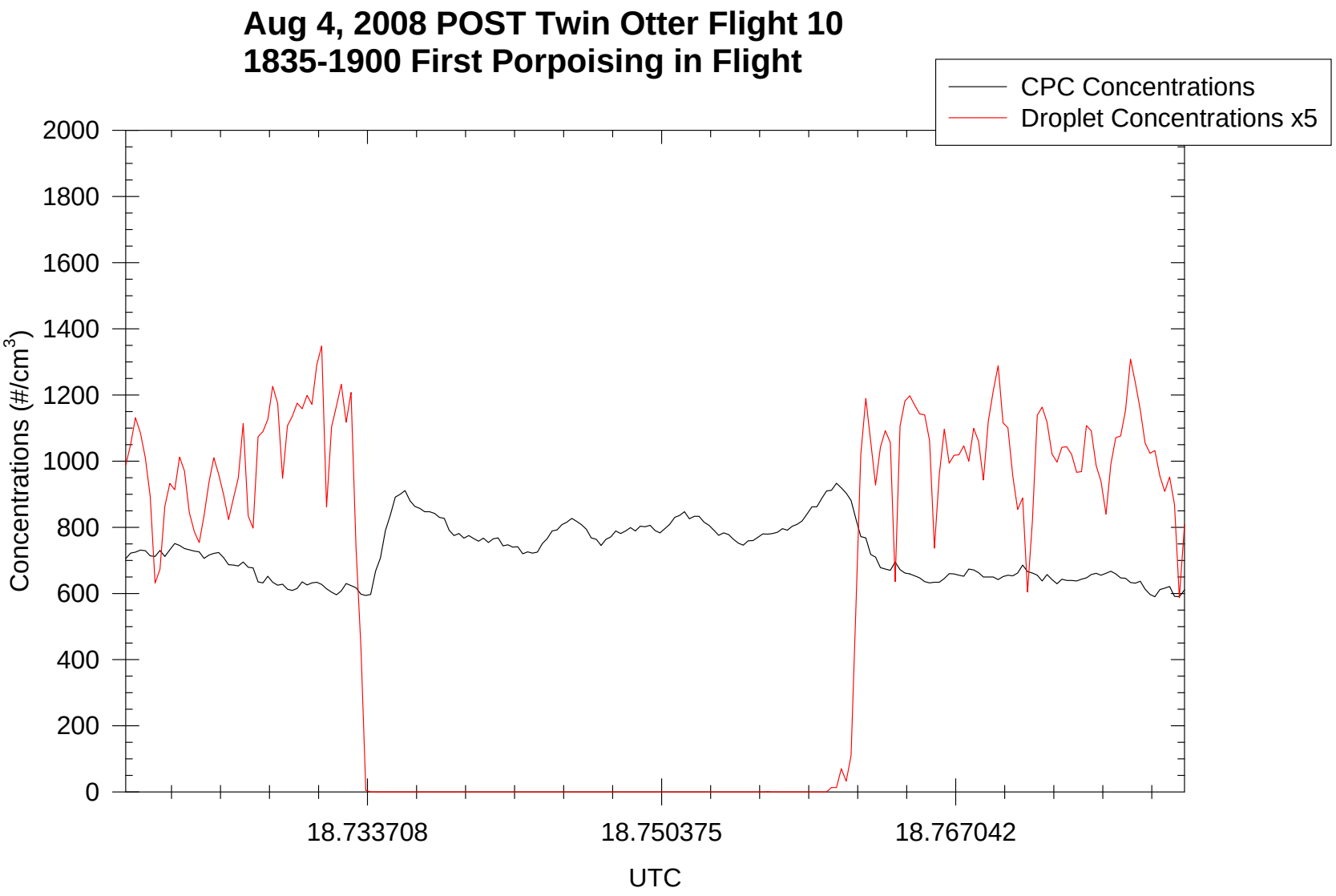

Aug 1, 2008, new spec C-130 TO8 Edited POST
low concentrations esp. above cloud
CCN tot
1.0%S
0.40%S
CCN (cm-3)
500
400
300
200
100
0
13.00
13.25
13.50
13.75
14.00
PDT

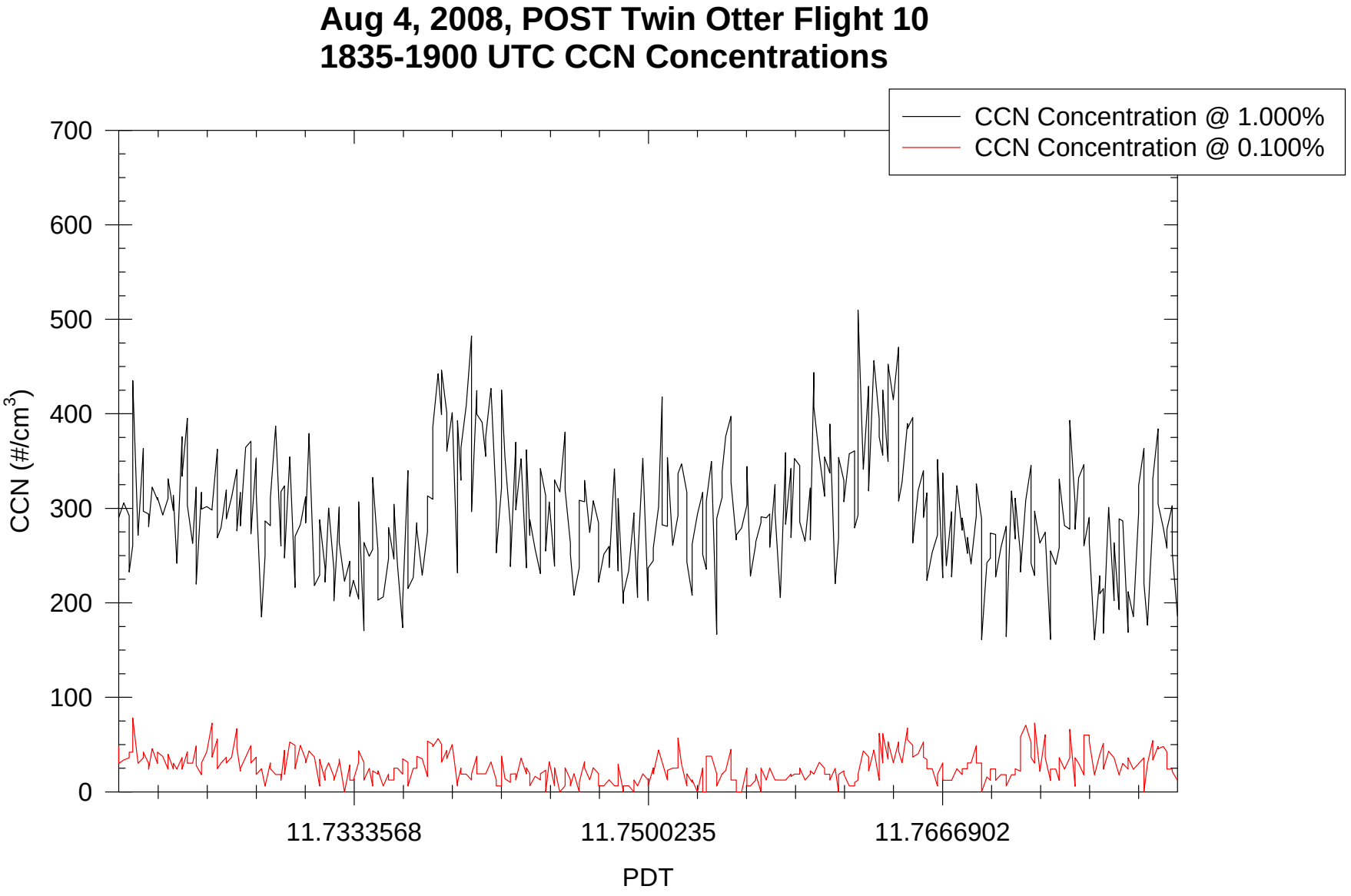

Aug 4, 2008 POST Twin Otter Flight 10
1835-1900 First Porpoising in Flight
HH.hhhhhh (Hour v Palt (m)
1000
900
800
700
600
500
400
300
200
100
0
Altitude (m)
18.75
19.00
UTC


Aug 4, 2008 POST Twin Otter Flight 10
1835-1900 First Porpoising in Flight
CPC Concentrations
Droplet Concentrations x5
Concentrations (#/cm3)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
18.75
19.00
UTC


Aug 4, 2008, POST Twin Otter Flight 10
1835-1900 UTC CCN Concentrations
CCN Concentration @ 1.000%
CCN Concentration @ 0.100%
CCN (#/cm3)
1000
900
800
700
600
500
400
300
200
100
0
11.75
12.00
PDT


Aug 4, 2008 POST Twin Otter Flight 10
1835-1900 First Porpoising in Flight
CPC Concentrations
Droplet Concentrations x5
Concentrations (#/cm3)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
18.75
UTC


Aug 4, 2008 POST Twin Otter Flight 10
1835-1900 First Porpoising in Flight
CPC Concentrations
Droplet Concentrations x5
Concentrations (#/cm3)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
18.733708
18.750375
18.767042
UTC


Aug 4, 2008, POST Twin Otter Flight 10
1835-1900 UTC CCN Concentrations
CCN Concentration @ 1.000%
CCN Concentration @ 0.100%
700
600
500
400
300
200
100
0
CCN (#/cm3)
11.7333568
11.7500235
11.7666902
PDT

Sounding plots of CCN and CAS conc and LWC, CIRPAS CN.

Determine N_c for various cloud thresholds for soundings.

So far 0.1 gcm^{-3}

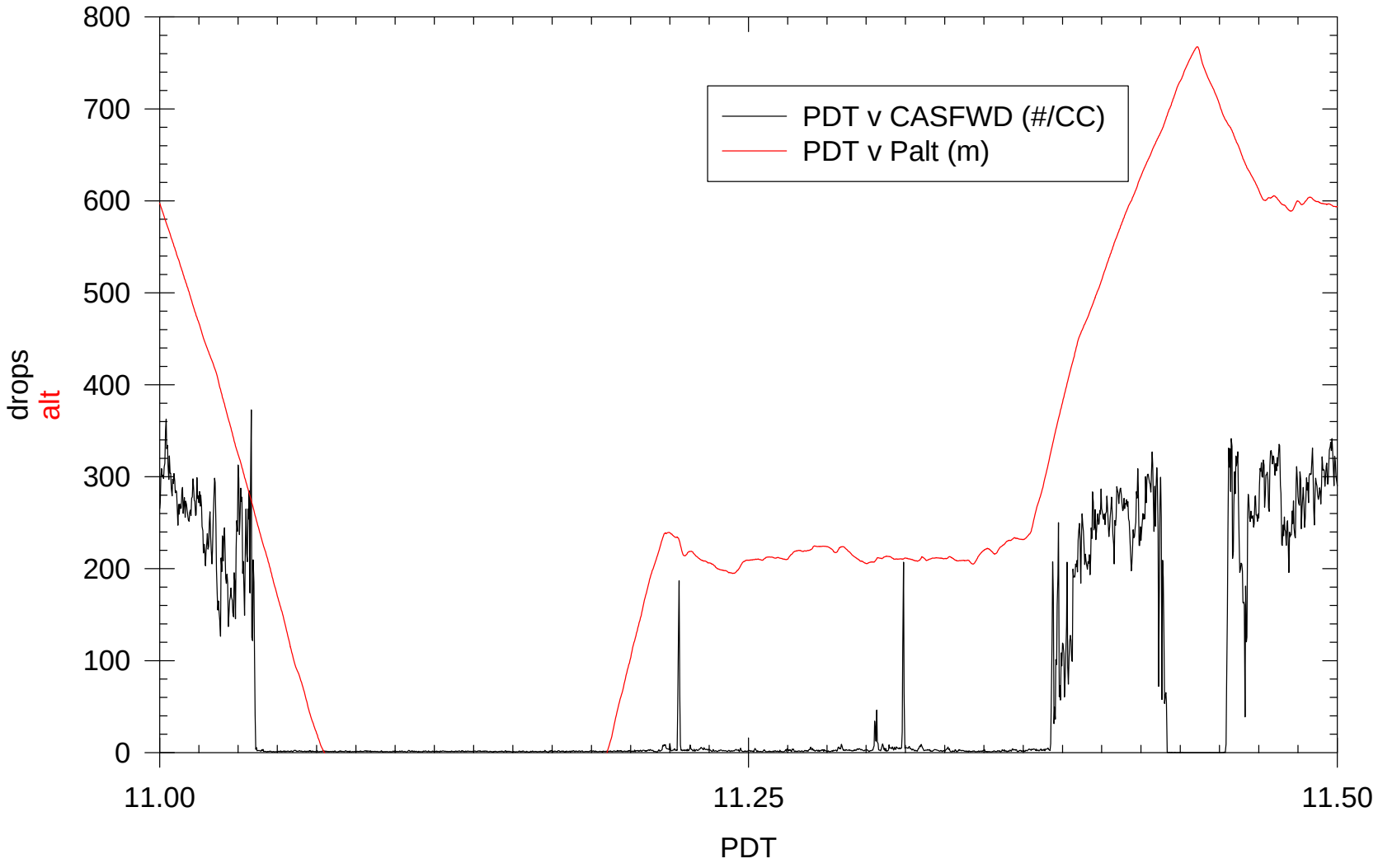
Compare below cloud CCN conc in sounding with N_c.

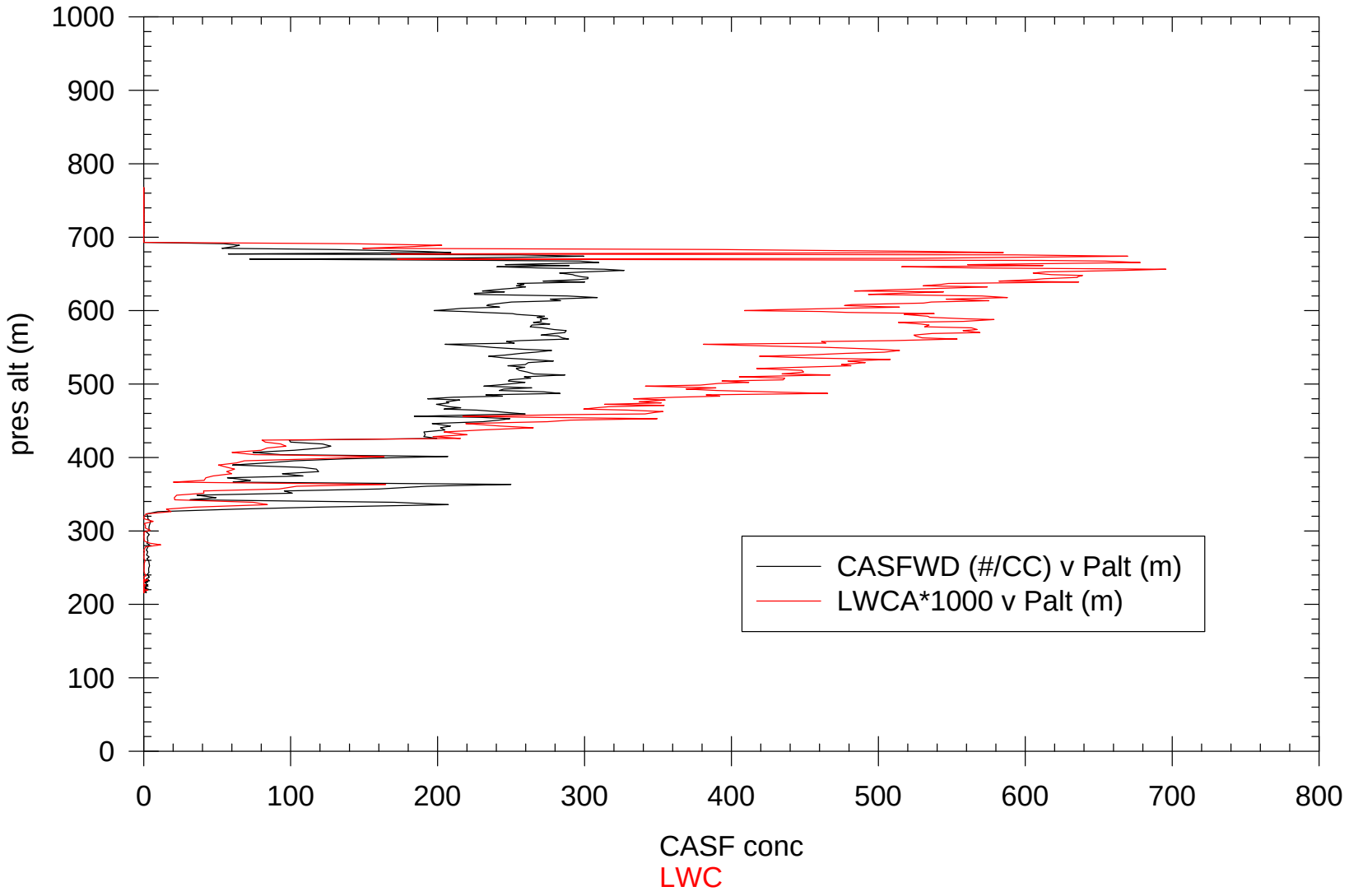
Determine CCN conc. for horizontal passes at 100' and 300' near soundings

Compare with N_c.

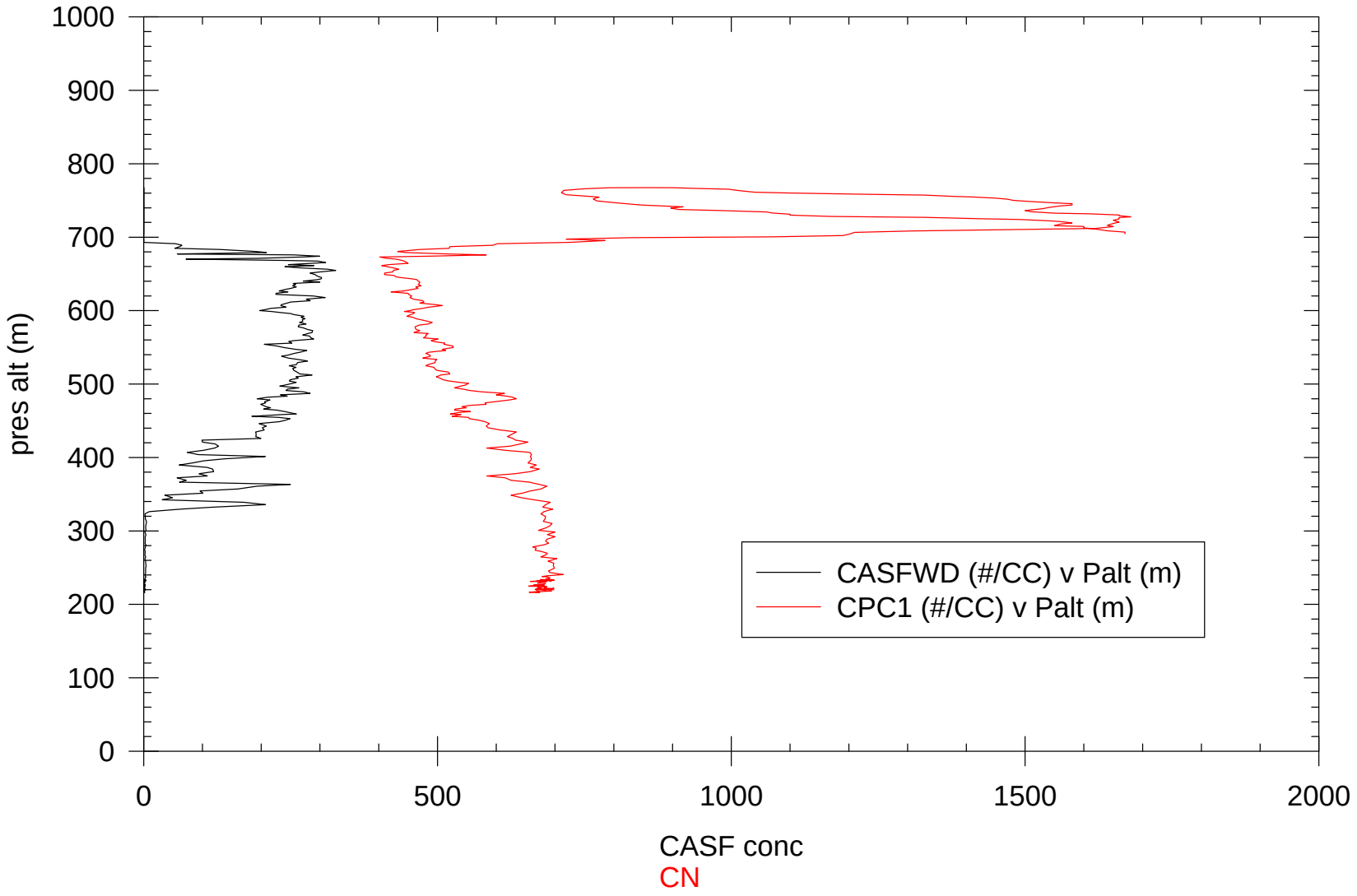
Correlations with larger droplet concentrations and drizzle drop concentrations and LWC a la RICO (Hudson et al. 2009 JGR)

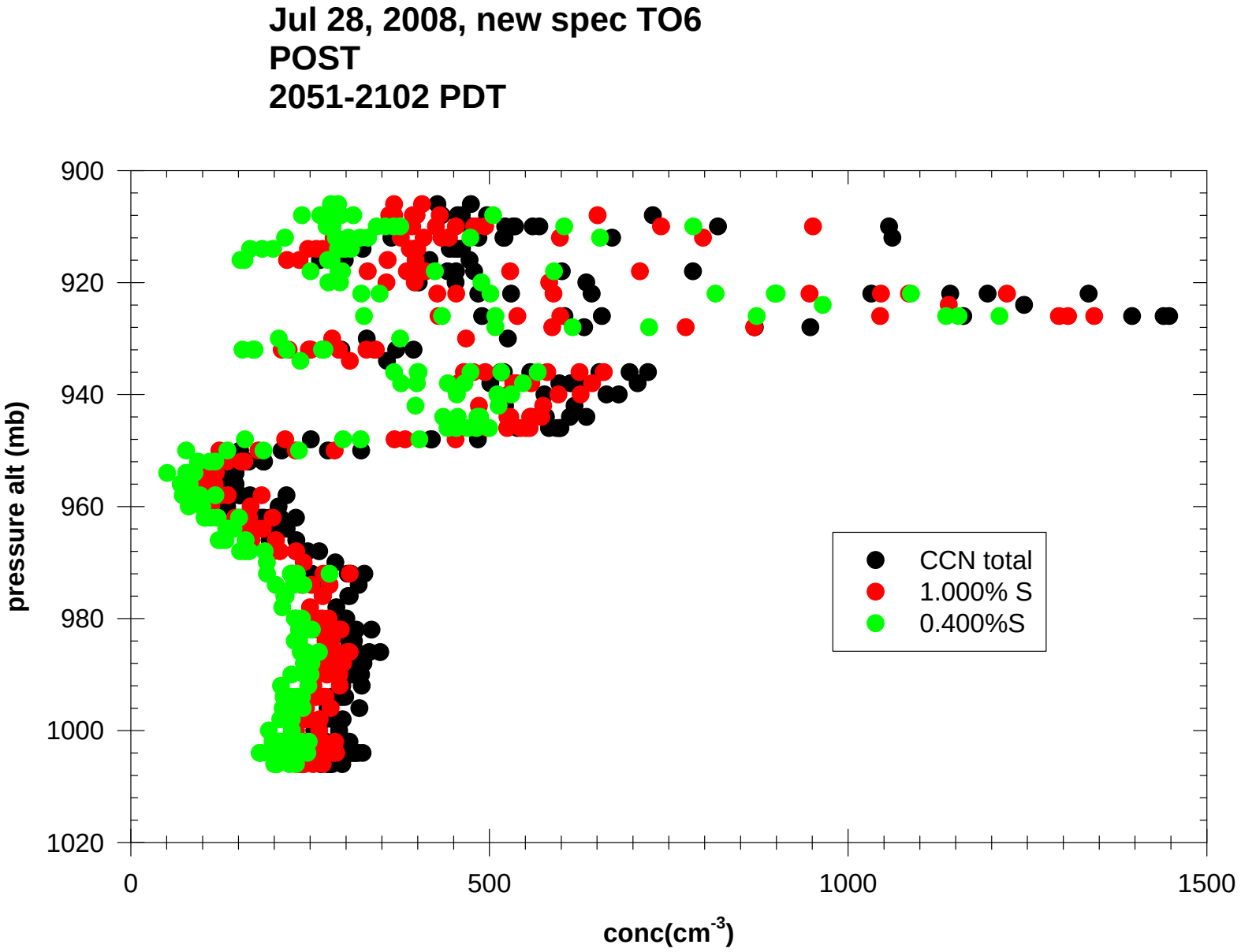
August 4, 2008 POST Twin Otter 10

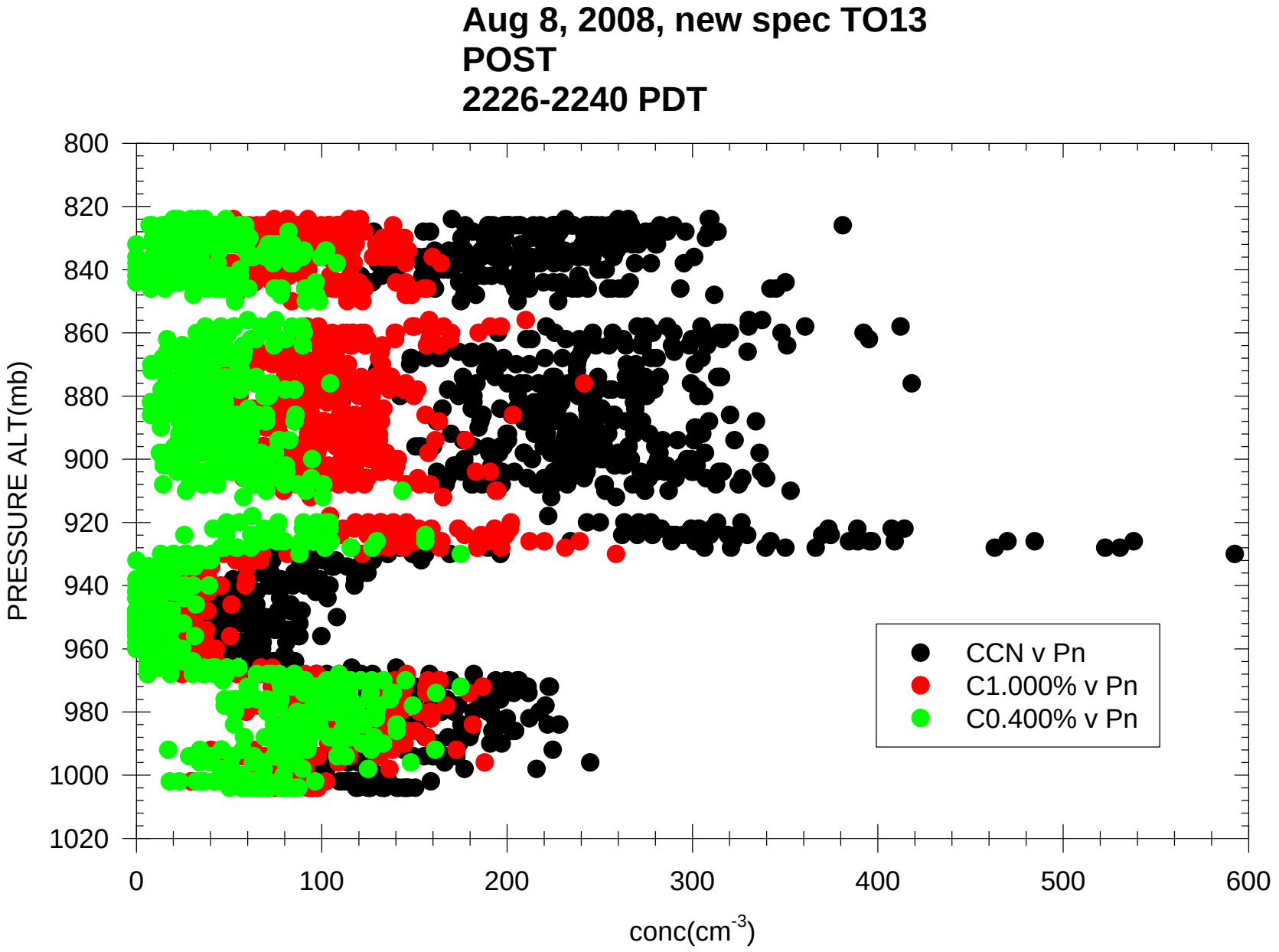



August 4, 2008 POST Twin Otter 10
1121-1127 PDT ascent
pres alt (m)
1000
900
800
700
600
500
400
300
200
100
0
0
100
200
300
400
500
600
700
800
CASF conc
LWC
CASFWD (#/CC) v Palt (m)
LWCA*1000 v Palt (m)

August 4, 2008 POST Twin Otter 10
1121-1127 PDT ascent




Jul 28, 2008, new spec TO6
POST
2051-2102 PDT
pressure alt (mb)
900
920
940
960
980
1000
1020
0
500
1000
1500
conc(cm-3)
CCN total
1.000% S
0.400%S


Aug 8, 2008, new spec TO13
POST
2226-2240 PDT
PRESSURE ALT(mb)
800
820
840
860
880
900
920
940
960
980
1000
1020
0
100
200
300
400
500
600
conc(cm-3)
CCN v Pn
C1.000% v Pn
C0.400% v Pn

Size vs. S_c for TO16 and 17 and lab during last week.

Volatility for TO3, 4, 16, and 17

Examine updraft velocity, W.

R for concentrations at various S

Determine adiabatic N_c from cloud base temperature and altitude compared to altitude of cloud measurements (Hudson and Yum 2000 and 2002).

Predict N_c from W and complete CCN spectra and compare with adiabatic N_c.

Remove data obtained in cloud and produce another file for archive.

Determine whether above cloud CCN affect microphysics or visa versa.