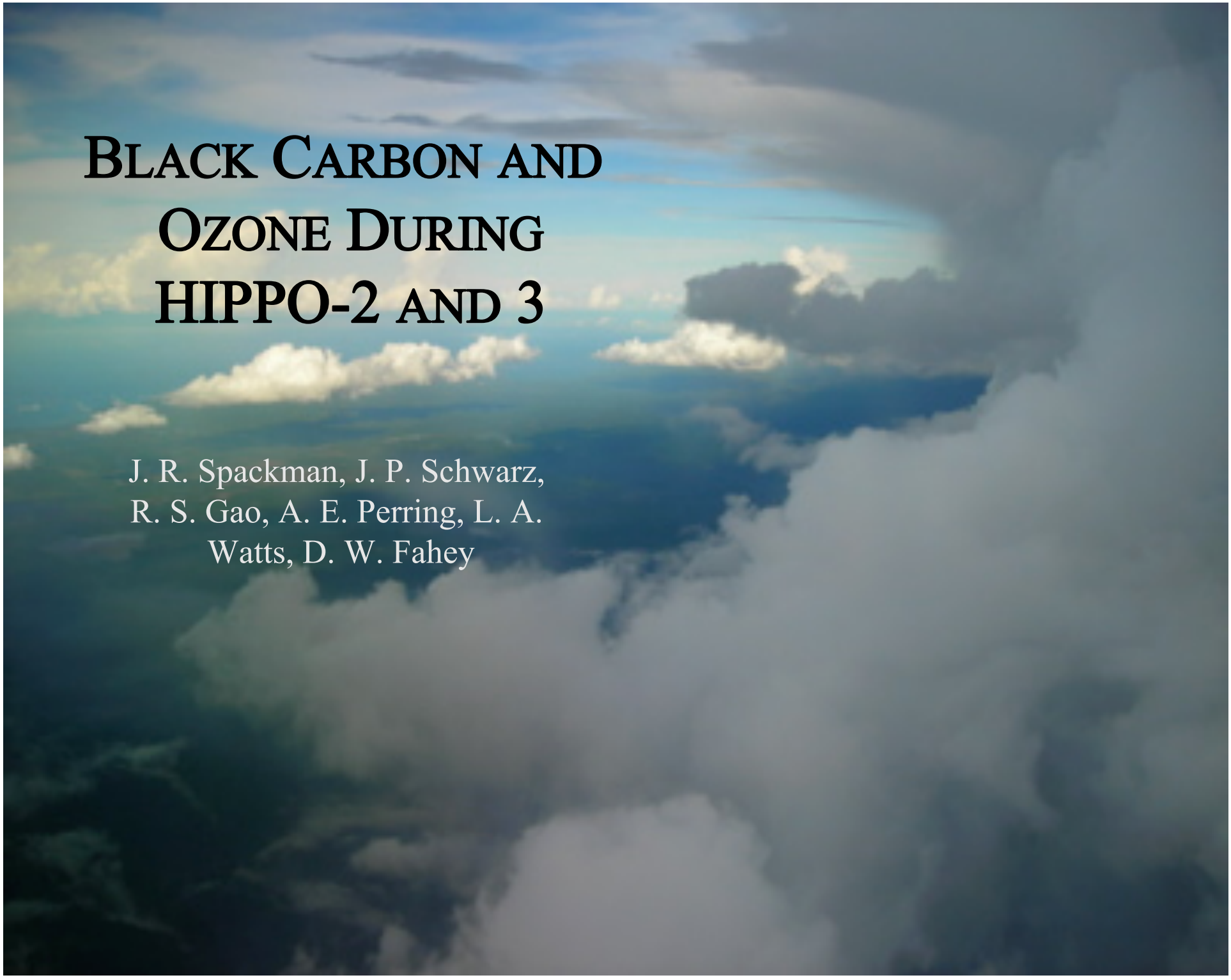
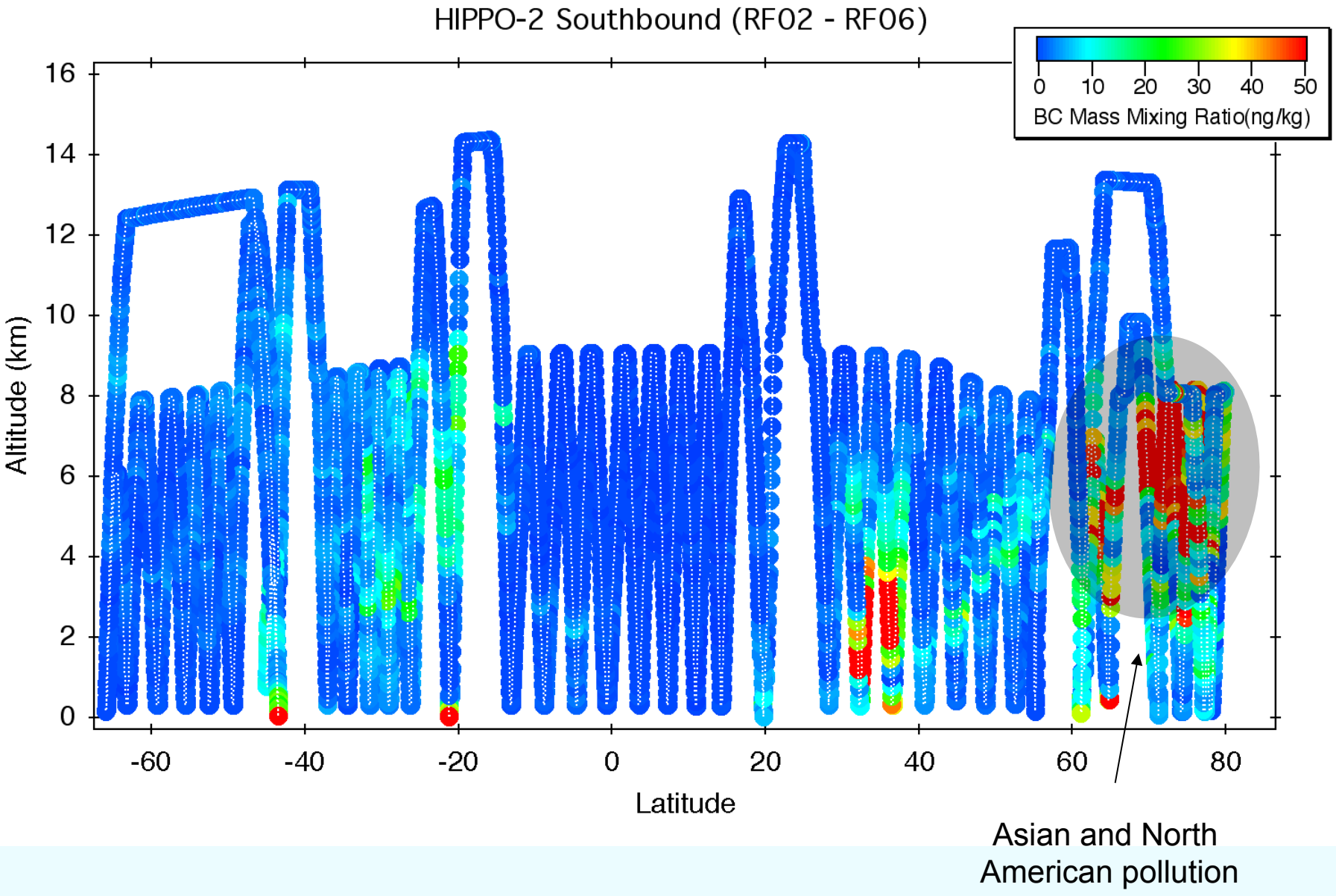
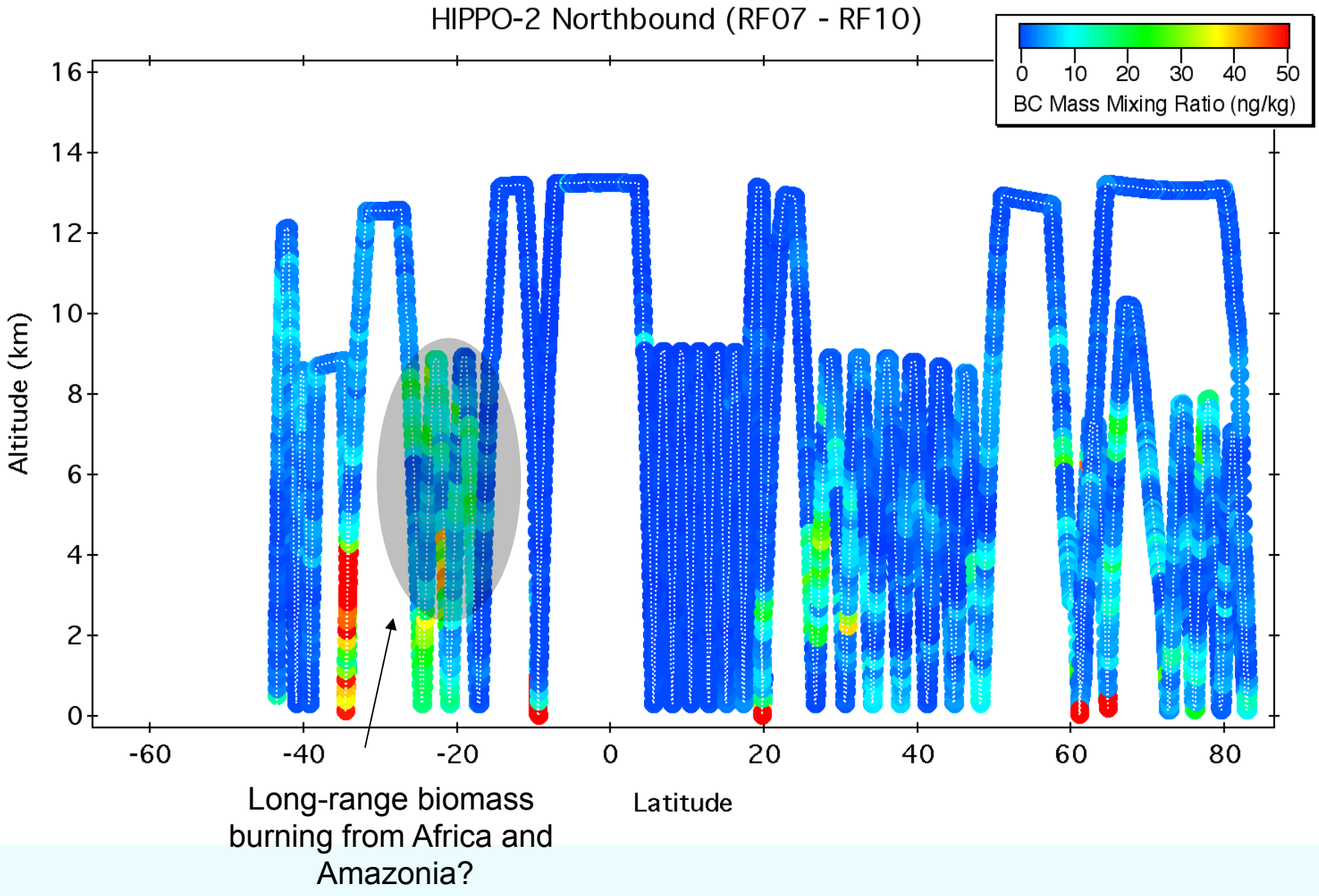
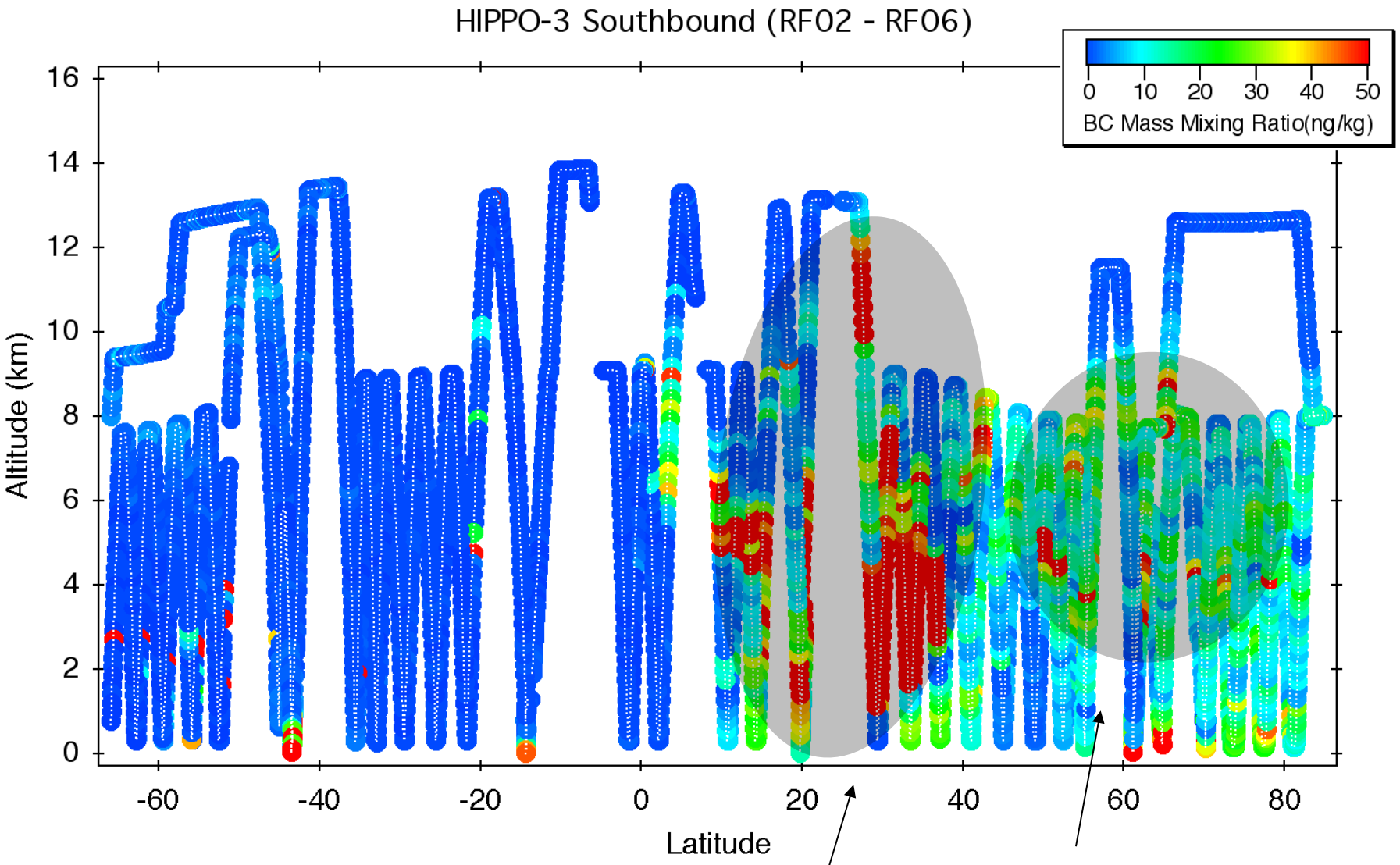


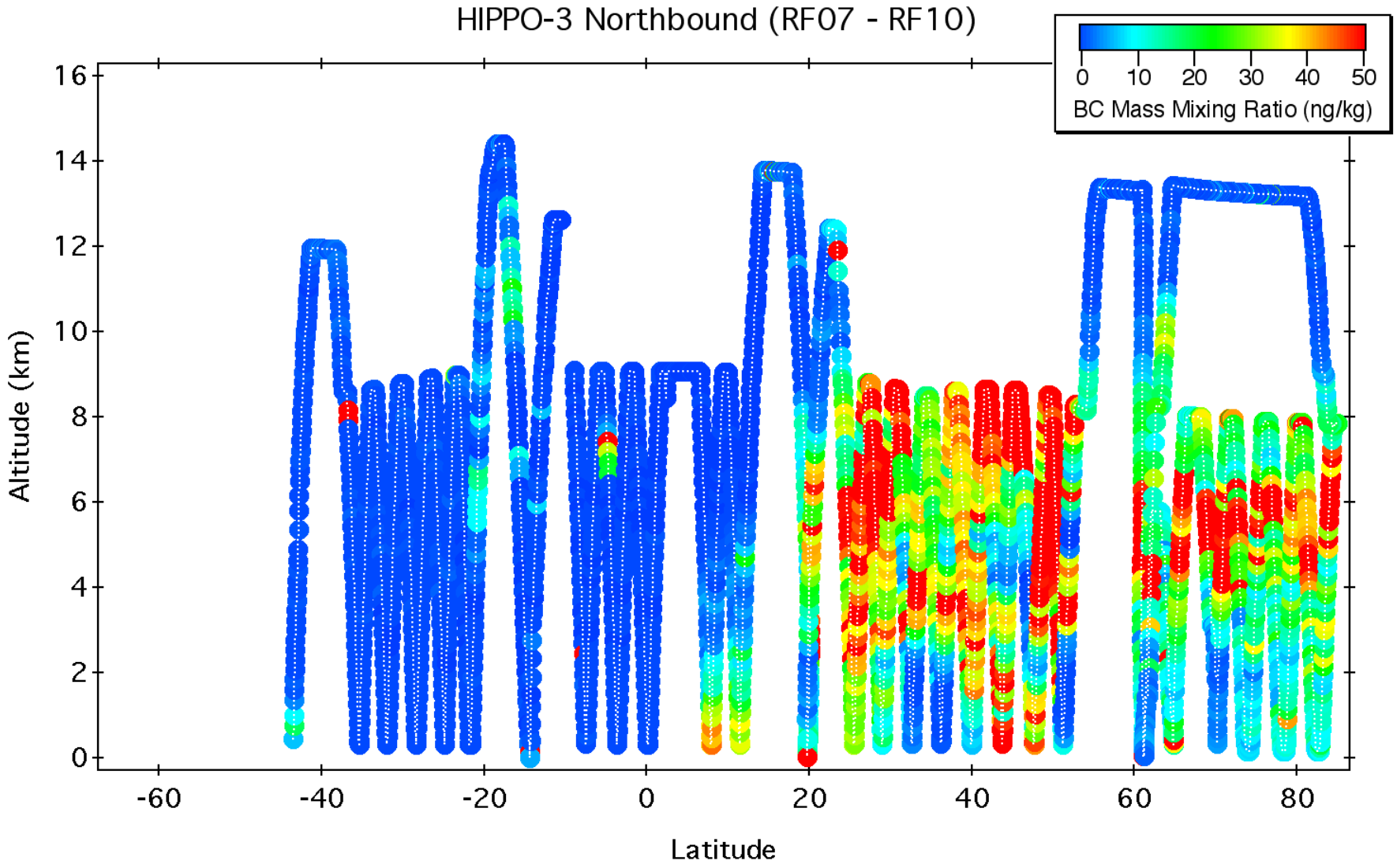
Black Carbon and Ozone During HIPPO-2 and 3

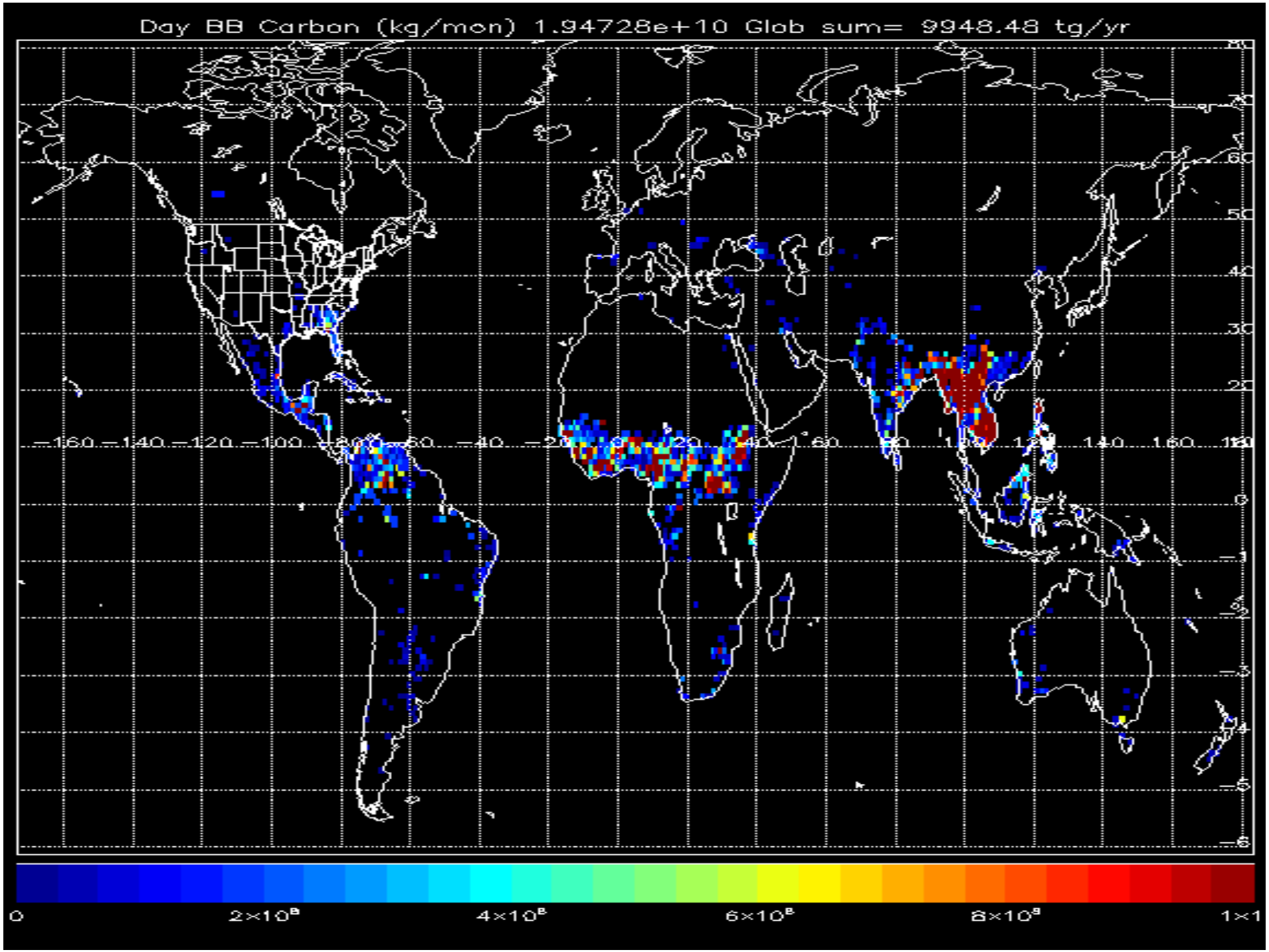
J. R. Spackman, J. P. Schwarz, R. S. Gao, A. E. Perring, L. A. Watts, D. W. Fahey

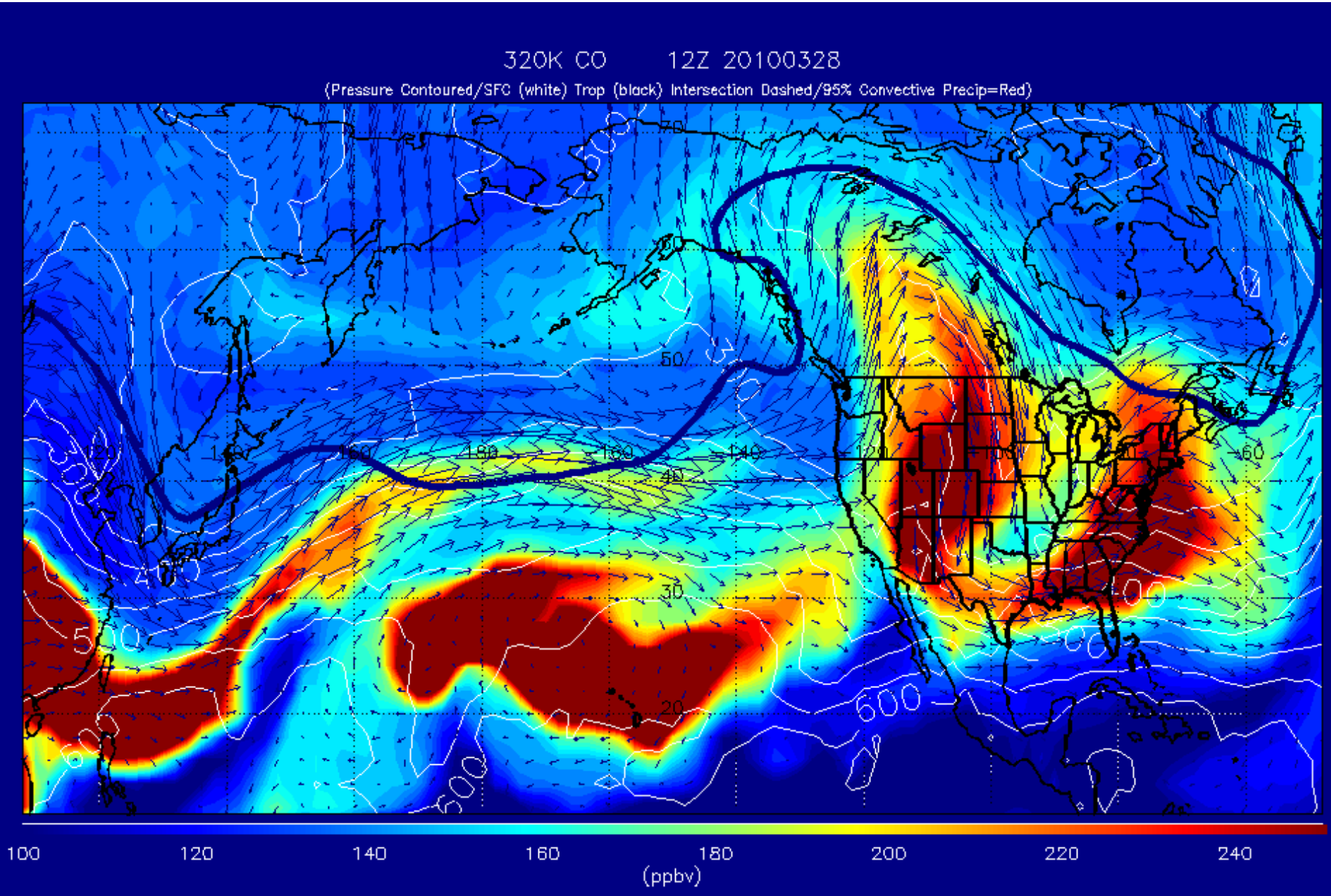

HIPPO-2 Southbound (RF02 - RF06)
0
10
20
30
40
50
BC Mass Mixing Ratio(ng/kg)
Altitude (km)
16
14
12
10
8
6
4
2
0
-60
-40
-20
0
20
40
60
80
Latitude
Asian and North
American pollution


HIPPO-2 Northbound (RF07 - RF10)
0
10
20
30
40
50
BC Mass Mixing Ratio (ng/kg)
Altitude (km)
16
14
12
10
8
6
4
2
0
-60
-40
-20
0
20
40
60
80
Latitude
Long-range biomass burning from Africa and Amazonia?


HIPPO-3 Southbound (RF02 - RF06)
0 10 20 30 40 50
BC Mass Mixing Ratio(ng/kg)
Altitude (km)
16
14
12
10
8
6
4
2
0
-60 -40 -20 0 20 40 60 80
Latitude
Biomass Burning
SE Asia?
Stratified Asian
pollution plumes


HIPPO-3 Northbound (RF07 - RF10)
0
10
20
30
40
50
BC Mass Mixing Ratio (ng/kg)
Altitude (km)
16
14
12
10
8
6
4
2
0
-60
-40
-20
0
20
40
60
80
Latitude


Day BB Carbon (kg/mon) 1.94728e+10 Glob sum= 9948.48 tg/yr
0
2×10⁸
4×10⁸
6×10⁸
8×10⁸
1×1


320K CO 12Z 20100328
(Pressure Contoured/SFC (white) Trop (black) Intersection Dashed/95% Convective Precip=Red)
100
120
140
160
180
200
220
240
(ppbv)
RAQMS$_G$ −24hr OMI/MLS ASSIM Initialized 12Z 20100328

BLACK CARBON SCIENCE

- Springtime NH Pacific (H-3)

  Enhanced BC mass loadings (100–1000 ng/kg in plumes) and elevated O_3 (60-70 ppb) were observed on both meridional cross sections through the remote springtime NH Pacific troposphere:

  (i) Calculate direct radiative forcing from BC aerosol
  (ii) Use observations of BC, O_3, CO and other tracers to examine the roles of the persistent subtropical anticyclone (and Aleutian low) in intercontinental transport of Asian pollution and biomass burning plumes

- Arctic Survey Flights (H-2, H-3)

  (i) Measurement-model study of BC mass in the Arctic troposphere
  (ii) BC in the the Arctic boundary layer: deposition of BC to the snow?

- Seasonal tracer-tracer study with BC, O_3, H_2O, N_2O, CO_2 in the lowermost stratosphere (all H)

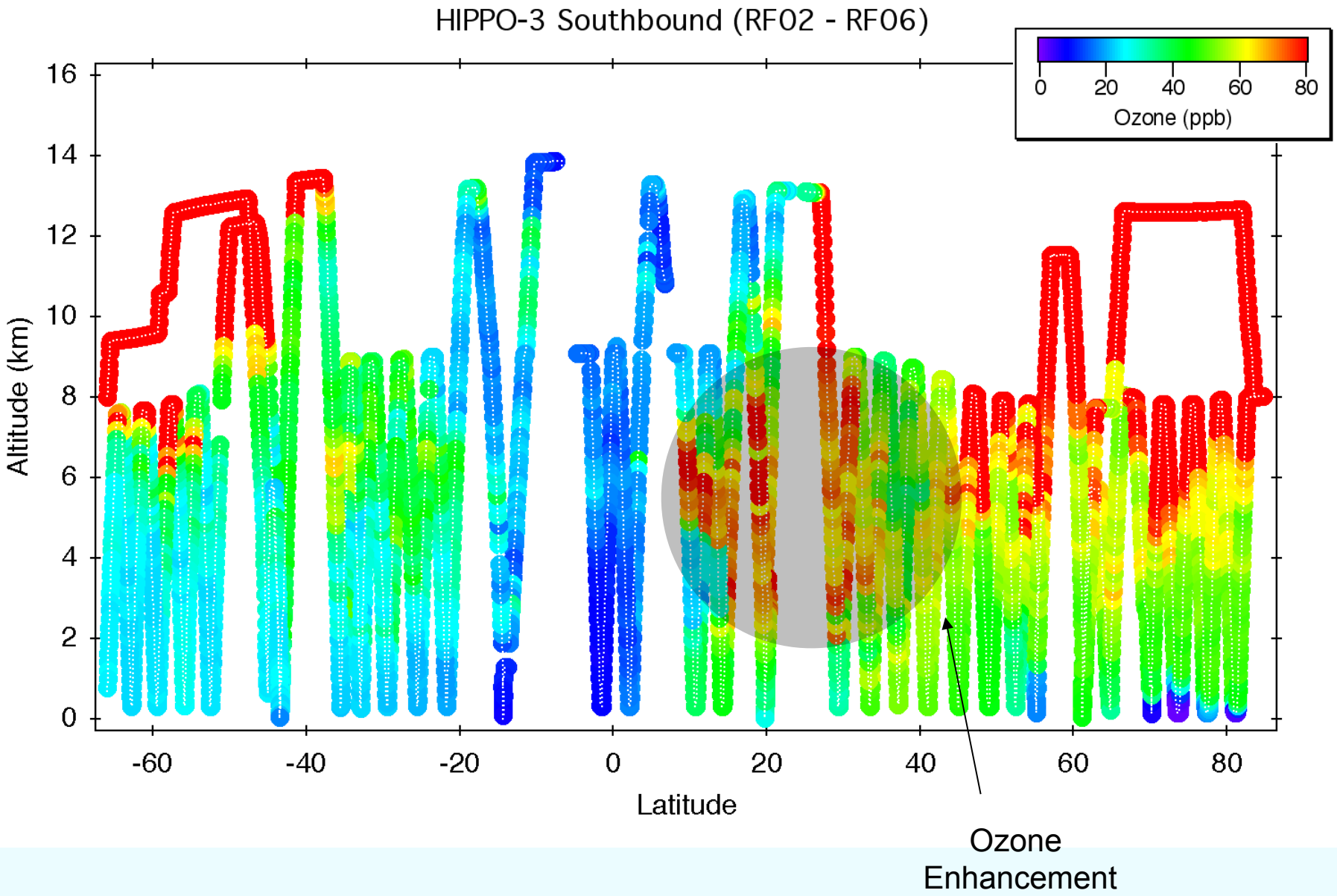
NOAA CSD Ozone

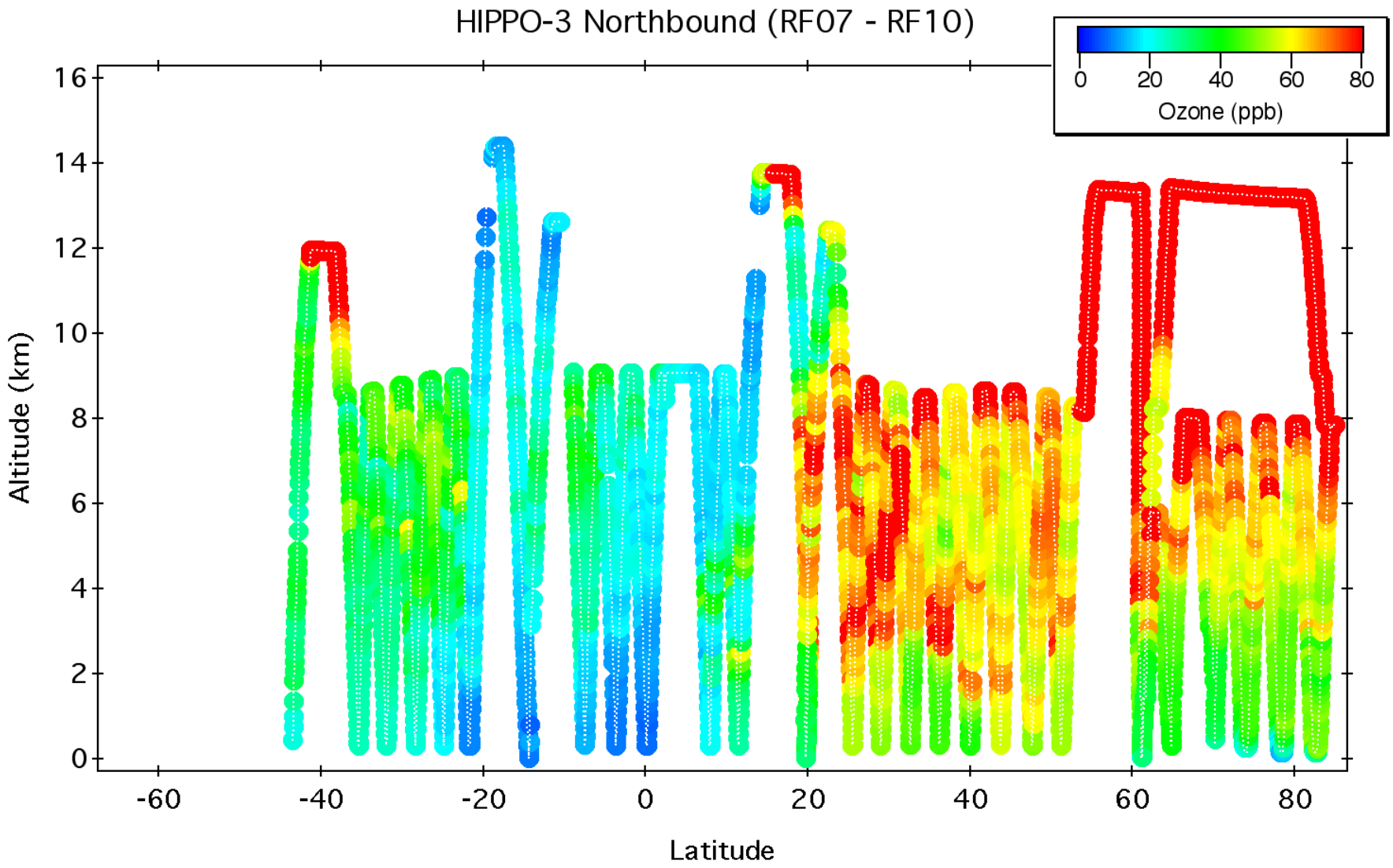
- Data are final. H-3 still needs to be posted. Intercomparisons between three O_3 instruments at various pressures were done before and after H-1, H-2, and H-3. Agreement was always better than 1%.

- The discrepancy in O_3 values between CSD and GMD UCATS O_3 during H-2 is still unresolved:

  (i) in laboratory intercomparisons between CSD O_3 instrument and other two O_3 instruments in CSD, from 52 to 540 mb, agreement was better than 1%.

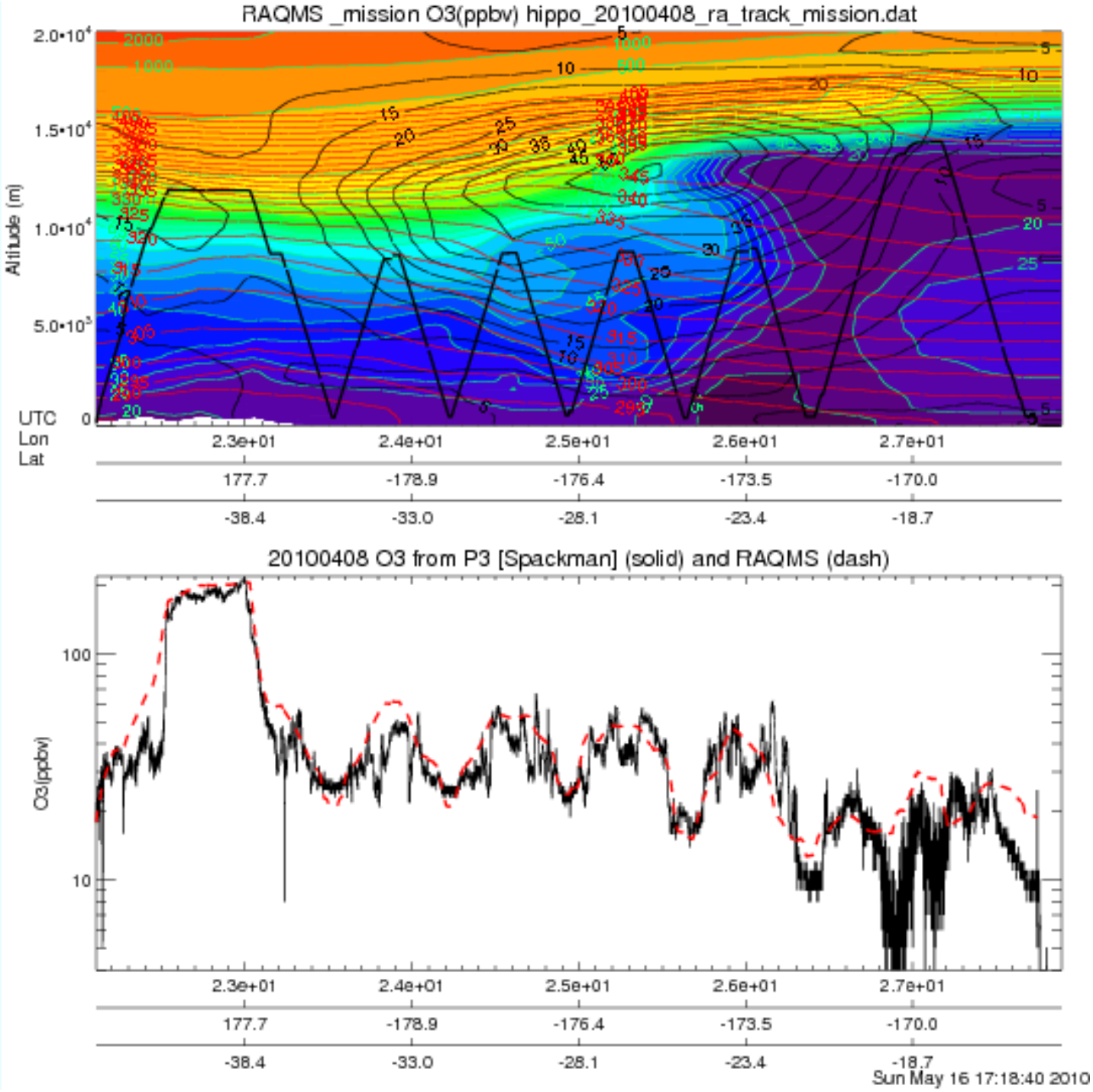
  (ii) during H-2 the CSD O_3 compared better with the GMD sondes than the UCATS O_3.


HIPPO-3 Southbound (RF02 - RF06)
0
20
40
60
80
Ozone (ppb)
16
14
12
10
8
6
4
2
0
Altitude (km)
-60
-40
-20
0
20
40
60
80
Latitude
Ozone
Enhancement


HIPPO-3 Northbound (RF07 - RF10)
0
20
40
60
80
Ozone (ppb)
16
14
12
10
8
6
4
2
0
Altitude (km)
-60
-40
-20
0
20
40
60
80
Latitude

NOAA CSD Ozone Science

- RAQMS analysis for RF07 between Christchurch and Am Samoa (R. Bradley Pierce)
- RAQMS assimilates MLS and OMI
- Use O_3 curtain data to constrain models



Tracer-Tracer Studies