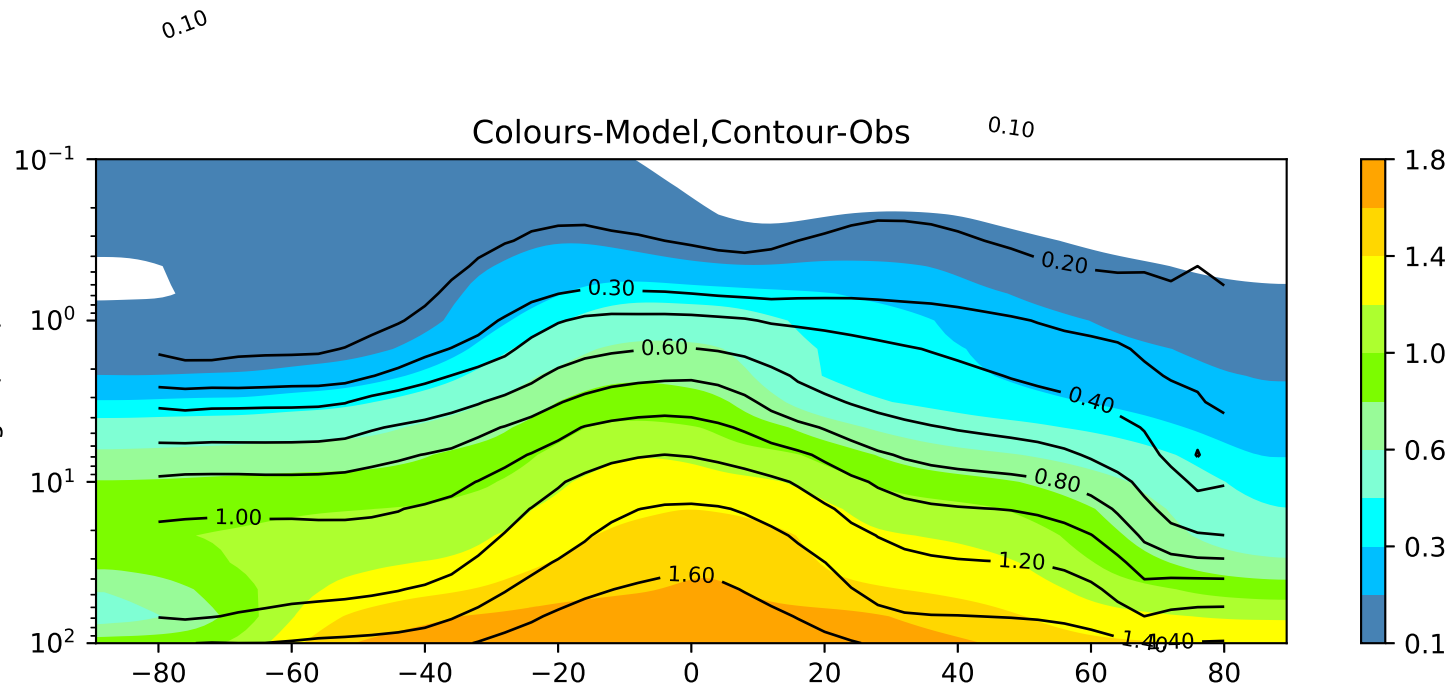
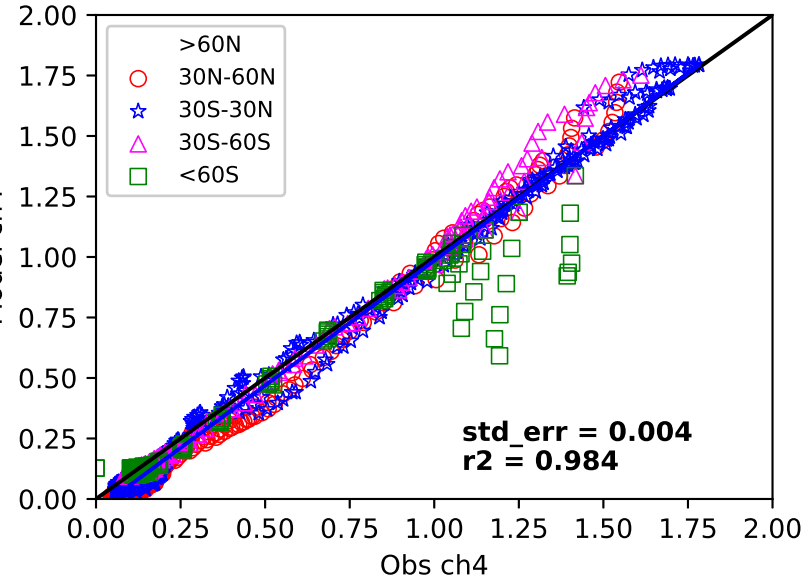
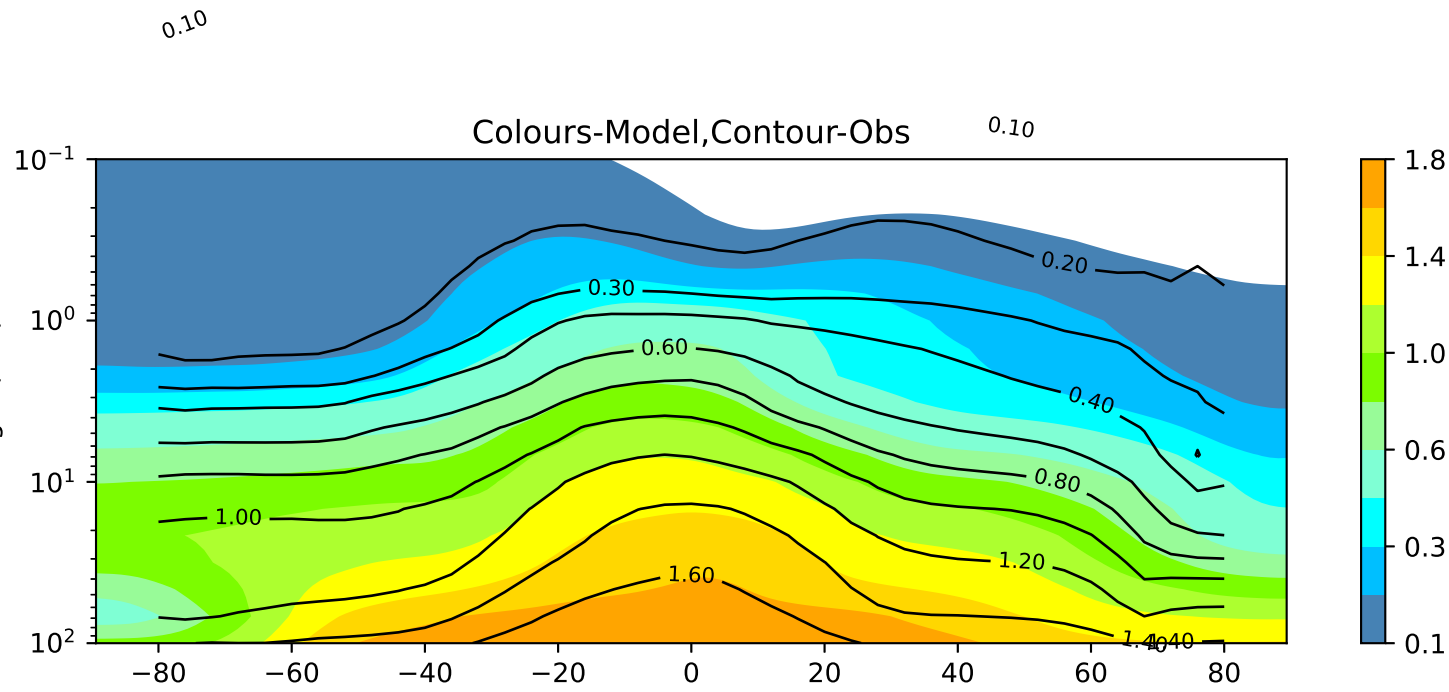
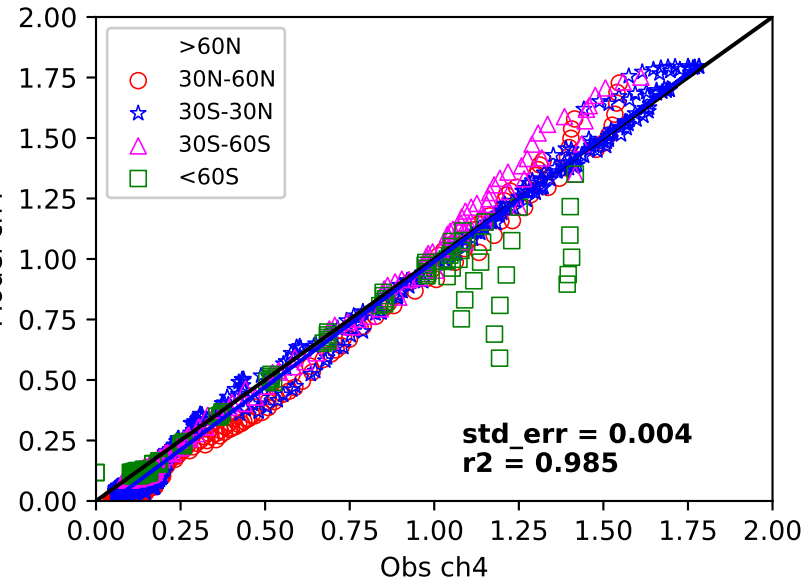


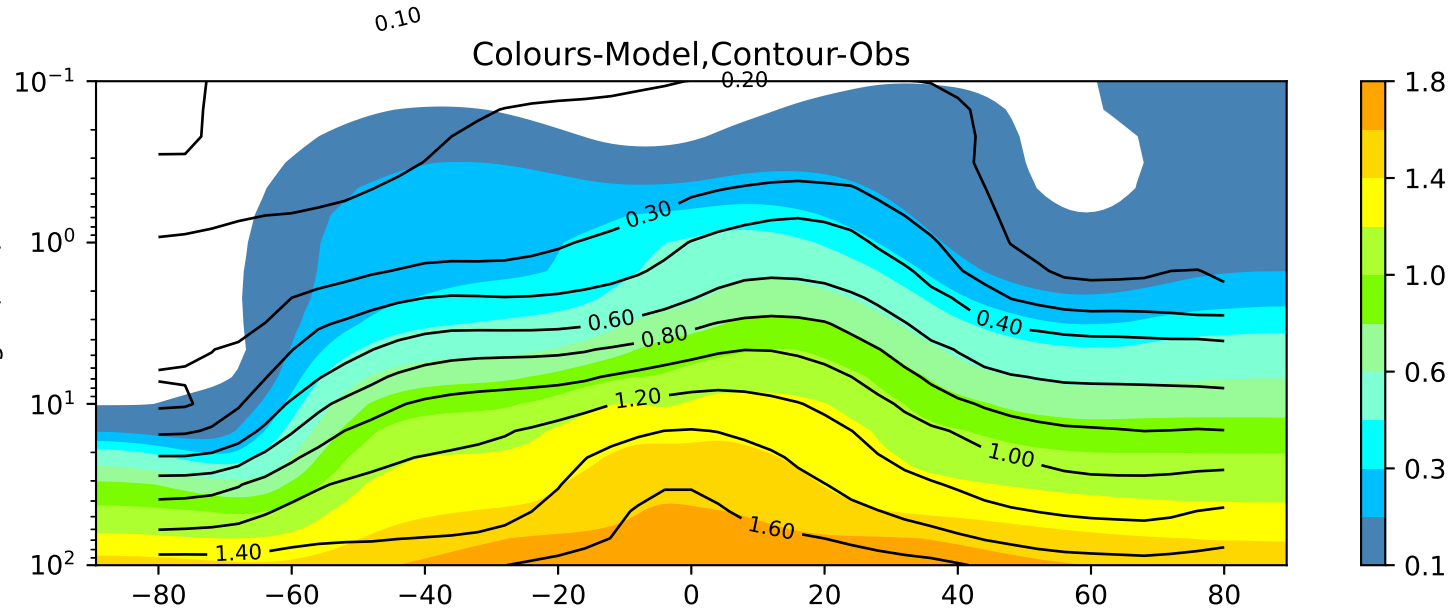


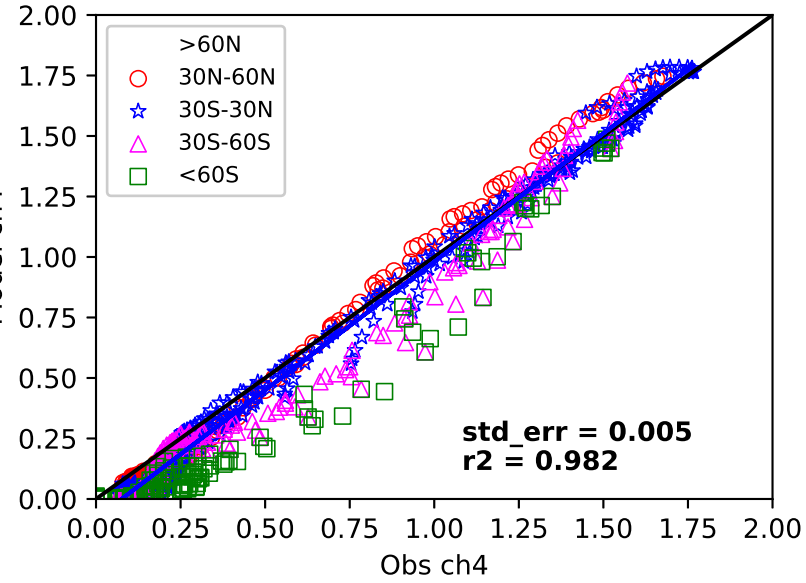
UKCA da492 vs HALOE:
CH4 (ppmv) Jan



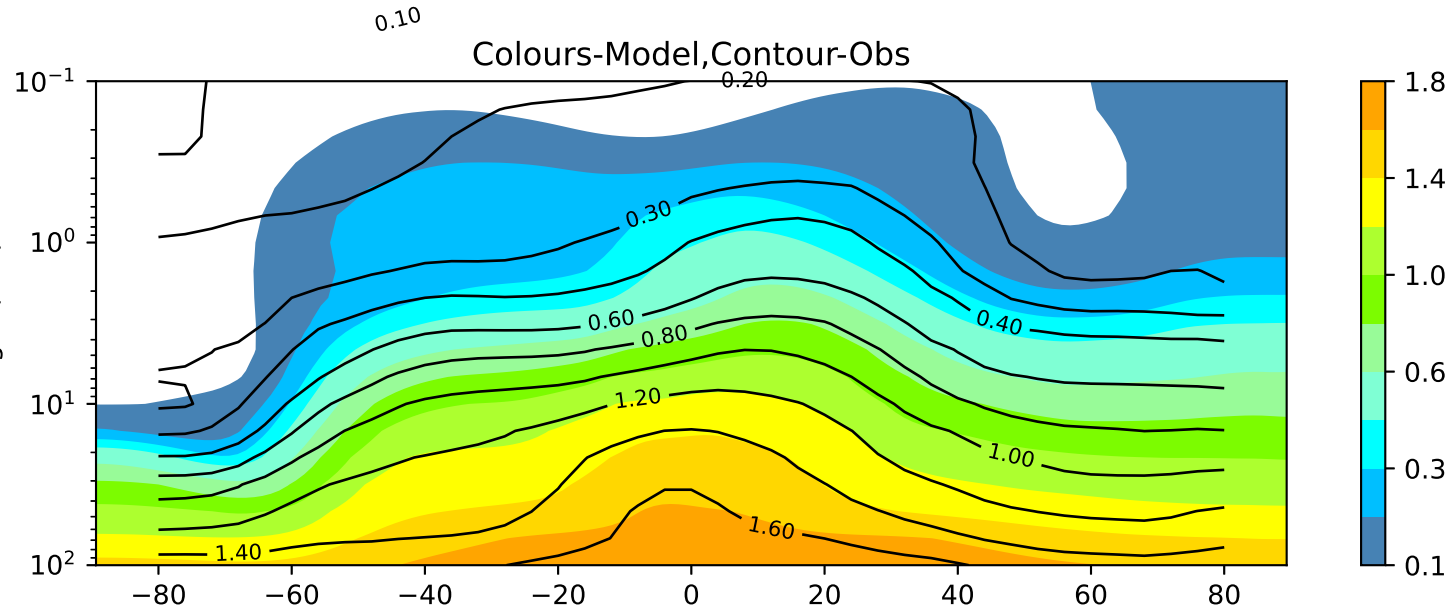


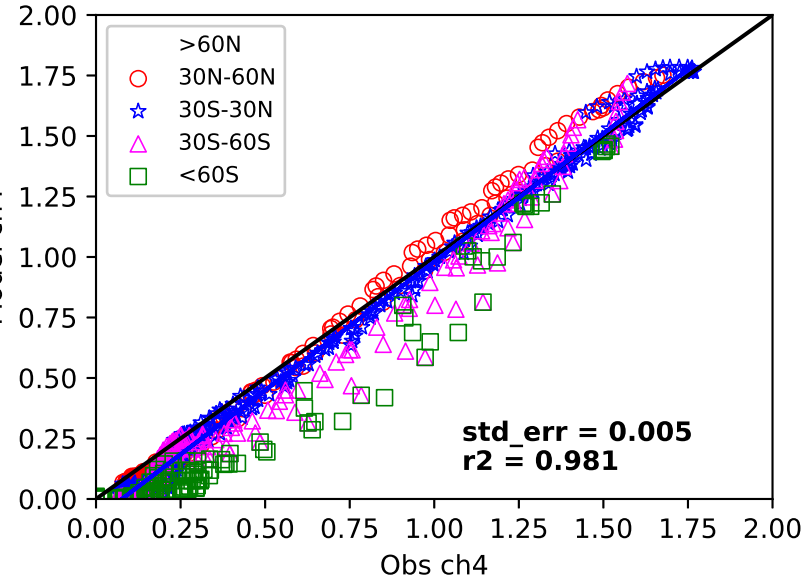
UKCA bf636 vs HALOE:
CH4 (ppmv) Jan



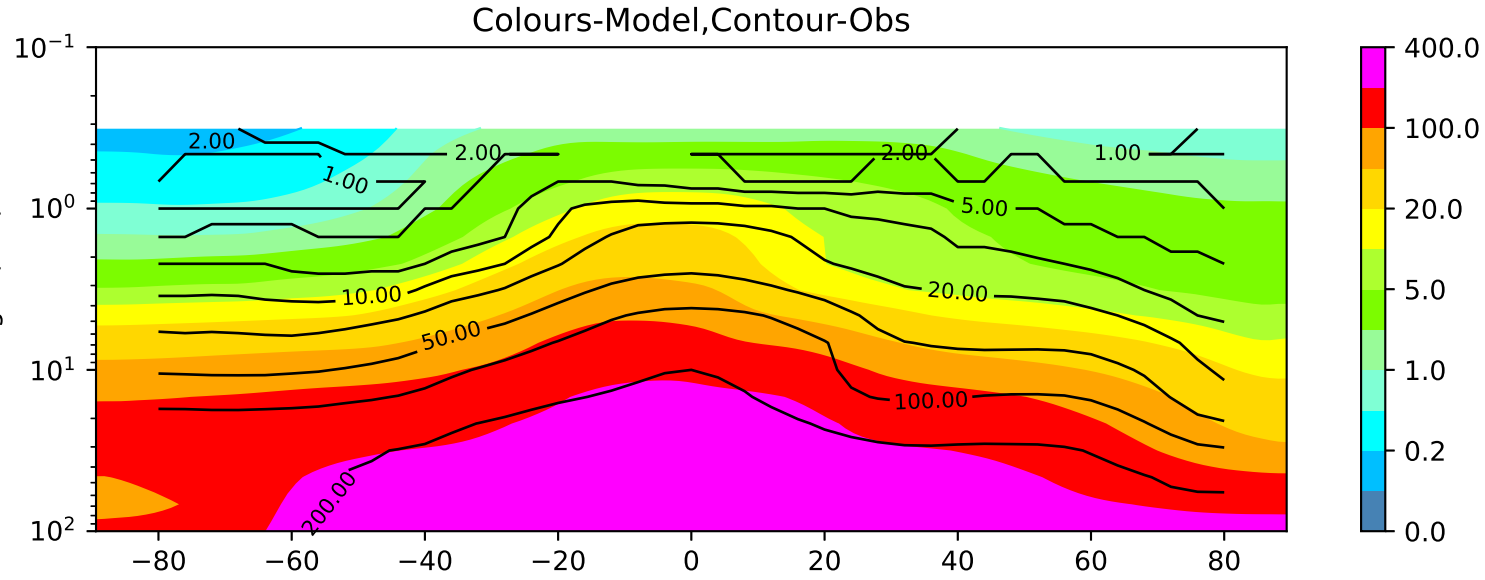


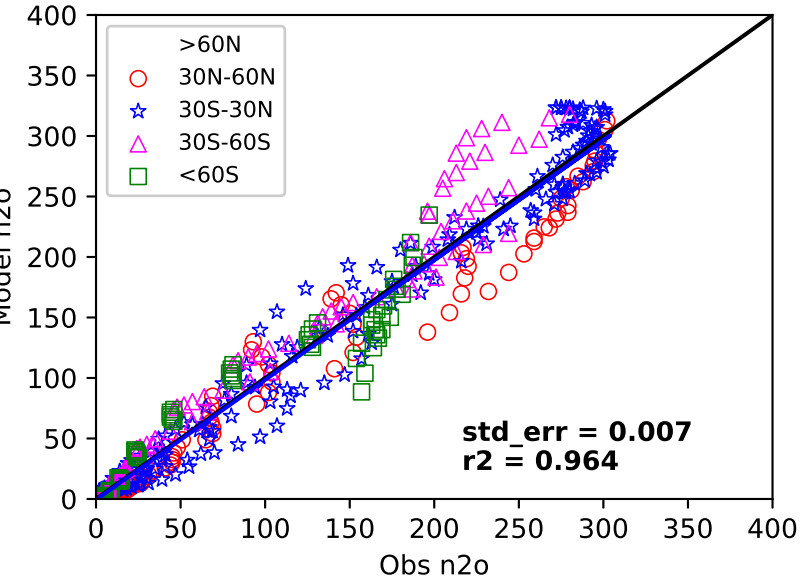
UKCA da492 vs HALOE:
CH4 (ppmv) Jul



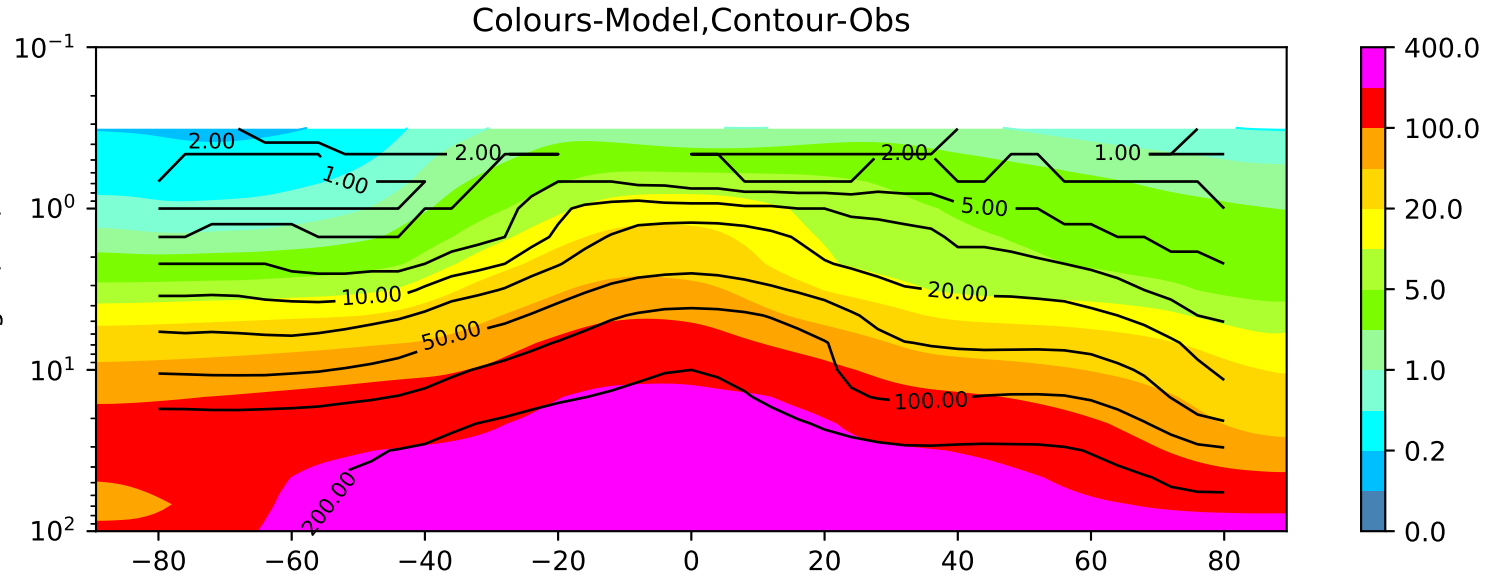


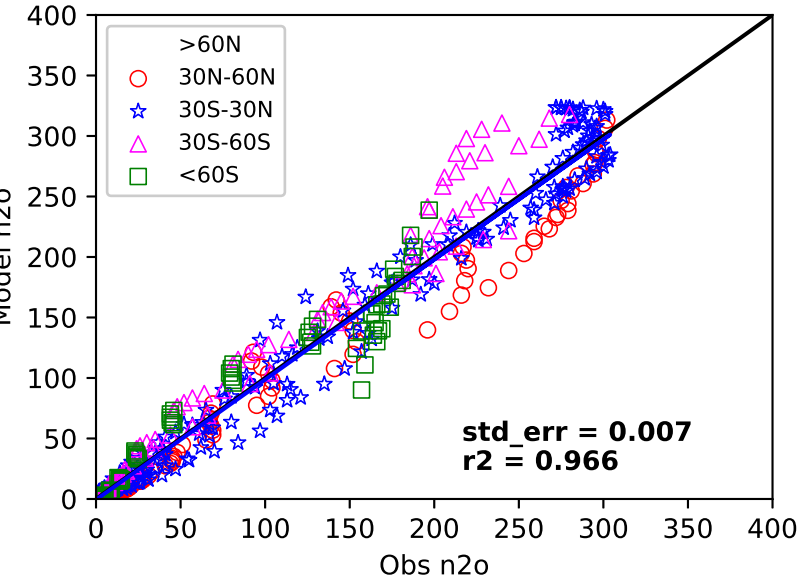
UKCA bf636 vs HALOE:
CH4 (ppmv) Jul



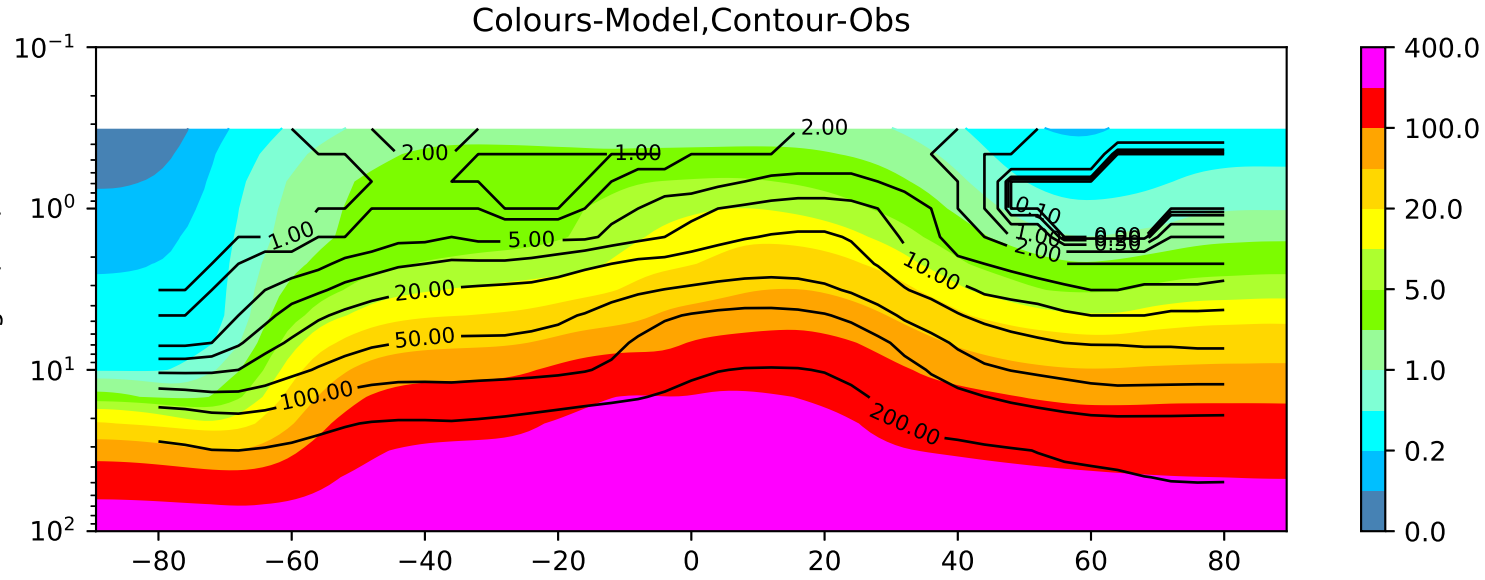


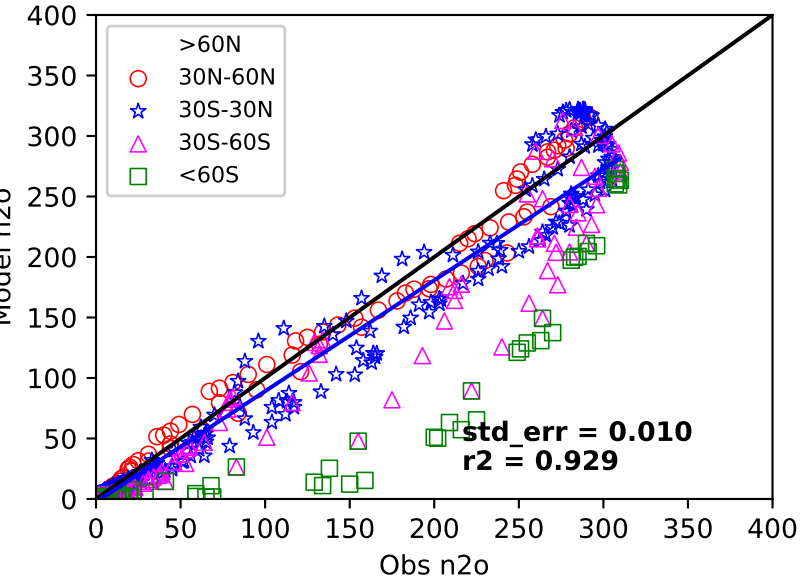
UKCA da492 vs HALOE:
N2O (ppmv) Jan



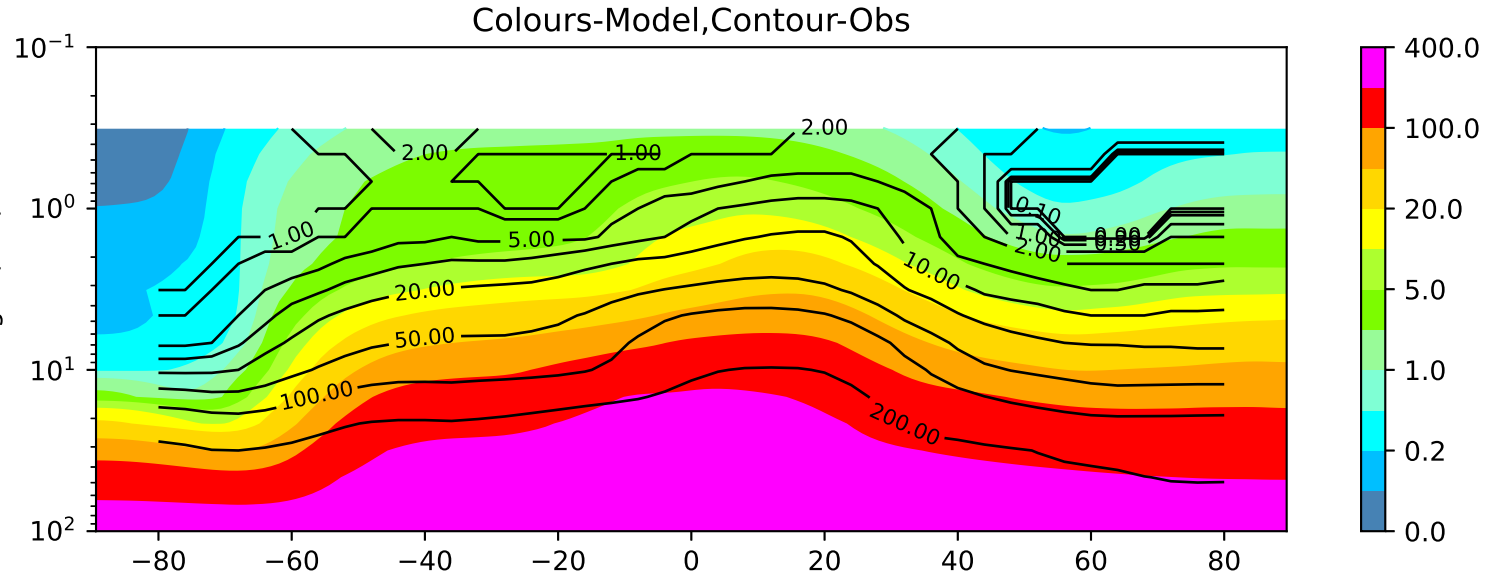


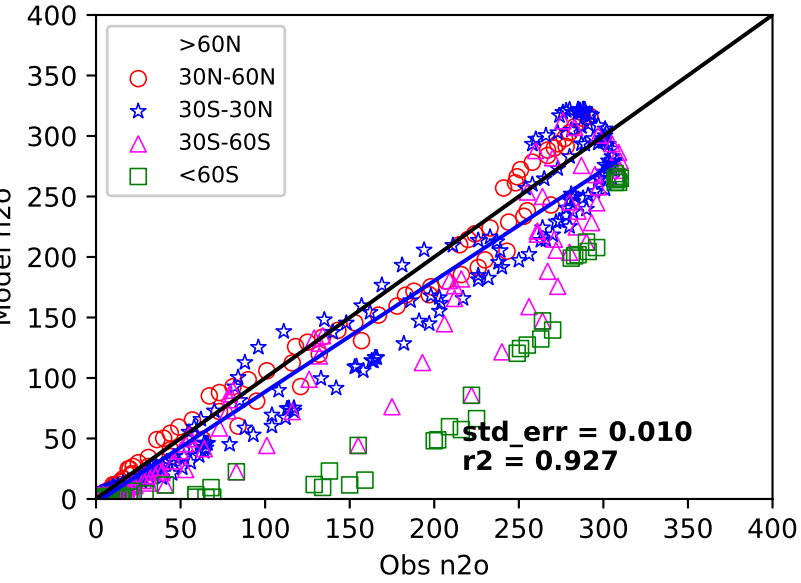
UKCA bf636 vs HALOE:
N2O (ppmv) Jan



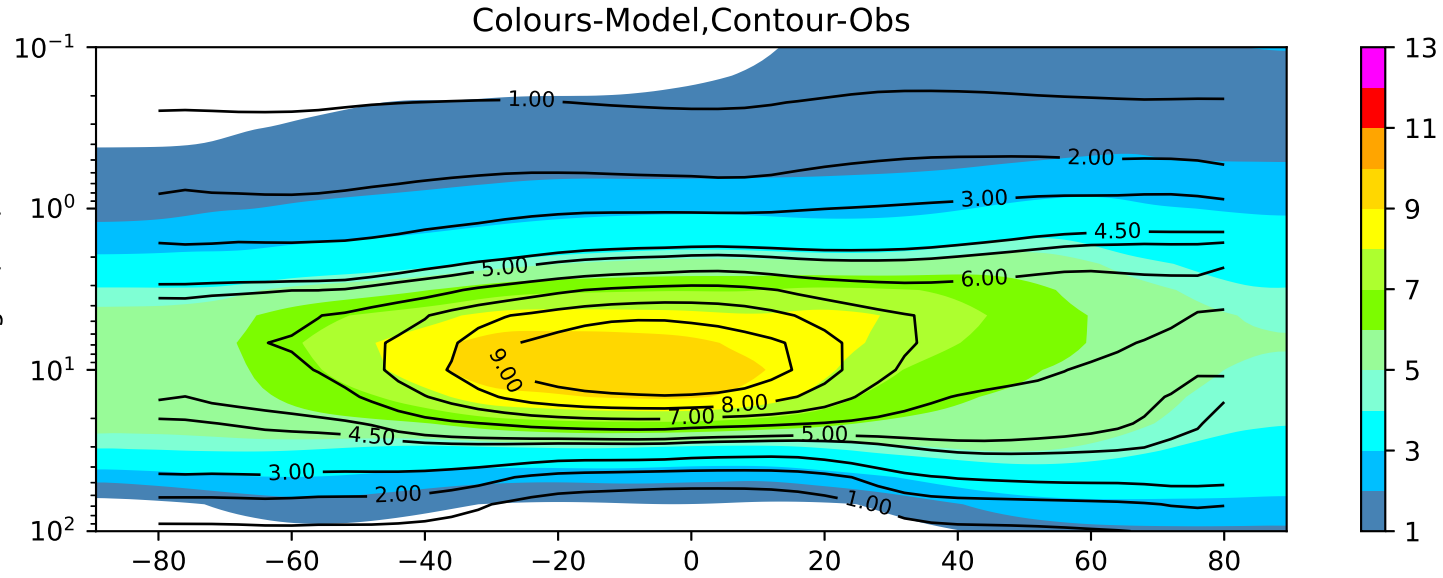


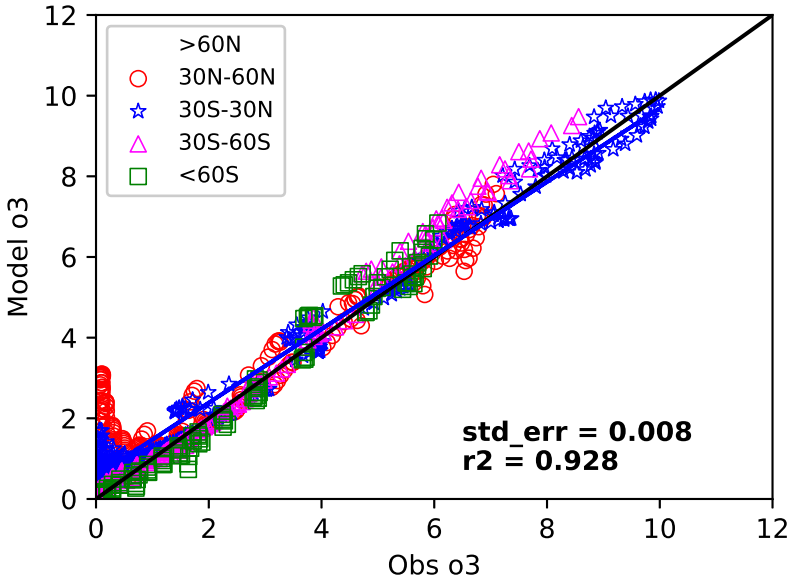
UKCA da492 vs HALOE:
N2O (ppmv) Jul



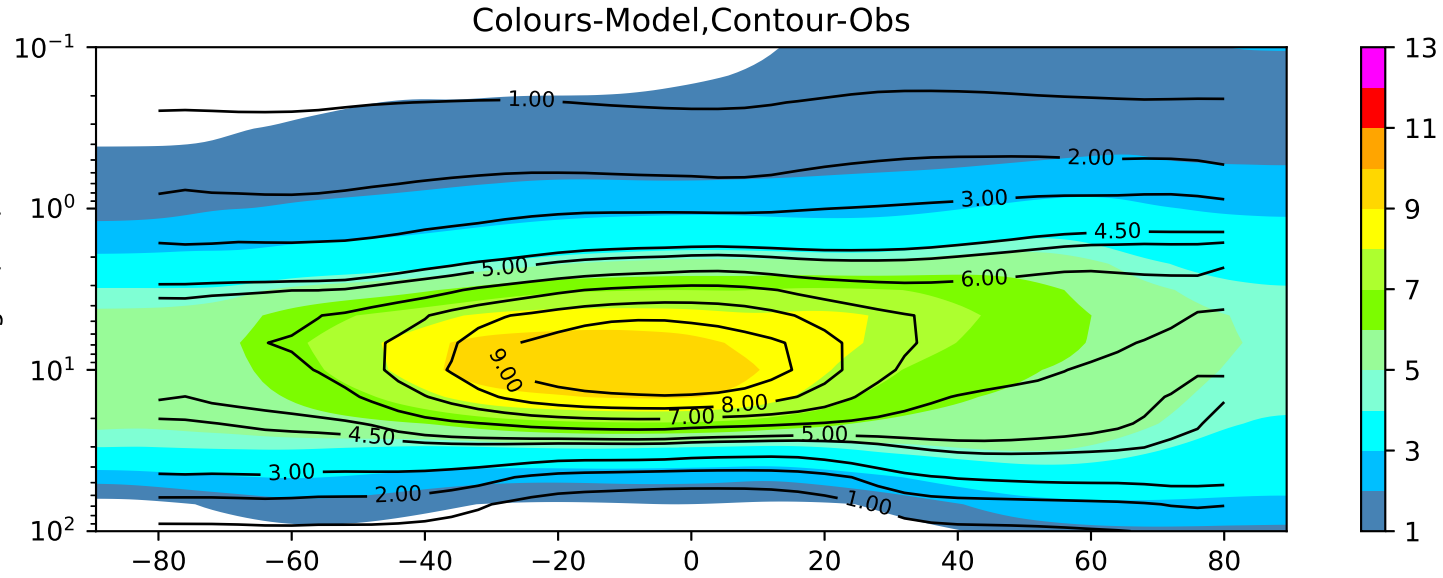


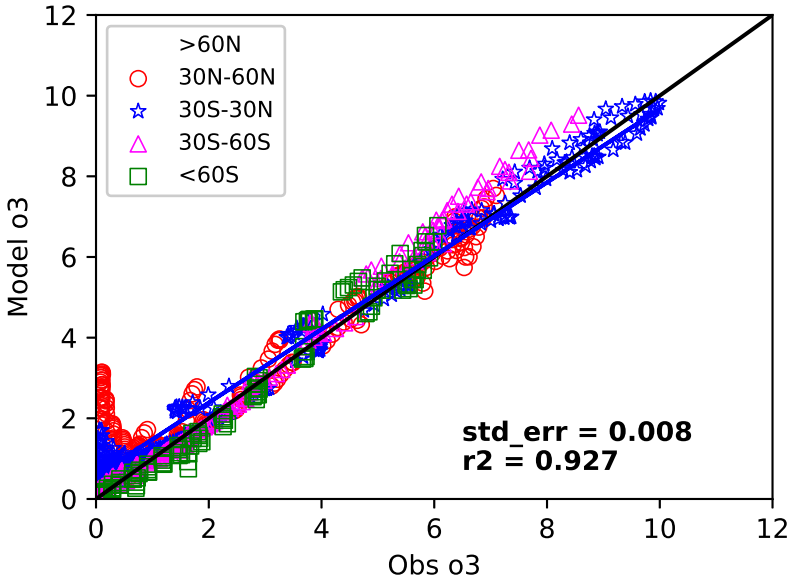
UKCA bf636 vs HALOE:
N2O (ppmv) Jul



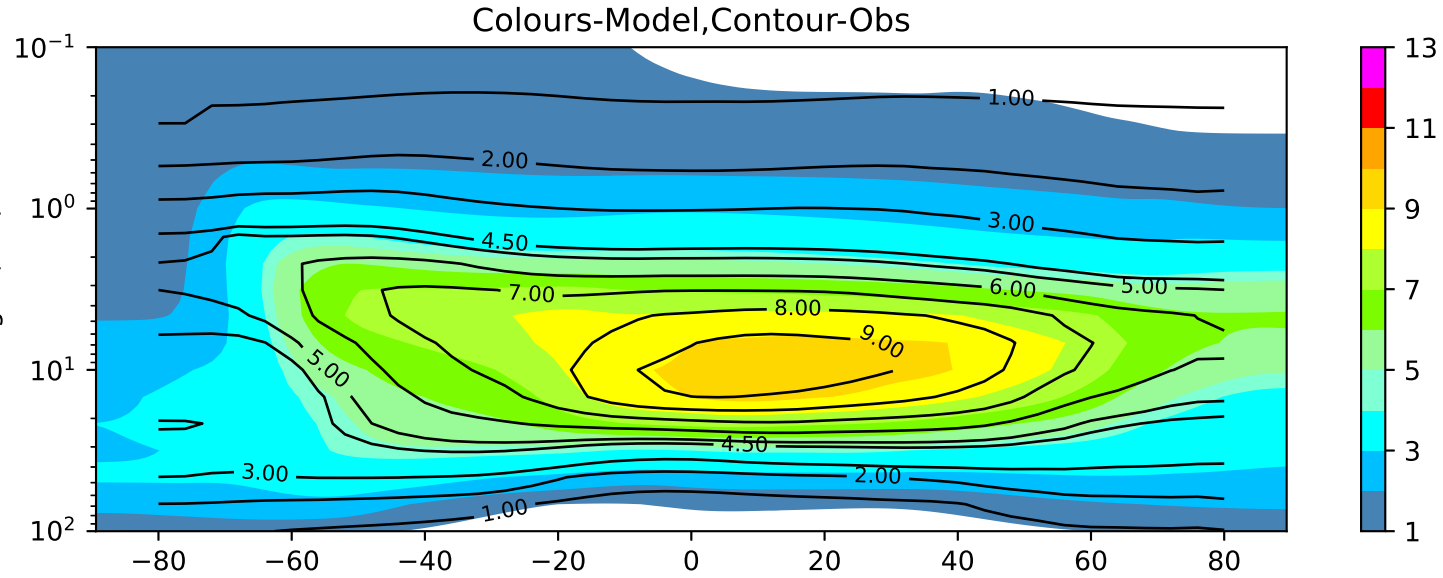


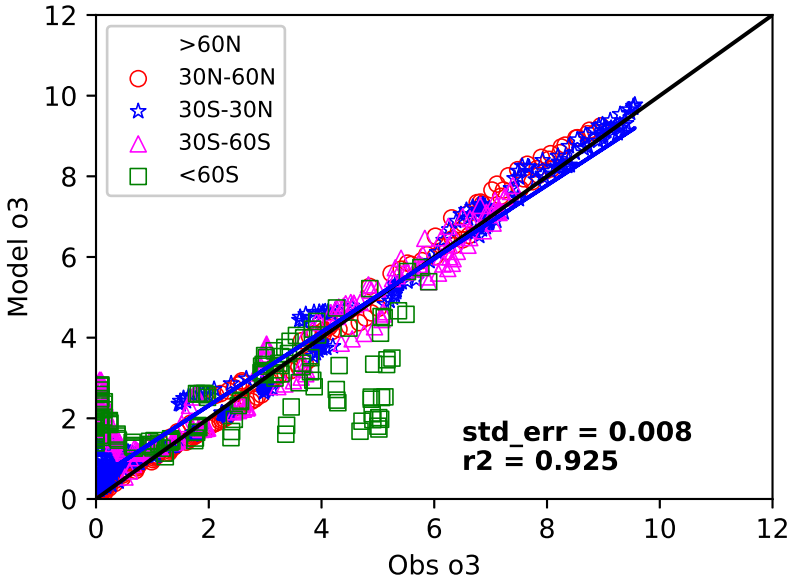
UKCA da492 vs HALOE:
O3 (ppmv) Jan



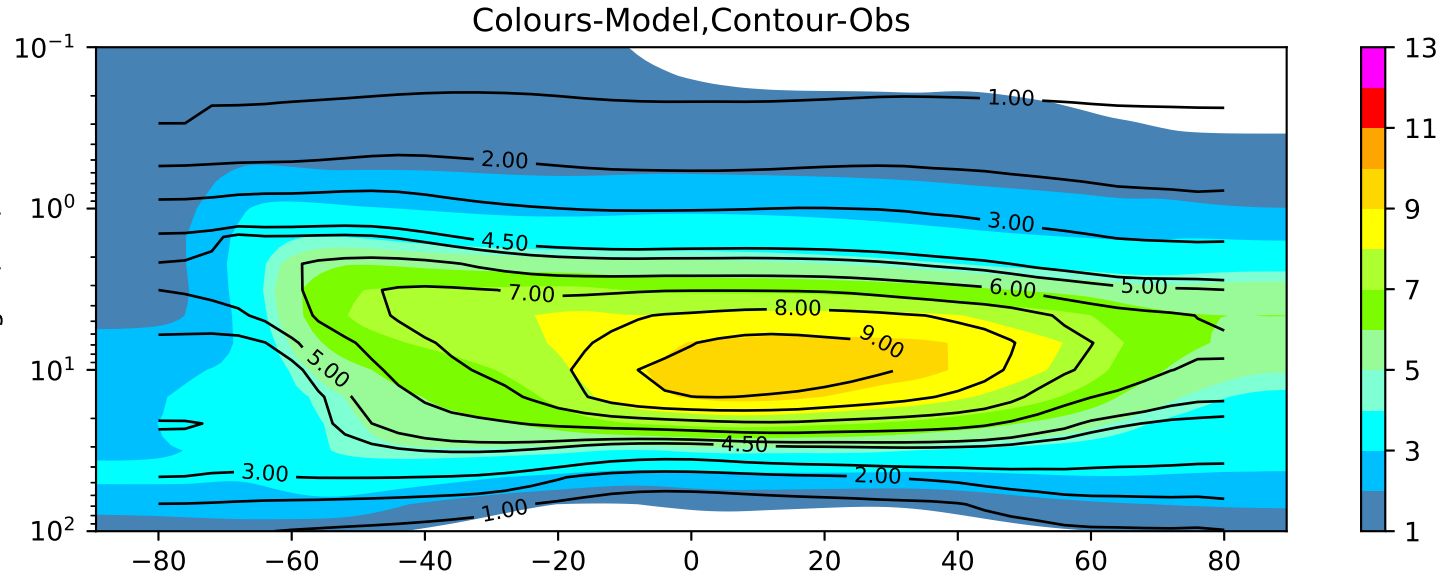


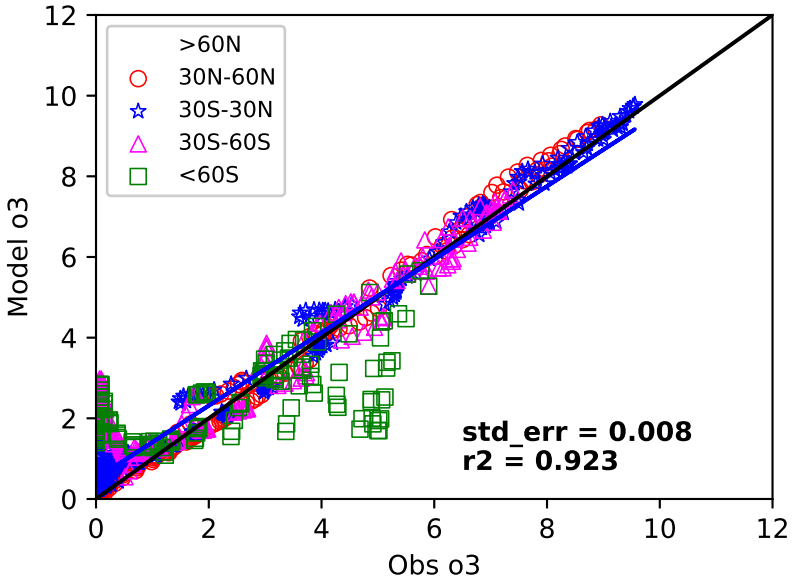
UKCA bf636 vs HALOE:
O3 (ppmv) Jan



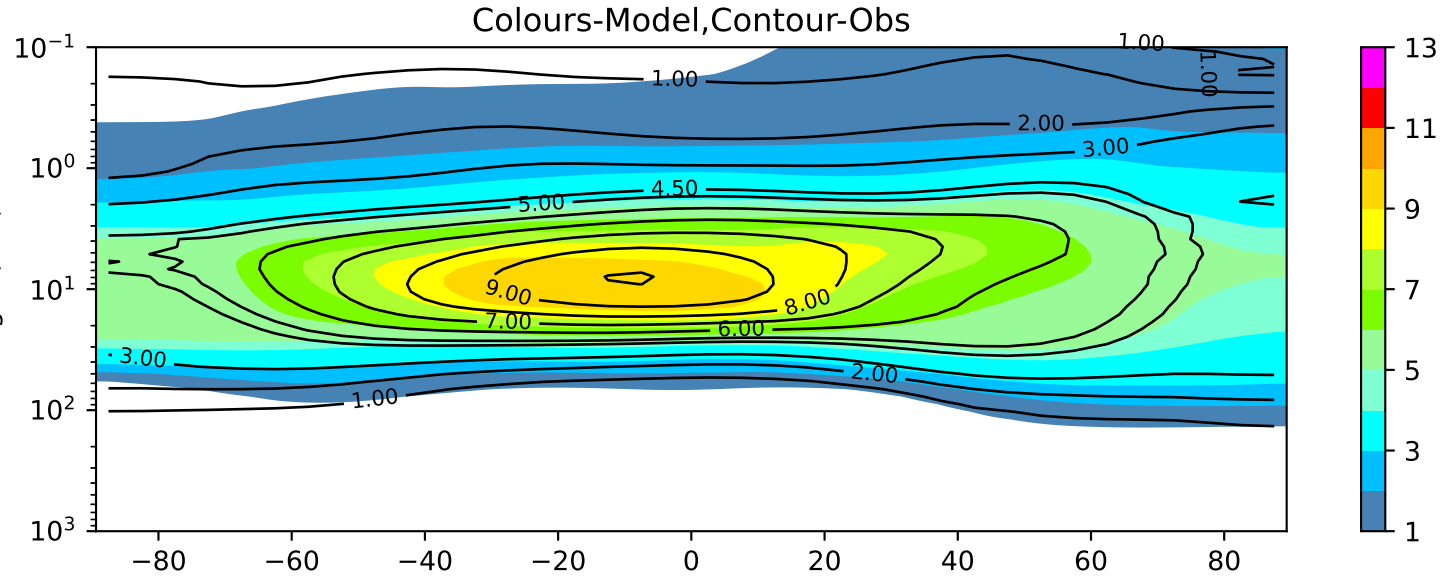


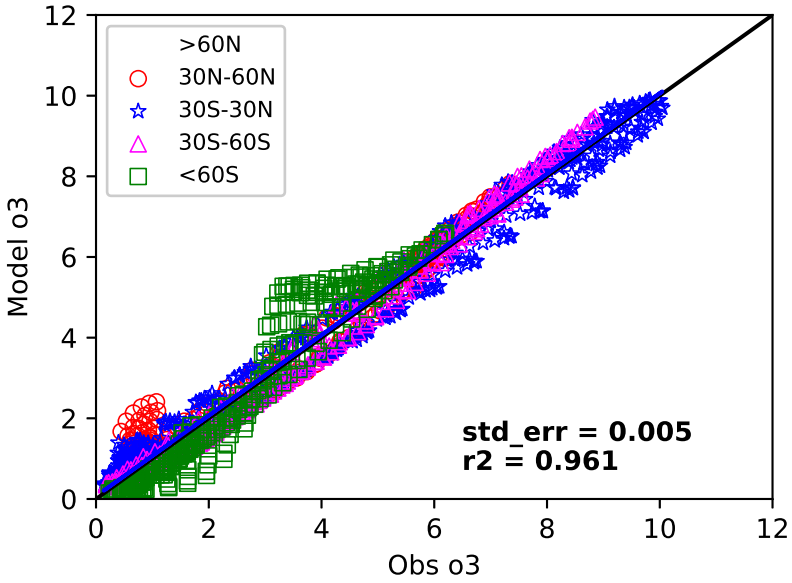
UKCA da492 vs HALOE:
O3 (ppmv) Jul



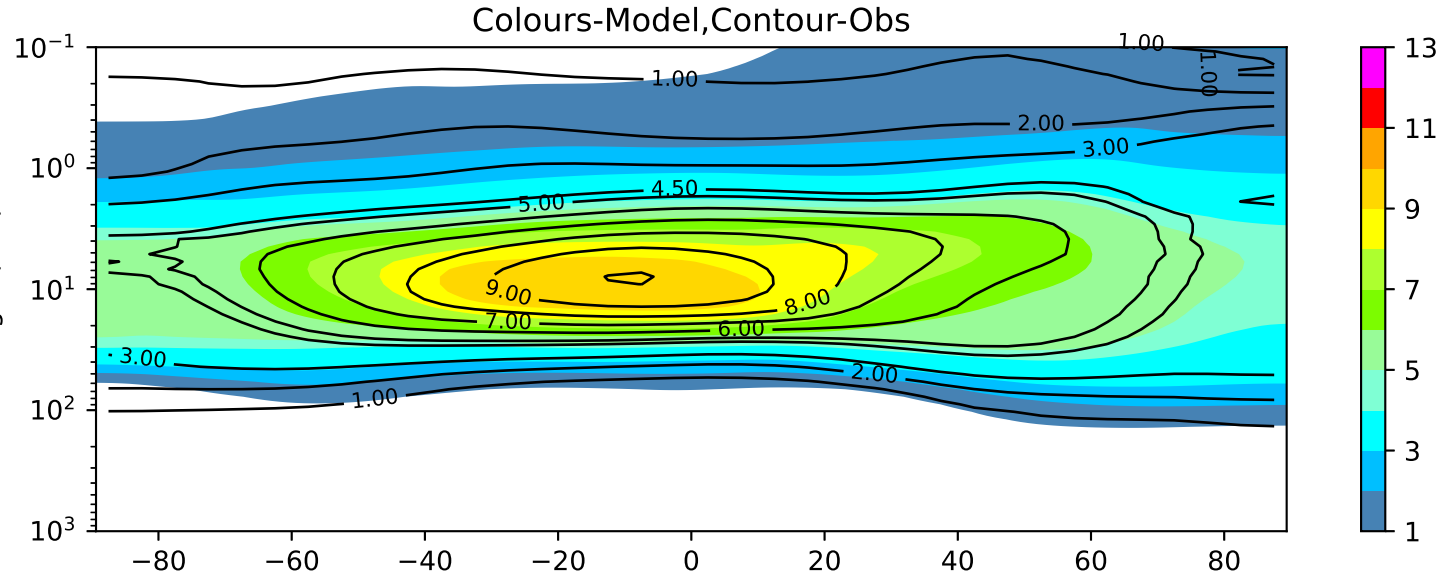


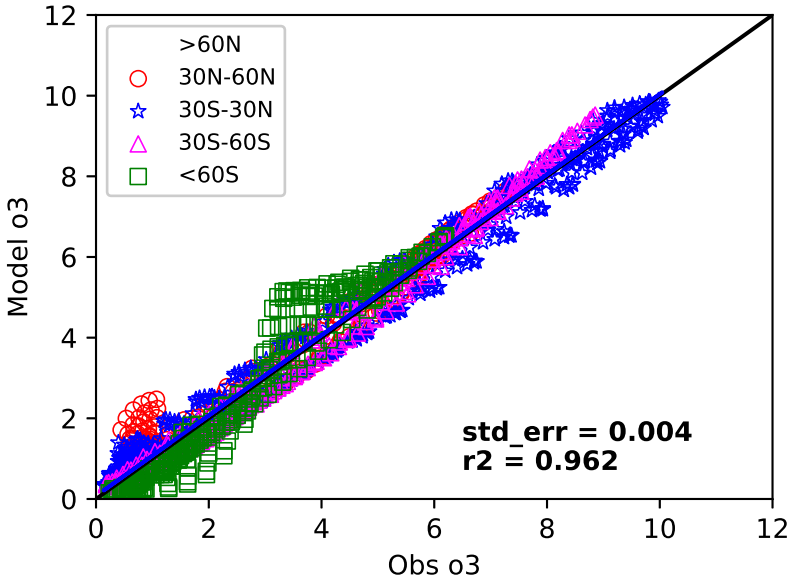
UKCA bf636 vs HALOE:
O3 (ppmv) Jul



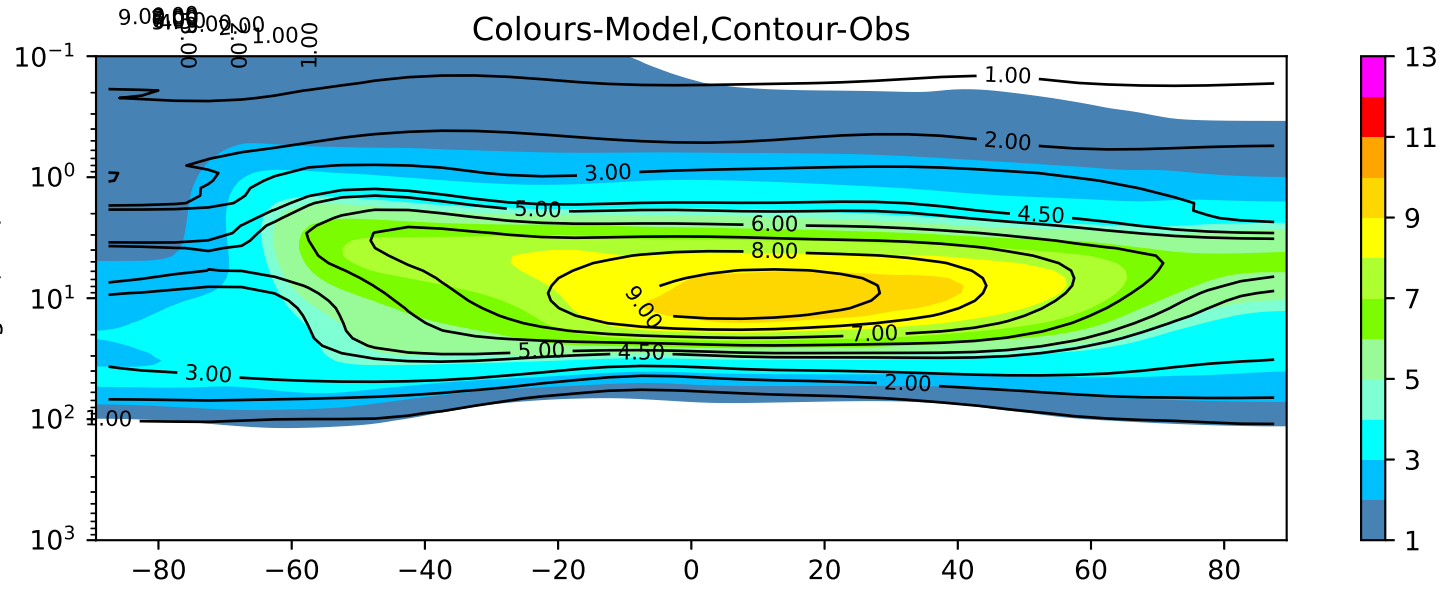


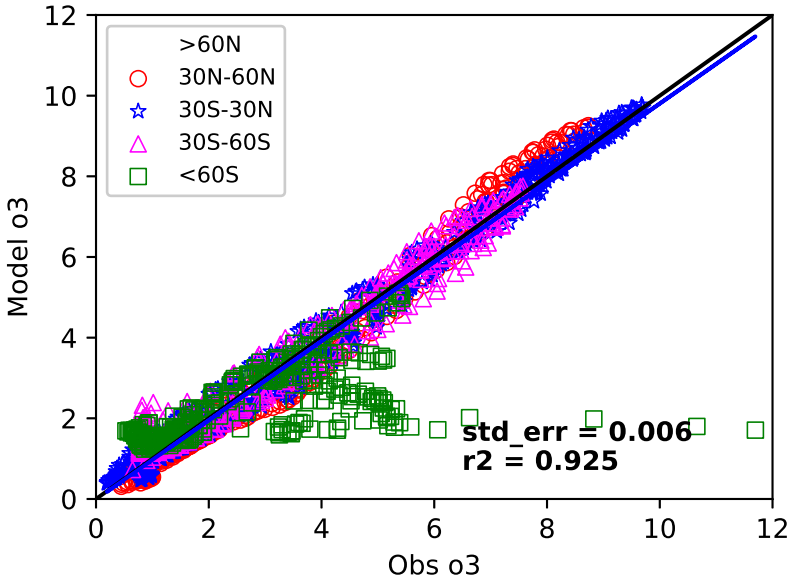
UKCA da492 vs NIWA-CCMVal:
O3 (ppmv) Jan



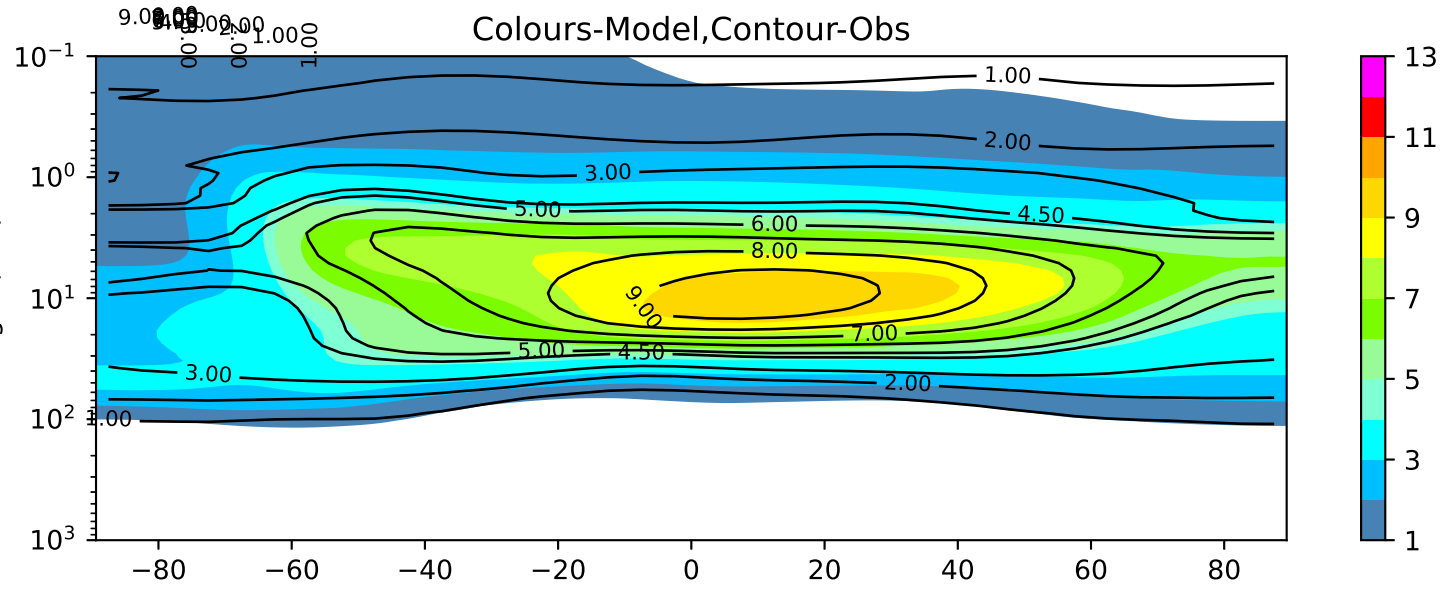


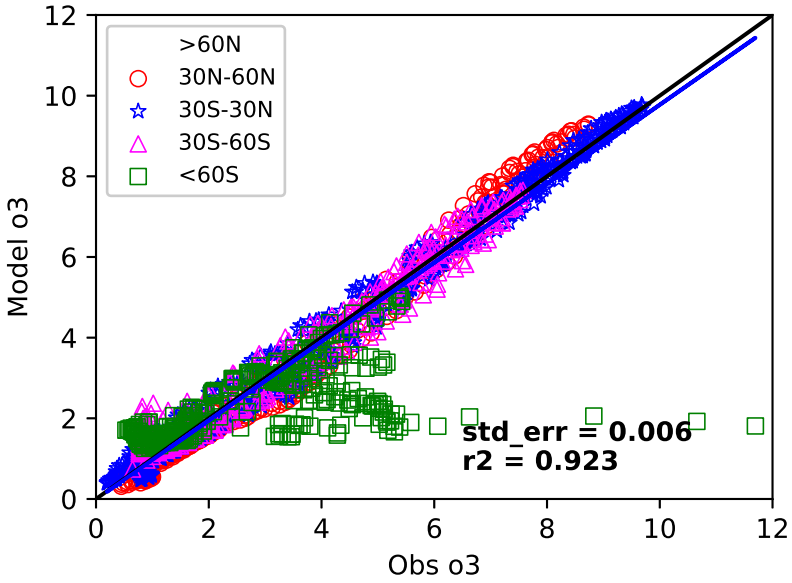
UKCA bf636 vs NIWA-CCMVal:
O3 (ppmv) Jan



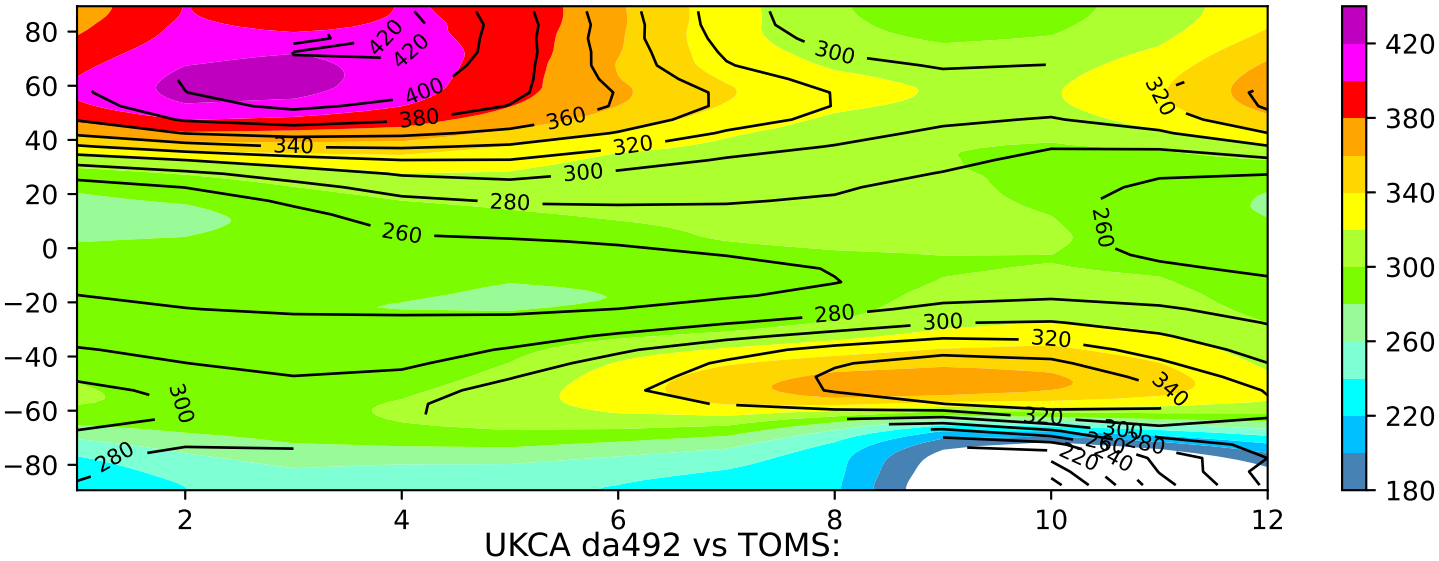


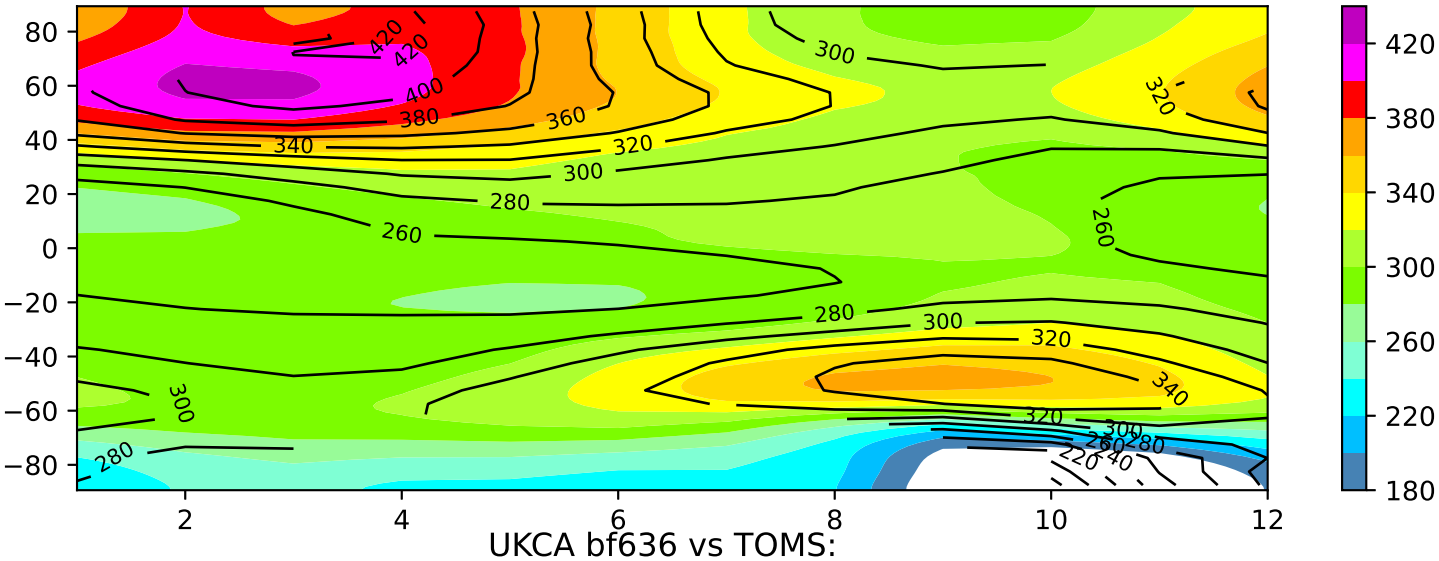
UKCA da492 vs NIWA-CCMVal:
O3 (ppmv) Jul

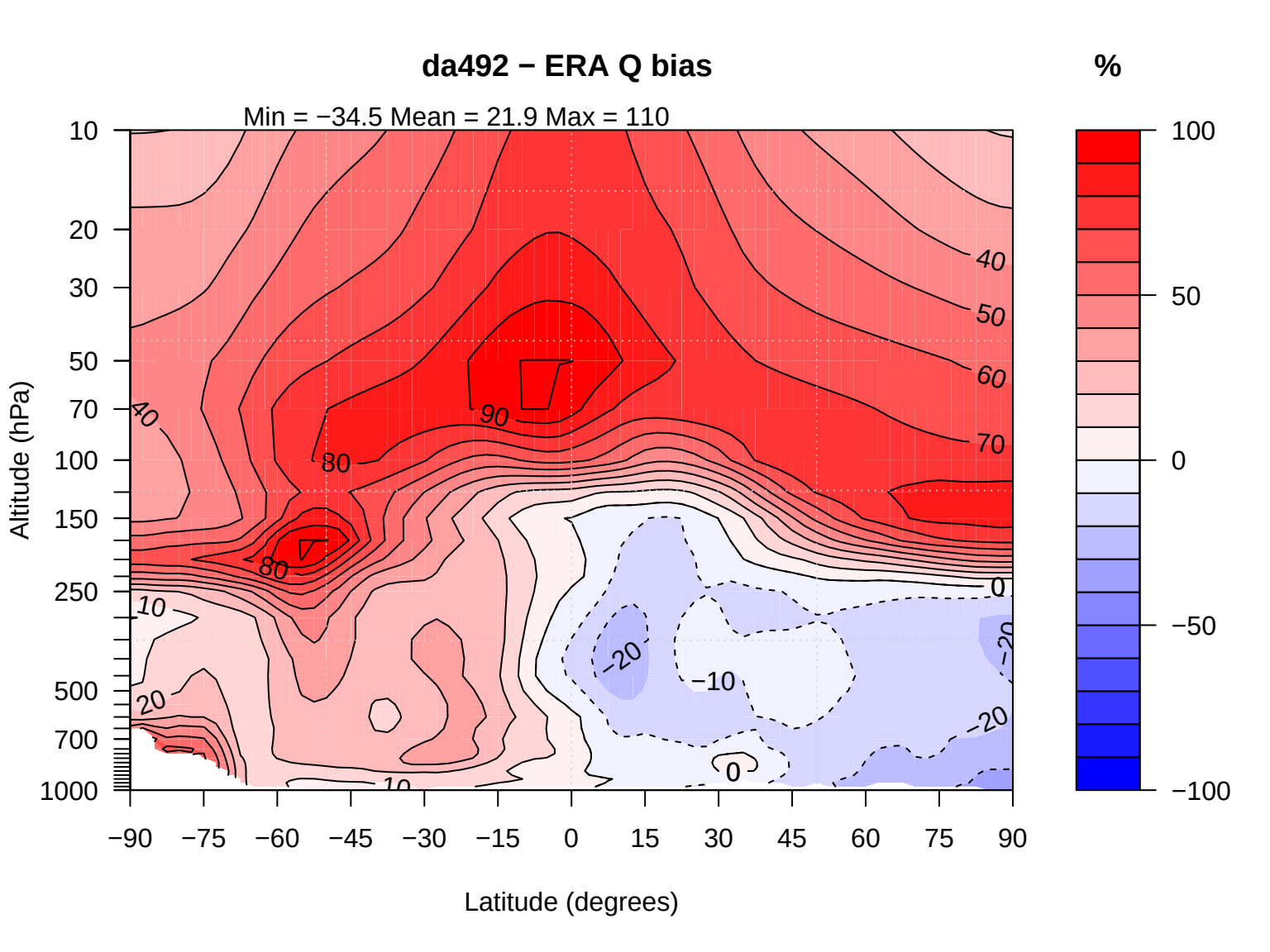


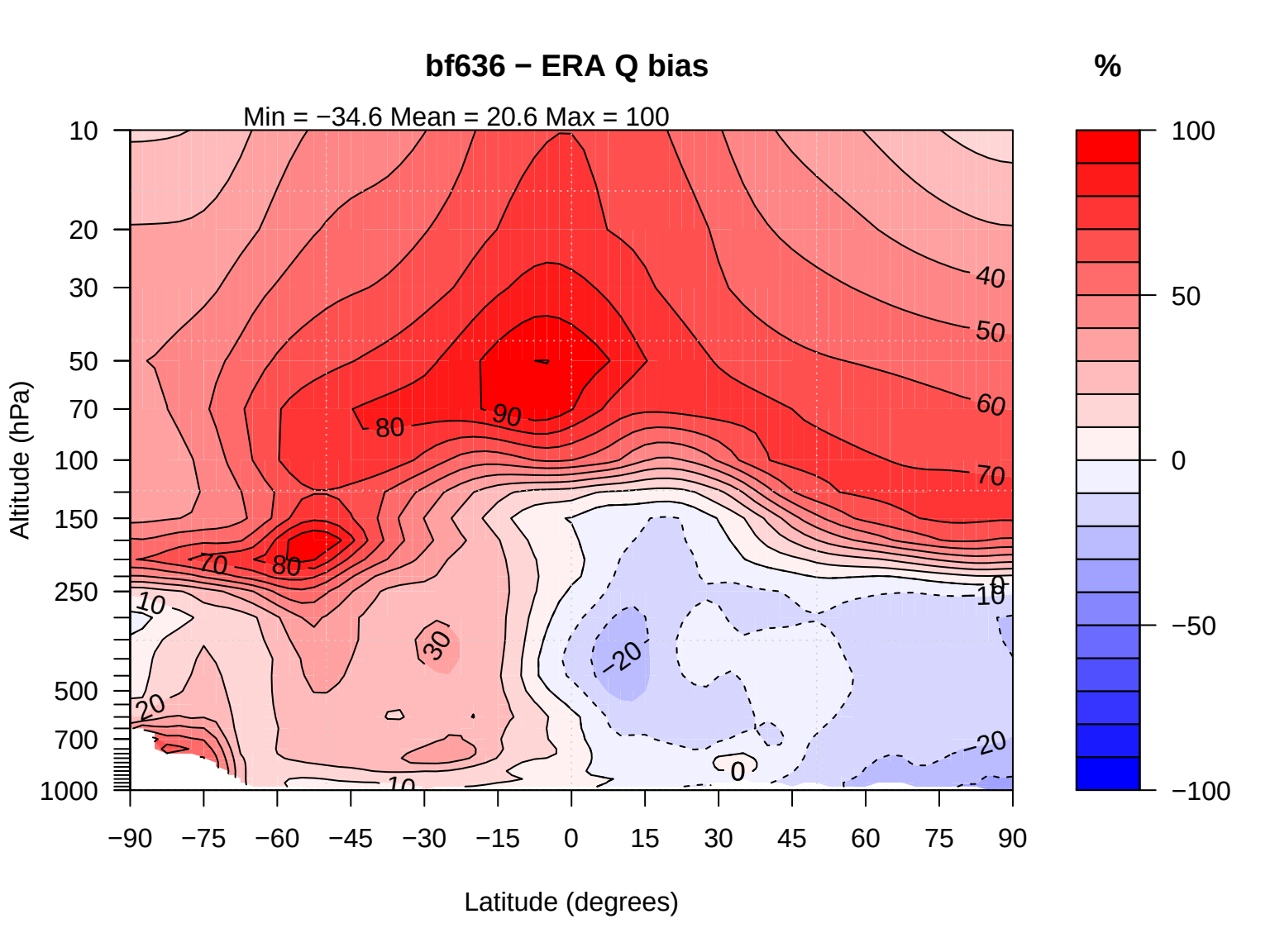


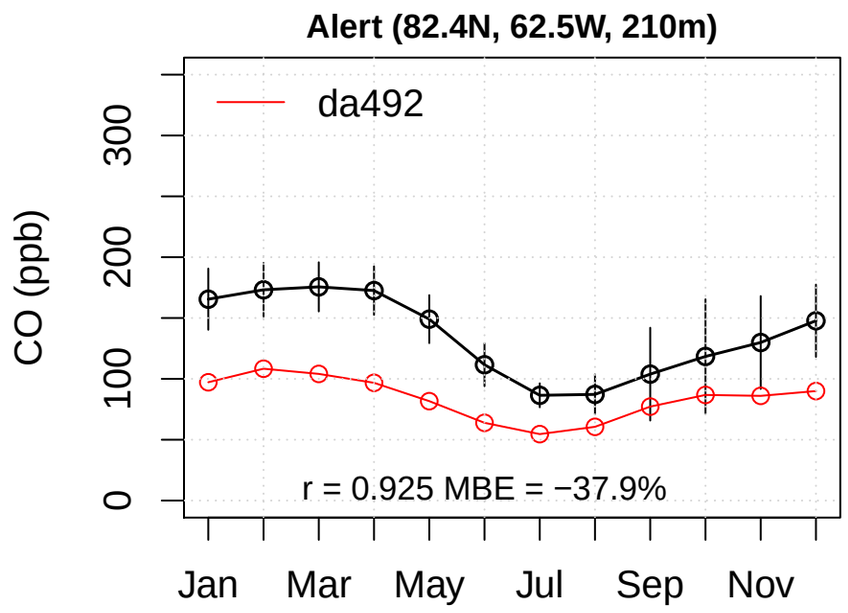
UKCA bf636 vs NIWA-CCMVal:
O3 (ppmv) Jul

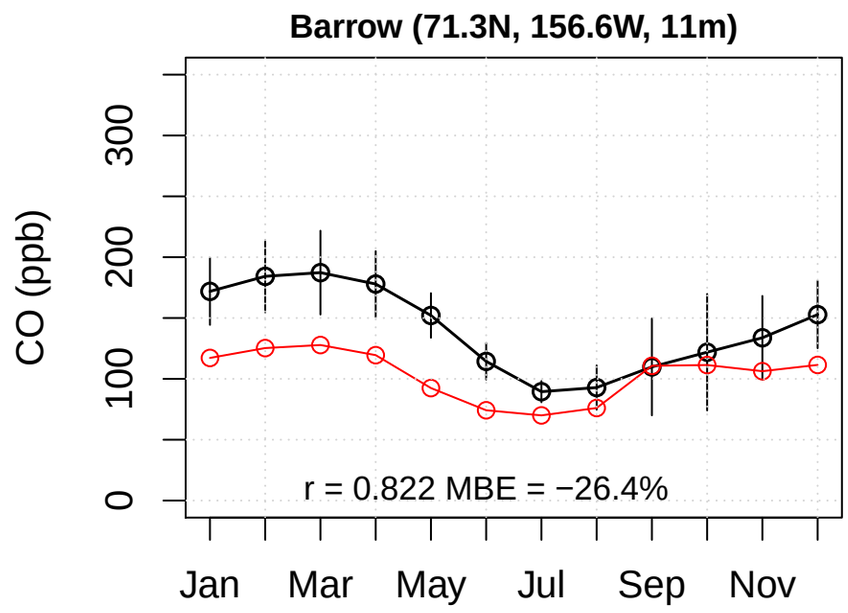

80
60
40
20
0
−20
−40
−60
−80
2
4
6
8
10
12
420
380
340
300
260
220
180
UKCA da492 vs TOMS:
Column_Ozone (DU)

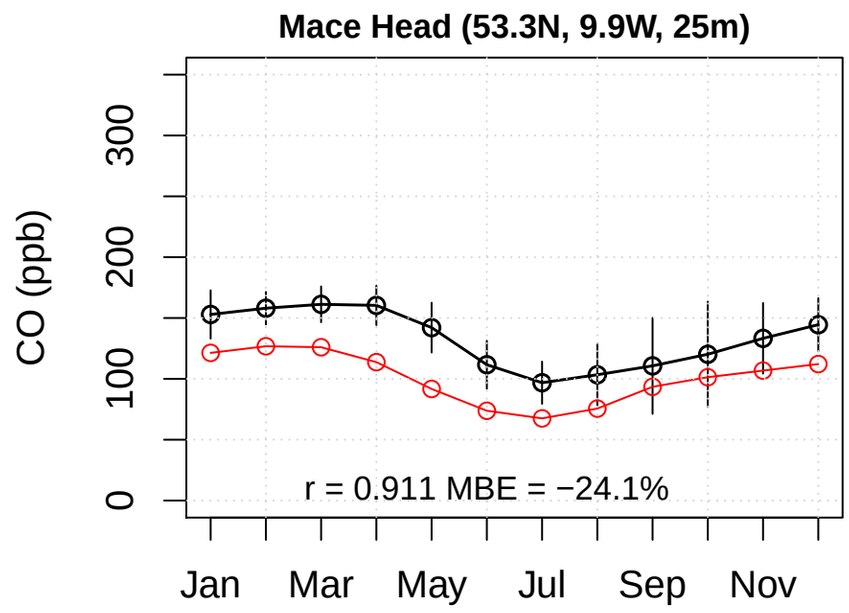

80
60
40
20
0
−20
−40
−60
−80
2
4
6
8
10
12
420
380
340
300
260
220
180
UKCA bf636 vs TOMS:
Column_Ozone (DU)

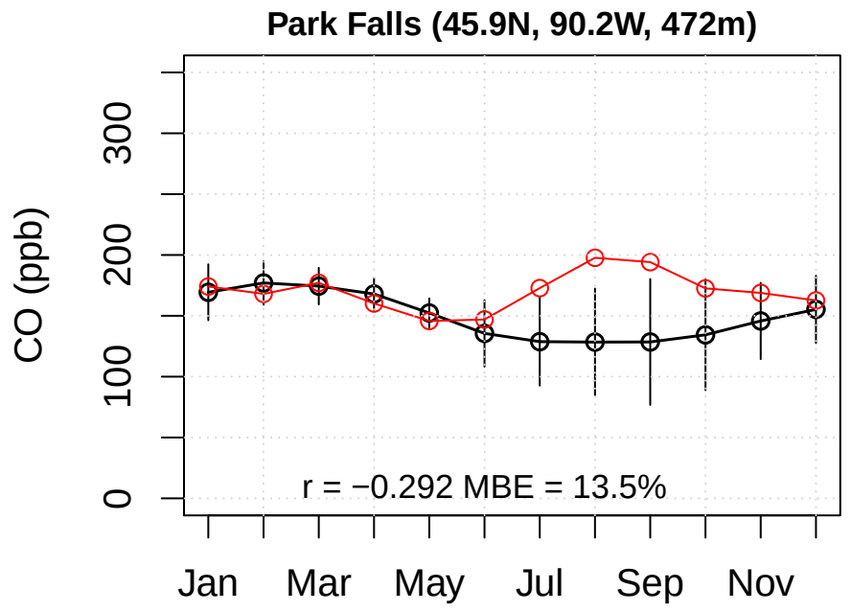

da492 − ERA Q bias
%
Min = −34.5 Mean = 21.9 Max = 110
Altitude (hPa)
10
20
30
50
70
100
150
250
500
700
1000
−90
−75
−60
−45
−30
−15
0
15
30
45
60
75
90
Latitude (degrees)
100
50
0
−50
−100
40
50
60
70
90
80
80
40
10
20
10
0
−20
−10
−20
−20
0

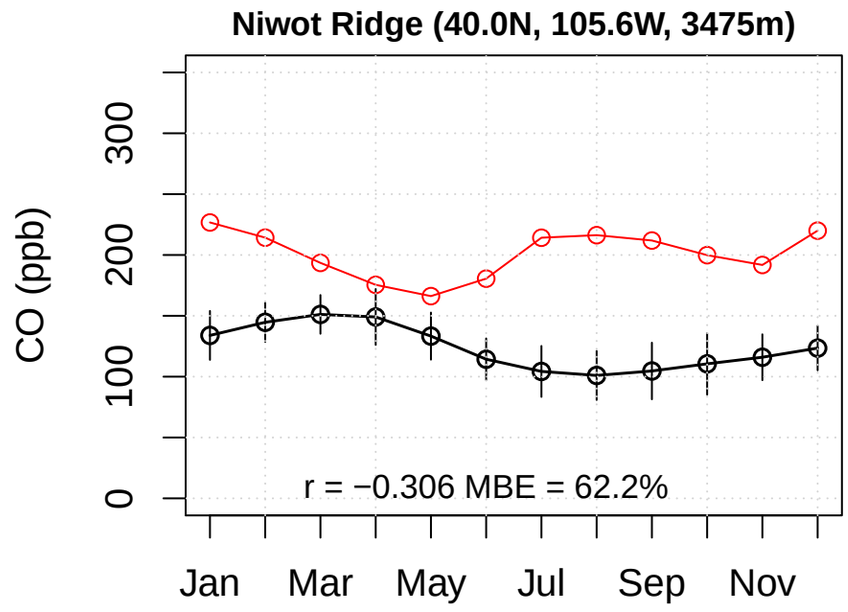

bf636 − ERA Q bias
%
Min = −34.6 Mean = 20.6 Max = 100
Altitude (hPa)
10
20
30
50
70
100
150
250
500
700
1000
−90
−75
−60
−45
−30
−15
0
15
30
45
60
75
90
Latitude (degrees)
100
50
0
−50
−100
40
50
60
70
80
90
10
20
30
−20
0

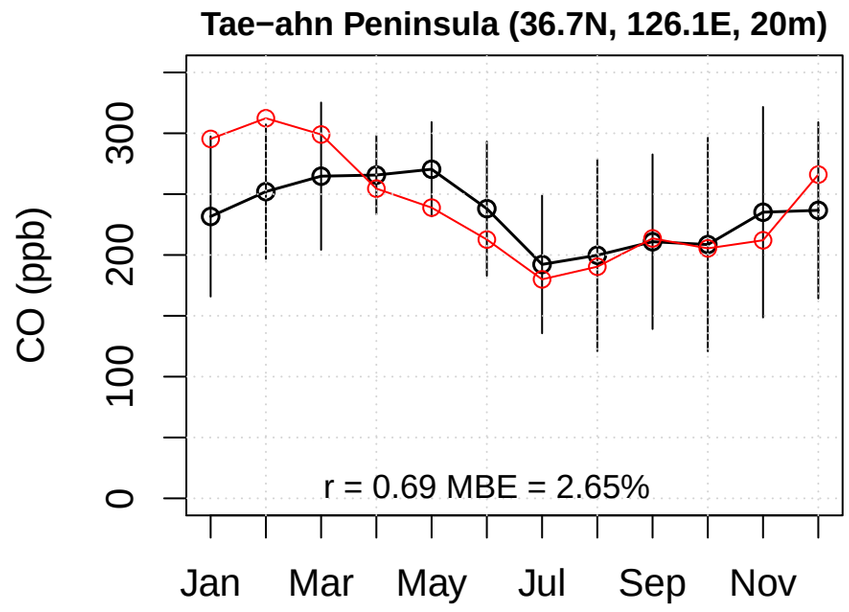

Alert (82.4N, 62.5W, 210m)
da492
CO (ppb)
0
100
200
300
r = 0.925 MBE = −37.9%
Jan
Mar
May
Jul
Sep
Nov

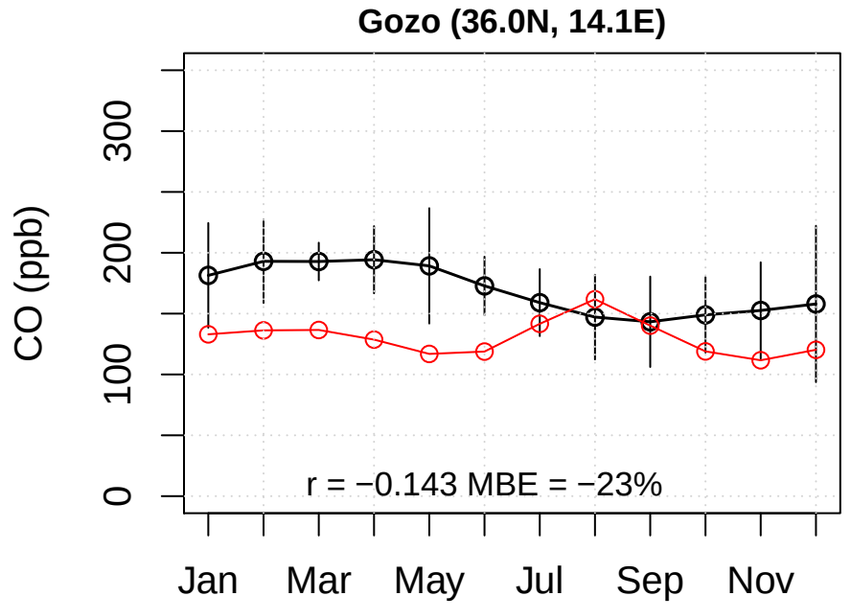

Barrow (71.3N, 156.6W, 11m)
CO (ppb)
0
100
200
300
r = 0.822 MBE = −26.4%
Jan
Mar
May
Jul
Sep
Nov

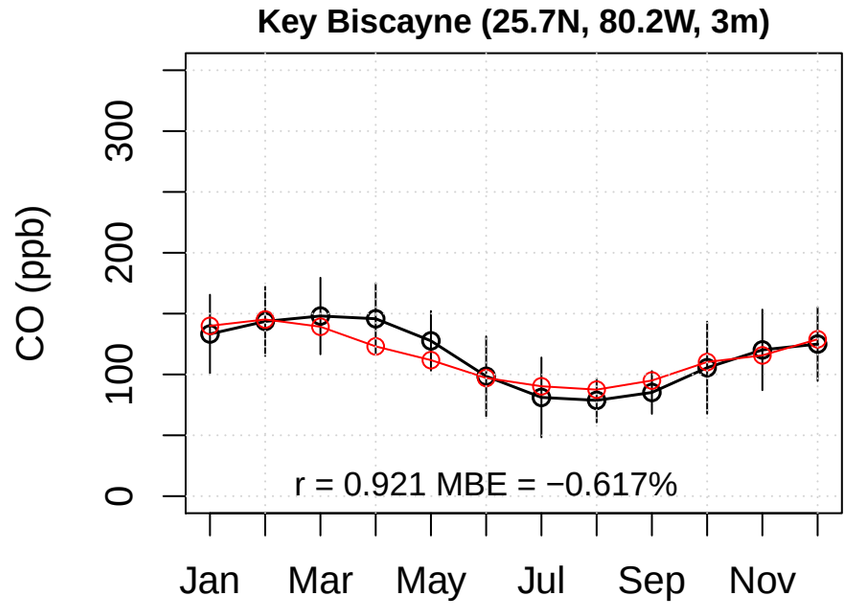

Mace Head (53.3N, 9.9W, 25m)
CO (ppb)
0
100
200
300
r = 0.911 MBE = −24.1%
Jan
Mar
May
Jul
Sep
Nov

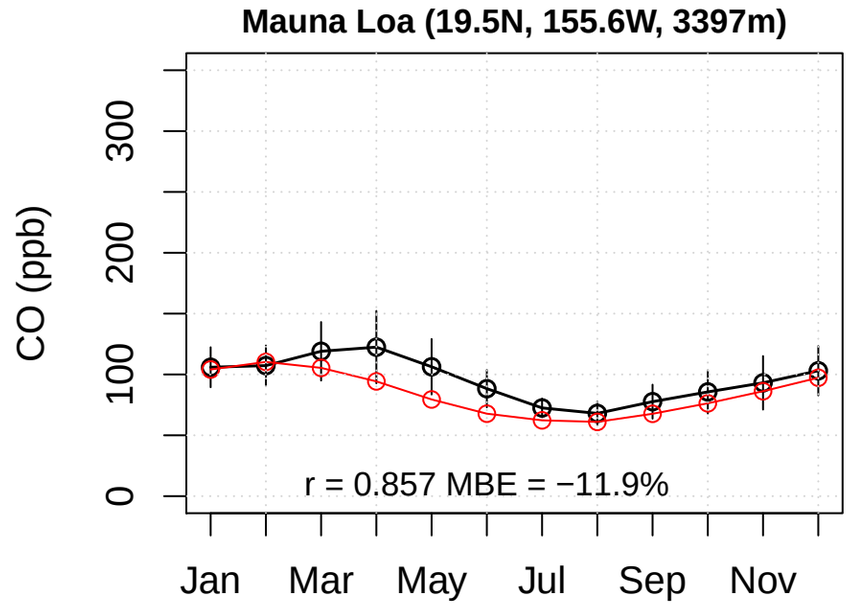

Park Falls (45.9N, 90.2W, 472m)
CO (ppb)
0
100
200
300
r = −0.292 MBE = 13.5%
Jan
Mar
May
Jul
Sep
Nov

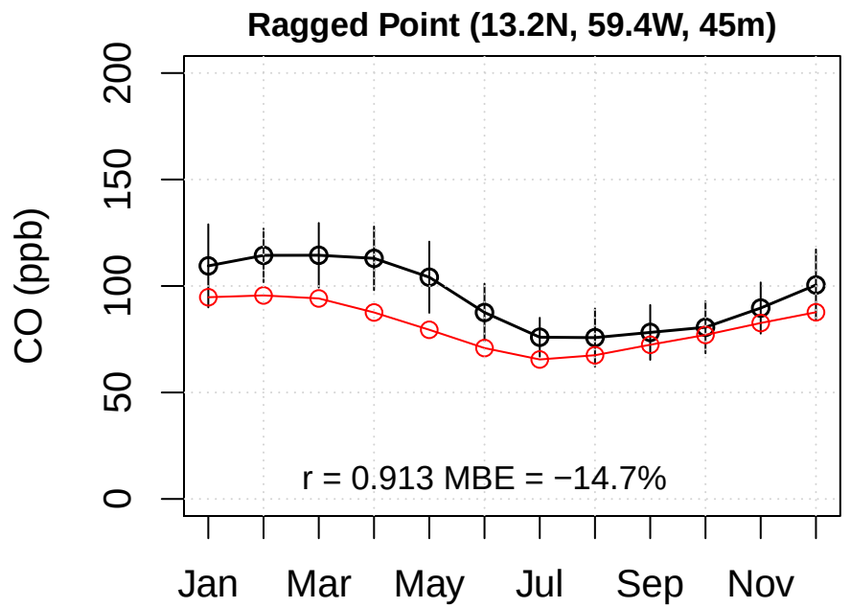

Niwot Ridge (40.0N, 105.6W, 3475m)
CO (ppb)
0
100
200
300
r = −0.306 MBE = 62.2%
Jan
Mar
May
Jul
Sep
Nov

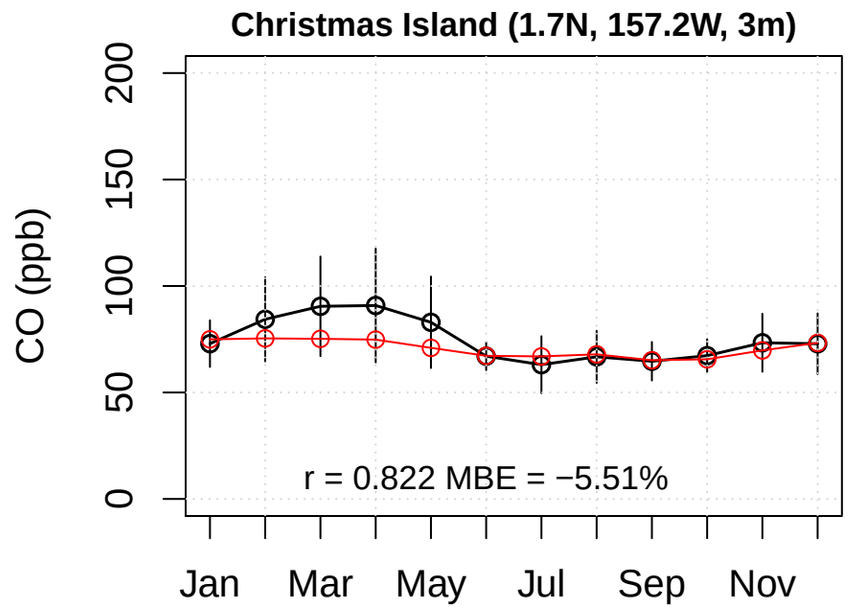

Tae−ahn Peninsula (36.7N, 126.1E, 20m)
CO (ppb)
0
100
200
300
r = 0.69 MBE = 2.65%
Jan
Mar
May
Jul
Sep
Nov

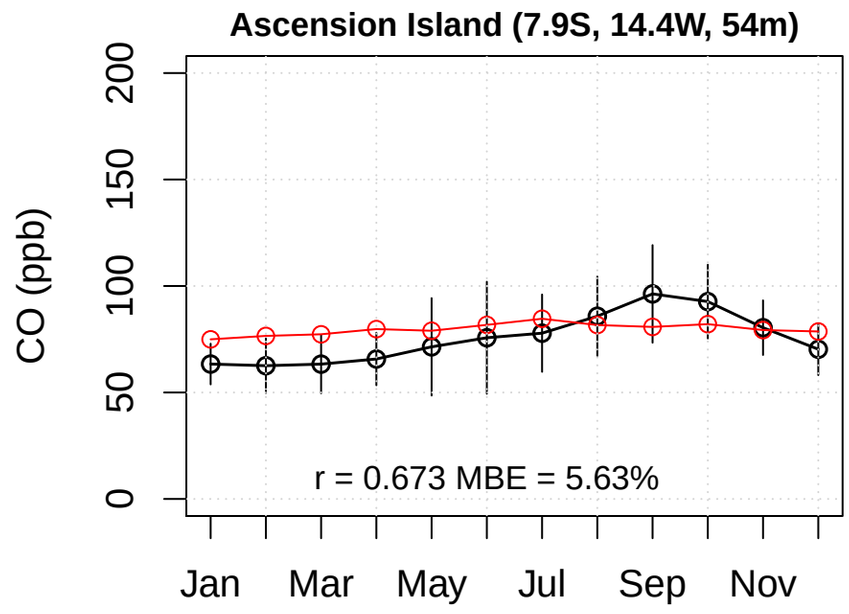

Gozo (36.0N, 14.1E)
CO (ppb)
0
100
200
300
r = −0.143 MBE = −23%
Jan
Mar
May
Jul
Sep
Nov

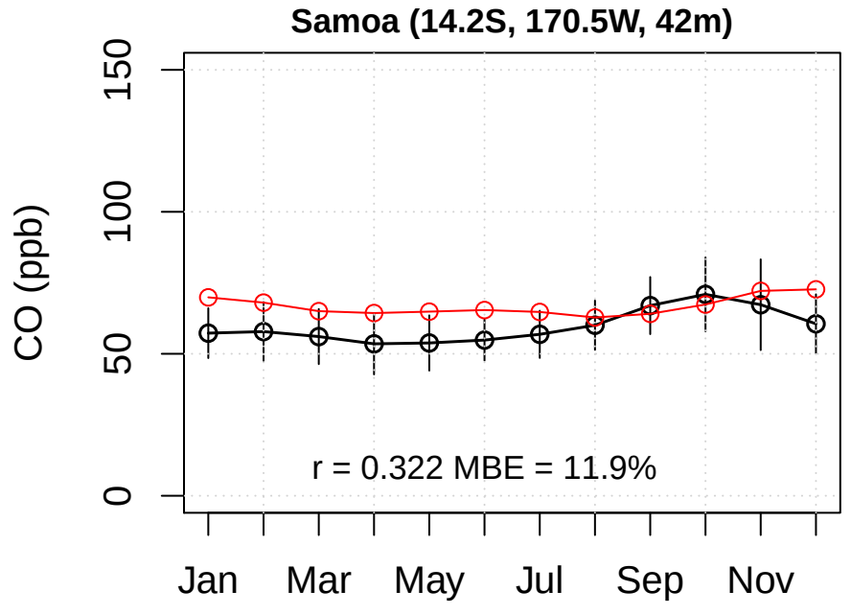

Key Biscayne (25.7N, 80.2W, 3m)
CO (ppb)
0
100
200
300
r = 0.921 MBE = −0.617%
Jan
Mar
May
Jul
Sep
Nov

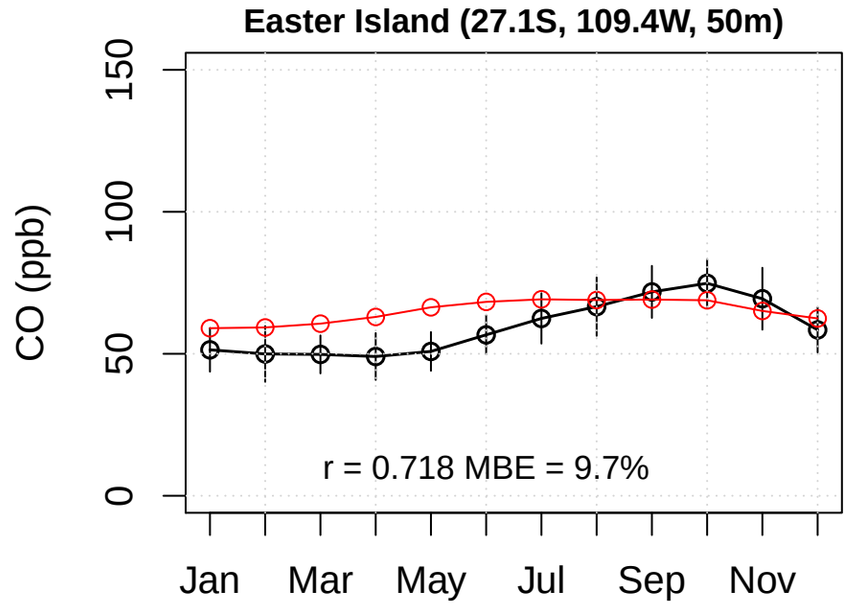

Mauna Loa (19.5N, 155.6W, 3397m)
CO (ppb)
0
100
200
300
r = 0.857 MBE = −11.9%
Jan
Mar
May
Jul
Sep
Nov

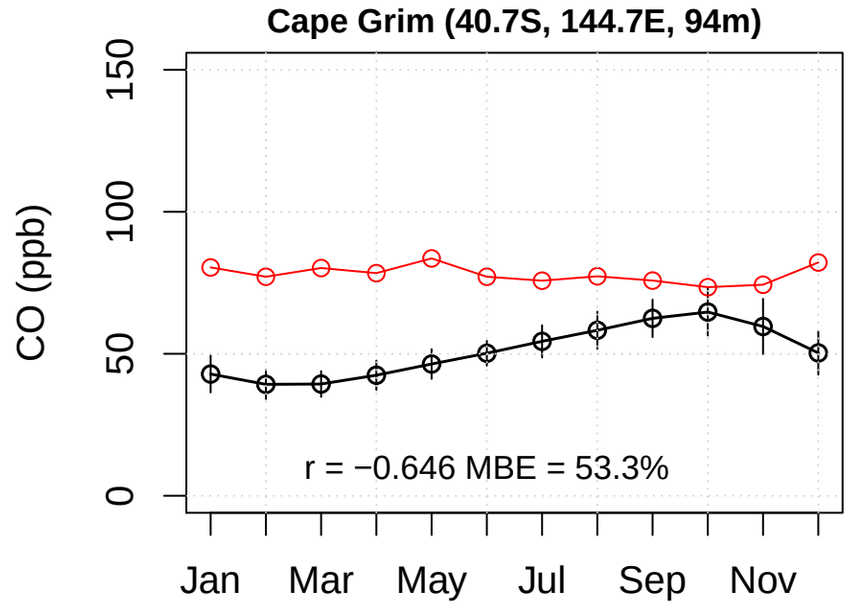

Ragged Point (13.2N, 59.4W, 45m)
CO (ppb)
0
50
100
150
200
r = 0.913 MBE = −14.7%
Jan
Mar
May
Jul
Sep
Nov

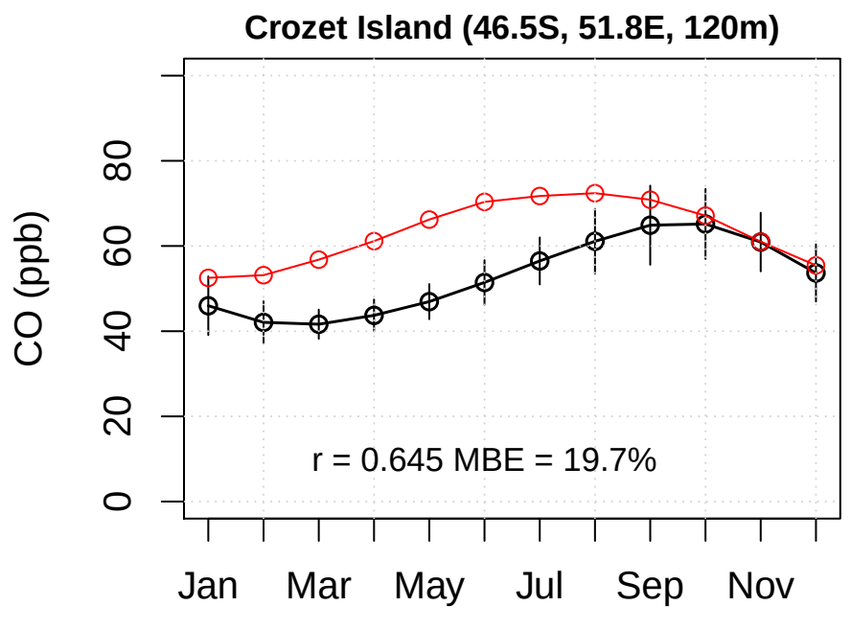

Christmas Island (1.7N, 157.2W, 3m)
CO (ppb)
0
50
100
150
200
r = 0.822 MBE = −5.51%
Jan
Mar
May
Jul
Sep
Nov

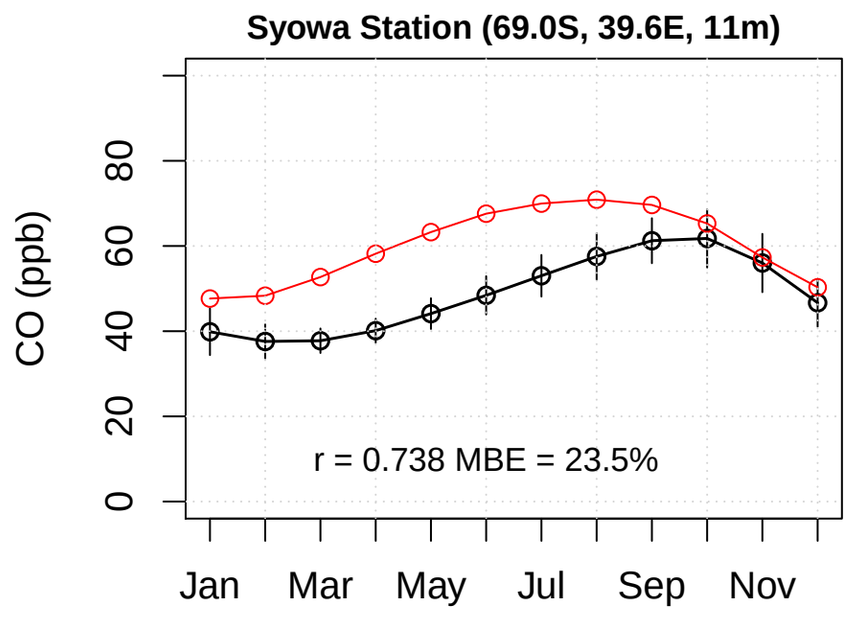

Ascension Island (7.9S, 14.4W, 54m)
CO (ppb)
0
50
100
150
200
r = 0.673 MBE = 5.63%
Jan
Mar
May
Jul
Sep
Nov

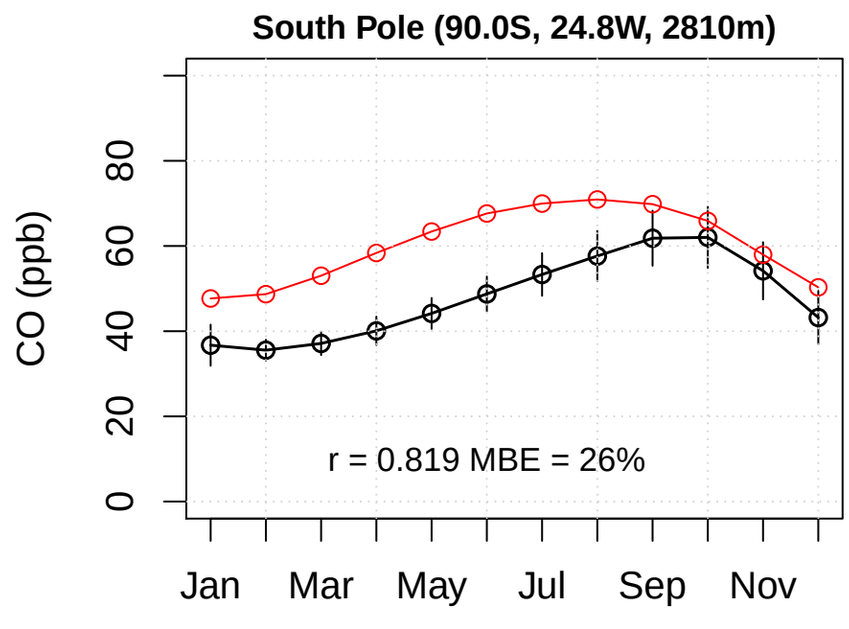

Samoa (14.2S, 170.5W, 42m)
CO (ppb)
0
50
100
150
r = 0.322 MBE = 11.9%
Jan
Mar
May
Jul
Sep
Nov

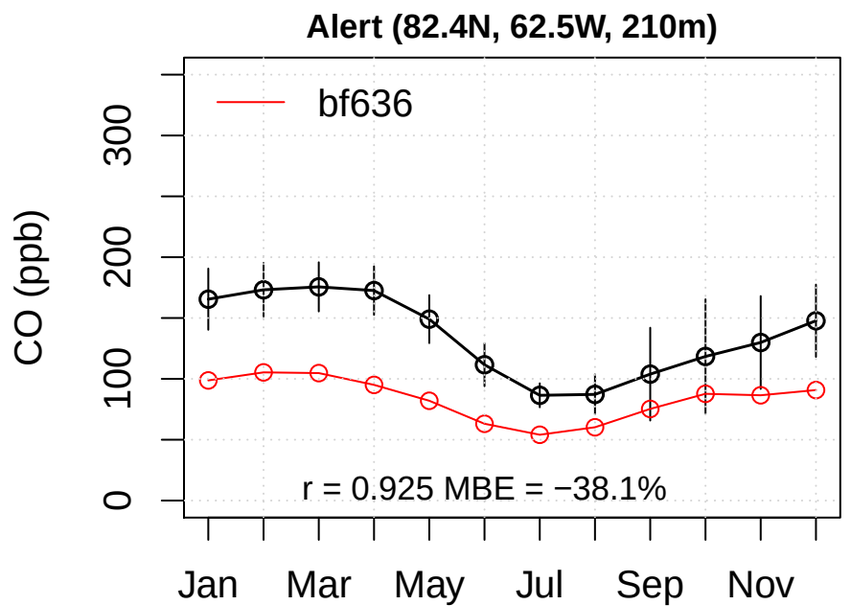

Easter Island (27.1S, 109.4W, 50m)
CO (ppb)
0
50
100
150
r = 0.718 MBE = 9.7%
Jan
Mar
May
Jul
Sep
Nov

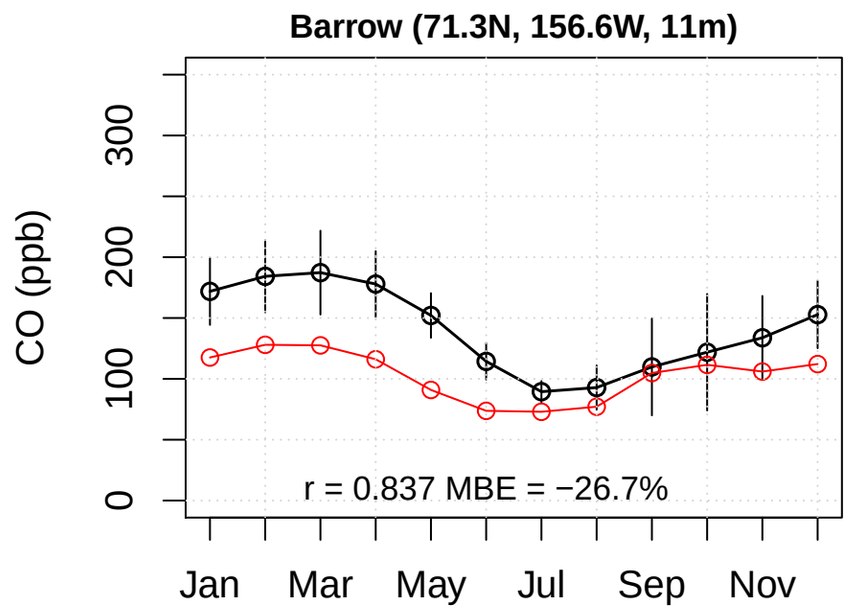

Cape Grim (40.7S, 144.7E, 94m)
CO (ppb)
0
50
100
150
r = −0.646 MBE = 53.3%
Jan
Mar
May
Jul
Sep
Nov

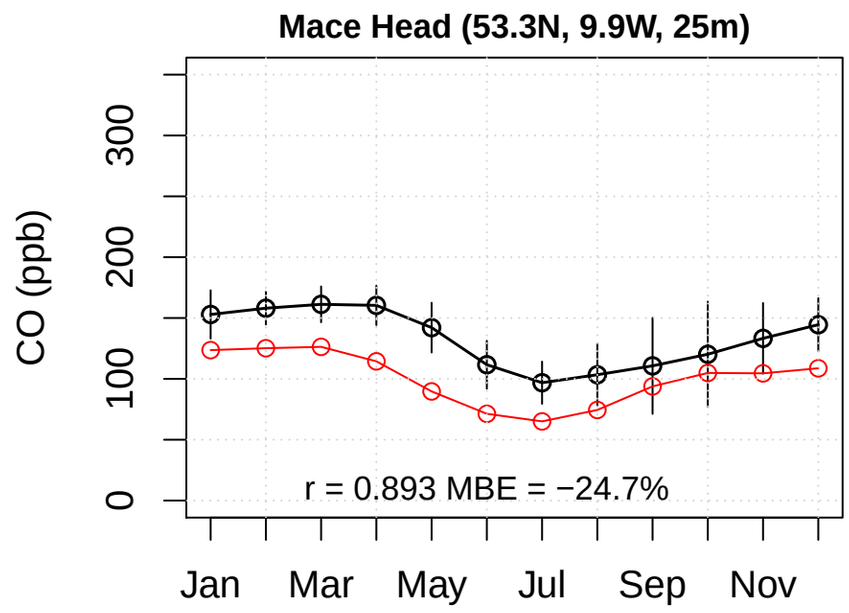

Crozet Island (46.5S, 51.8E, 120m)
CO (ppb)
0
20
40
60
80
r = 0.645 MBE = 19.7%
Jan
Mar
May
Jul
Sep
Nov

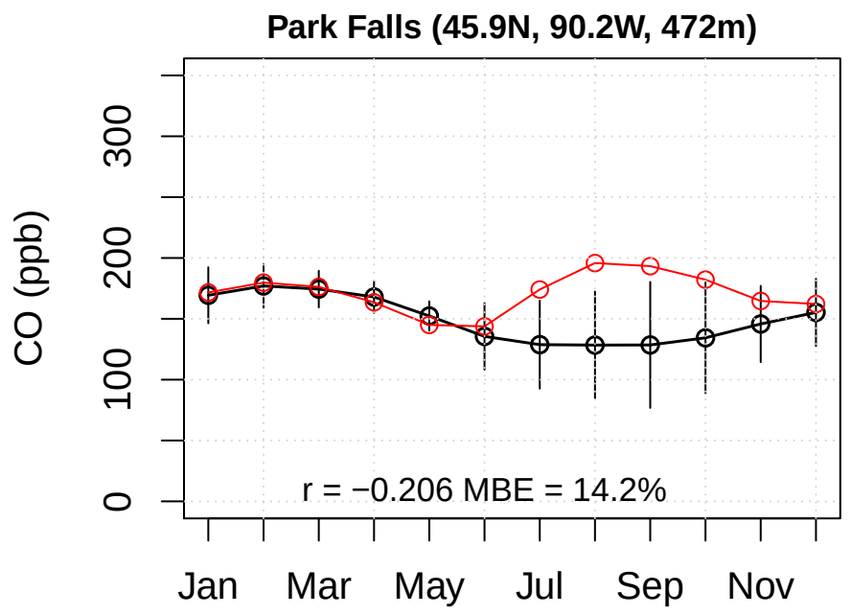

Syowa Station (69.0S, 39.6E, 11m)
CO (ppb)
0
20
40
60
80
r = 0.738 MBE = 23.5%
Jan
Mar
May
Jul
Sep
Nov

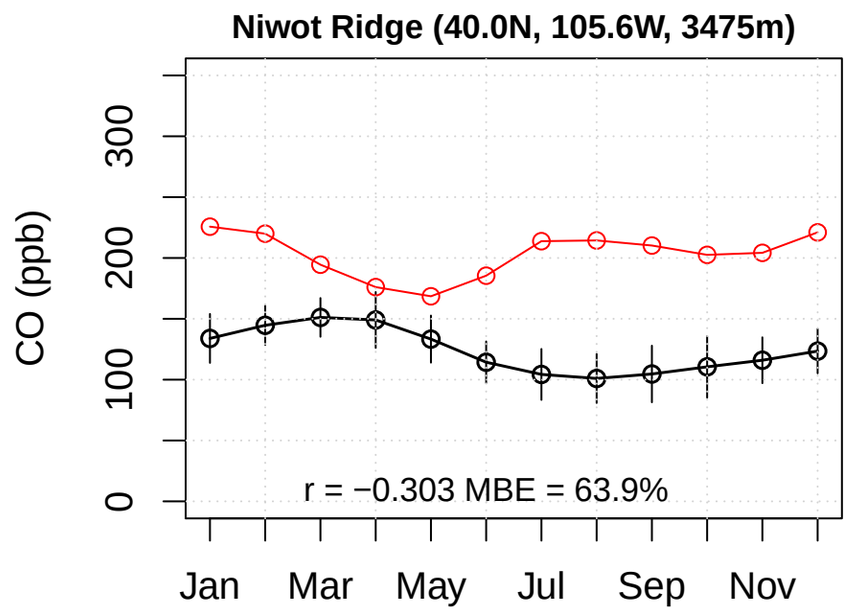

South Pole (90.0S, 24.8W, 2810m)
CO (ppb)
0
20
40
60
80
r = 0.819 MBE = 26%
Jan
Mar
May
Jul
Sep
Nov

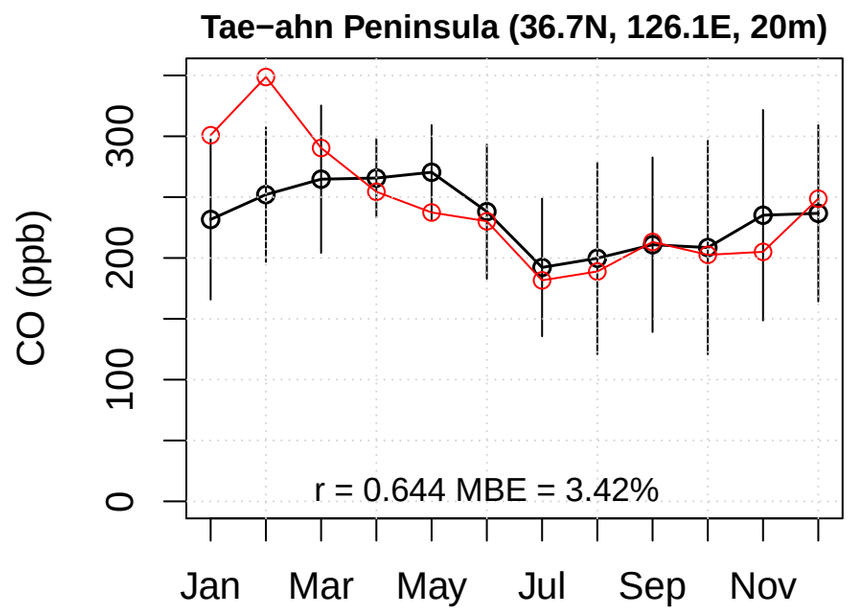

Alert (82.4N, 62.5W, 210m)
bf636
CO (ppb)
0
100
200
300
r = 0.925 MBE = −38.1%
Jan
Mar
May
Jul
Sep
Nov

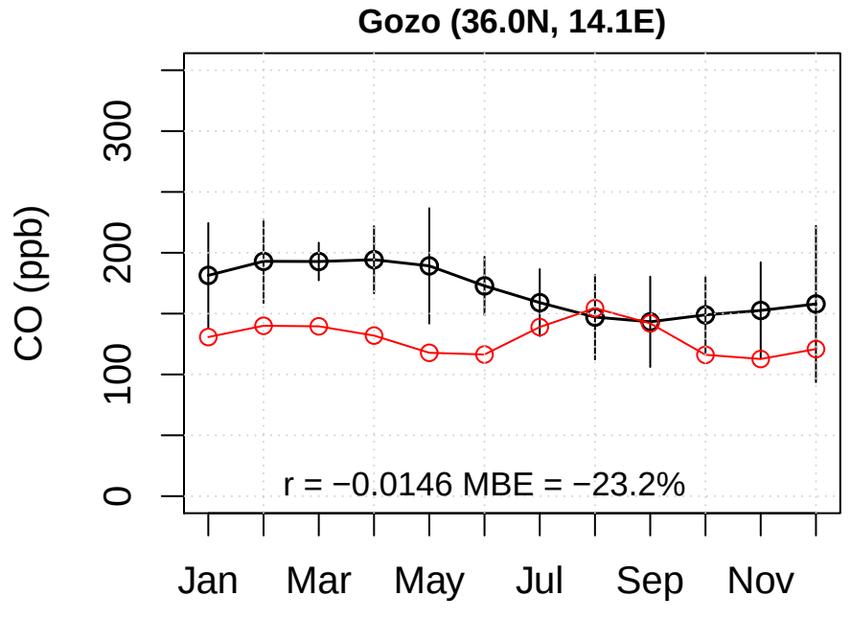

Barrow (71.3N, 156.6W, 11m)
CO (ppb)
0
100
200
300
r = 0.837 MBE = −26.7%
Jan
Mar
May
Jul
Sep
Nov

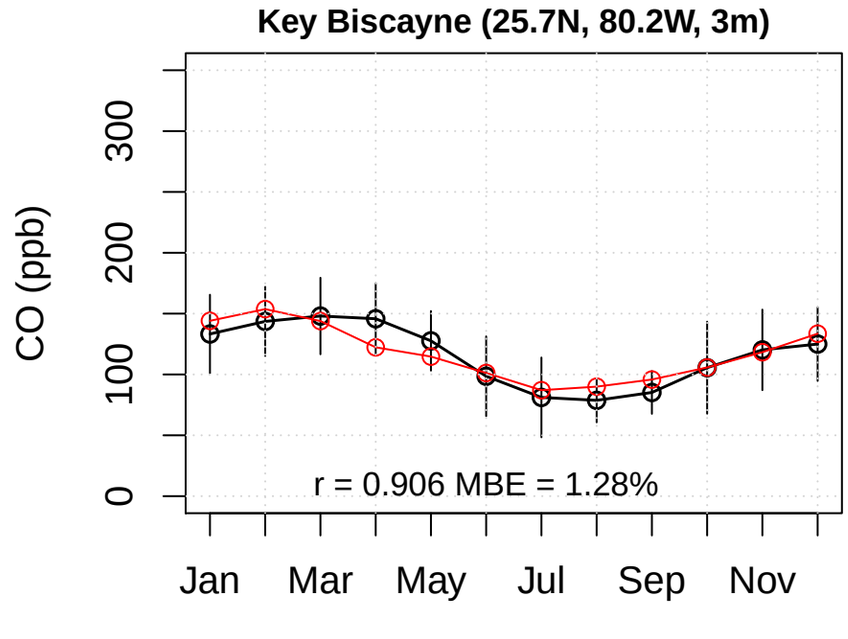

Mace Head (53.3N, 9.9W, 25m)
CO (ppb)
0
100
200
300
r = 0.893 MBE = −24.7%
Jan
Mar
May
Jul
Sep
Nov

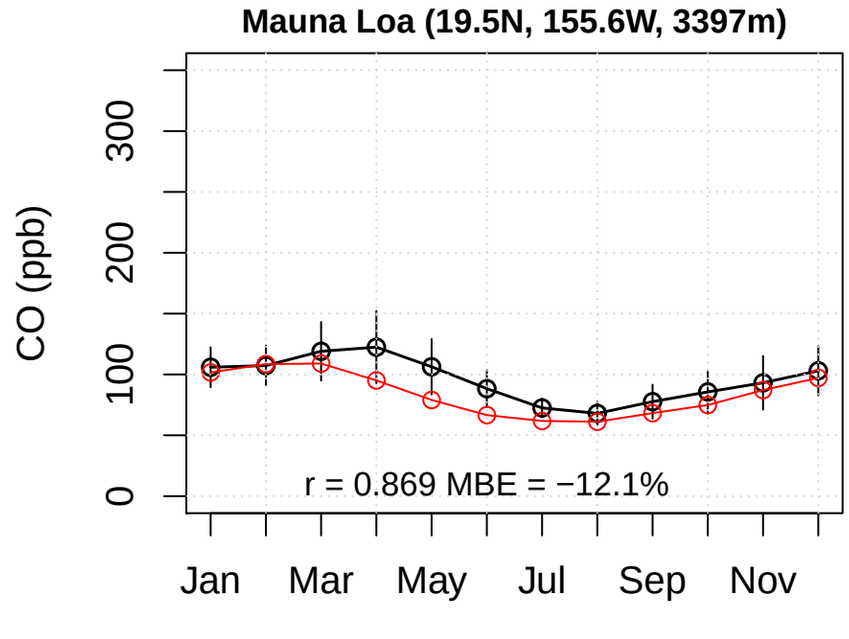

Park Falls (45.9N, 90.2W, 472m)
CO (ppb)
0
100
200
300
r = −0.206 MBE = 14.2%
Jan
Mar
May
Jul
Sep
Nov

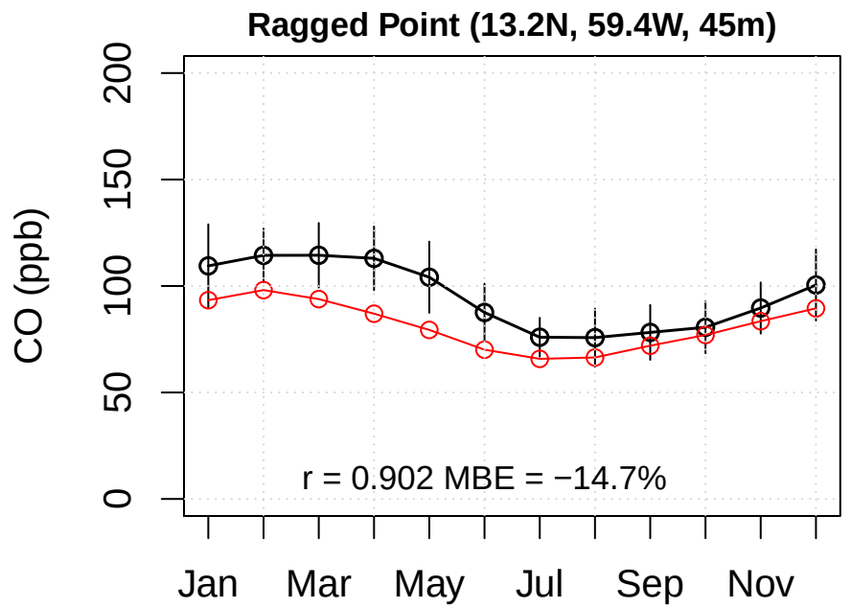

Niwot Ridge (40.0N, 105.6W, 3475m)
CO (ppb)
0
100
200
300
r = −0.303 MBE = 63.9%
Jan
Mar
May
Jul
Sep
Nov

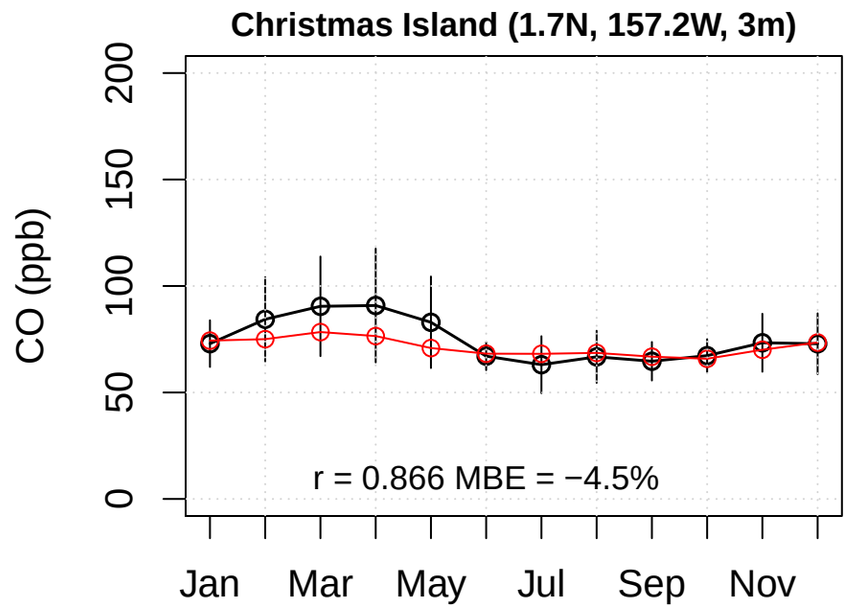

Tae−ahn Peninsula (36.7N, 126.1E, 20m)
CO (ppb)
0
100
200
300
r = 0.644 MBE = 3.42%
Jan
Mar
May
Jul
Sep
Nov

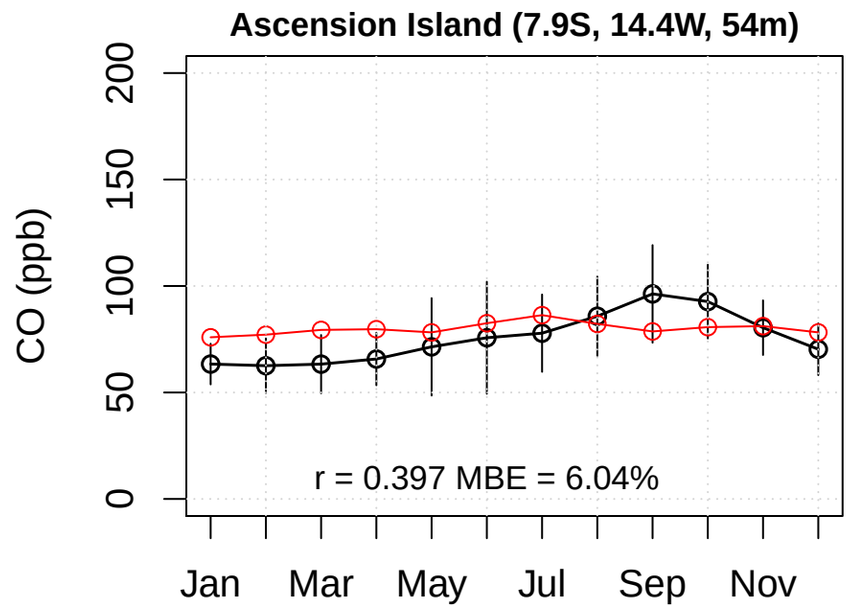

Gozo (36.0N, 14.1E)
CO (ppb)
0
100
200
300
r = −0.0146 MBE = −23.2%
Jan
Mar
May
Jul
Sep
Nov

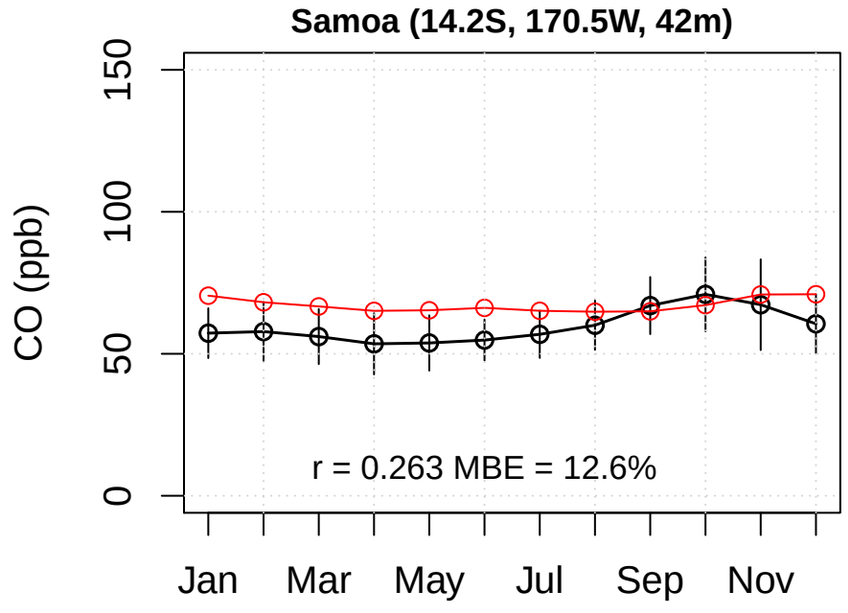

Key Biscayne (25.7N, 80.2W, 3m)
CO (ppb)
0
100
200
300
r = 0.906 MBE = 1.28%
Jan
Mar
May
Jul
Sep
Nov

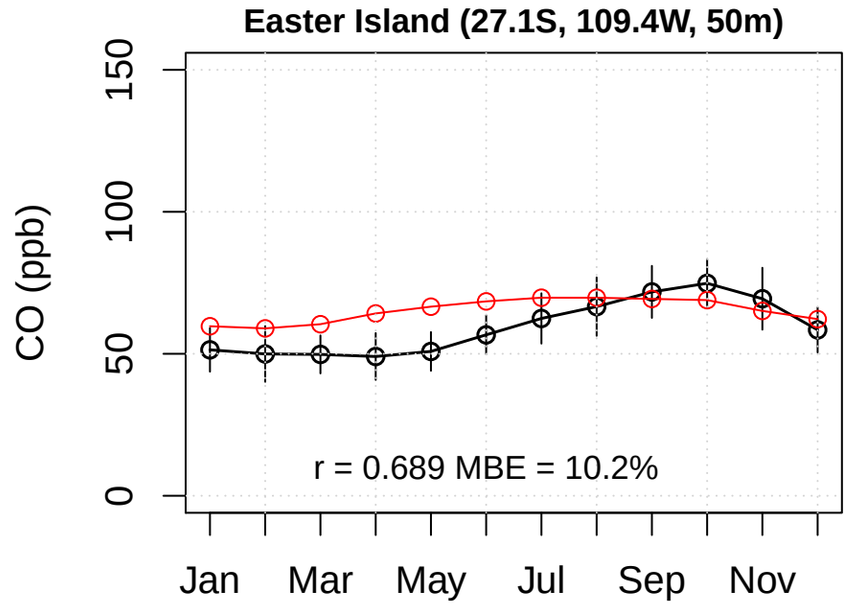

Mauna Loa (19.5N, 155.6W, 3397m)
CO (ppb)
0
100
200
300
r = 0.869 MBE = −12.1%
Jan
Mar
May
Jul
Sep
Nov

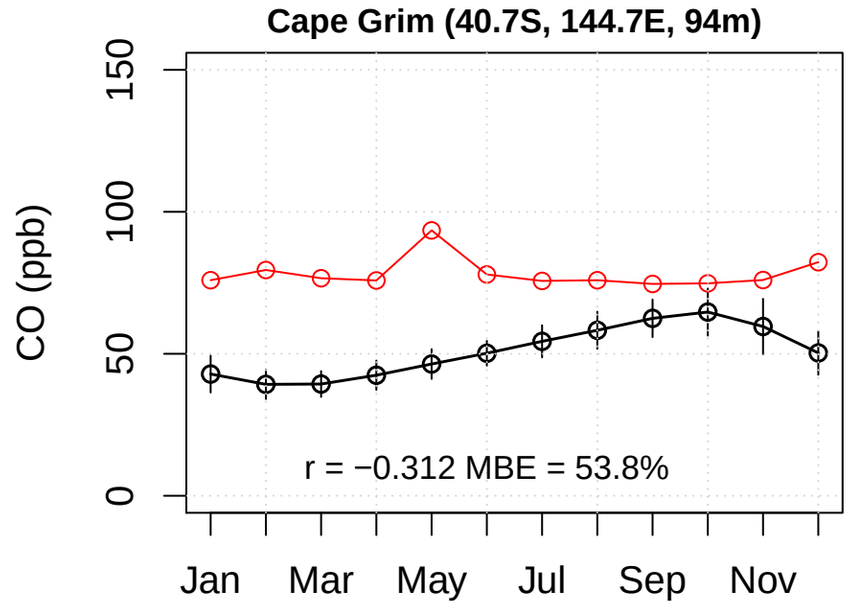

Ragged Point (13.2N, 59.4W, 45m)
CO (ppb)
0
50
100
150
200
r = 0.902 MBE = −14.7%
Jan
Mar
May
Jul
Sep
Nov

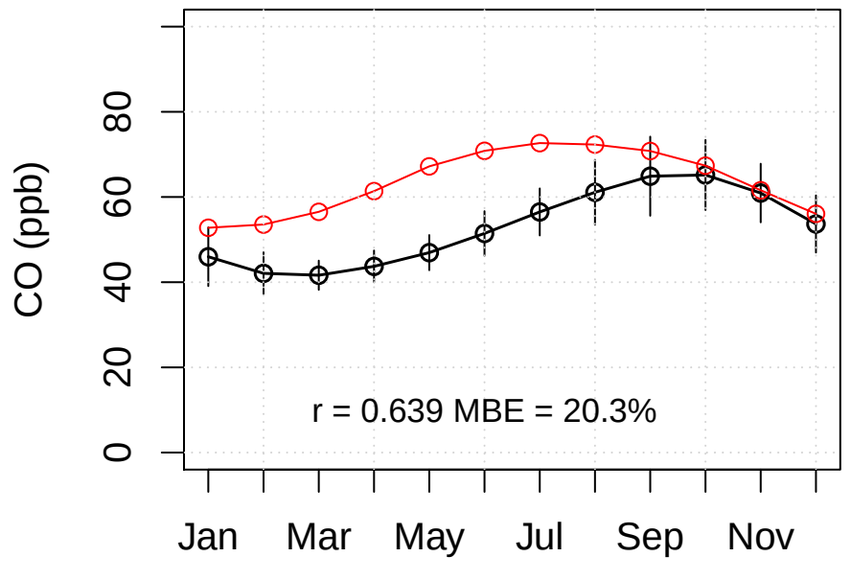

Christmas Island (1.7N, 157.2W, 3m)
CO (ppb)
0
50
100
150
200
r = 0.866 MBE = −4.5%
Jan
Mar
May
Jul
Sep
Nov

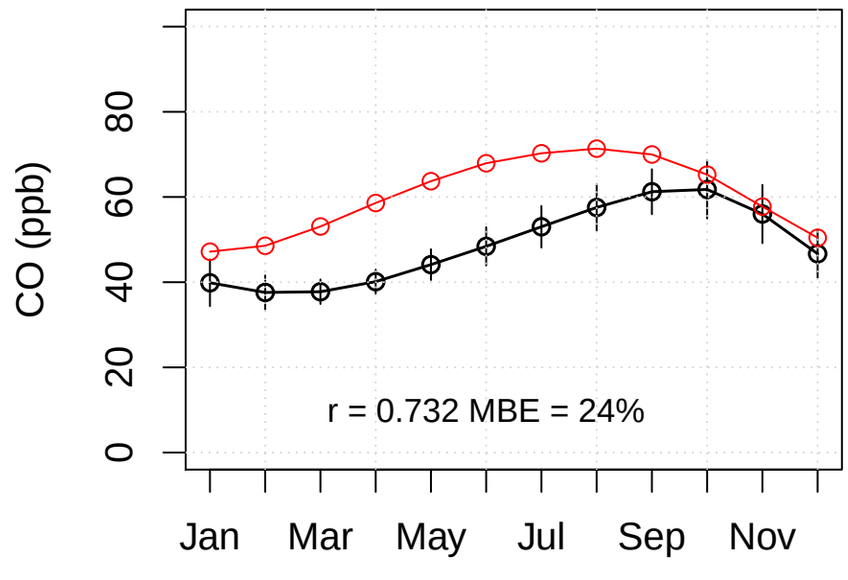

Ascension Island (7.9S, 14.4W, 54m)
CO (ppb)
0
50
100
150
200
r = 0.397 MBE = 6.04%
Jan
Mar
May
Jul
Sep
Nov

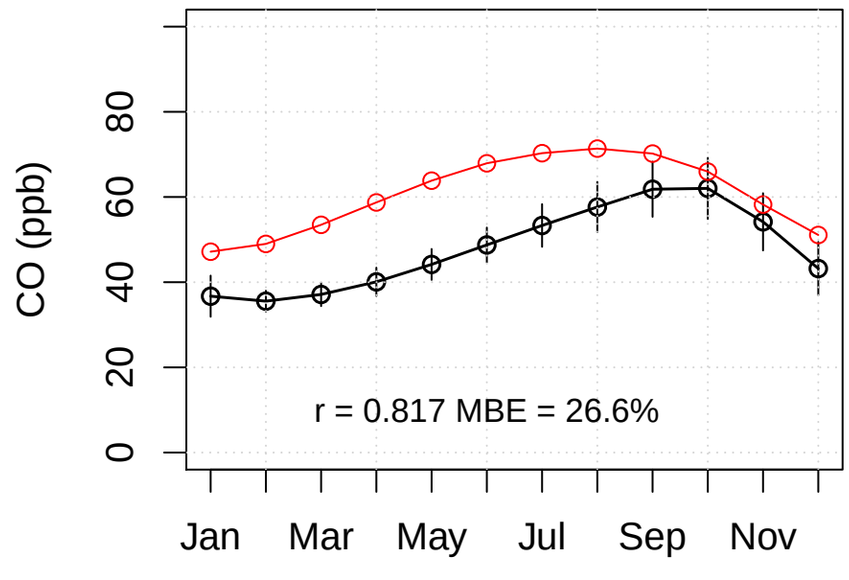

Samoa (14.2S, 170.5W, 42m)
CO (ppb)
0
50
100
150
r = 0.263 MBE = 12.6%
Jan
Mar
May
Jul
Sep
Nov

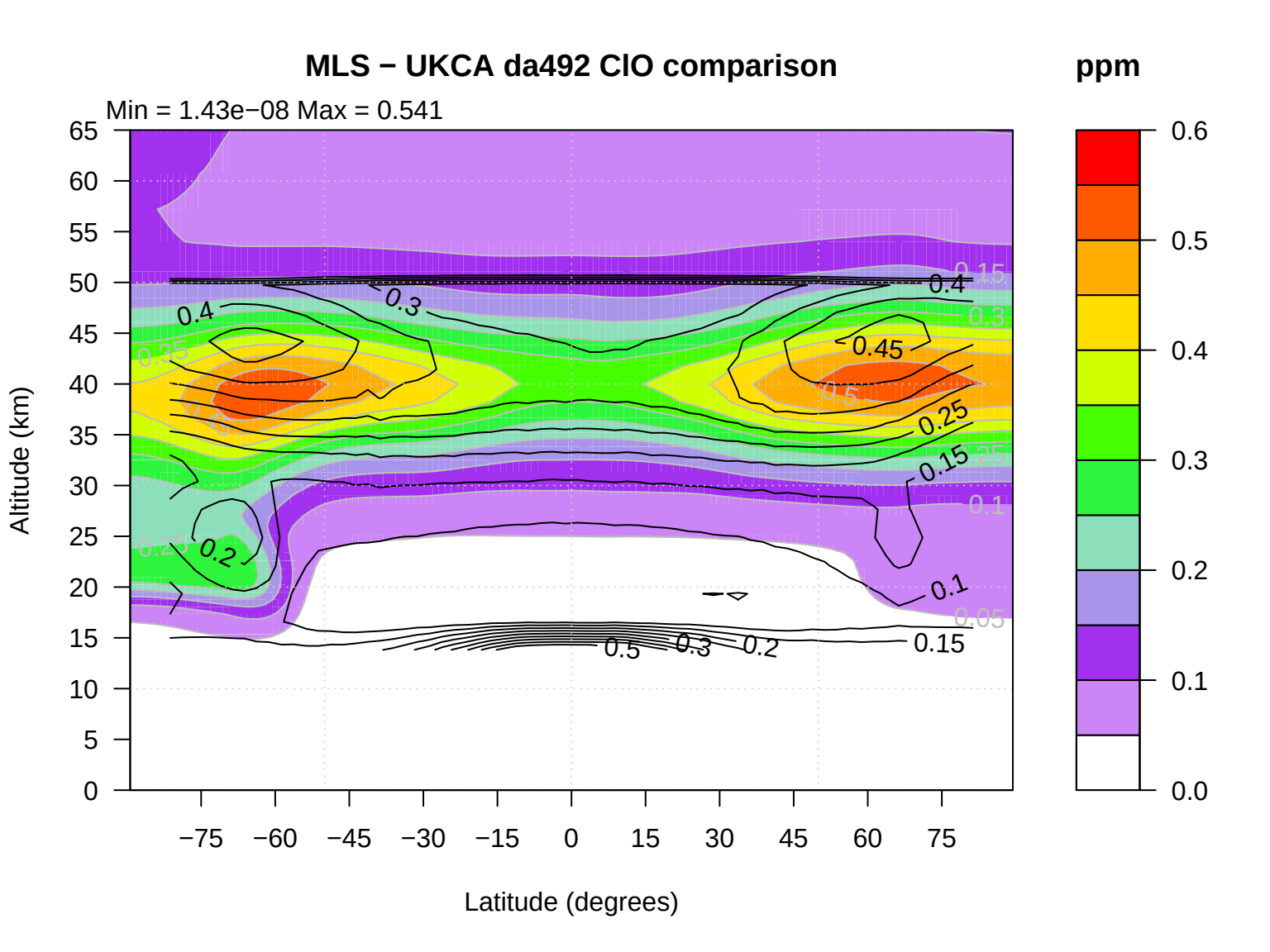

Easter Island (27.1S, 109.4W, 50m)
CO (ppb)
0
50
100
150
r = 0.689 MBE = 10.2%
Jan
Mar
May
Jul
Sep
Nov

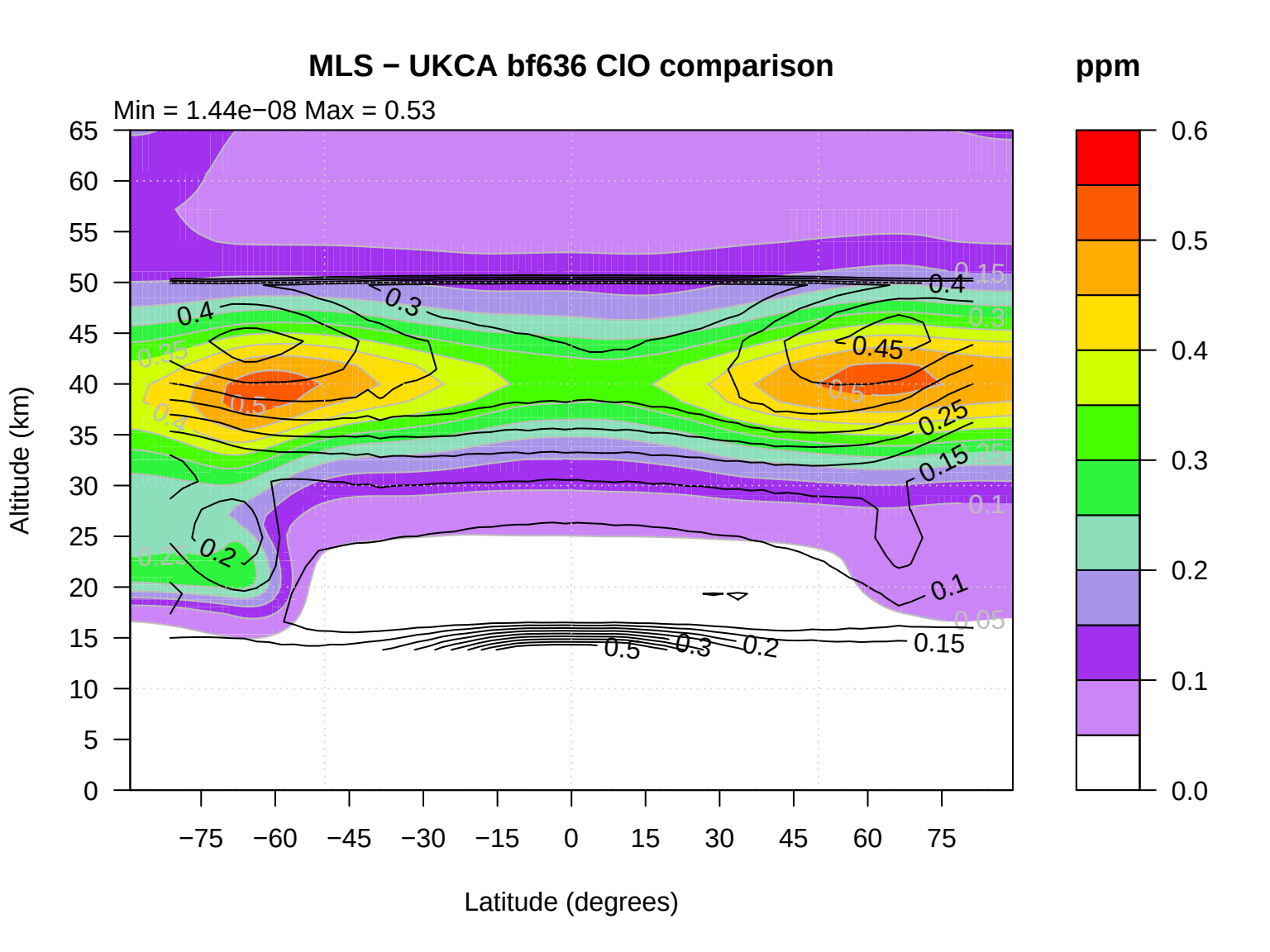

Cape Grim (40.7S, 144.7E, 94m)
CO (ppb)
0
50
100
150
r = −0.312 MBE = 53.8%
Jan
Mar
May
Jul
Sep
Nov


Crozet Island (46.5S, 51.8E, 120m)
CO (ppb)
0
20
40
60
80
r = 0.639 MBE = 20.3%
Jan
Mar
May
Jul
Sep
Nov

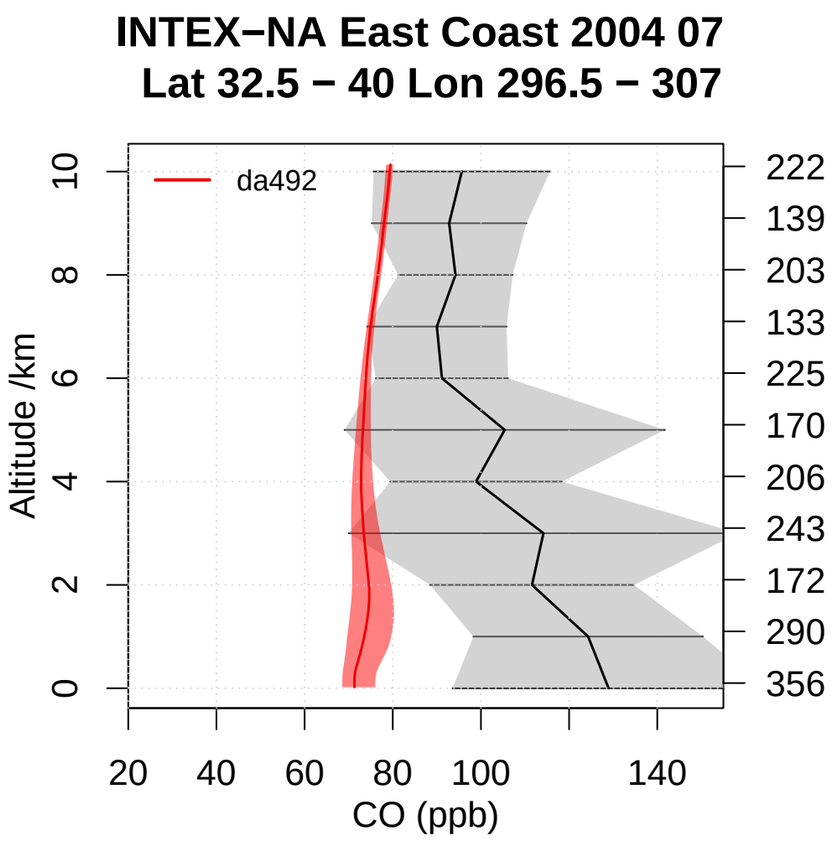

Syowa Station (69.0S, 39.6E, 11m)
CO (ppb)
0
20
40
60
80
r = 0.732 MBE = 24%
Jan
Mar
May
Jul
Sep
Nov

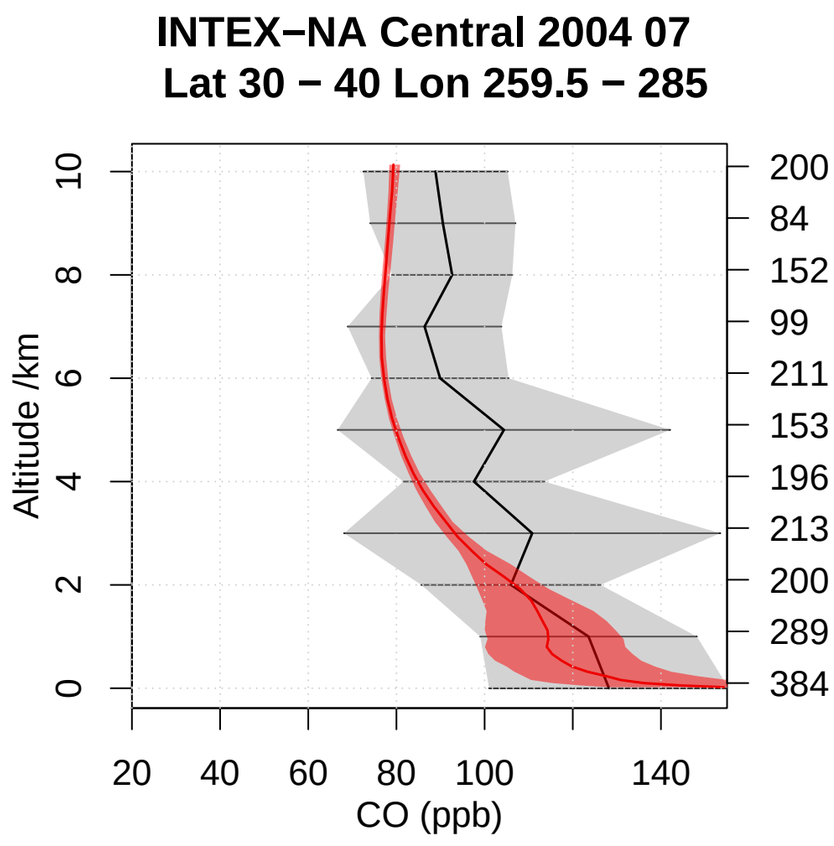

South Pole (90.0S, 24.8W, 2810m)
CO (ppb)
0
20
40
60
80
r = 0.817 MBE = 26.6%
Jan
Mar
May
Jul
Sep
Nov

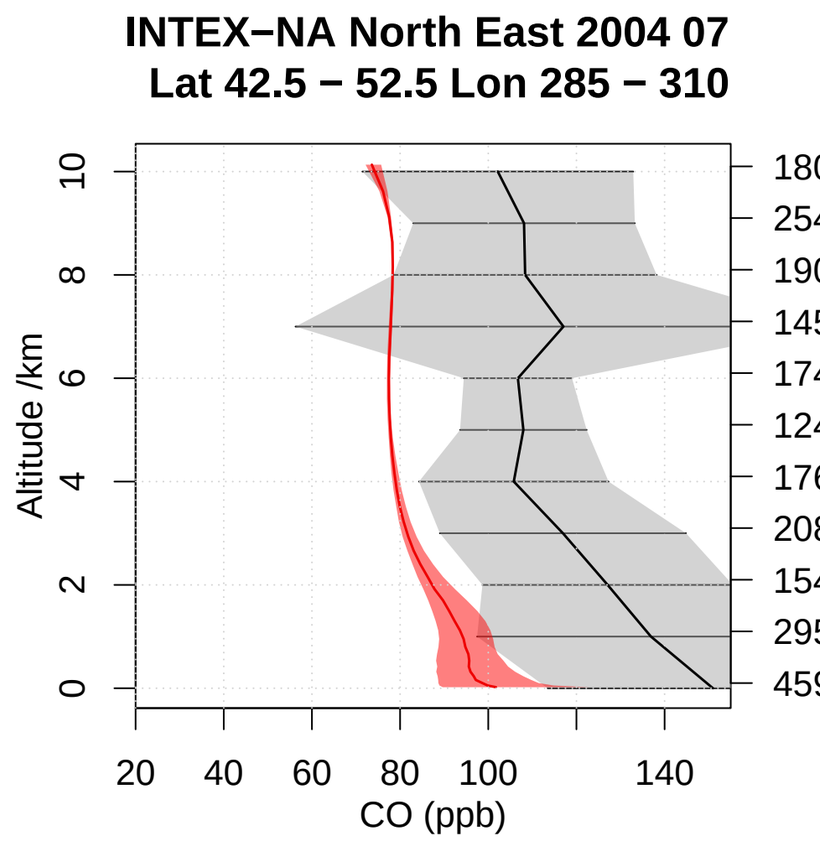

MLS − UKCA da492 ClO comparison
ppm
Min = 1.43e−08 Max = 0.541
Altitude (km)
Latitude (degrees)
65
60
55
50
45
40
35
30
25
20
15
10
5
0
−75
−60
−45
−30
−15
0
15
30
45
60
75
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.4
0.3
0.45
0.5
0.25
0.15
0.1
0.2
0.05

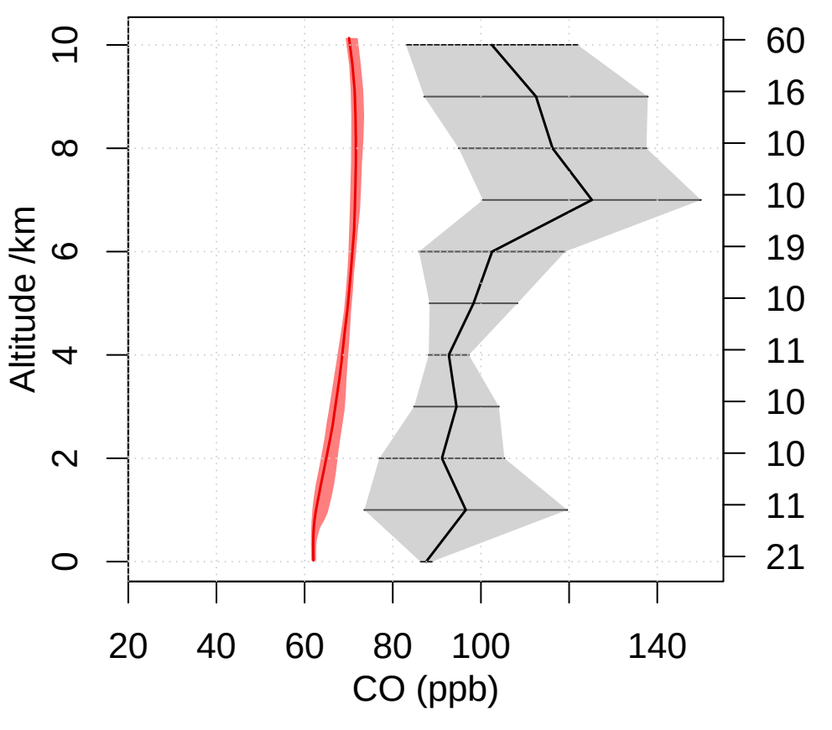

MLS − UKCA bf636 ClO comparison
ppm
Min = 1.44e−08 Max = 0.53
Altitude (km)
Latitude (degrees)
65
60
55
50
45
40
35
30
25
20
15
10
5
0
−75
−60
−45
−30
−15
0
15
30
45
60
75
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.4
0.3
0.45
0.25
0.15
0.1
0.2
0.5
0.3
0.2
0.15

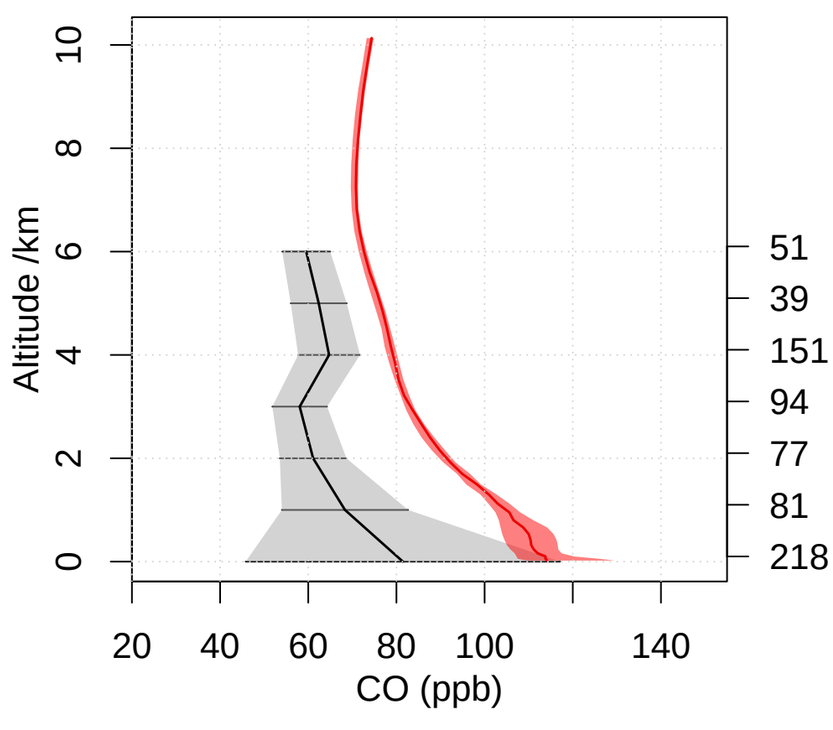
Emmons CO comparison

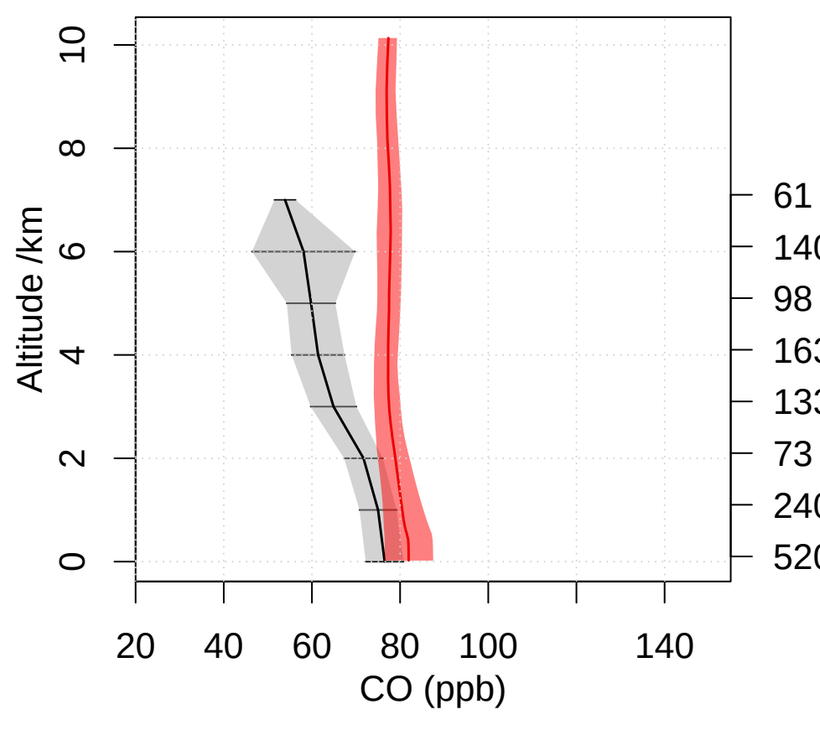


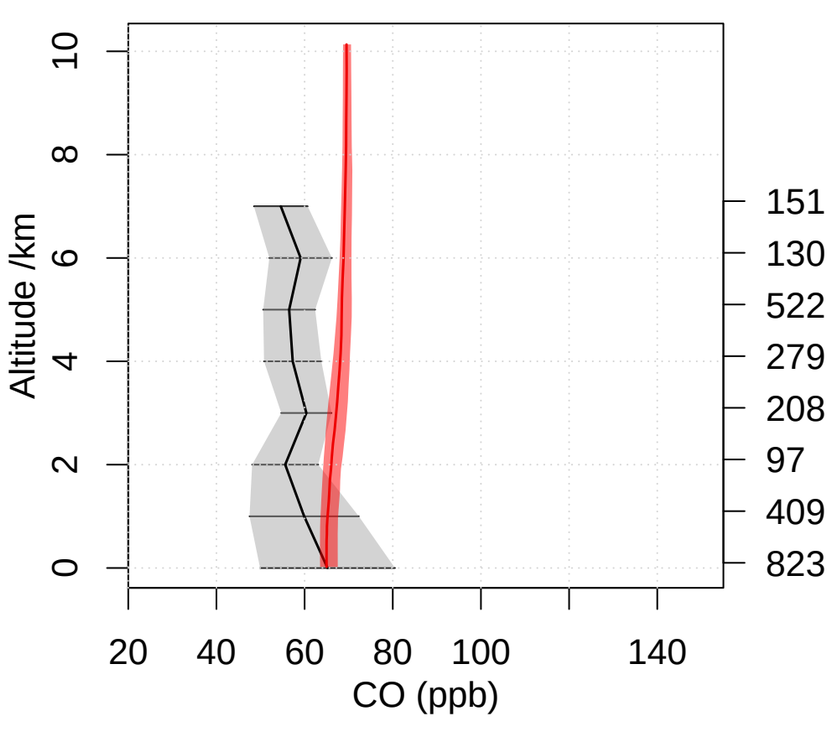


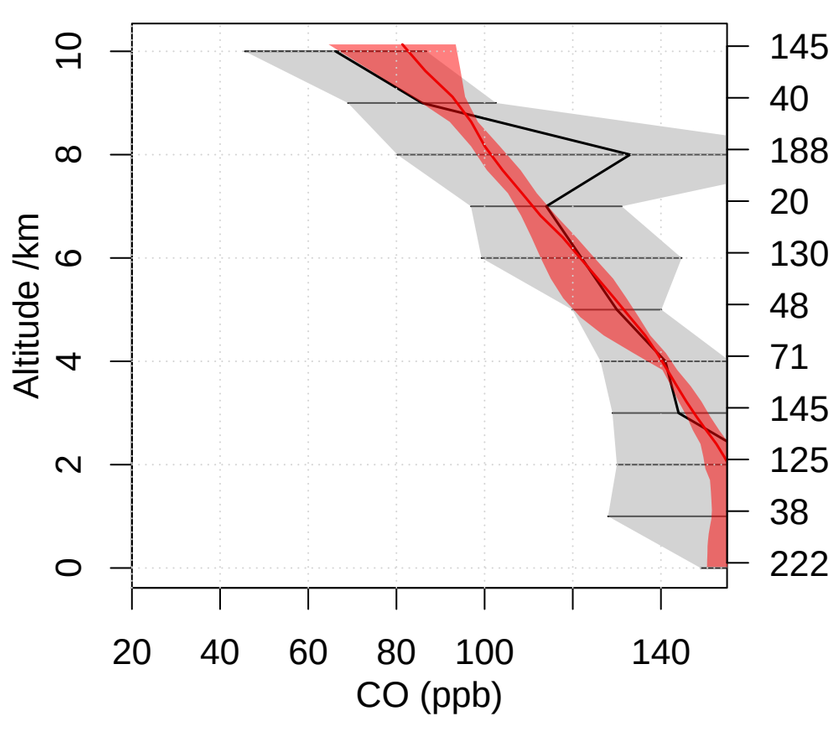


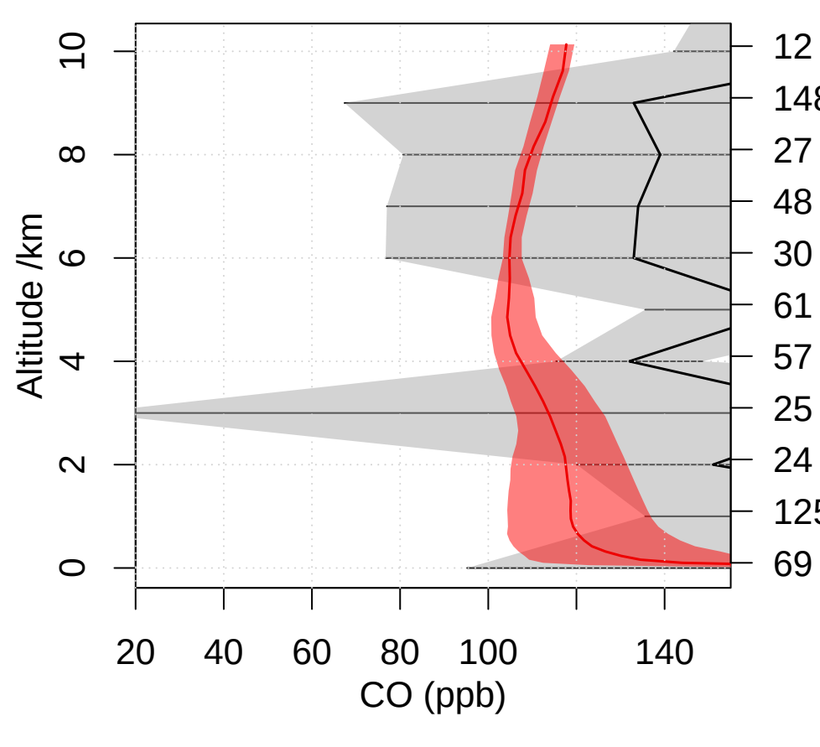


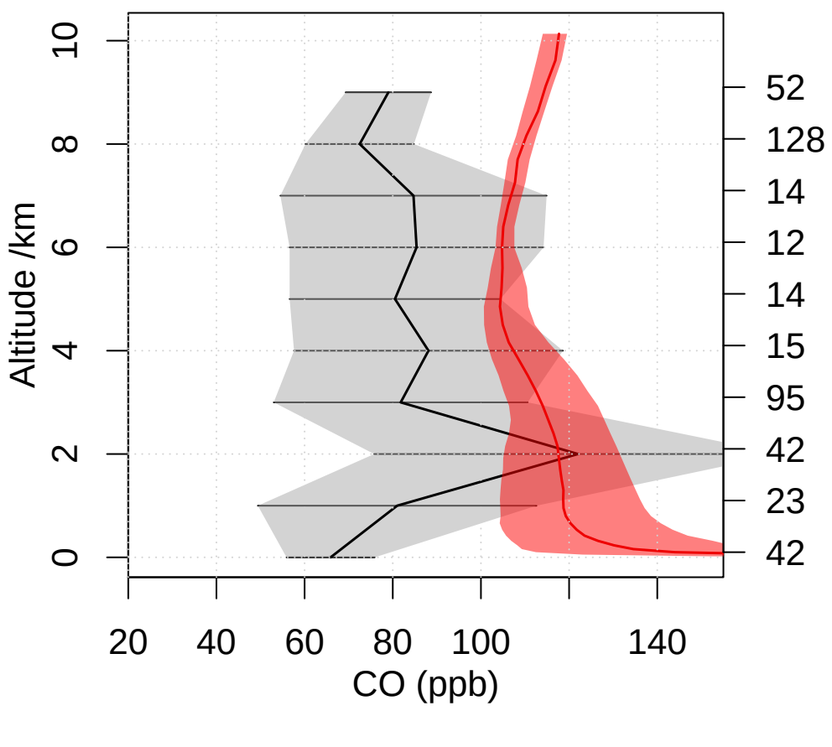


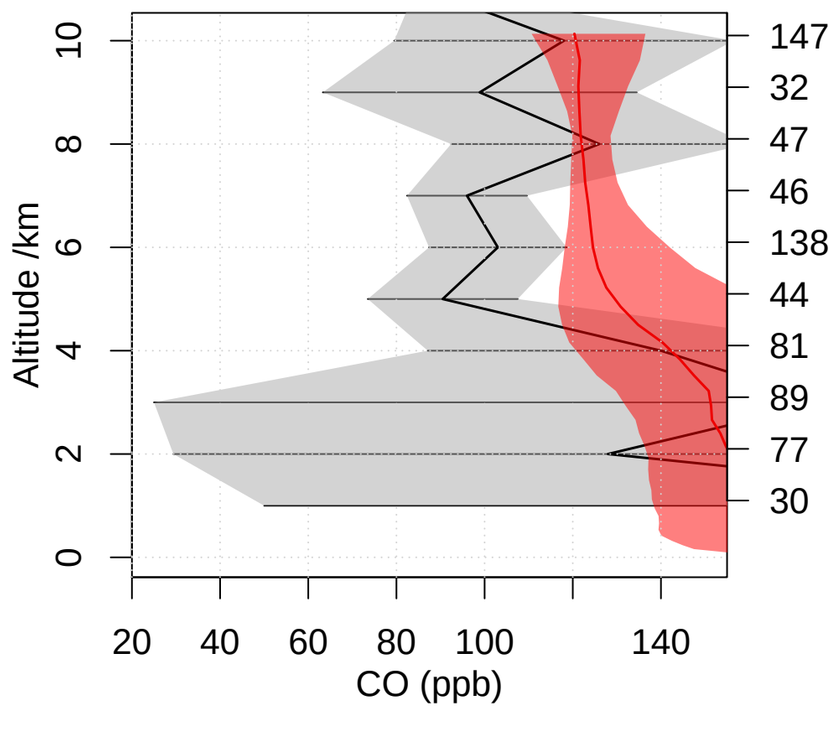


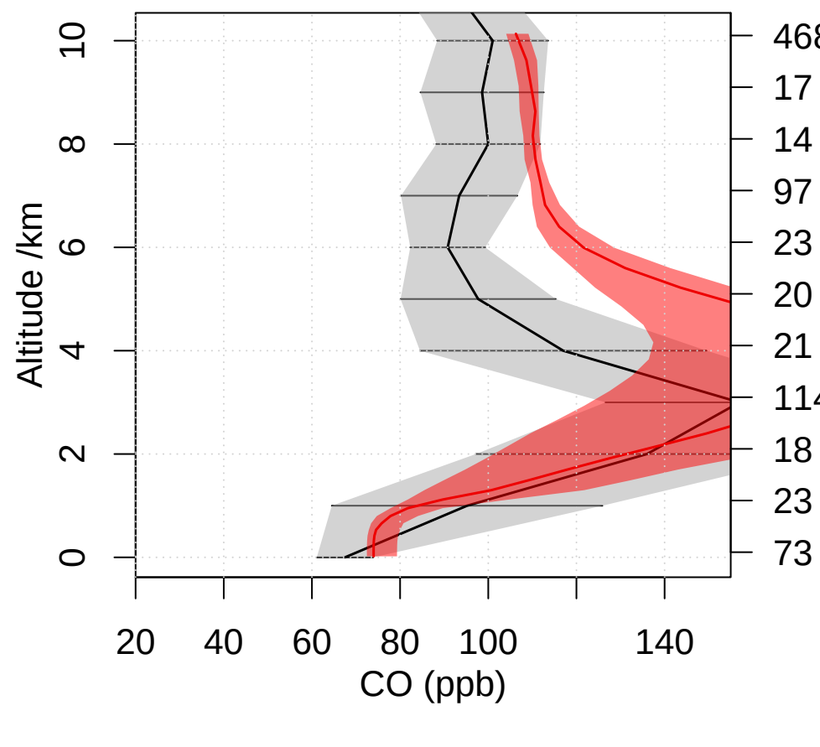




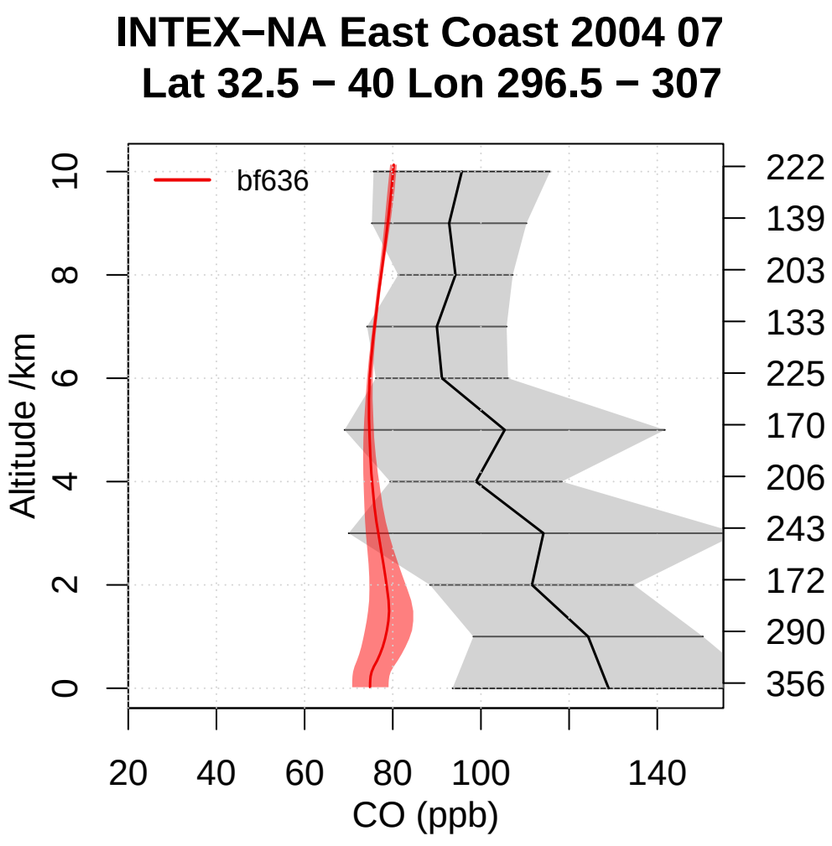


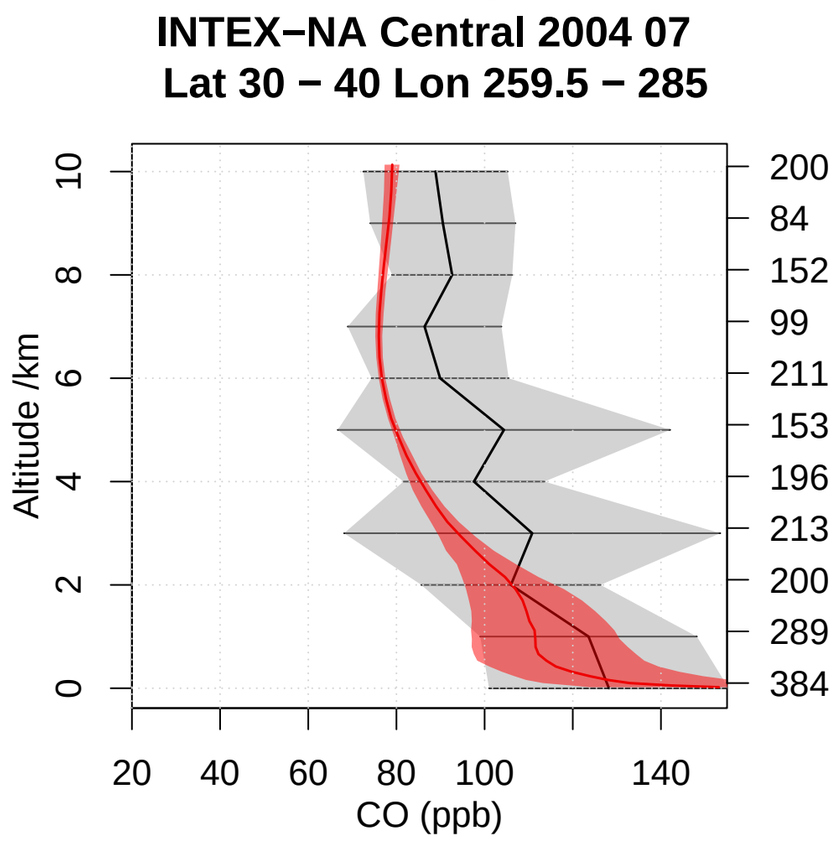


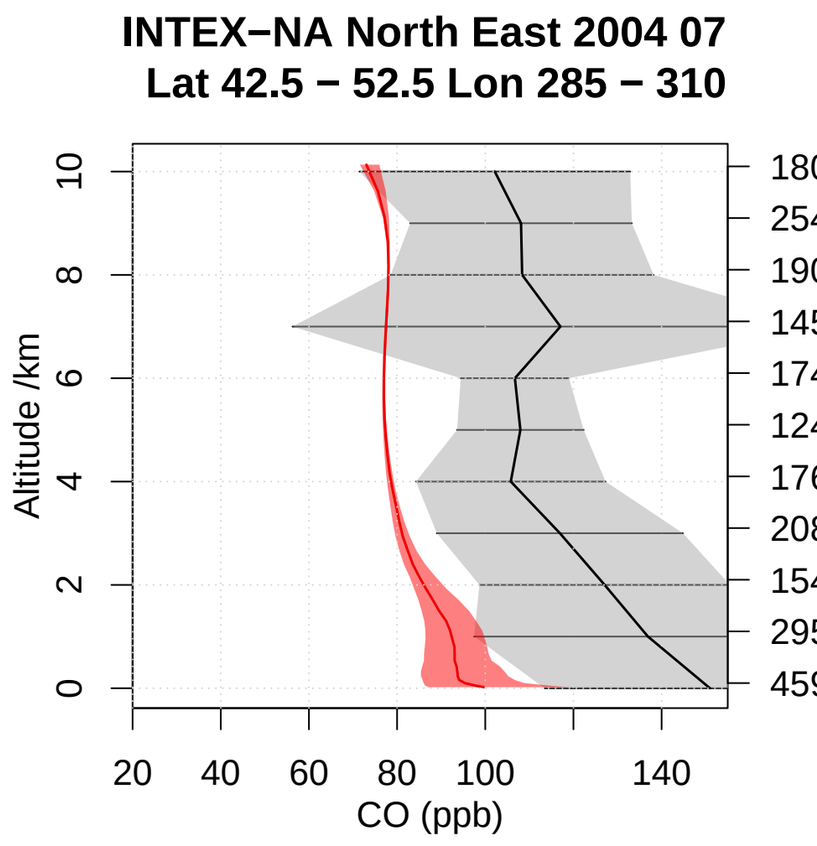


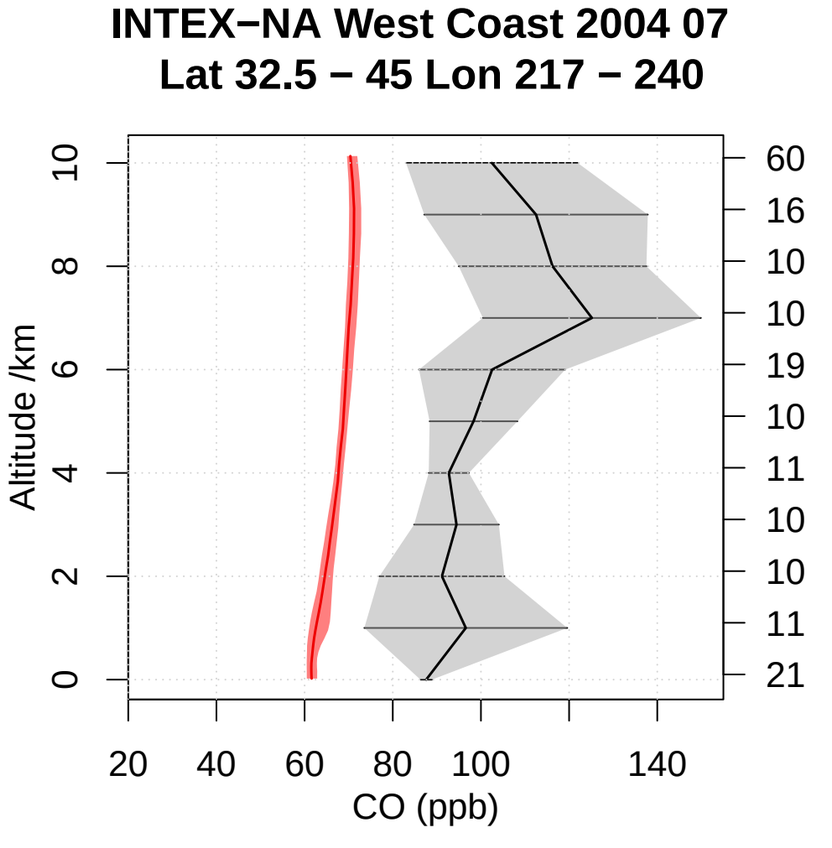


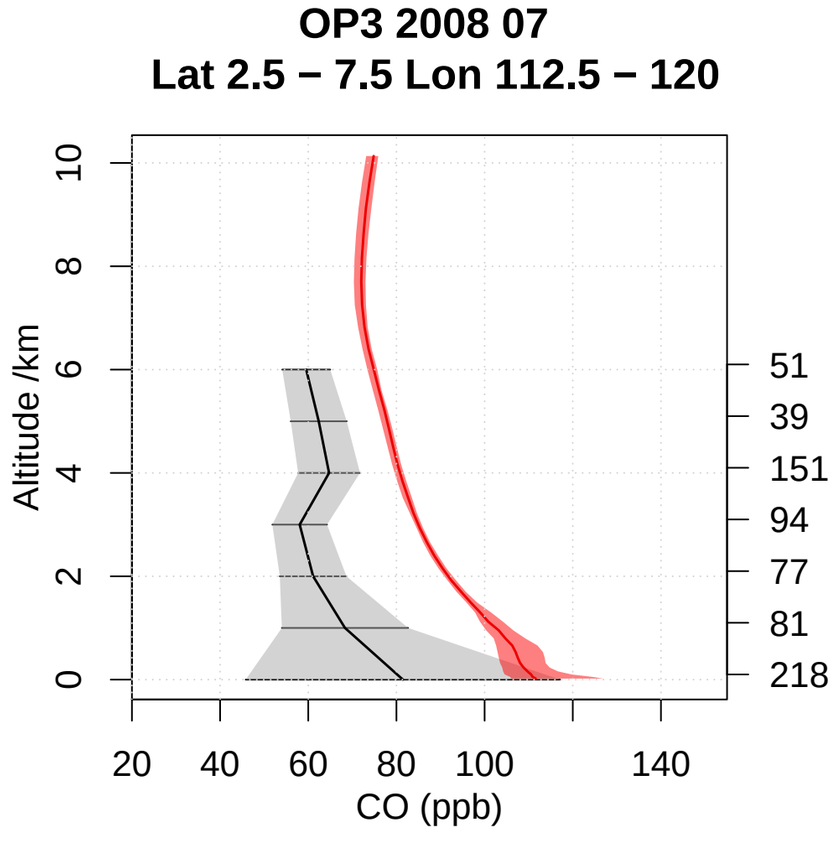
Emmons CO comparison

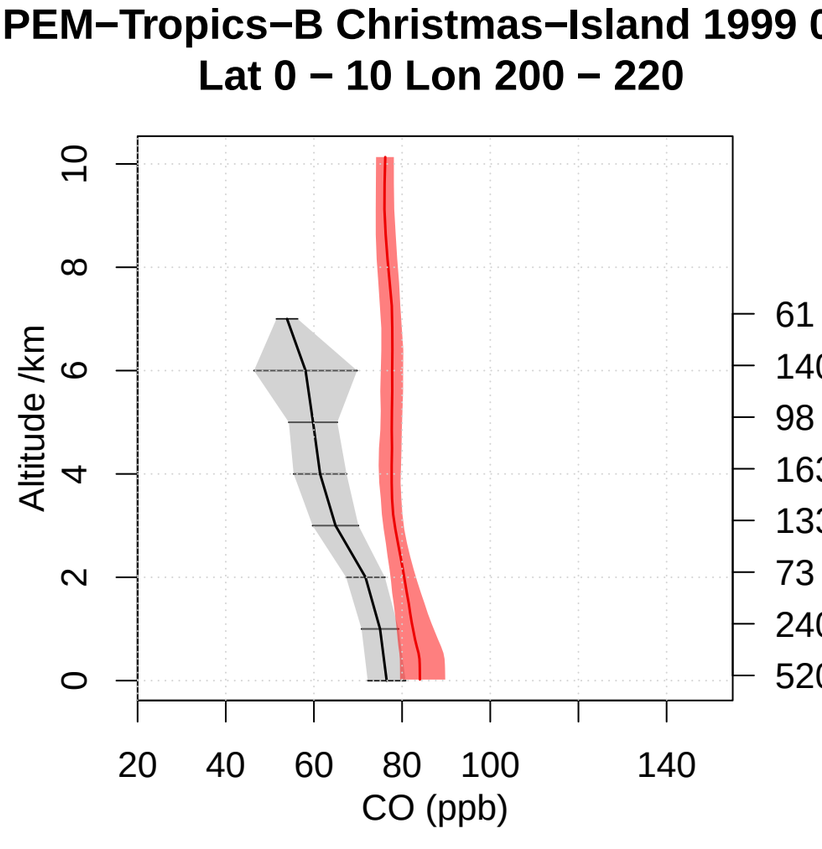


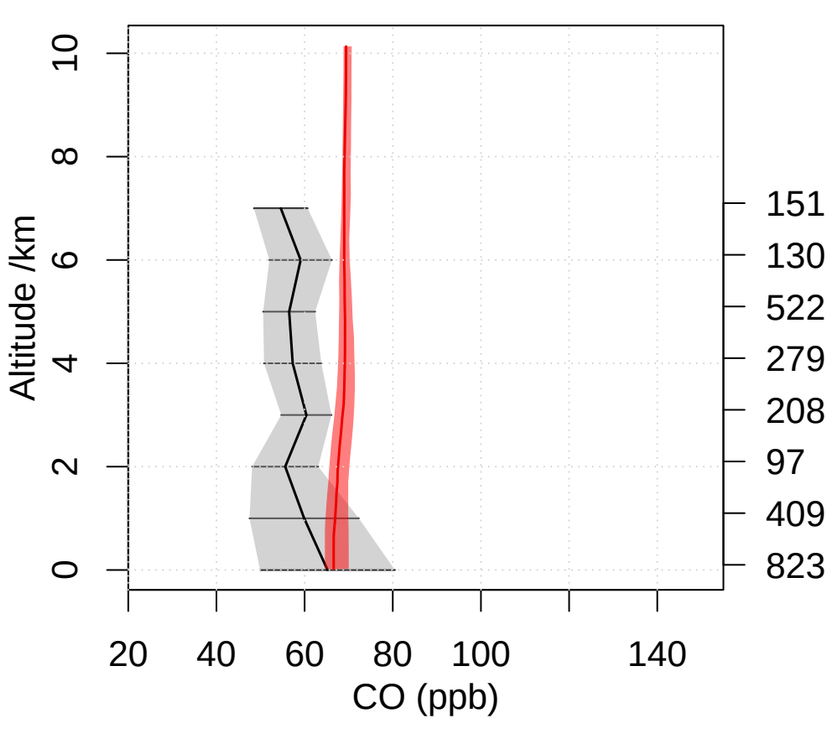


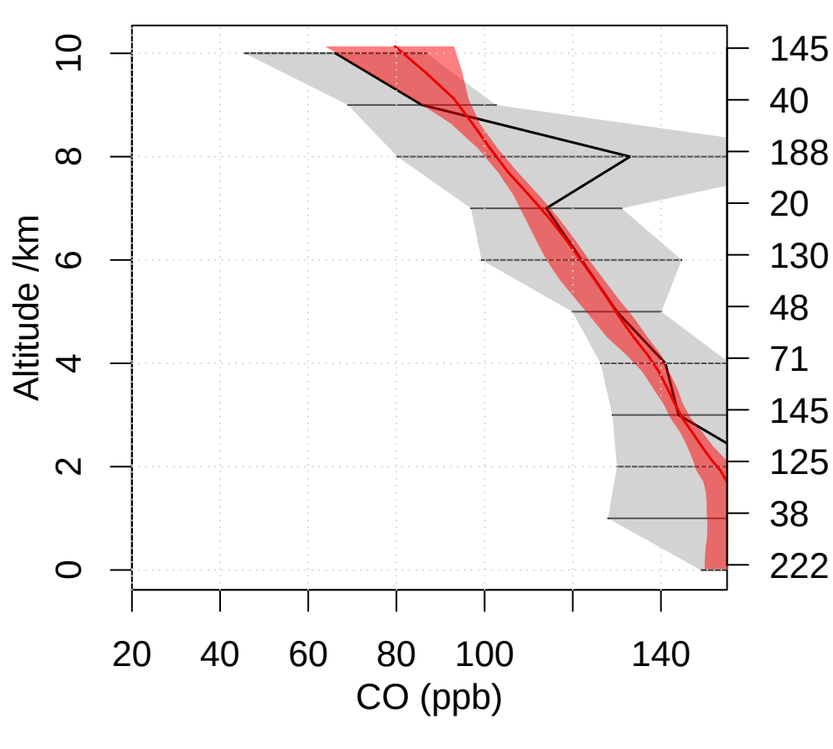


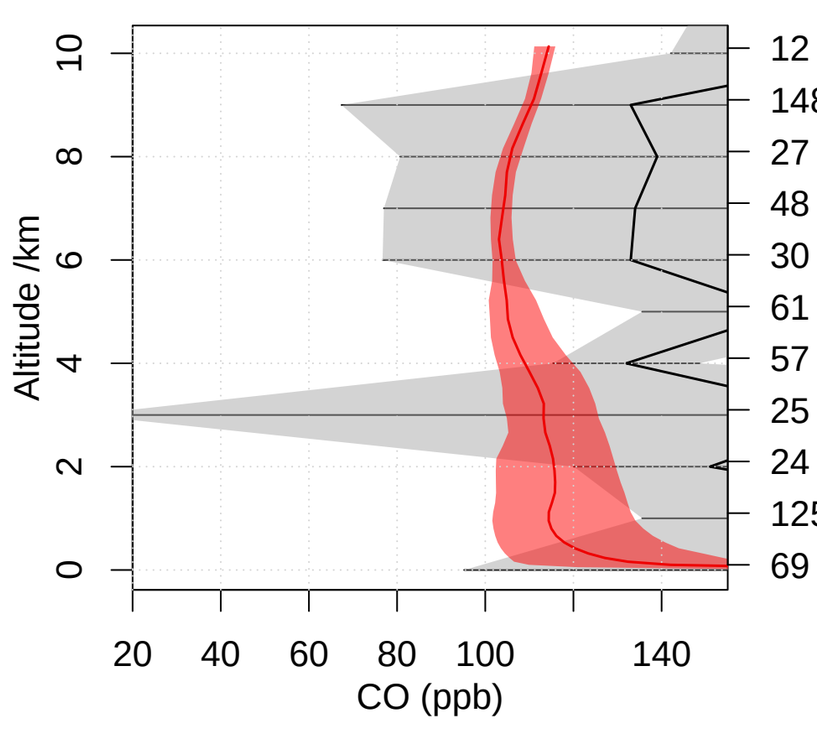


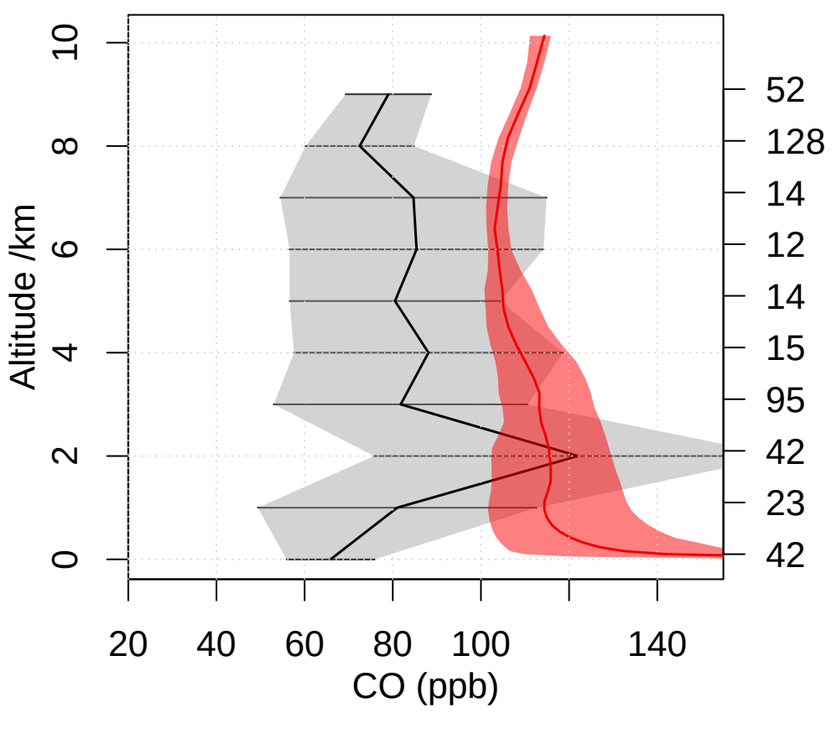


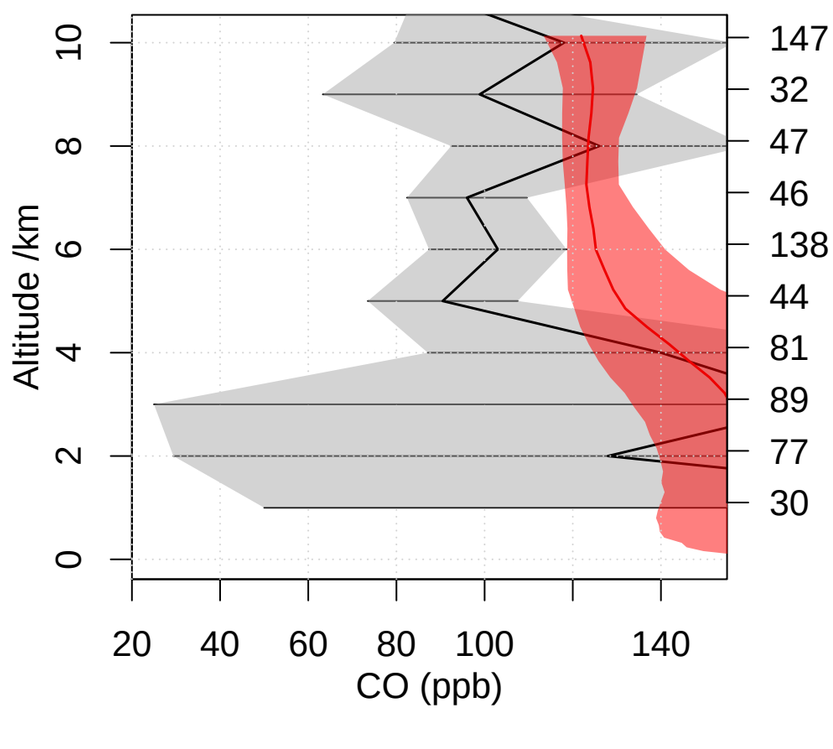


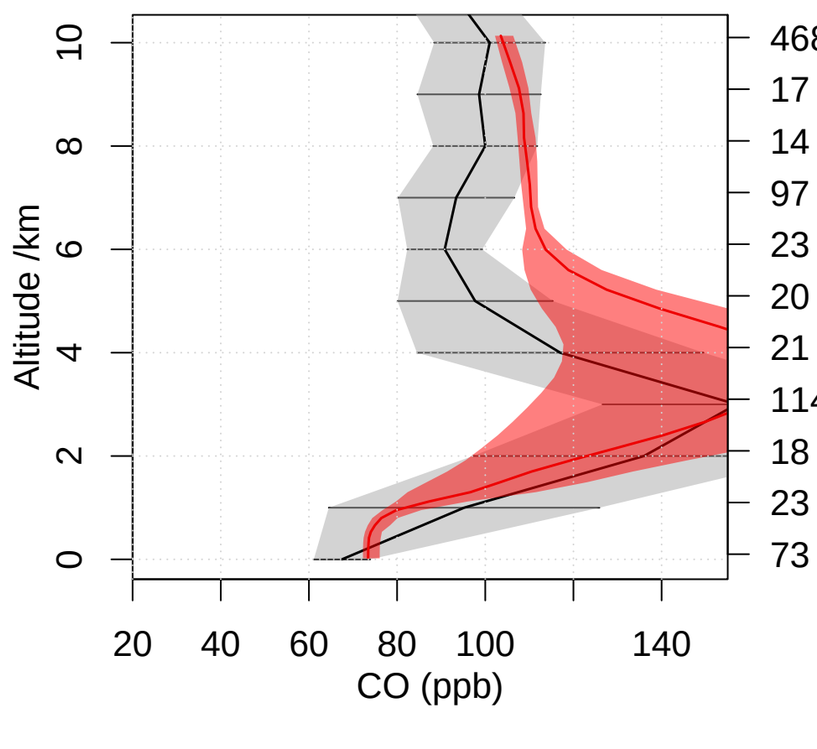




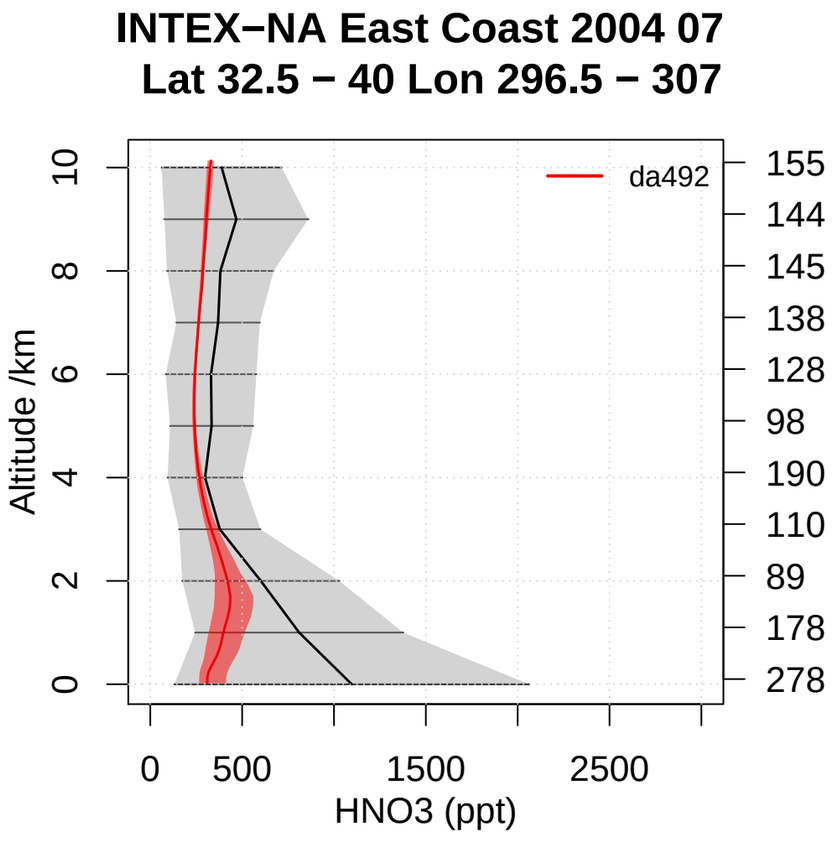


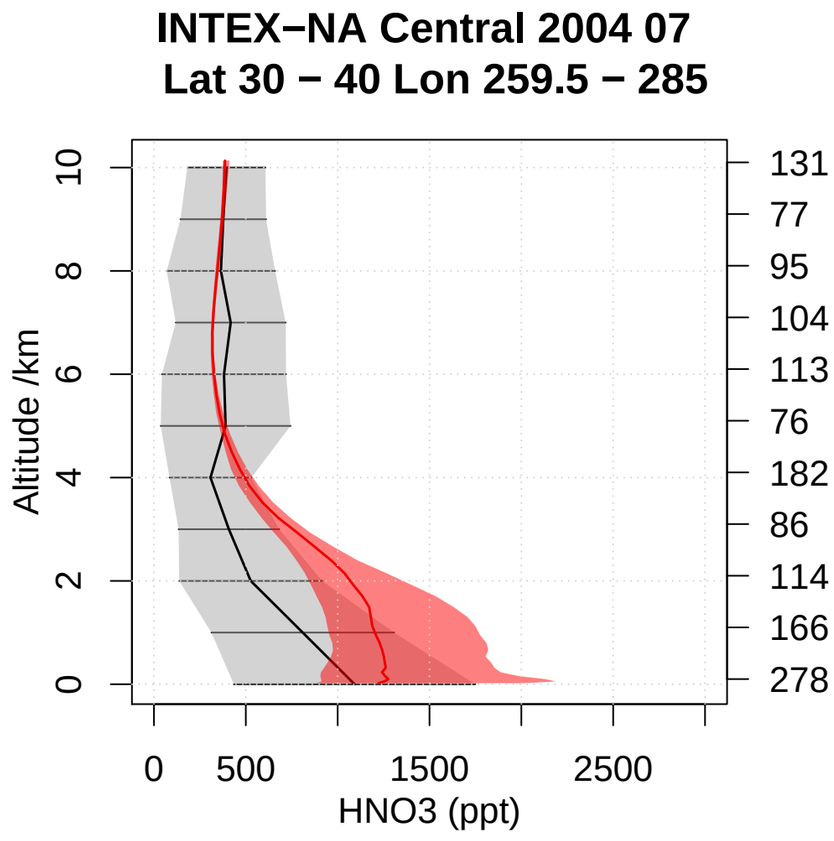


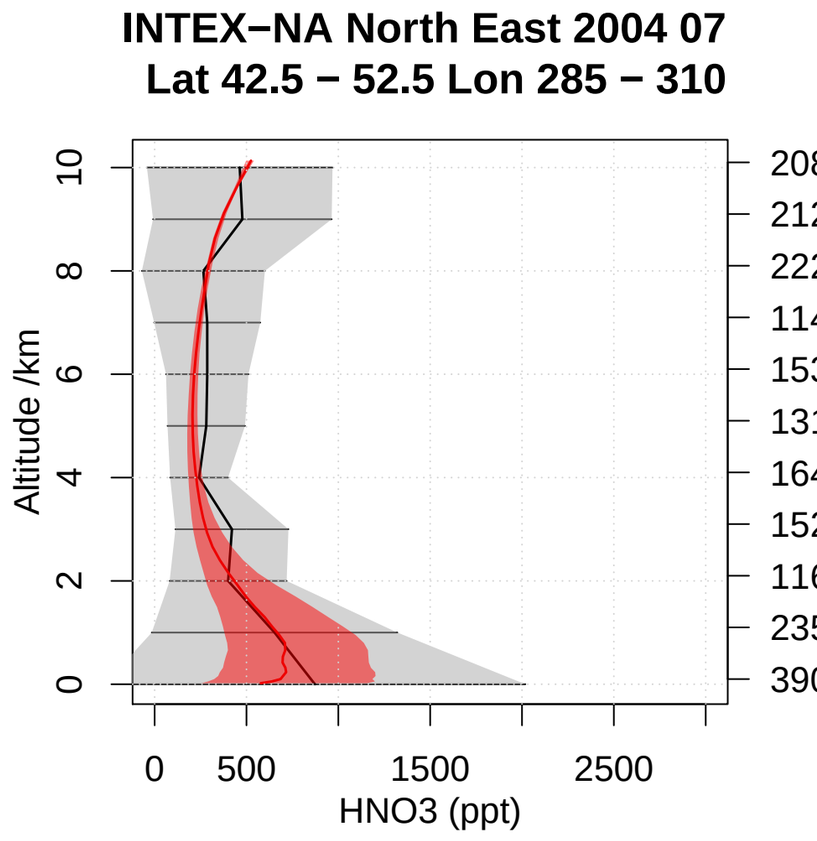


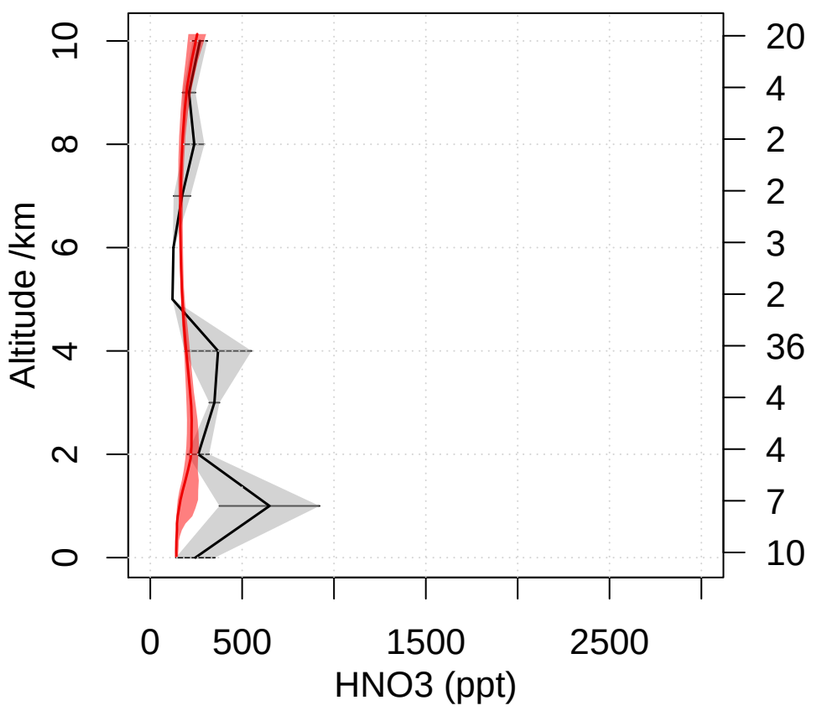


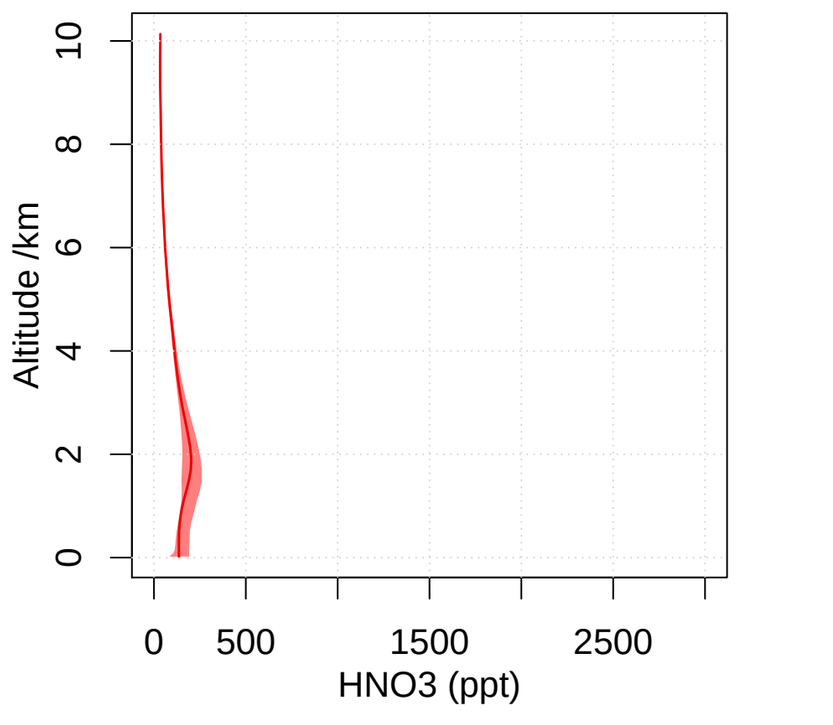
Emmons HNO3 comparison

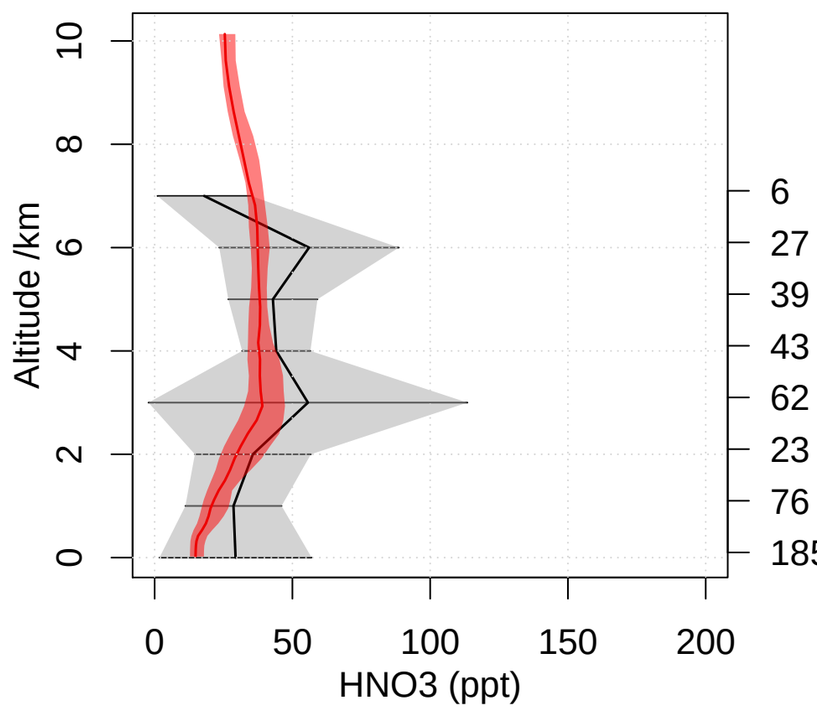


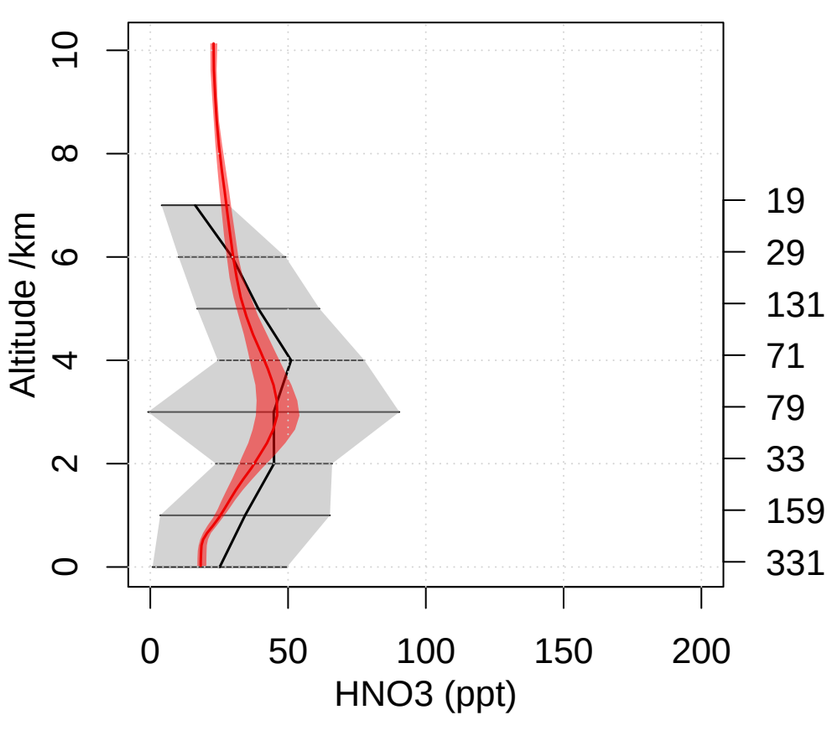


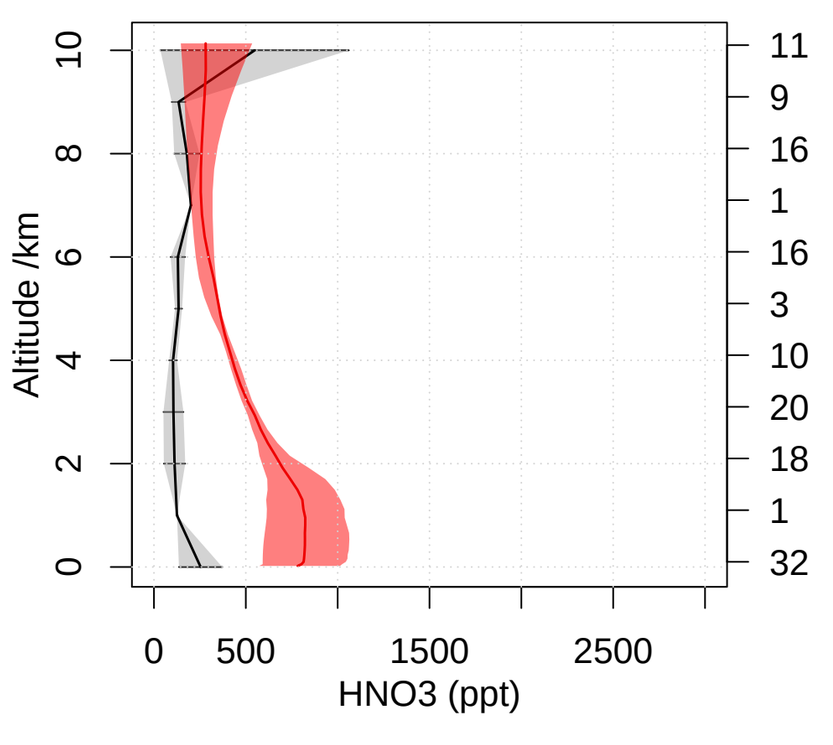


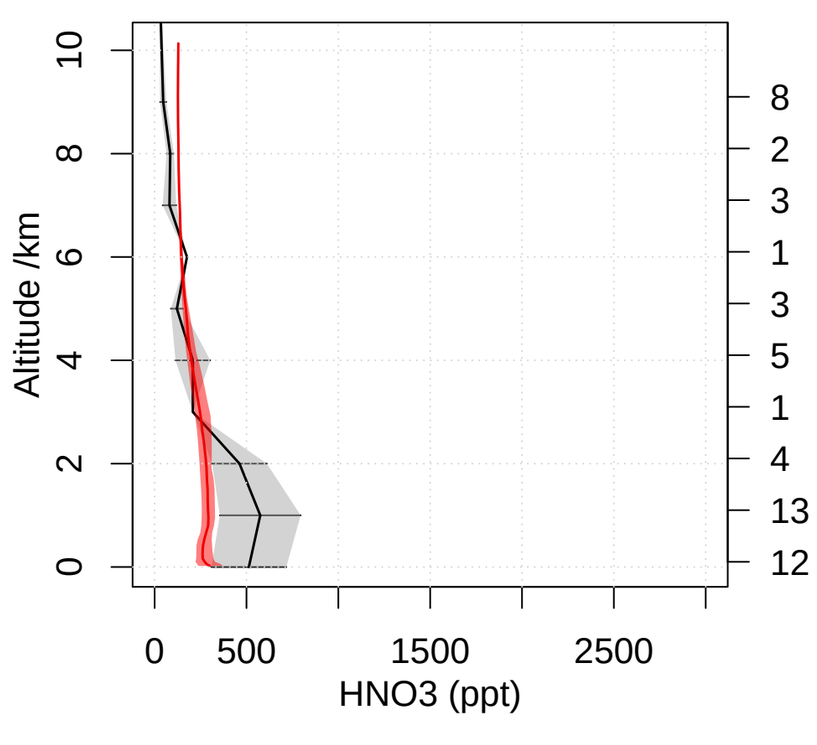


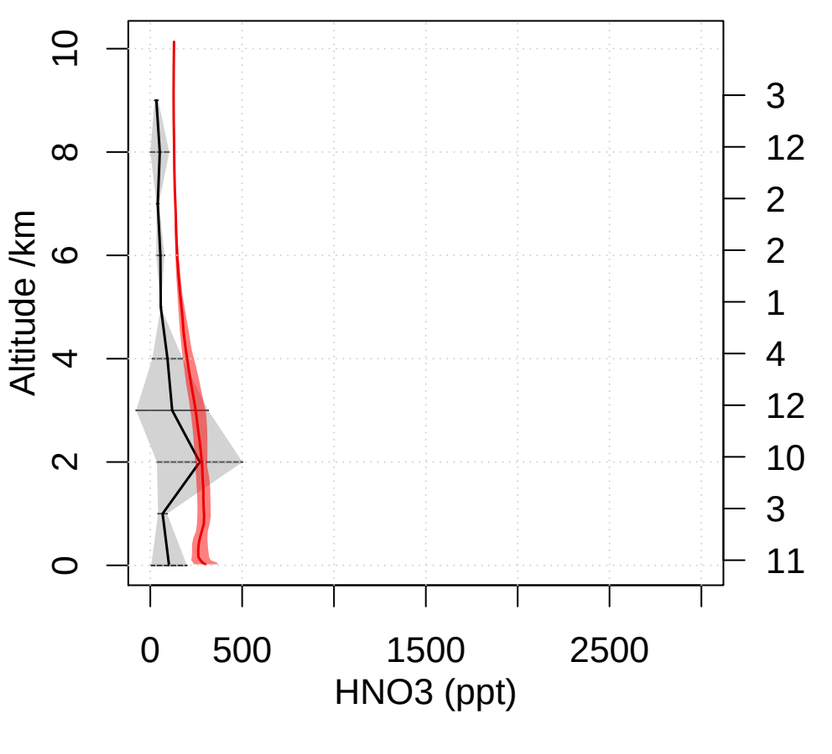


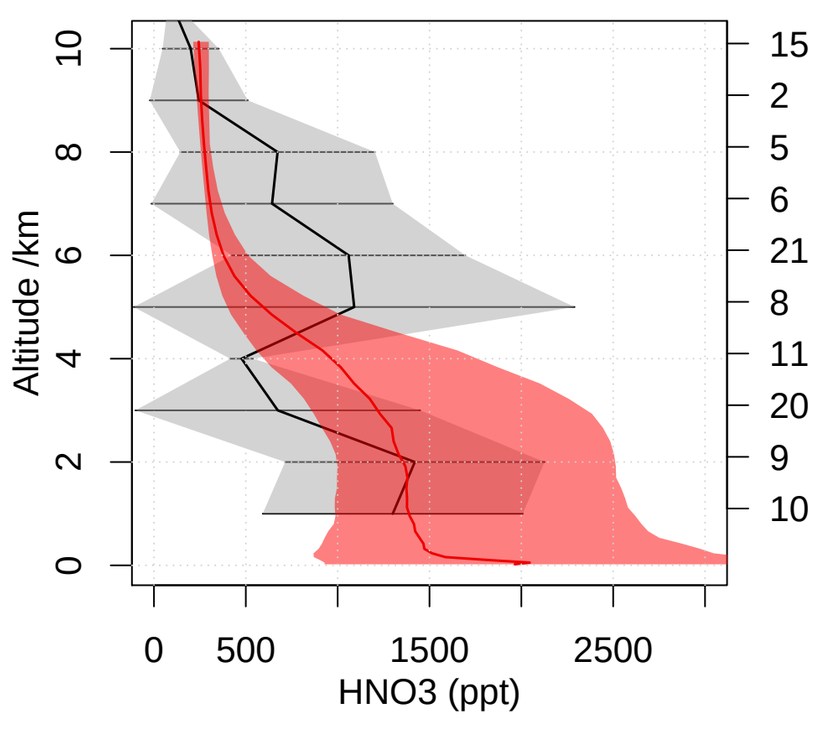


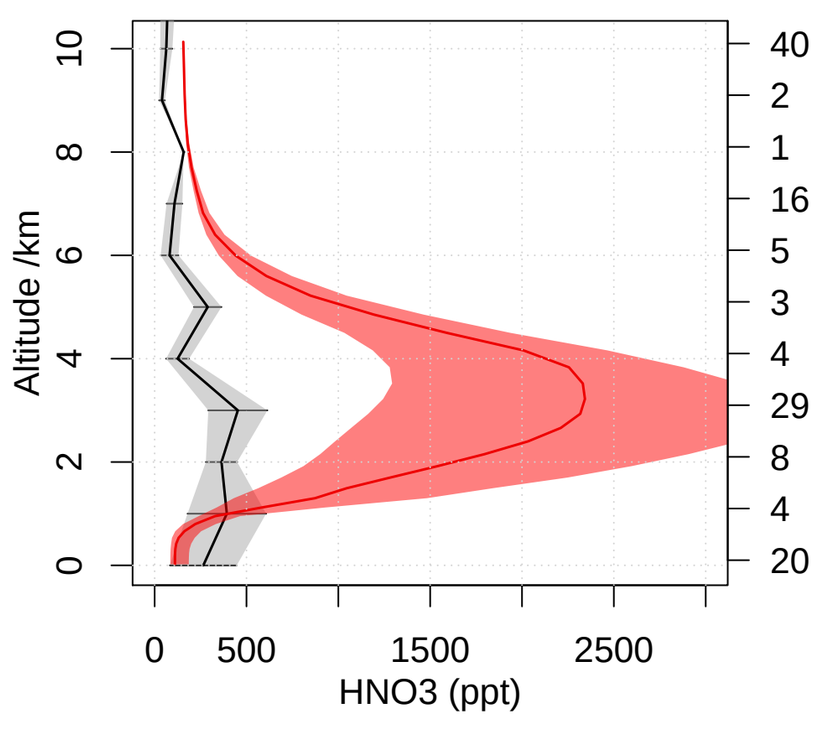




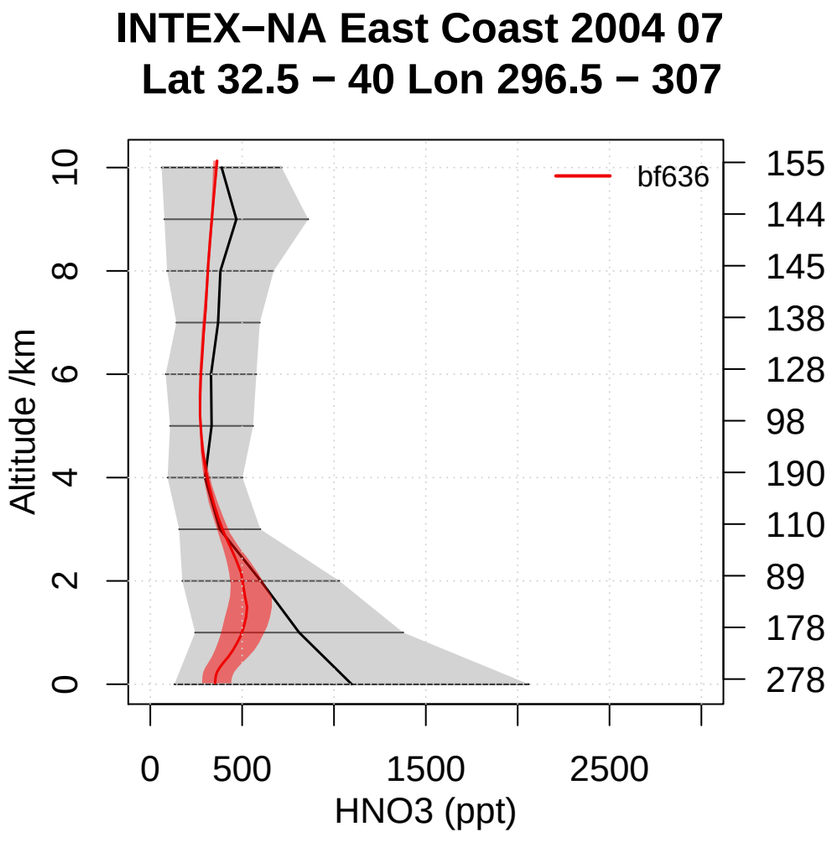


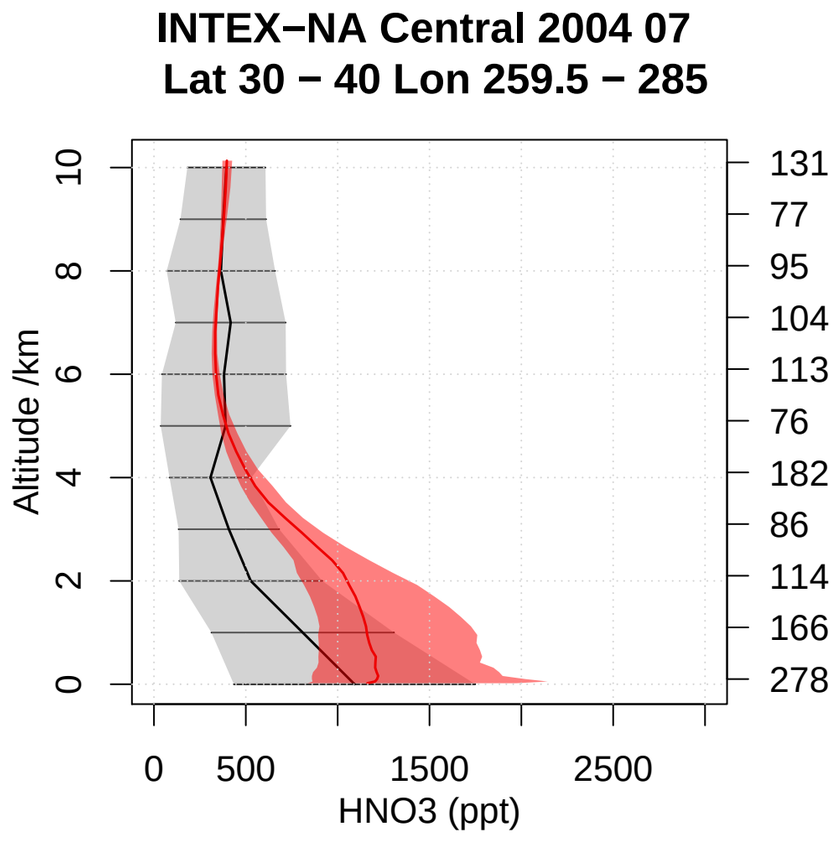


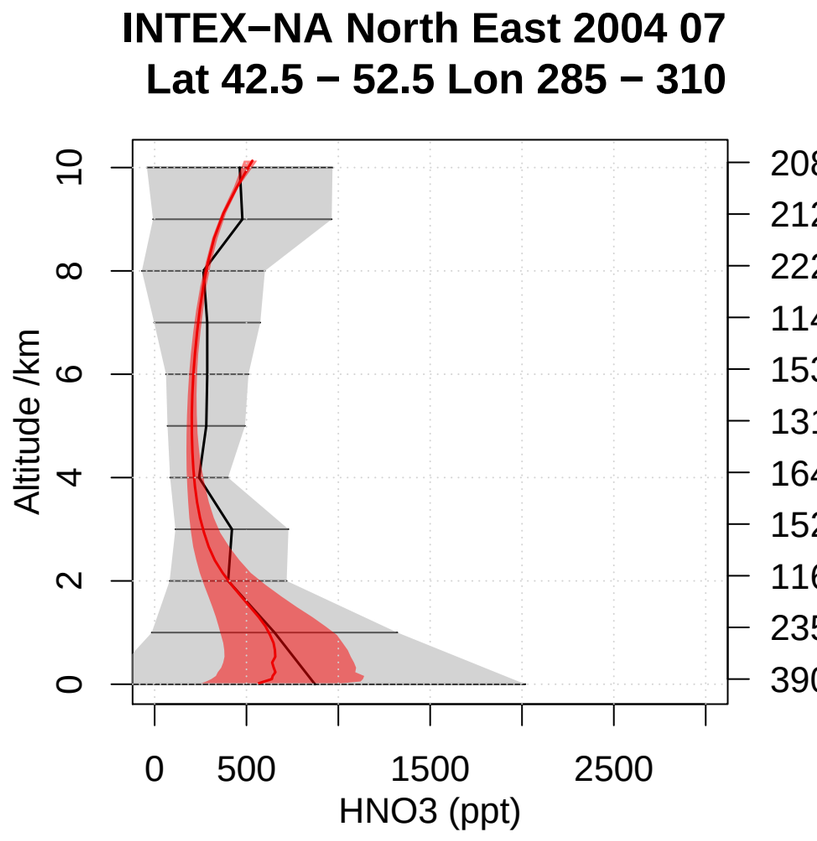


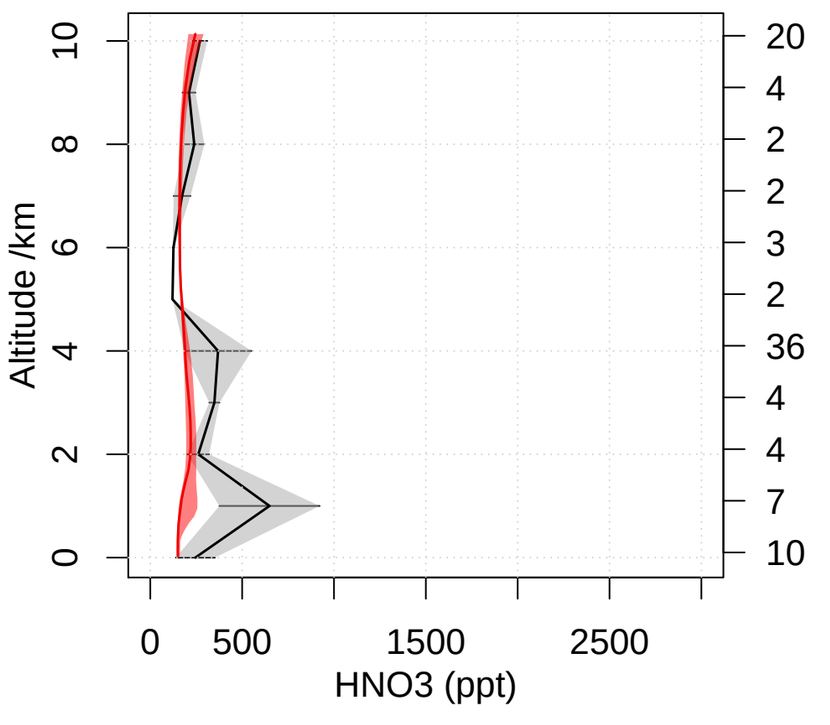


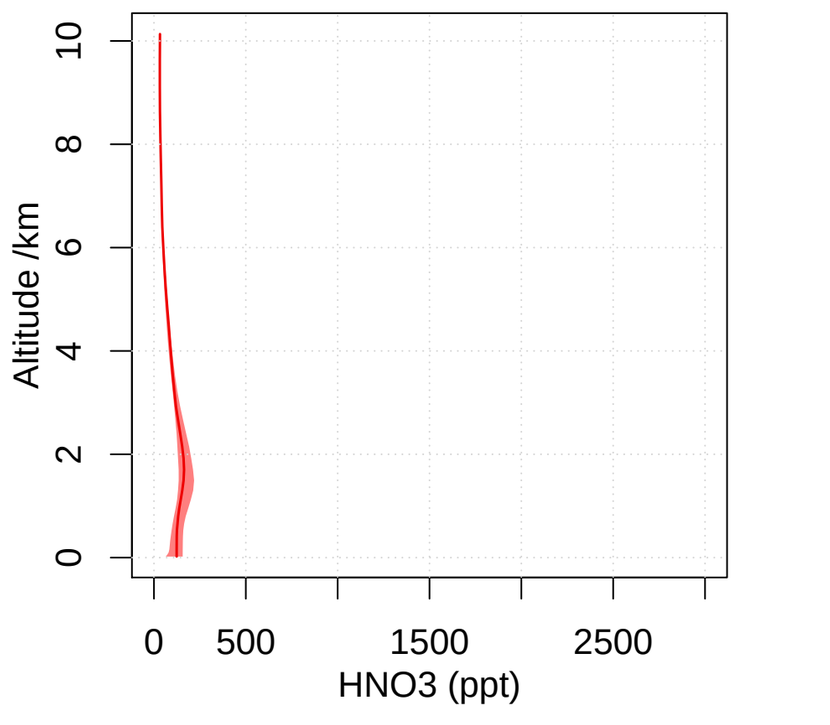
Emmons HNO3 comparison

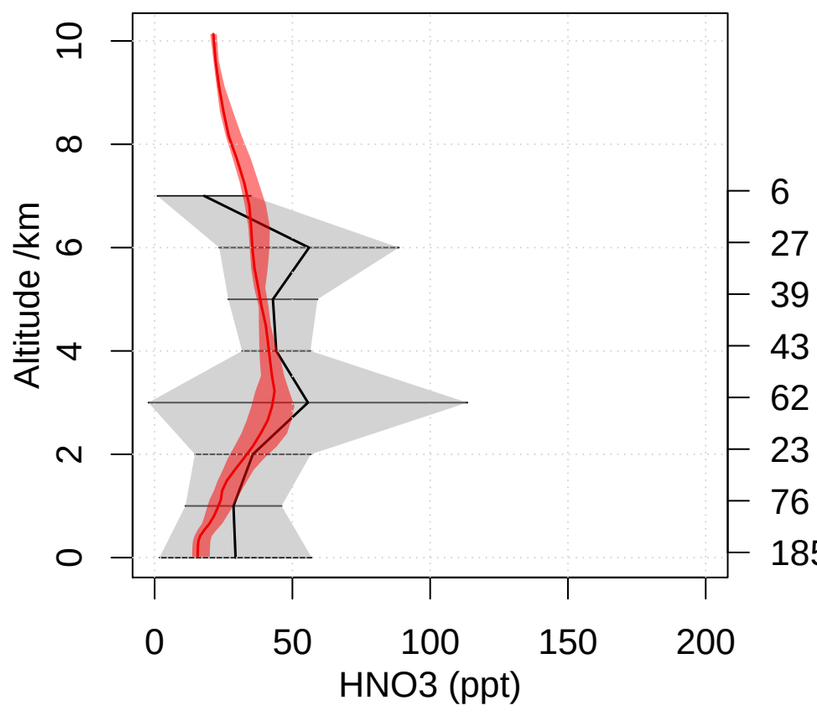


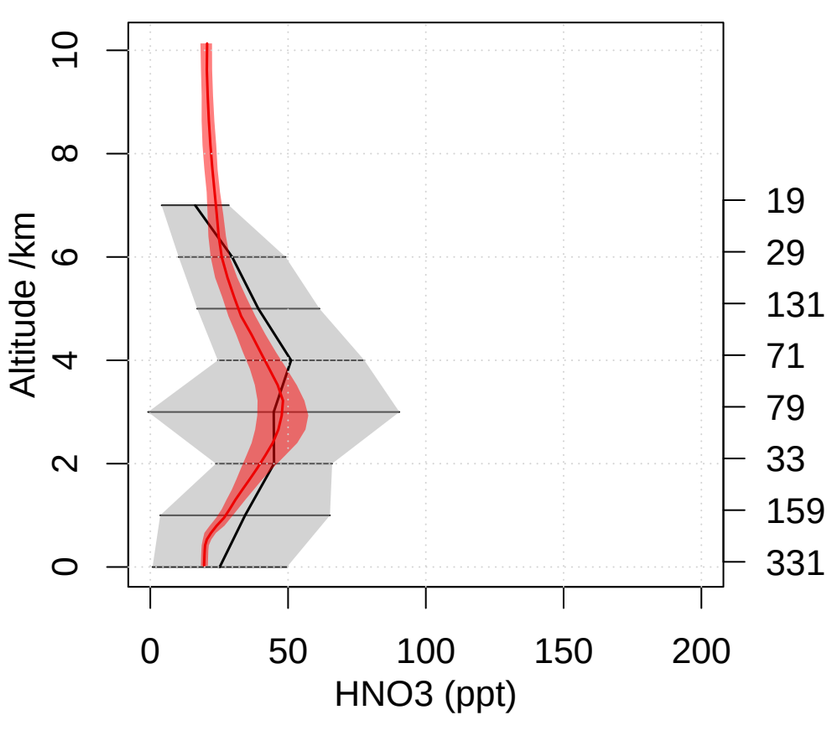


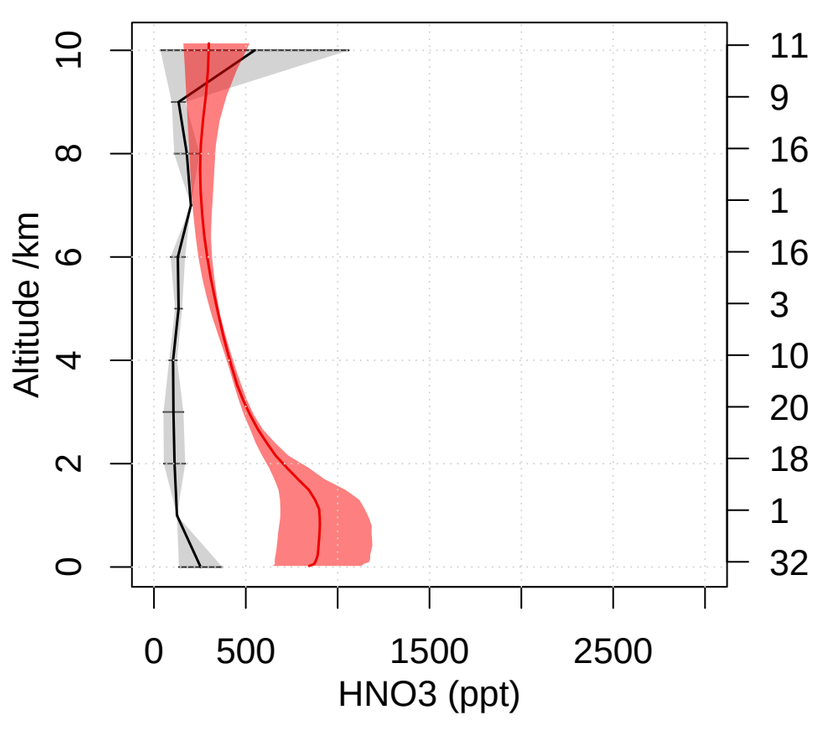


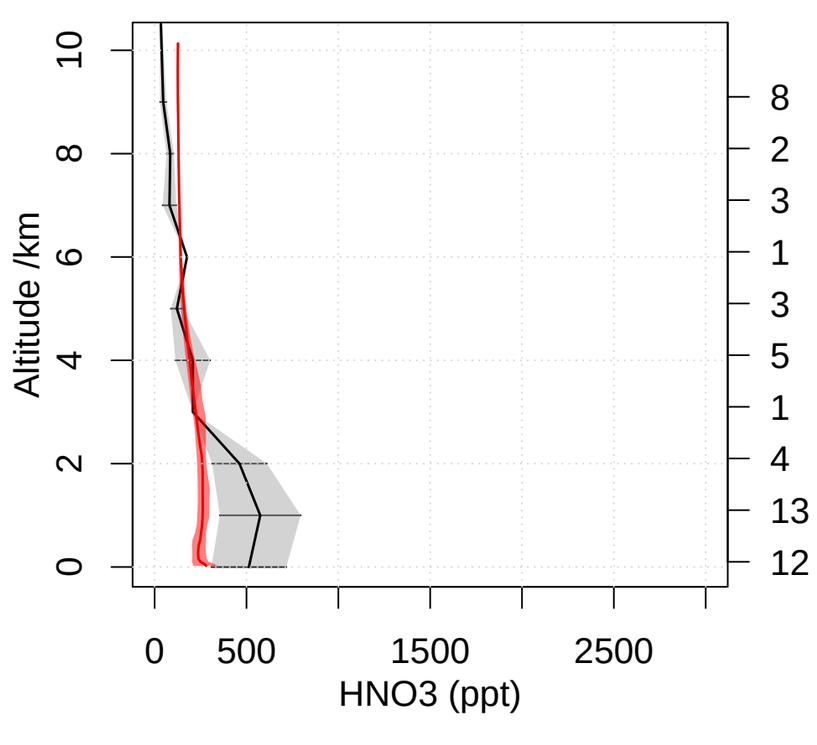


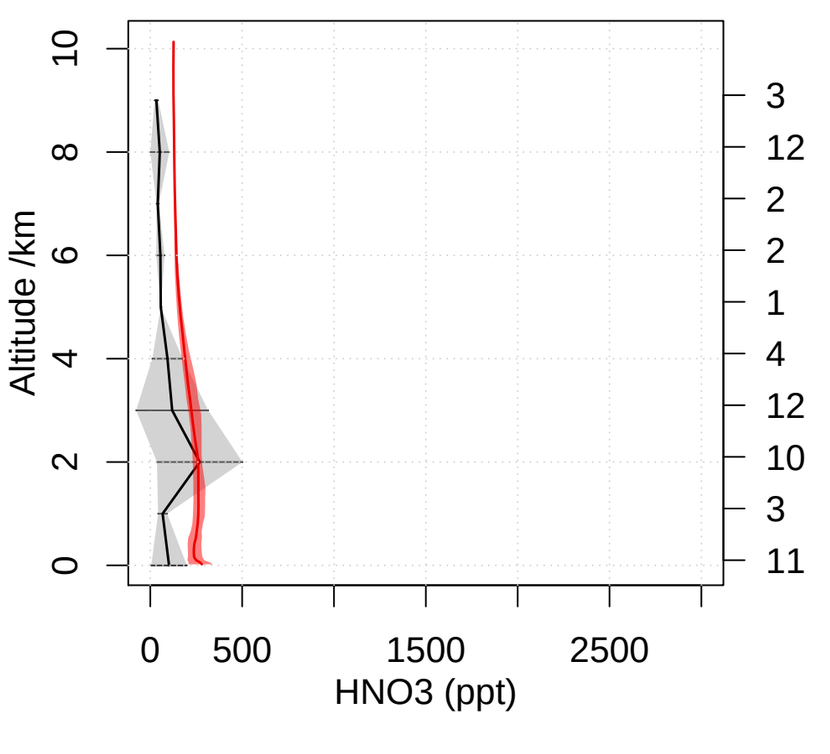


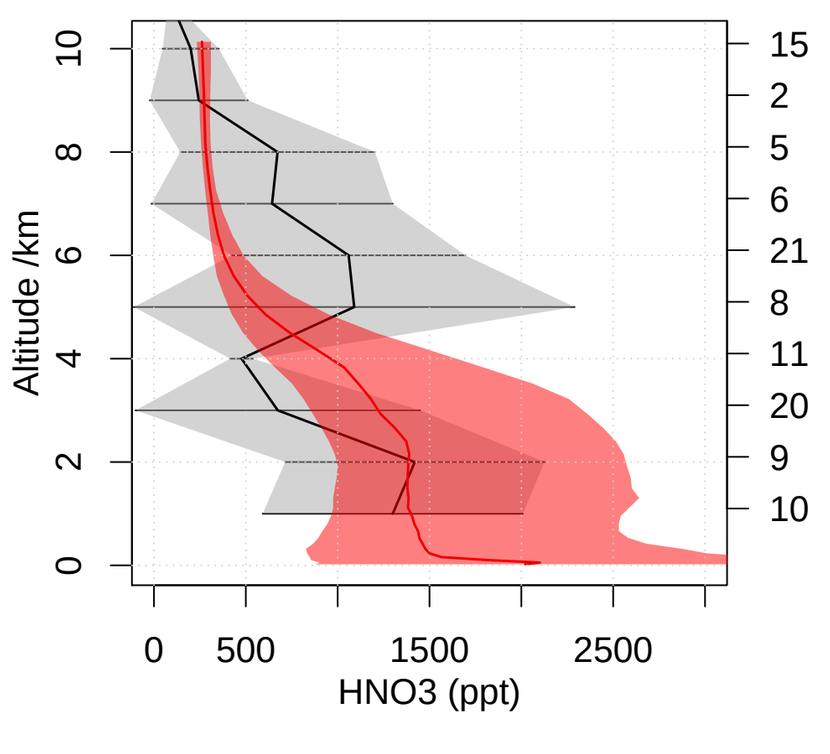


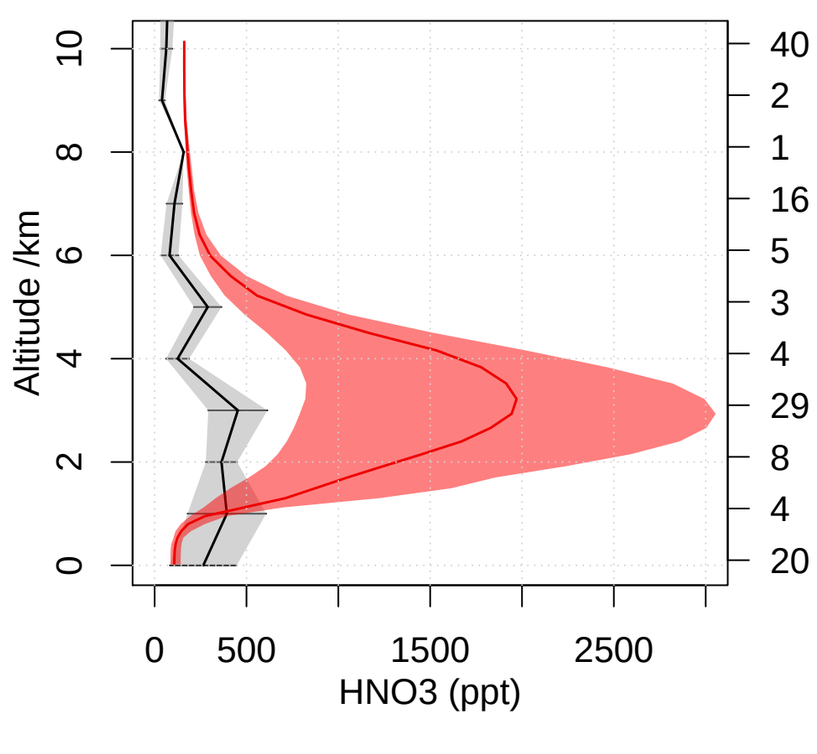




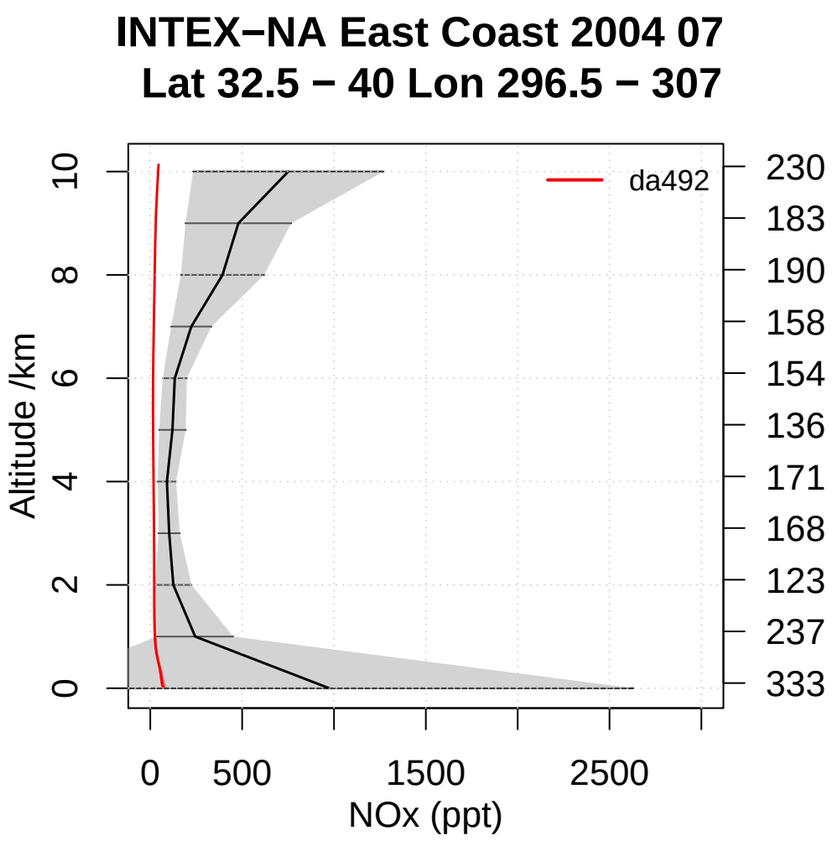


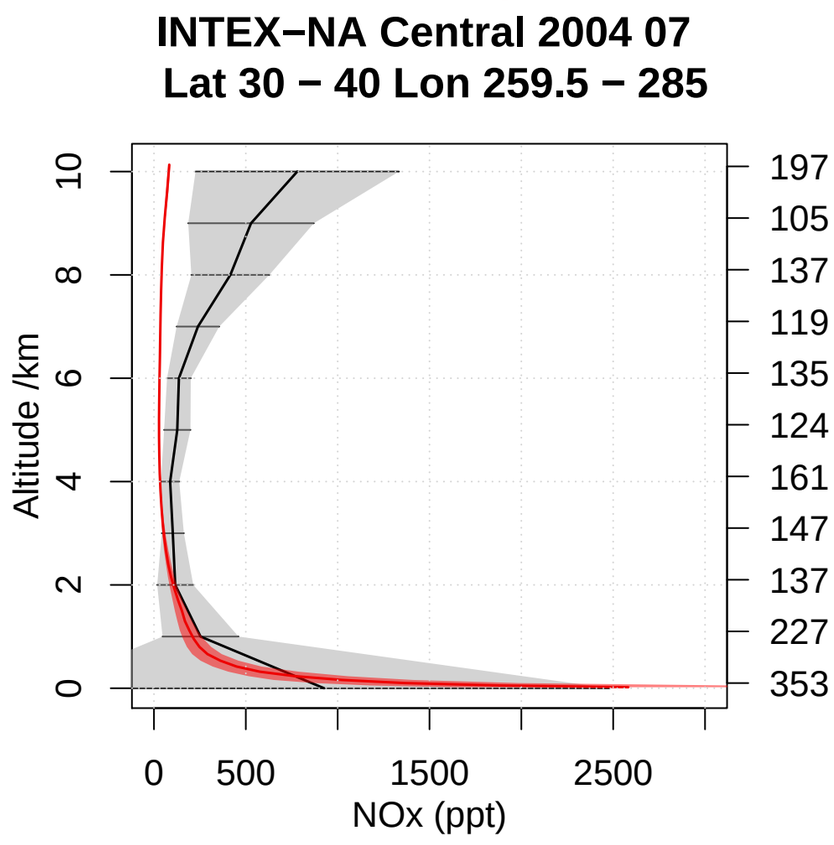


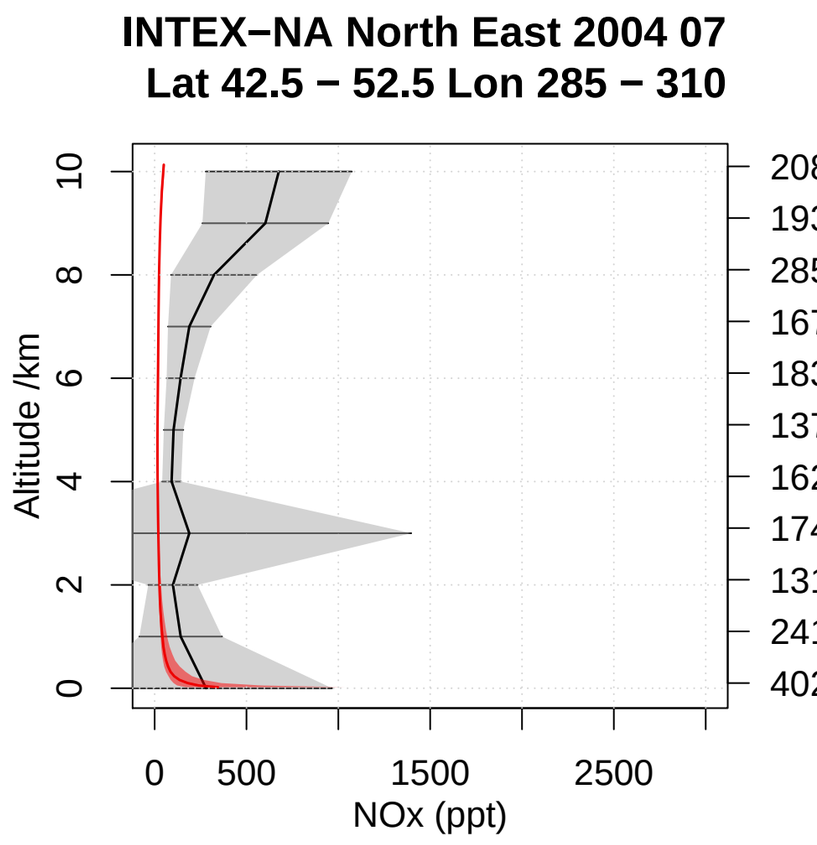


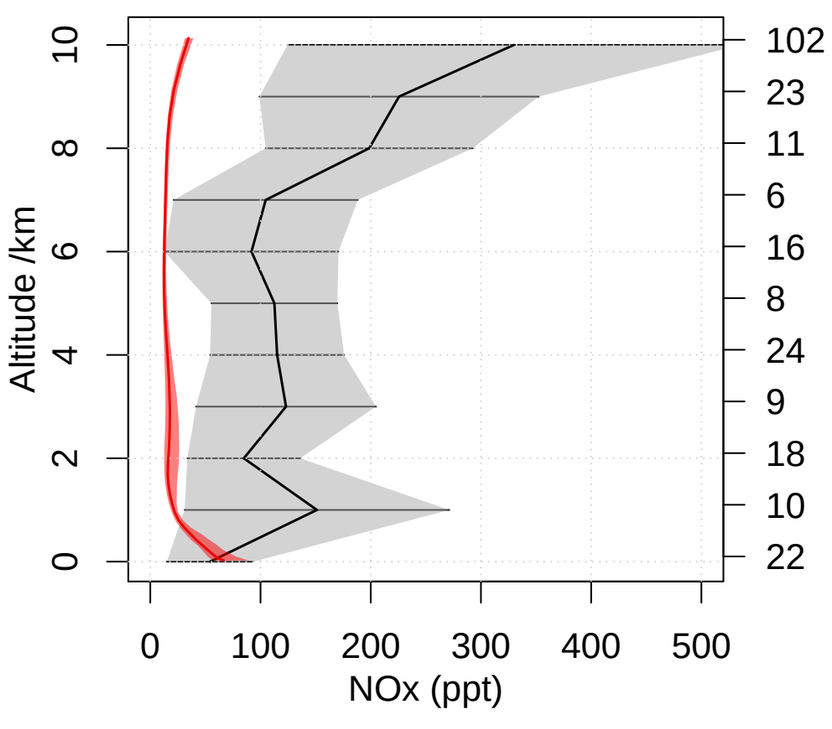


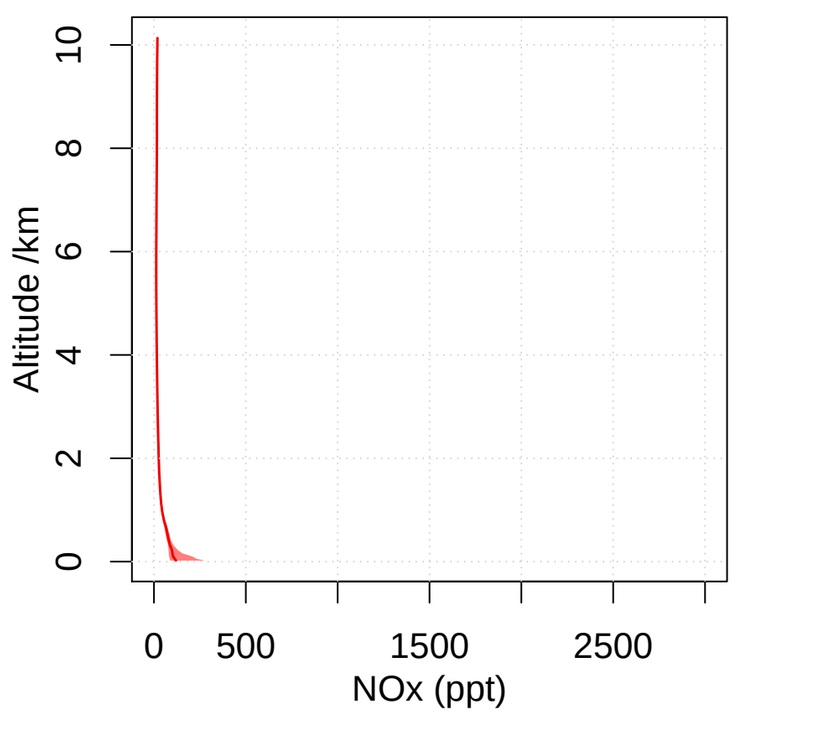
Emmons NOx comparison

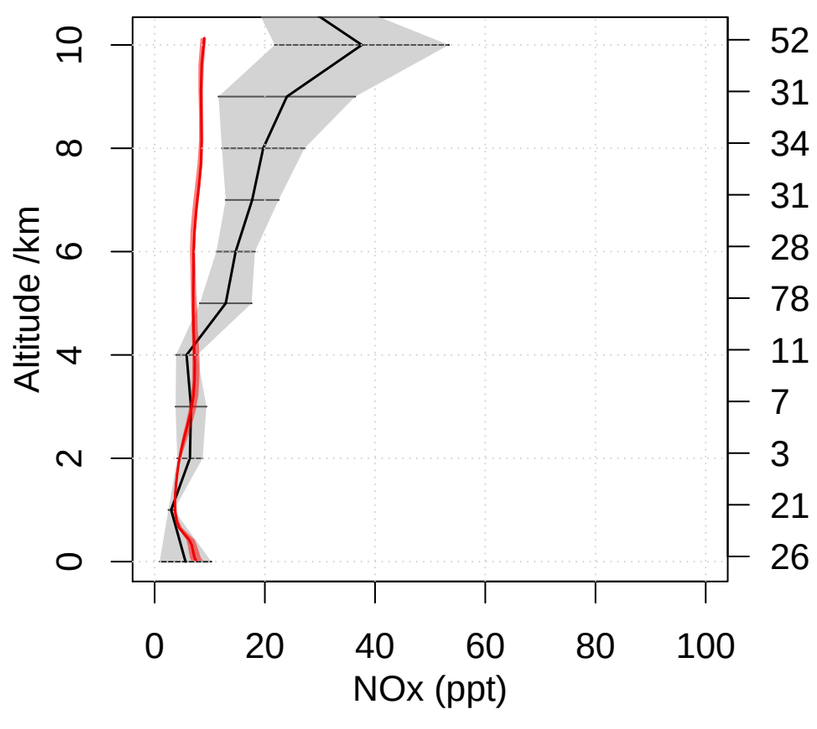


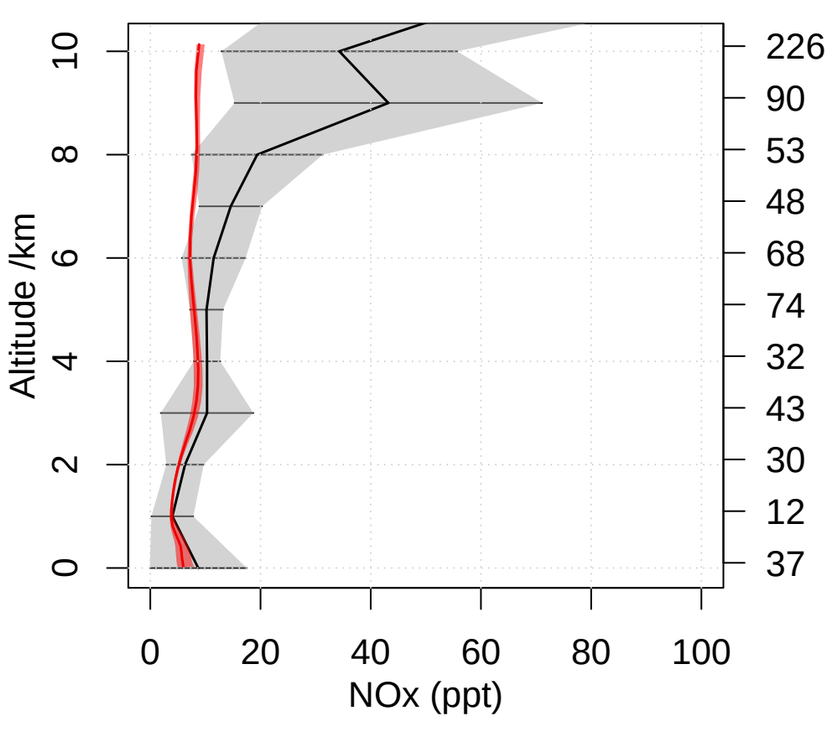


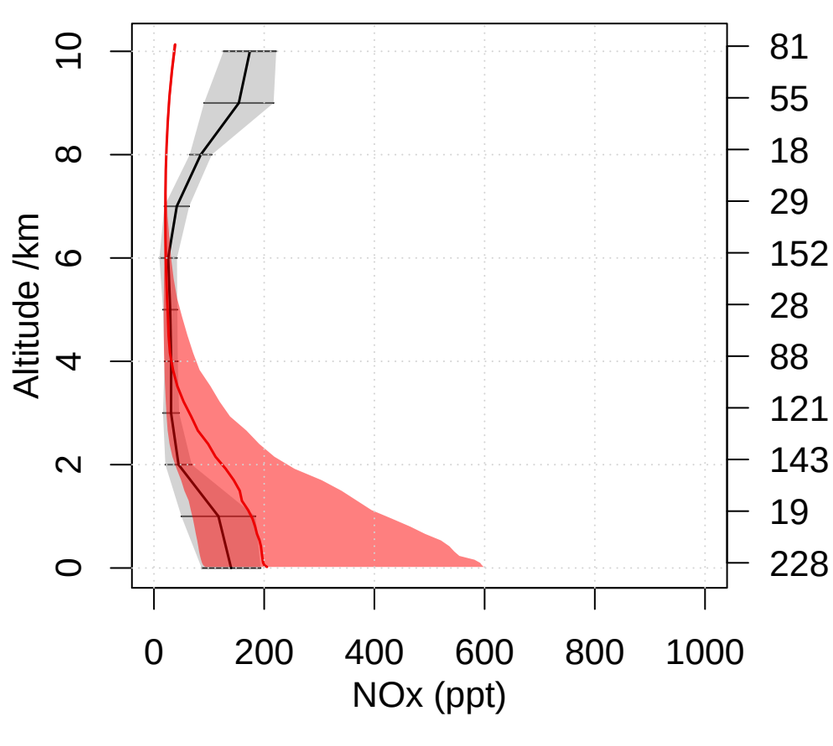


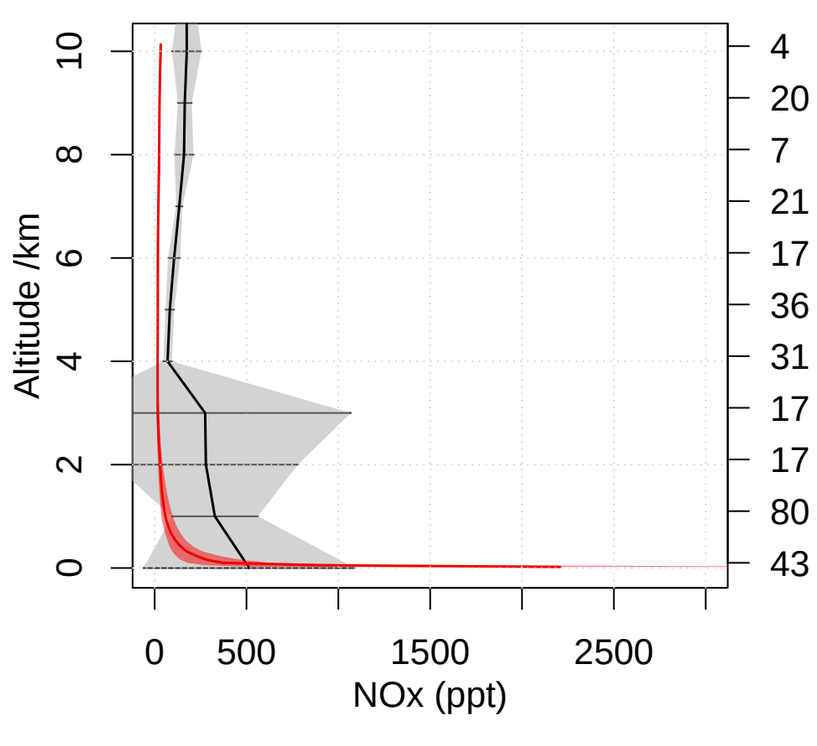


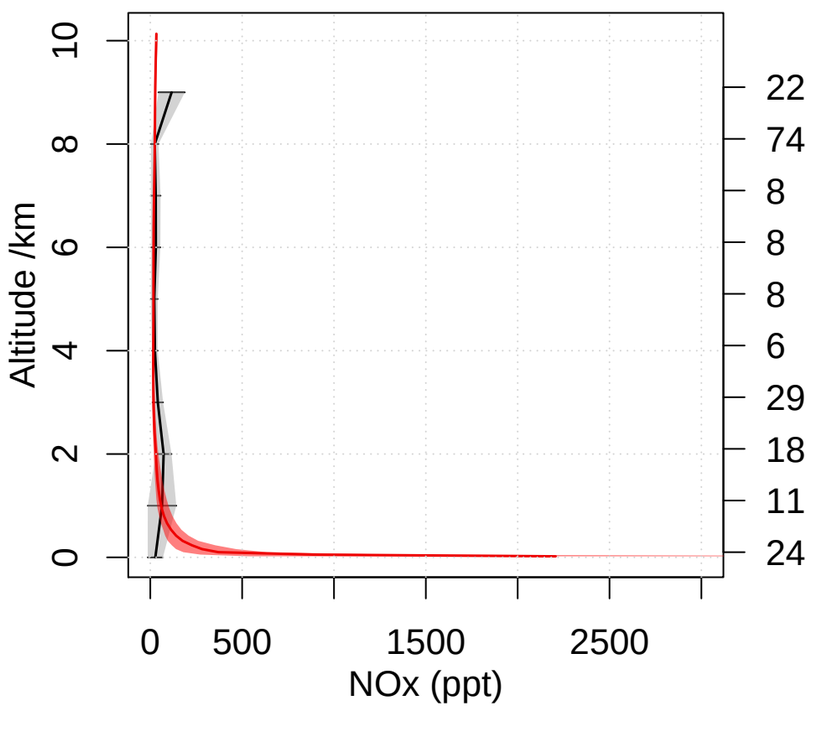


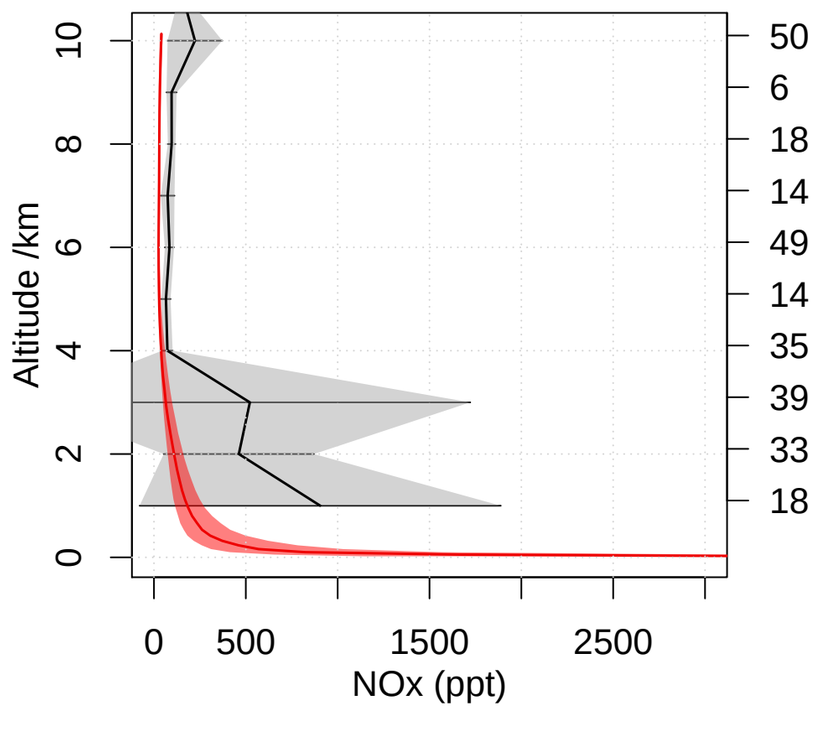


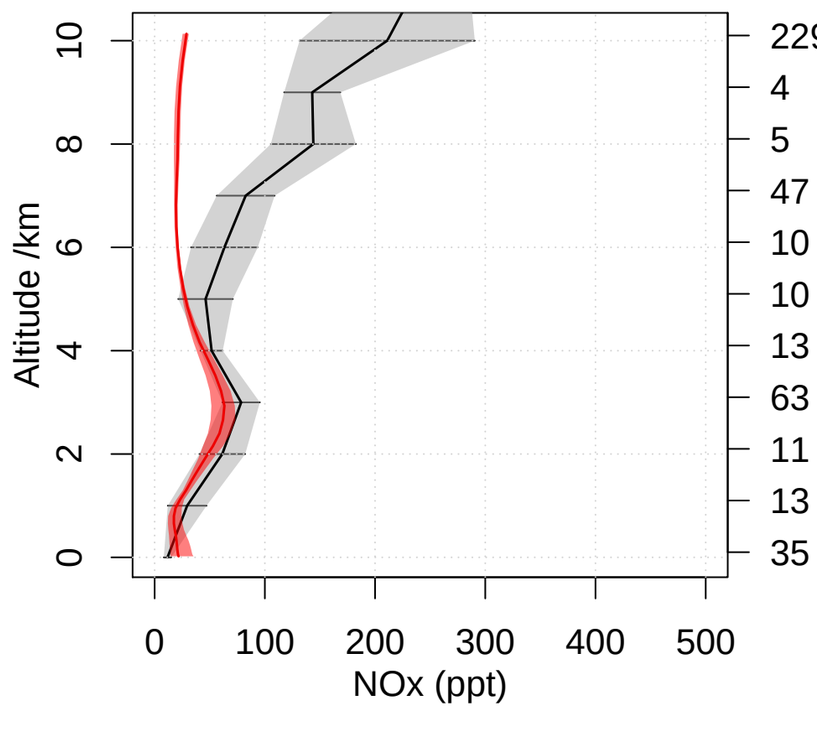




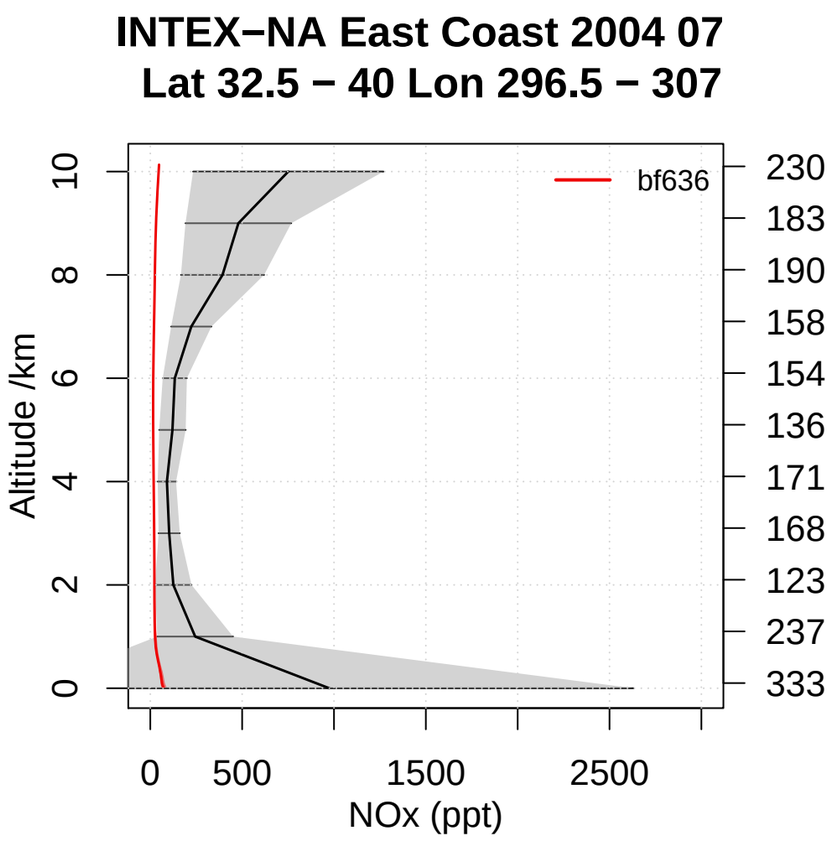


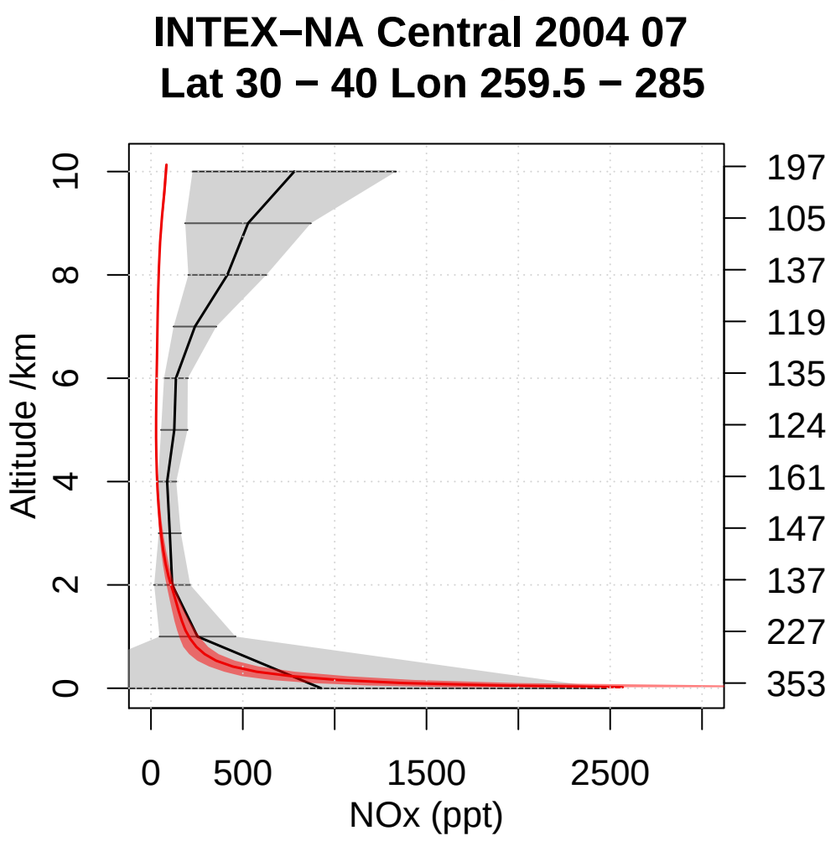


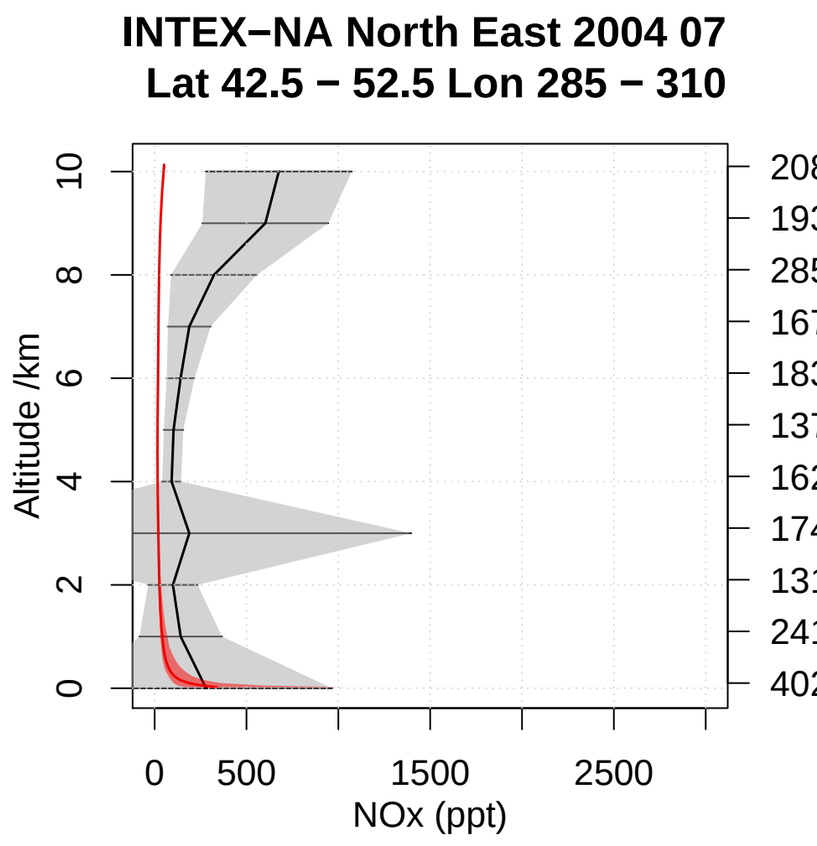


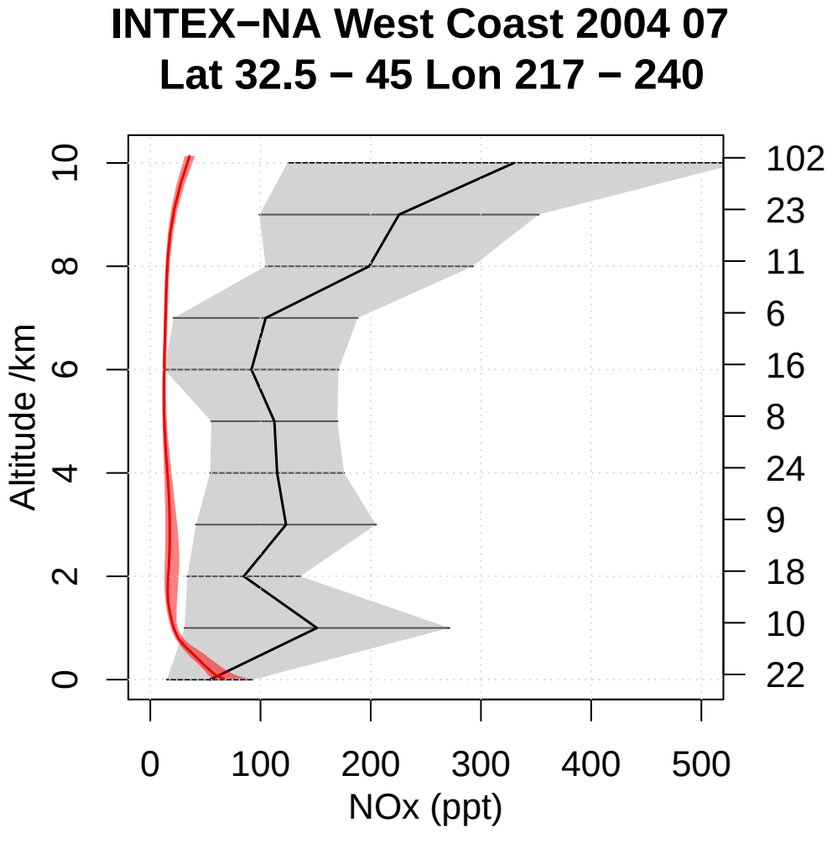


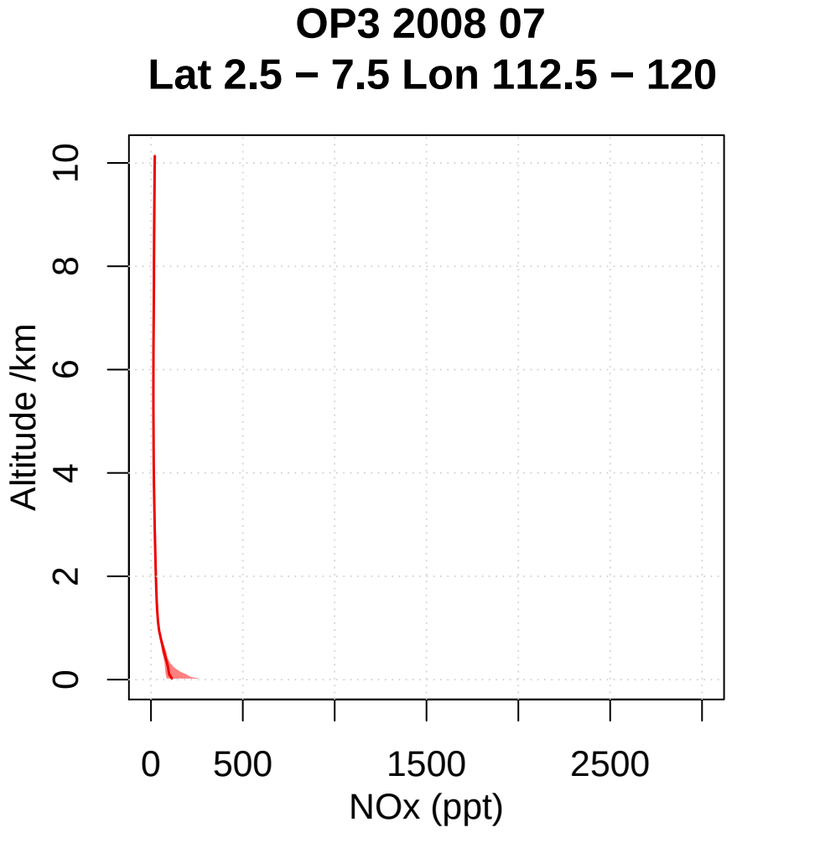
Emmons NOx comparison

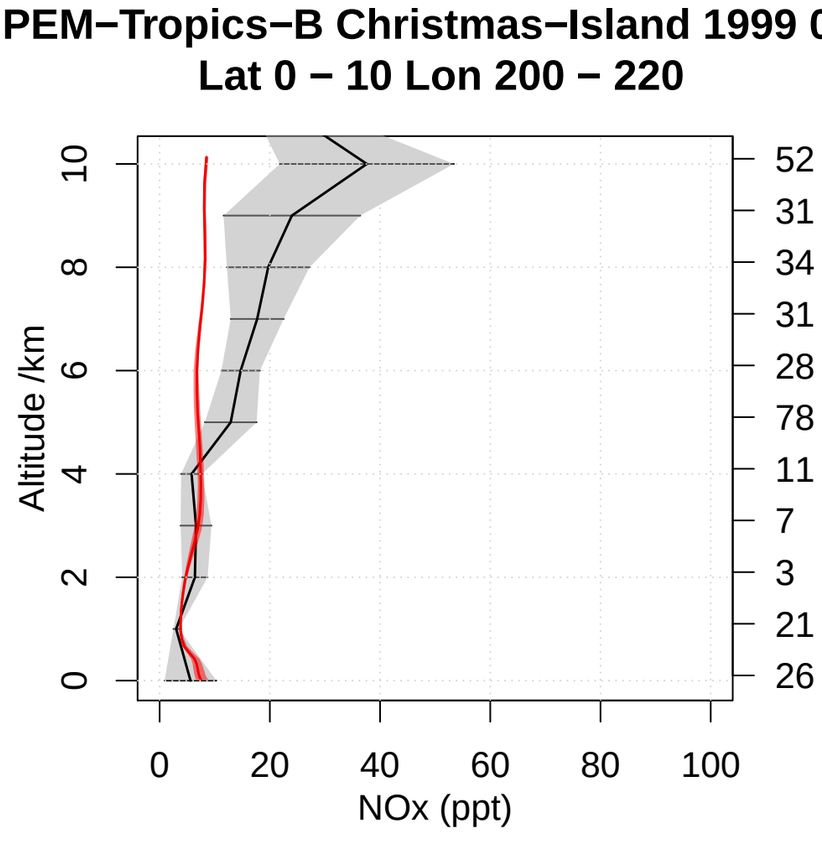


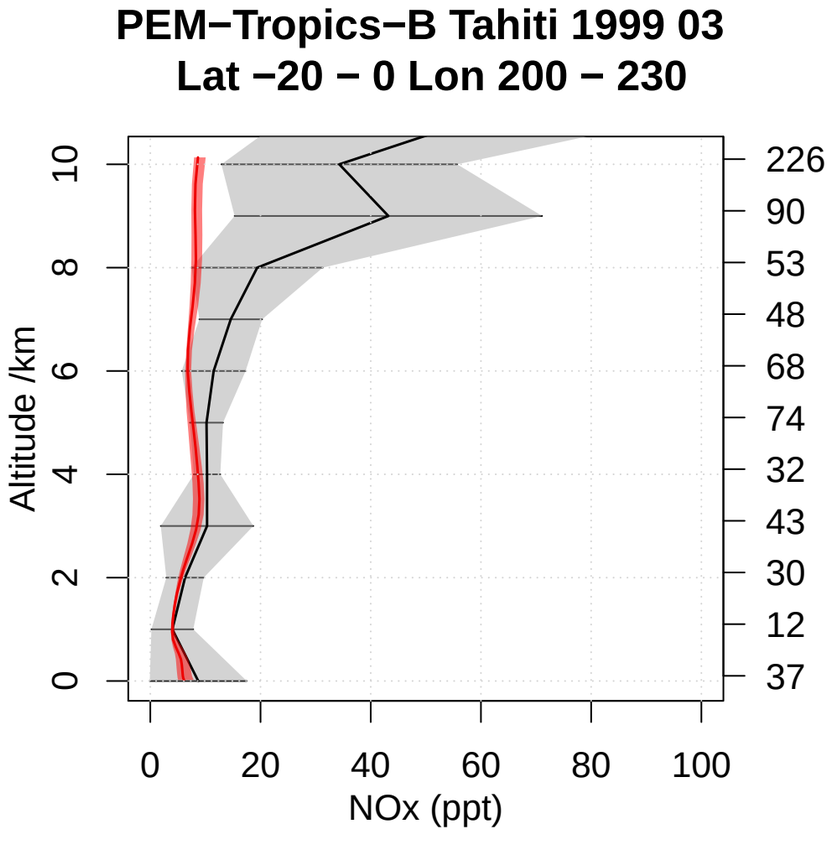


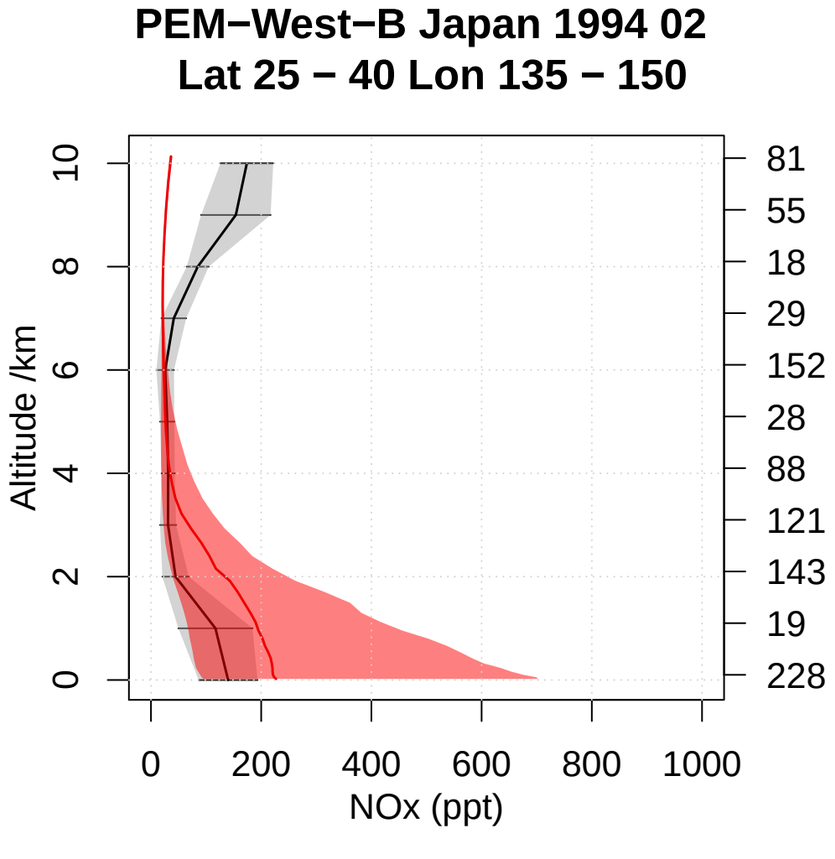


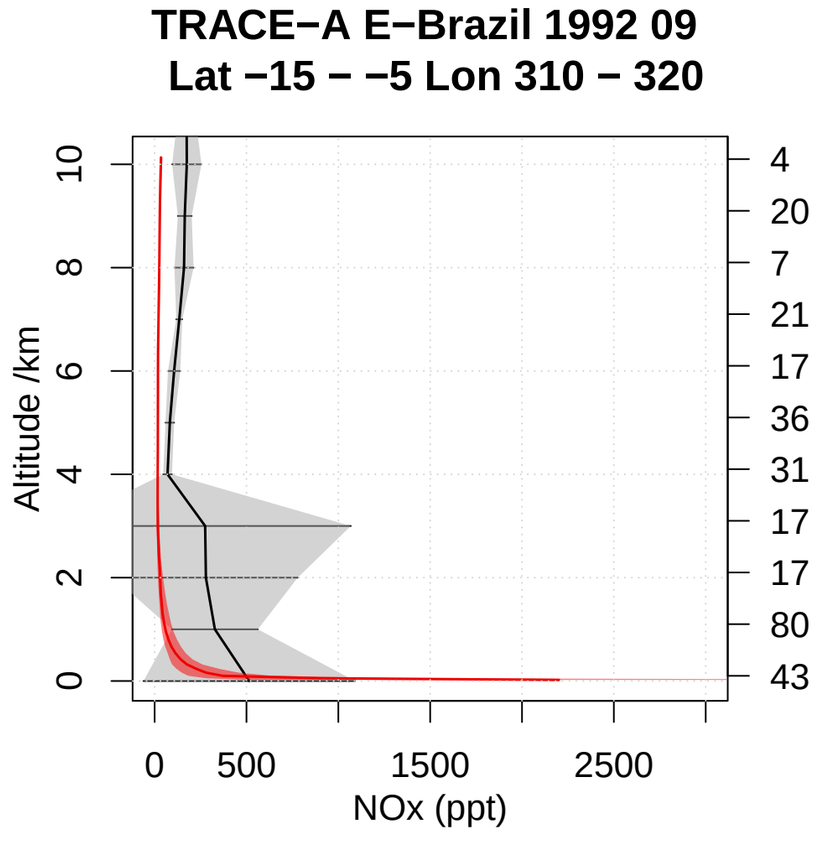


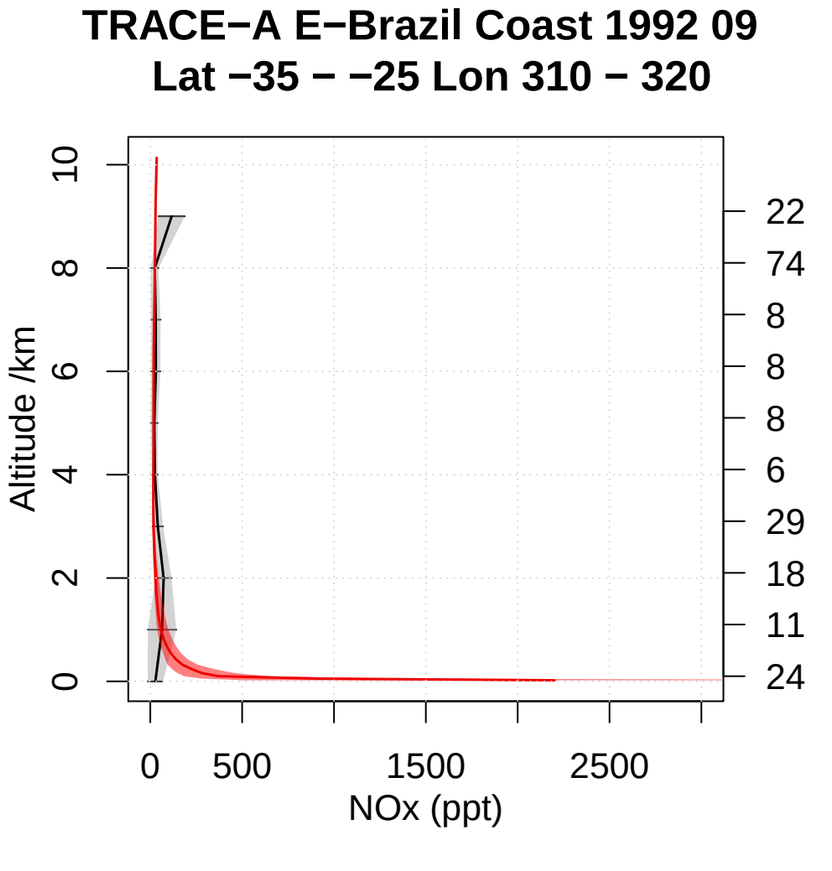


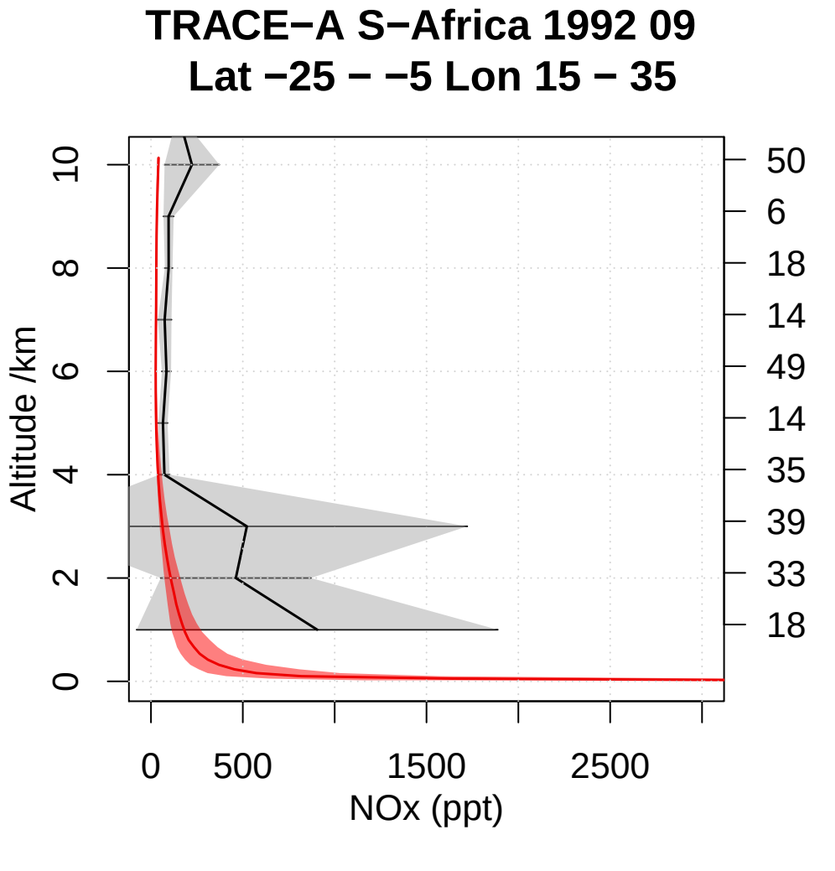


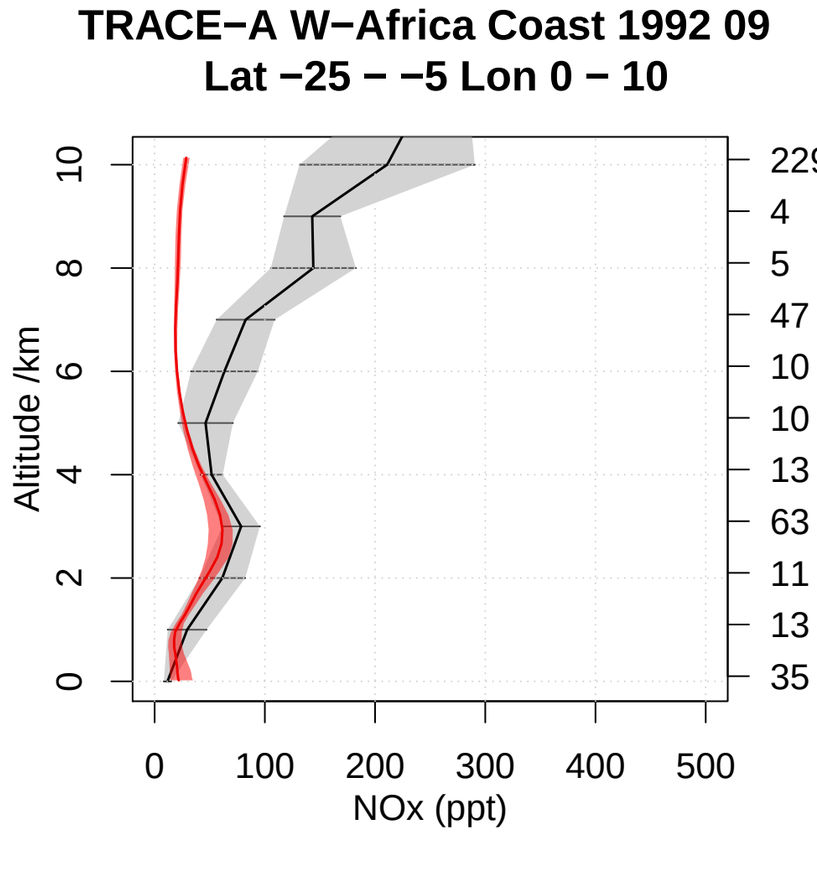


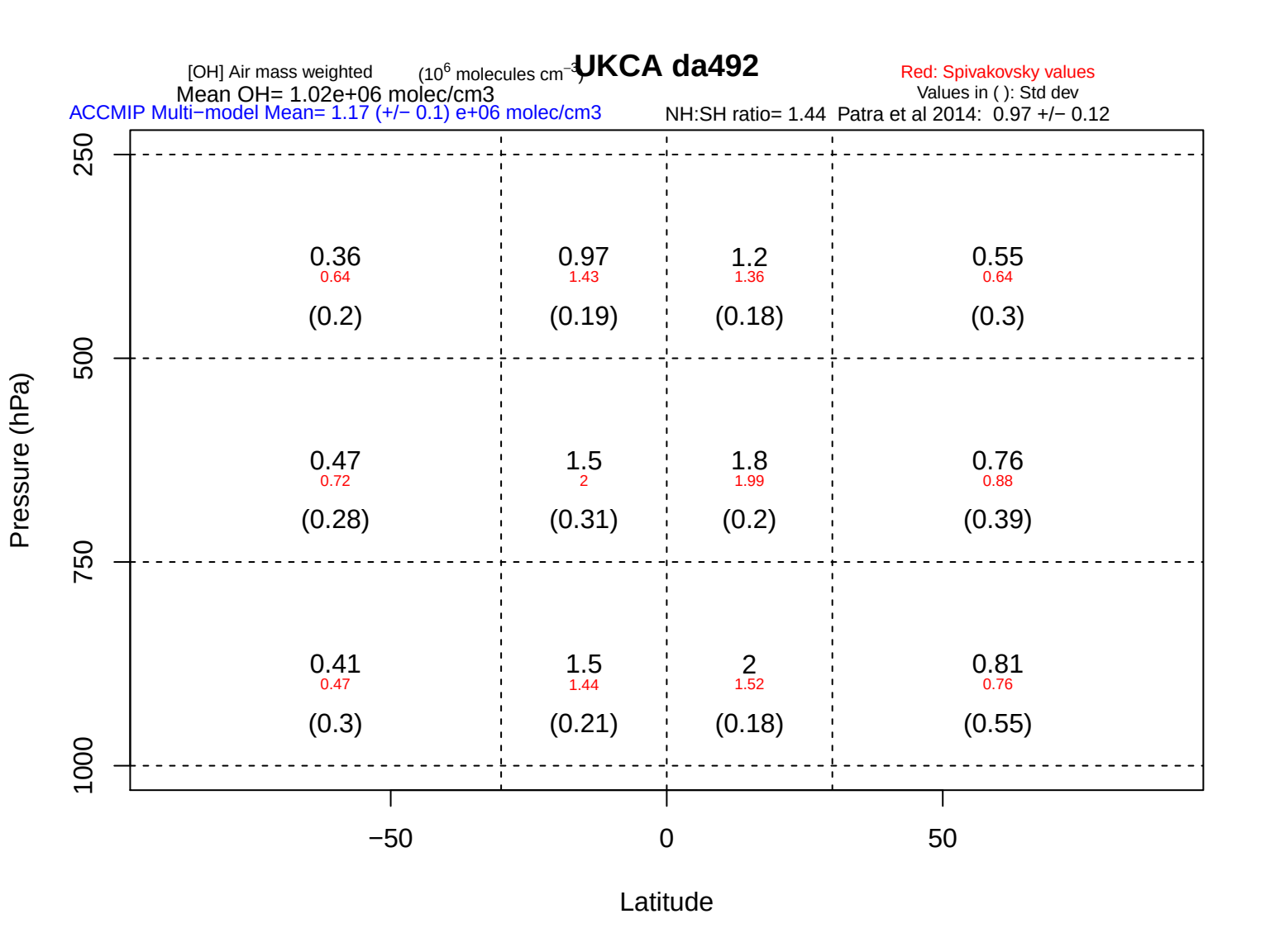


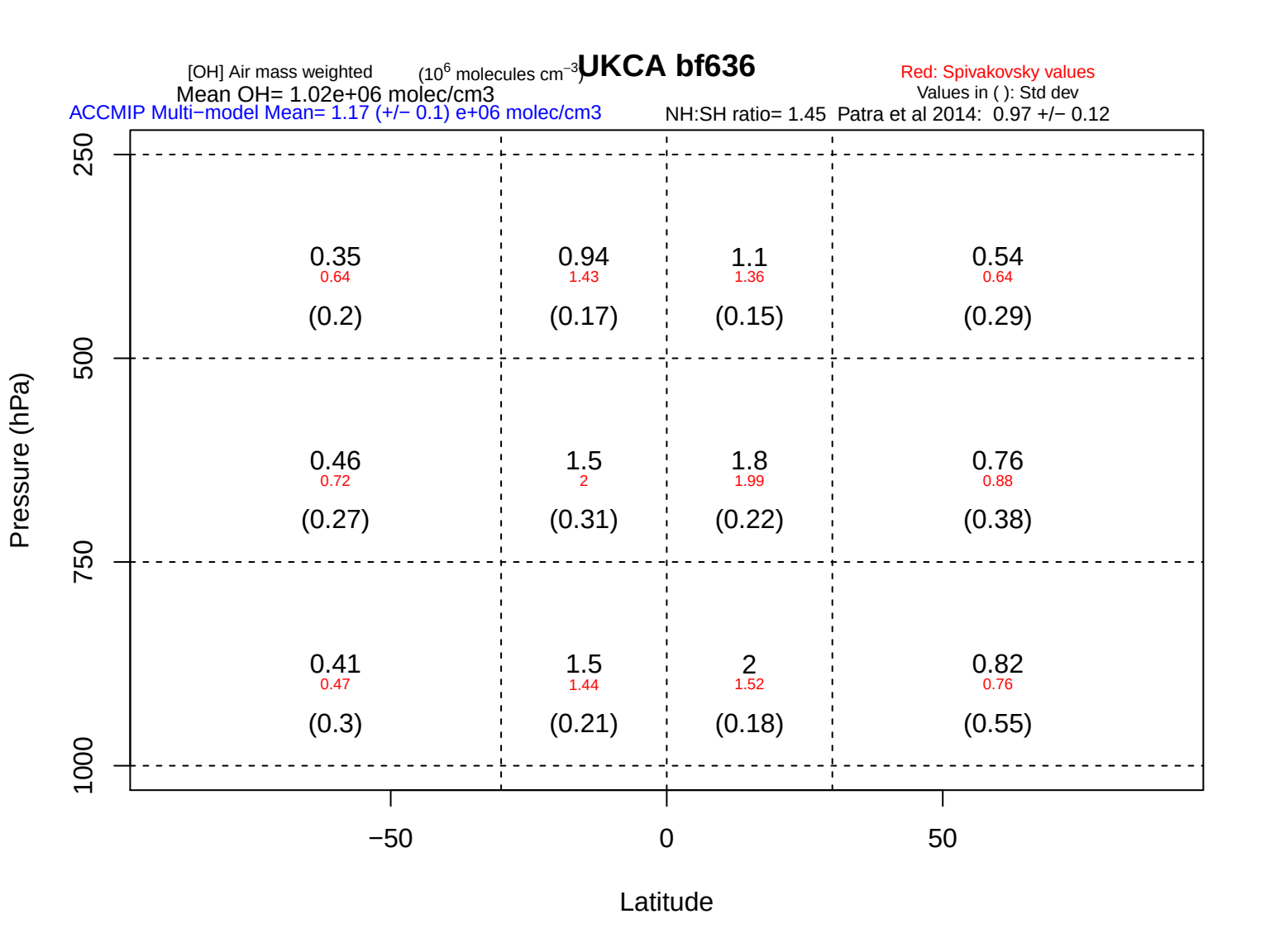


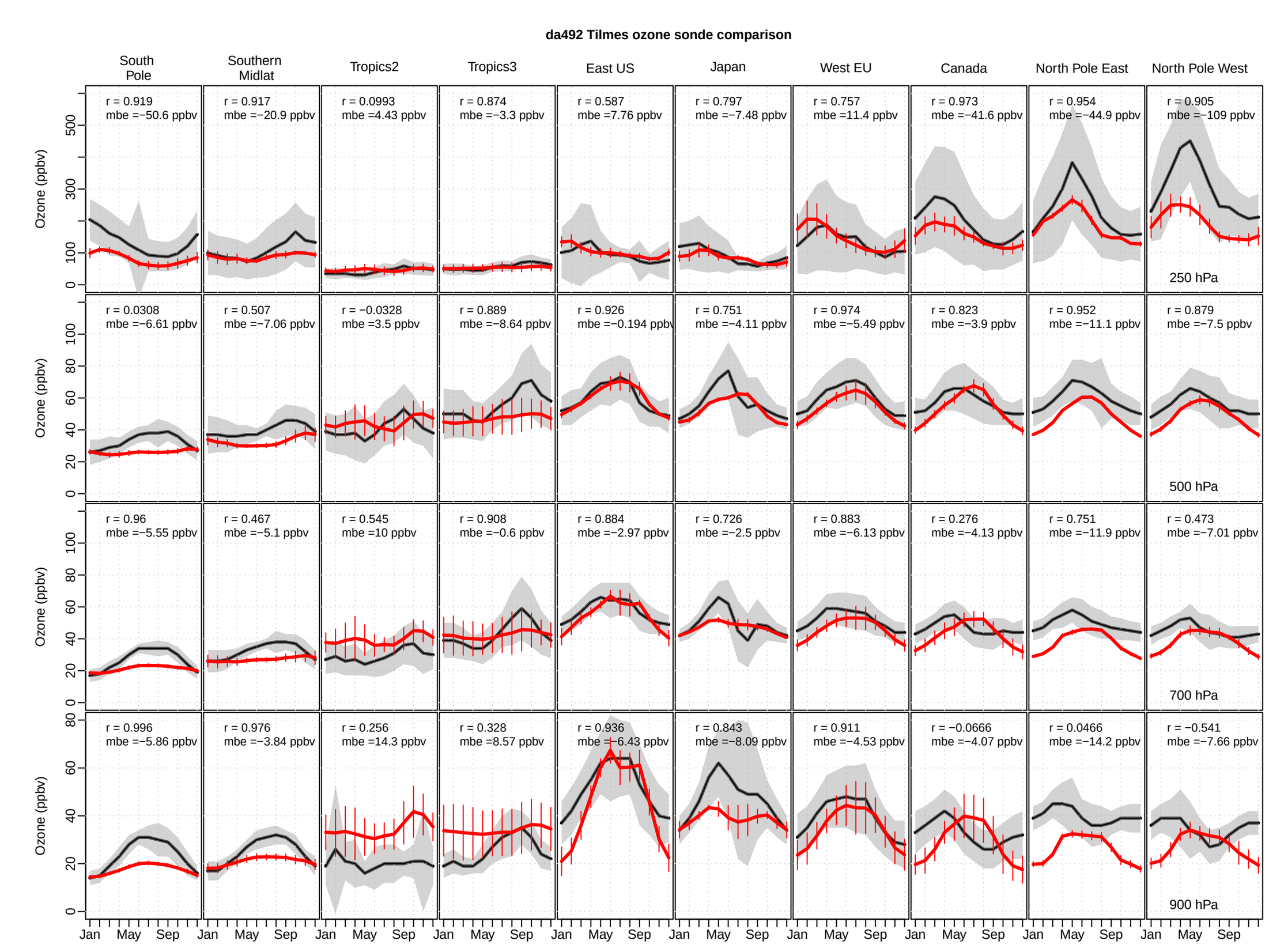


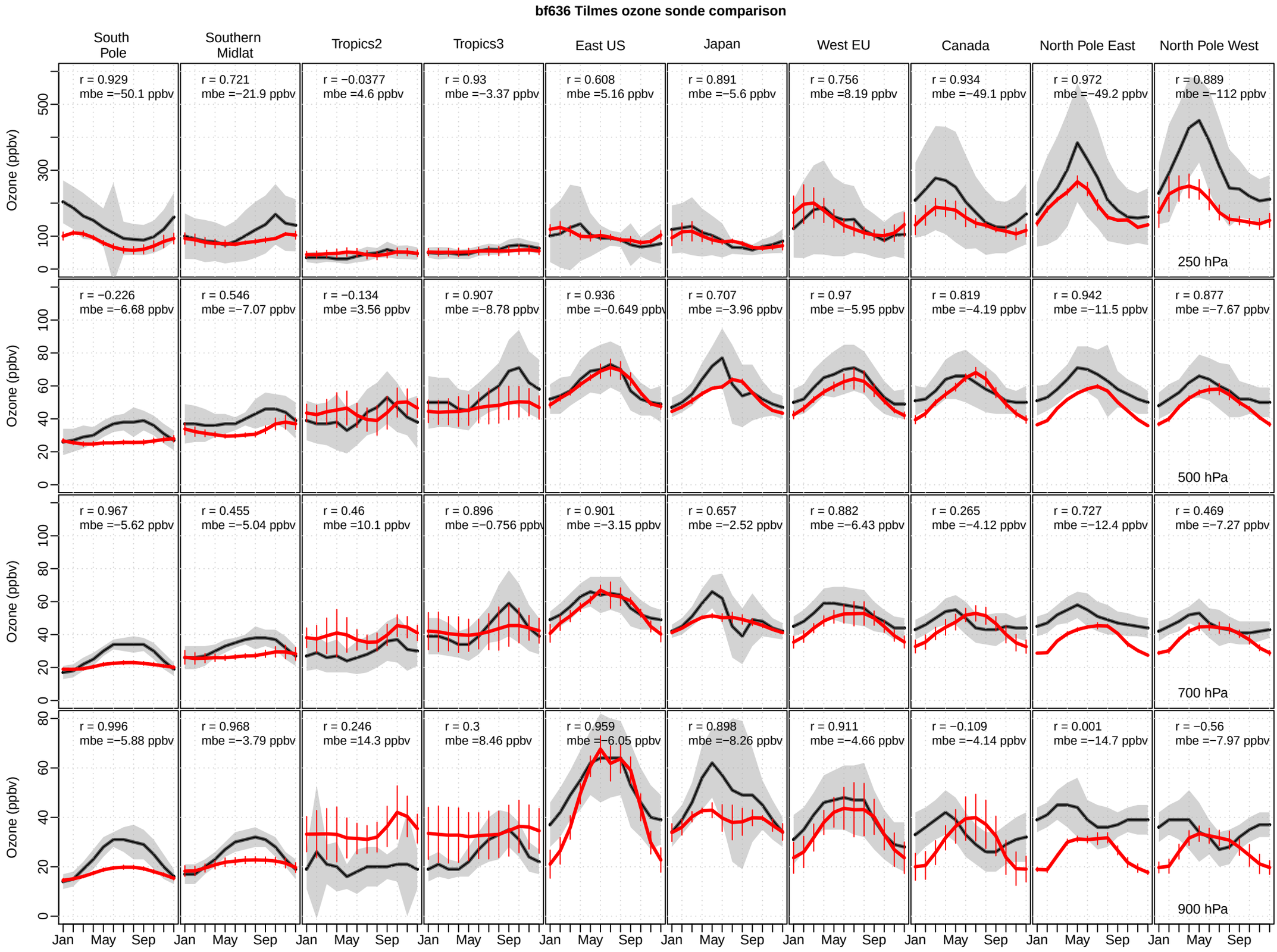


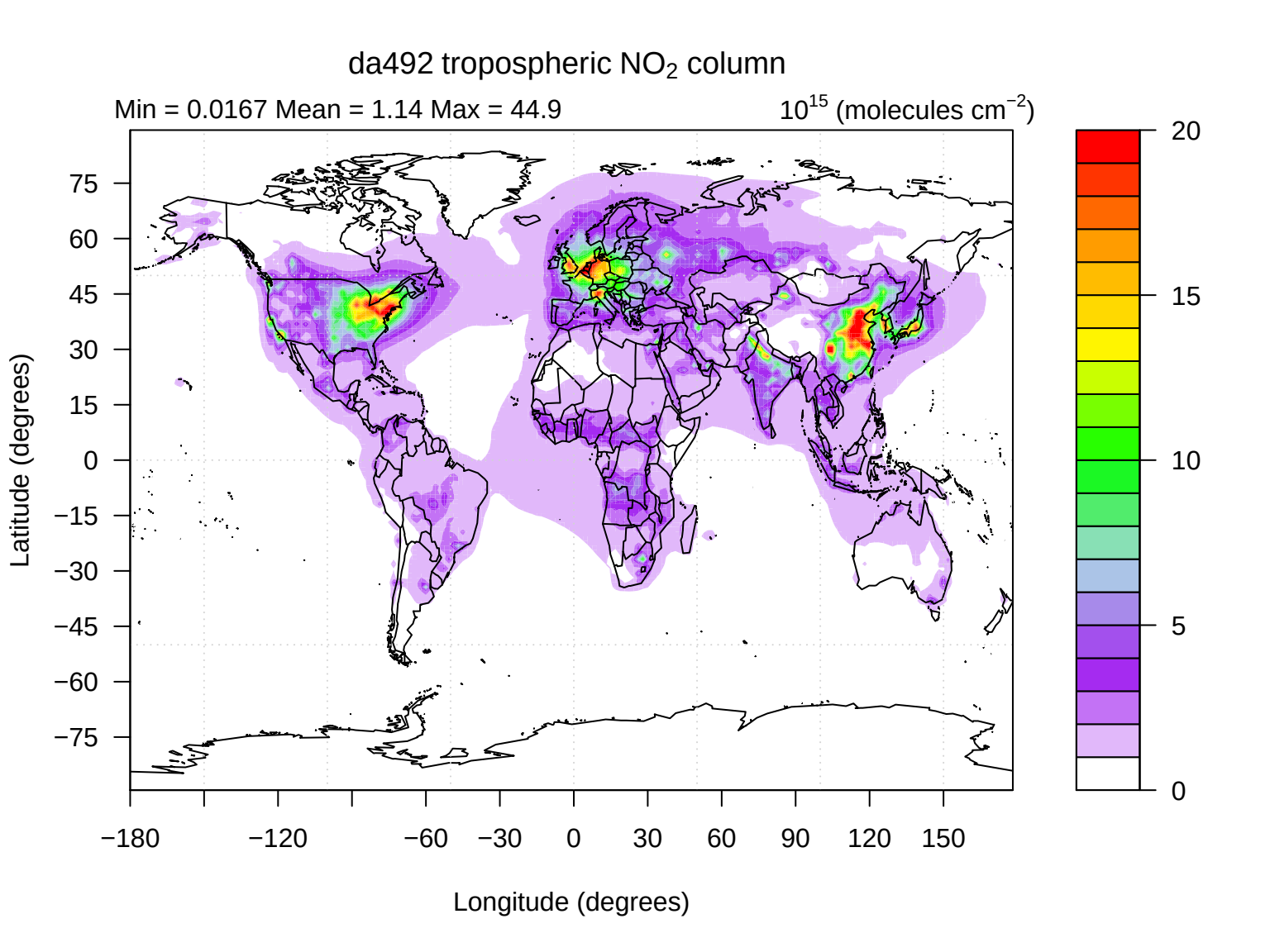


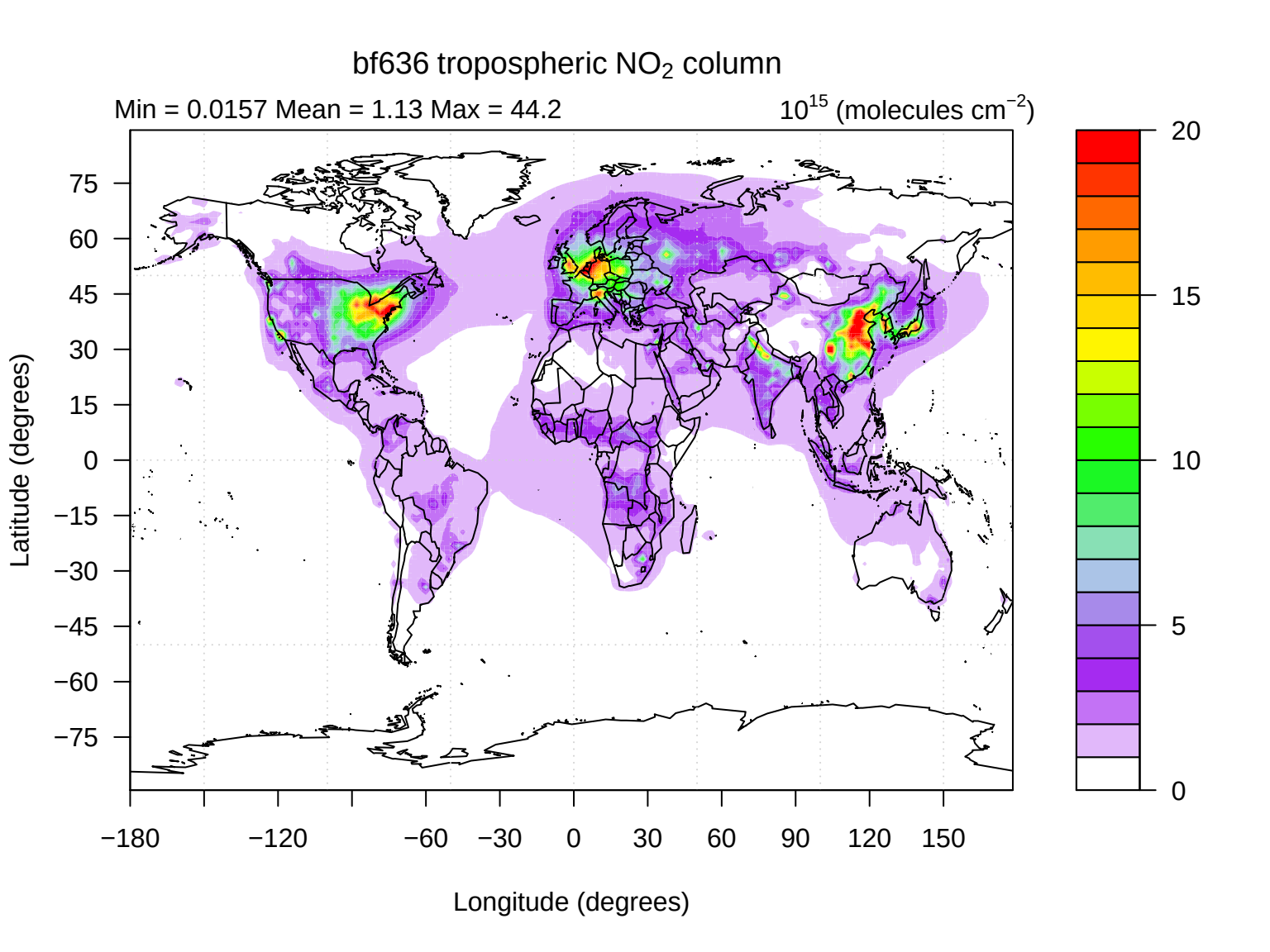

[OH] Air mass weighted (10^6 molecules cm^{-3})
UKCA da492
Red: Spivakovsky values
Values in ( ): Std dev
Mean OH= 1.02e+06 molec/cm3
ACCMIP Multi−model Mean= 1.17 (+/− 0.1) e+06 molec/cm3
NH:SH ratio= 1.44 Patra et al 2014: 0.97 +/− 0.12
0.36
0.64
(0.2)
0.97
1.43
(0.19)
1.2
1.36
(0.18)
0.55
0.64
(0.3)
0.47
0.72
(0.28)
1.5
2
(0.31)
1.8
1.99
(0.2)
0.76
0.88
(0.39)
0.41
0.47
(0.3)
1.5
1.44
(0.21)
2
1.52
(0.18)
0.81
0.76
(0.55)
250
500
750
1000
Pressure (hPa)
−50
0
50
Latitude

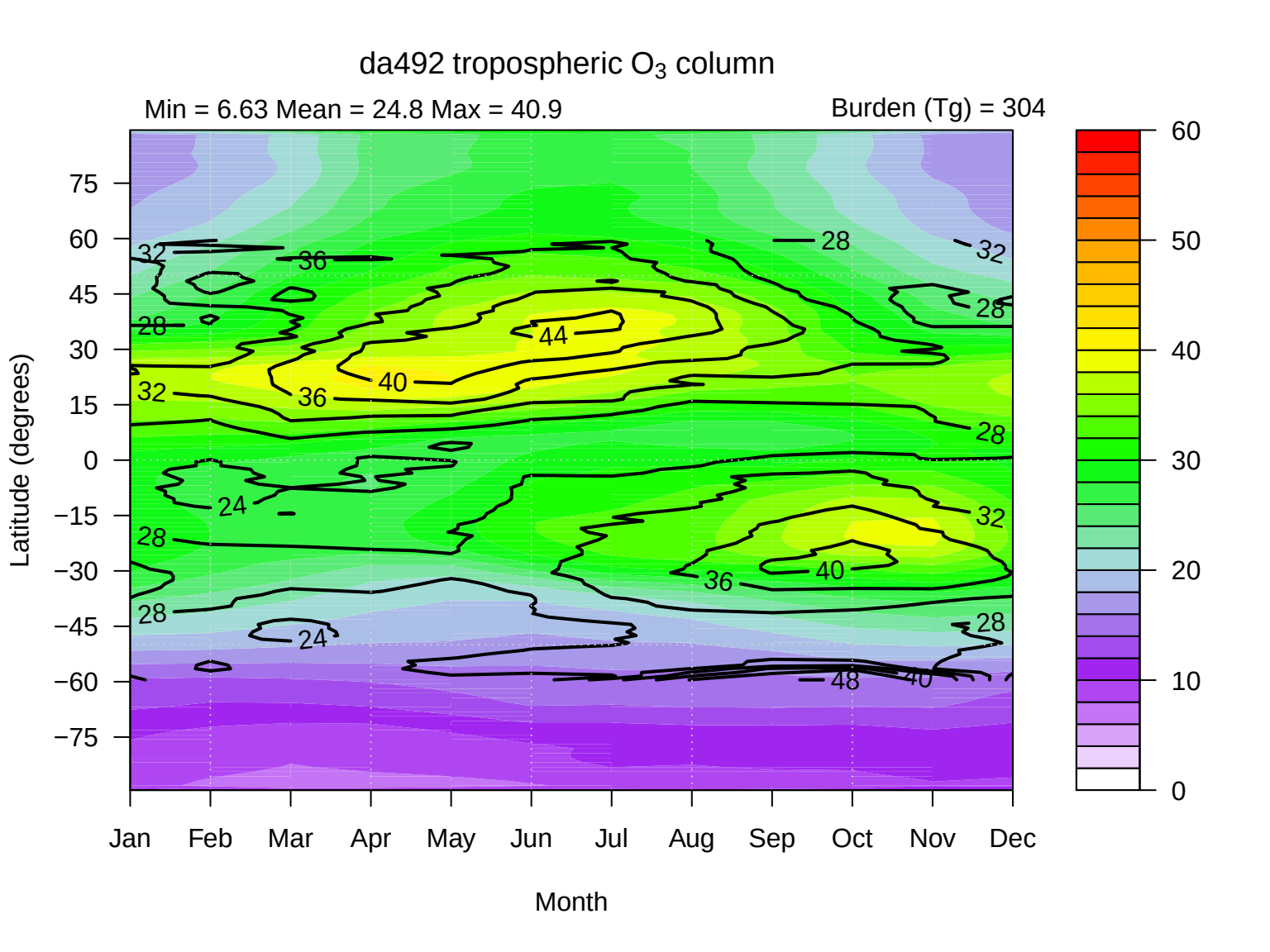

[OH] Air mass weighted (10^6 molecules cm^{-3})
UKCA bf636
Red: Spivakovsky values
Values in ( ): Std dev
Mean OH= 1.02e+06 molec/cm3
ACCMIP Multi−model Mean= 1.17 (+/− 0.1) e+06 molec/cm3
NH:SH ratio= 1.45 Patra et al 2014: 0.97 +/− 0.12
0.35
0.64
(0.2)
0.94
1.43
(0.17)
1.1
1.36
(0.15)
0.54
0.64
(0.29)
0.46
0.72
(0.27)
1.5
2
(0.31)
1.8
1.99
(0.22)
0.76
0.88
(0.38)
0.41
0.47
(0.3)
1.5
1.44
(0.21)
2
1.52
(0.18)
0.82
0.76
(0.55)
250
500
750
1000
Pressure (hPa)
−50
0
50
Latitude

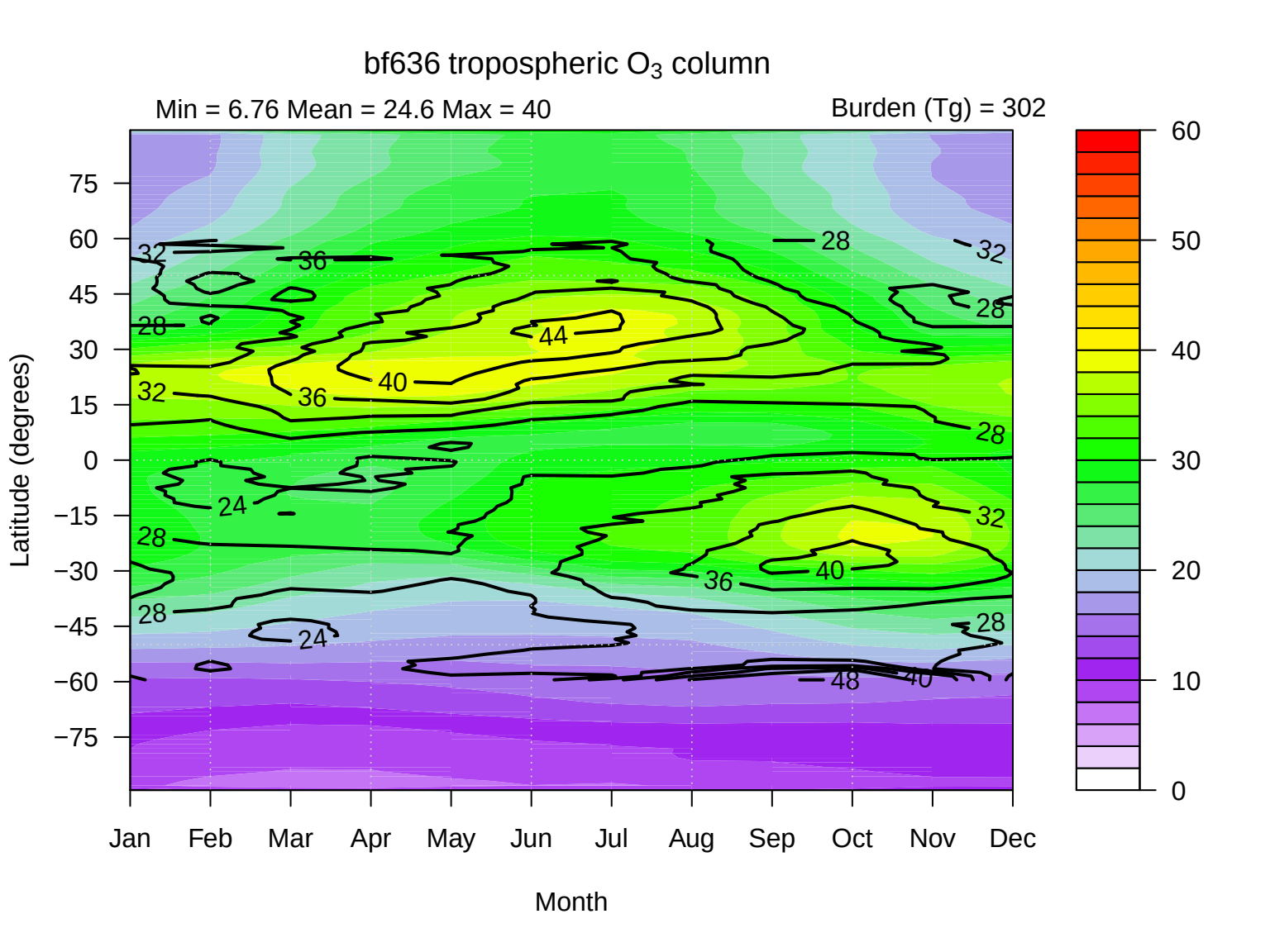

da492 Tilmes ozone sonde comparison
South Pole
Southern Midlat
Tropics2
Tropics3
East US
Japan
West EU
Canada
North Pole East
North Pole West
Ozone (ppbv)
r = 0.919
mbe =−50.6 ppbv
r = 0.917
mbe =−20.9 ppbv
r = 0.0993
mbe =4.43 ppbv
r = 0.874
mbe =−3.3 ppbv
r = 0.587
mbe =7.76 ppbv
r = 0.797
mbe =−7.48 ppbv
r = 0.757
mbe =11.4 ppbv
r = 0.973
mbe =−41.6 ppbv
r = 0.954
mbe =−44.9 ppbv
r = 0.905
mbe =−109 ppbv
250 hPa
r = 0.0308
mbe =−6.61 ppbv
r = 0.507
mbe =−7.06 ppbv
r = −0.0328
mbe =3.5 ppbv
r = 0.889
mbe =−8.64 ppbv
r = 0.926
mbe =−0.194 ppbv
r = 0.751
mbe =−4.11 ppbv
r = 0.974
mbe =−5.49 ppbv
r = 0.823
mbe =−3.9 ppbv
r = 0.952
mbe =−11.1 ppbv
r = 0.879
mbe =−7.5 ppbv
500 hPa
r = 0.96
mbe =−5.55 ppbv
r = 0.467
mbe =−5.1 ppbv
r = 0.545
mbe =10 ppbv
r = 0.908
mbe =−0.6 ppbv
r = 0.884
mbe =−2.97 ppbv
r = 0.726
mbe =−2.5 ppbv
r = 0.883
mbe =−6.13 ppbv
r = 0.276
mbe =−4.13 ppbv
r = 0.751
mbe =−11.9 ppbv
r = 0.473
mbe =−7.01 ppbv
700 hPa
r = 0.996
mbe =−5.86 ppbv
r = 0.976
mbe =−3.84 ppbv
r = 0.256
mbe =14.3 ppbv
r = 0.328
mbe =8.57 ppbv
r = 0.936
mbe =−6.43 ppbv
r = 0.843
mbe =−8.09 ppbv
r = 0.911
mbe =−4.53 ppbv
r = −0.0666
mbe =−4.07 ppbv
r = 0.0466
mbe =−14.2 ppbv
r = −0.541
mbe =−7.66 ppbv
900 hPa
Jan
May
Sep


bf636 Tilmes ozone sonde comparison
South Pole
Southern Midlat
Tropics2
Tropics3
East US
Japan
West EU
Canada
North Pole East
North Pole West
Ozone (ppbv)
r = 0.929
mbe =−50.1 ppbv
r = 0.721
mbe =−21.9 ppbv
r = −0.0377
mbe =4.6 ppbv
r = 0.93
mbe =−3.37 ppbv
r = 0.608
mbe =5.16 ppbv
r = 0.891
mbe =−5.6 ppbv
r = 0.756
mbe =8.19 ppbv
r = 0.934
mbe =−49.1 ppbv
r = 0.972
mbe =−49.2 ppbv
r = 0.889
mbe =−112 ppbv
250 hPa
r = −0.226
mbe =−6.68 ppbv
r = 0.546
mbe =−7.07 ppbv
r = −0.134
mbe =3.56 ppbv
r = 0.907
mbe =−8.78 ppbv
r = 0.936
mbe =−0.649 ppbv
r = 0.707
mbe =−3.96 ppbv
r = 0.97
mbe =−5.95 ppbv
r = 0.819
mbe =−4.19 ppbv
r = 0.942
mbe =−11.5 ppbv
r = 0.877
mbe =−7.67 ppbv
500 hPa
r = 0.967
mbe =−5.62 ppbv
r = 0.455
mbe =−5.04 ppbv
r = 0.46
mbe =10.1 ppbv
r = 0.896
mbe =−0.756 ppbv
r = 0.901
mbe =−3.15 ppbv
r = 0.657
mbe =−2.52 ppbv
r = 0.882
mbe =−6.43 ppbv
r = 0.265
mbe =−4.12 ppbv
r = 0.727
mbe =−12.4 ppbv
r = 0.469
mbe =−7.27 ppbv
700 hPa
r = 0.996
mbe =−5.88 ppbv
r = 0.968
mbe =−3.79 ppbv
r = 0.246
mbe =14.3 ppbv
r = 0.3
mbe =8.46 ppbv
r = 0.959
mbe =−6.05 ppbv
r = 0.898
mbe =−8.26 ppbv
r = 0.911
mbe =−4.66 ppbv
r = −0.109
mbe =−4.14 ppbv
r = 0.001
mbe =−14.7 ppbv
r = −0.56
mbe =−7.97 ppbv
900 hPa
Jan
May
Sep


da492 tropospheric NO2 column
Min = 0.0167 Mean = 1.14 Max = 44.9
10^15 (molecules cm^-2)
Latitude (degrees)
75
60
45
30
15
0
−15
−30
−45
−60
−75
−180
−120
−60
−30
0
30
60
90
120
150
Longitude (degrees)
20
15
10
5
0

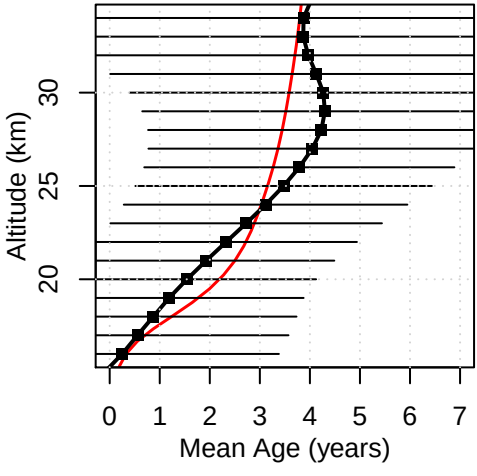

bf636 tropospheric NO2 column
Min = 0.0157 Mean = 1.13 Max = 44.2
10^15 (molecules cm^-2)
Latitude (degrees)
75
60
45
30
15
0
−15
−30
−45
−60
−75
−180
−120
−60
−30
0
30
60
90
120
150
Longitude (degrees)
20
15
10
5
0


da492 tropospheric O_3 column
Min = 6.63 Mean = 24.8 Max = 40.9
Burden (Tg) = 304
Latitude (degrees)
75
60
45
30
15
0
−15
−30
−45
−60
−75
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month
60
50
40
30
20
10
0

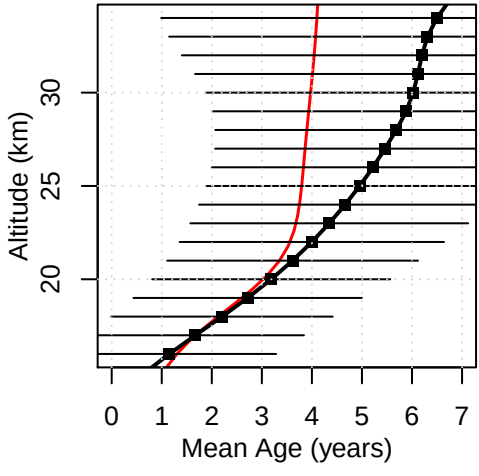

bf636 tropospheric O_3 column
Min = 6.76 Mean = 24.6 Max = 40
Burden (Tg) = 302
Latitude (degrees)
75
60
45
30
15
0
−15
−30
−45
−60
−75
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month
60
50
40
30
20
10
0

UKCA da492 Mean Age of Air

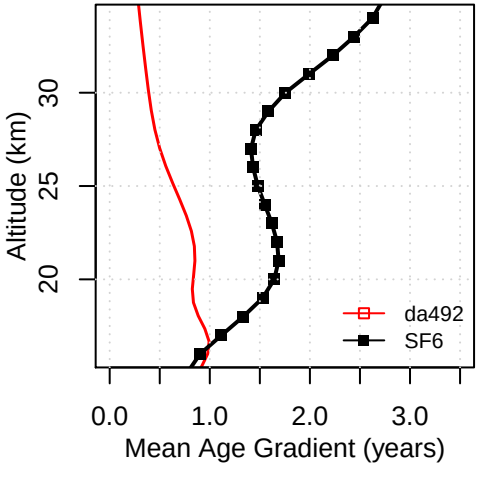
Tropical Mean Age Profile



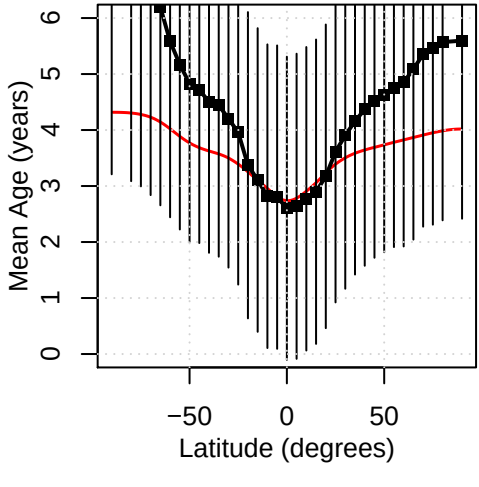
Midlatitude Mean Age Profile



Trop−Midlat Mean Age Gradient Prof

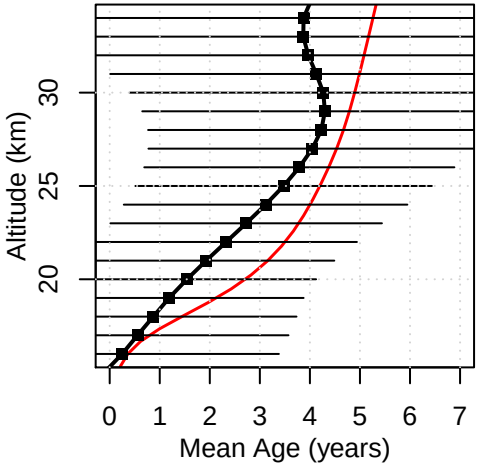


Mean Age, 23km (~50hPa)

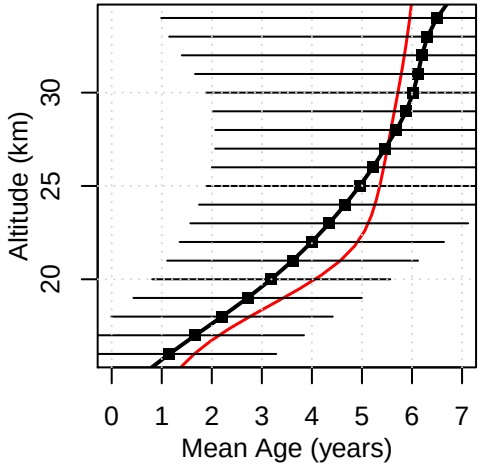


UKCA bf636 Mean Age of Air

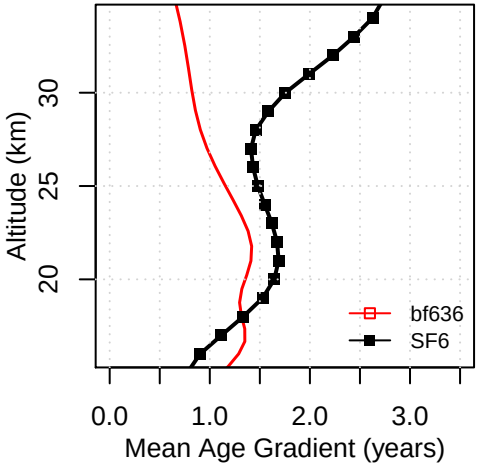
Tropical Mean Age Profile



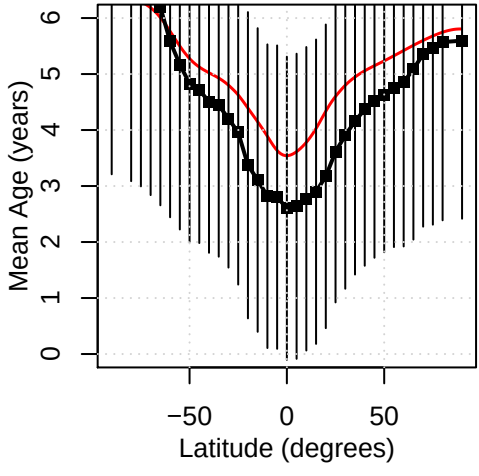
Midlatitude Mean Age Profile

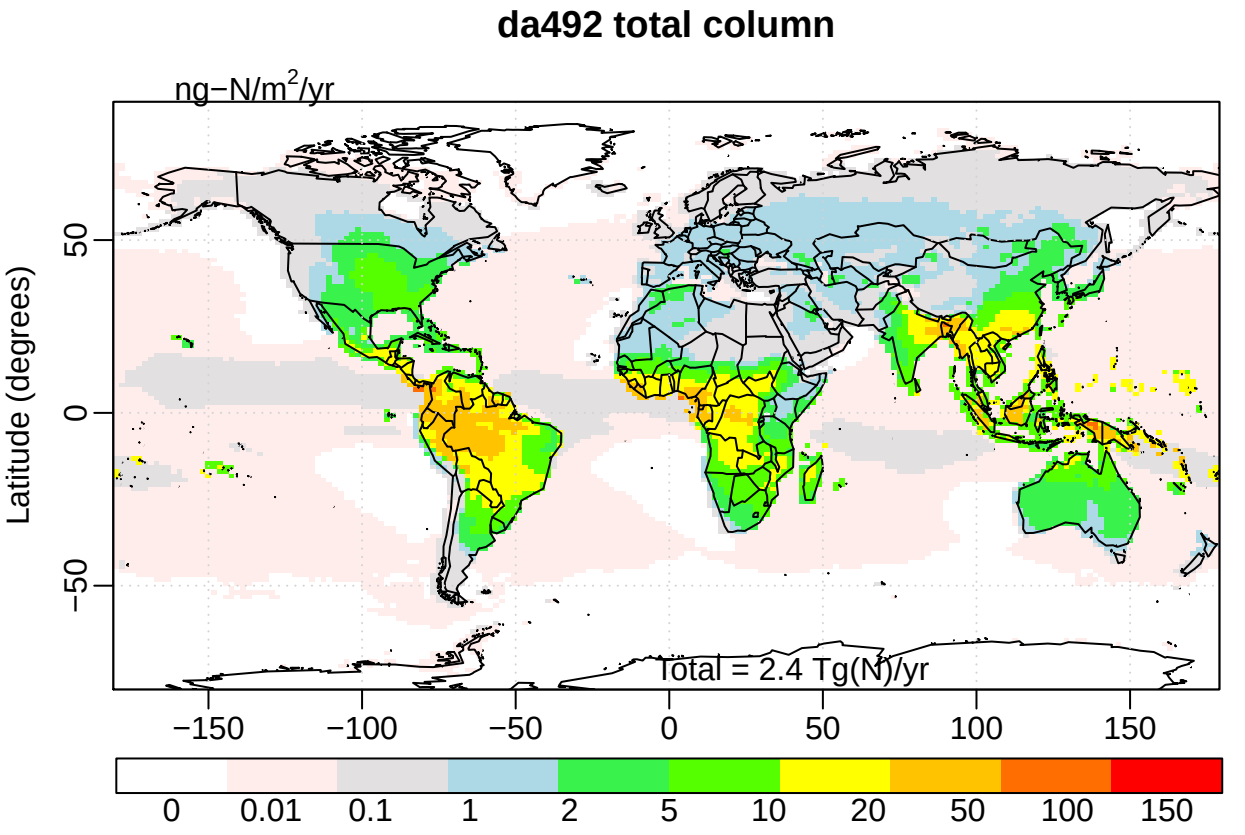


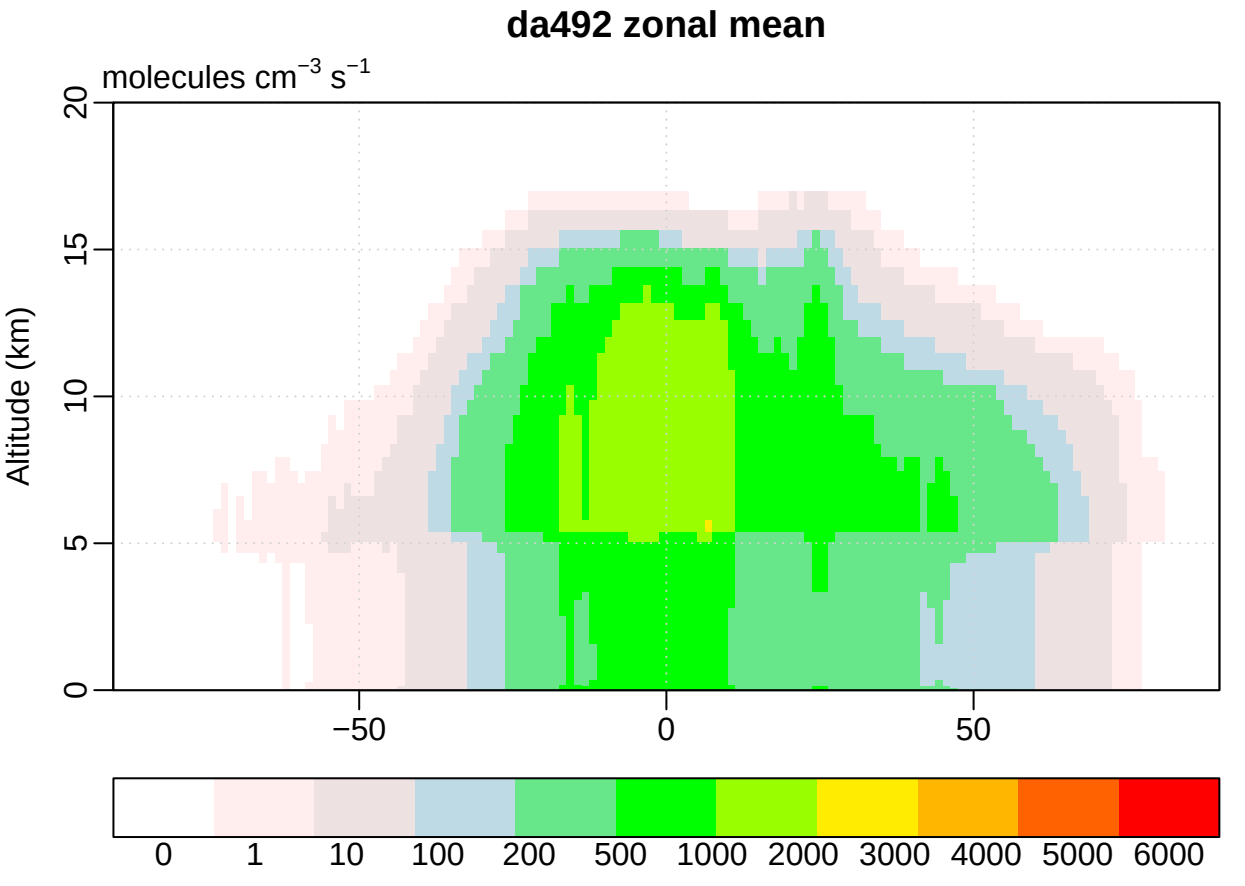
Trop−Midlat Mean Age Gradient Prof

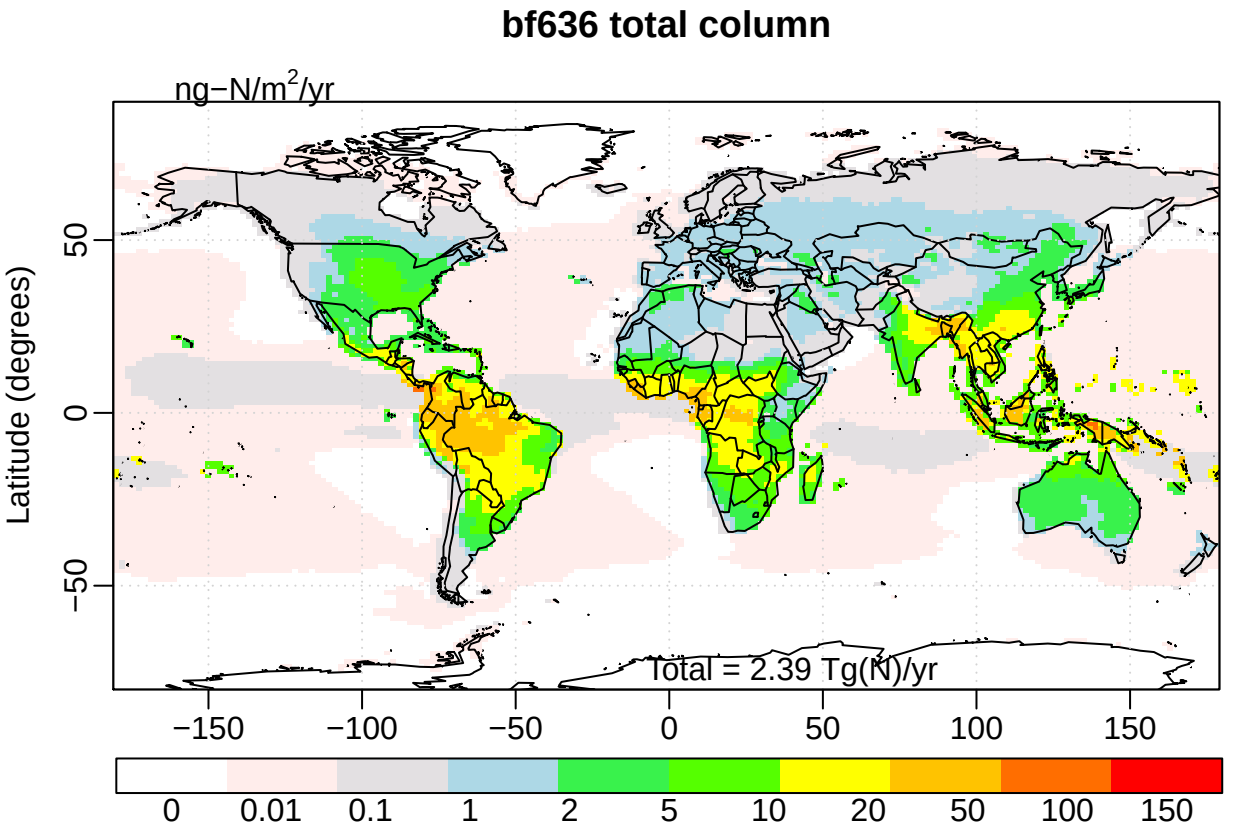


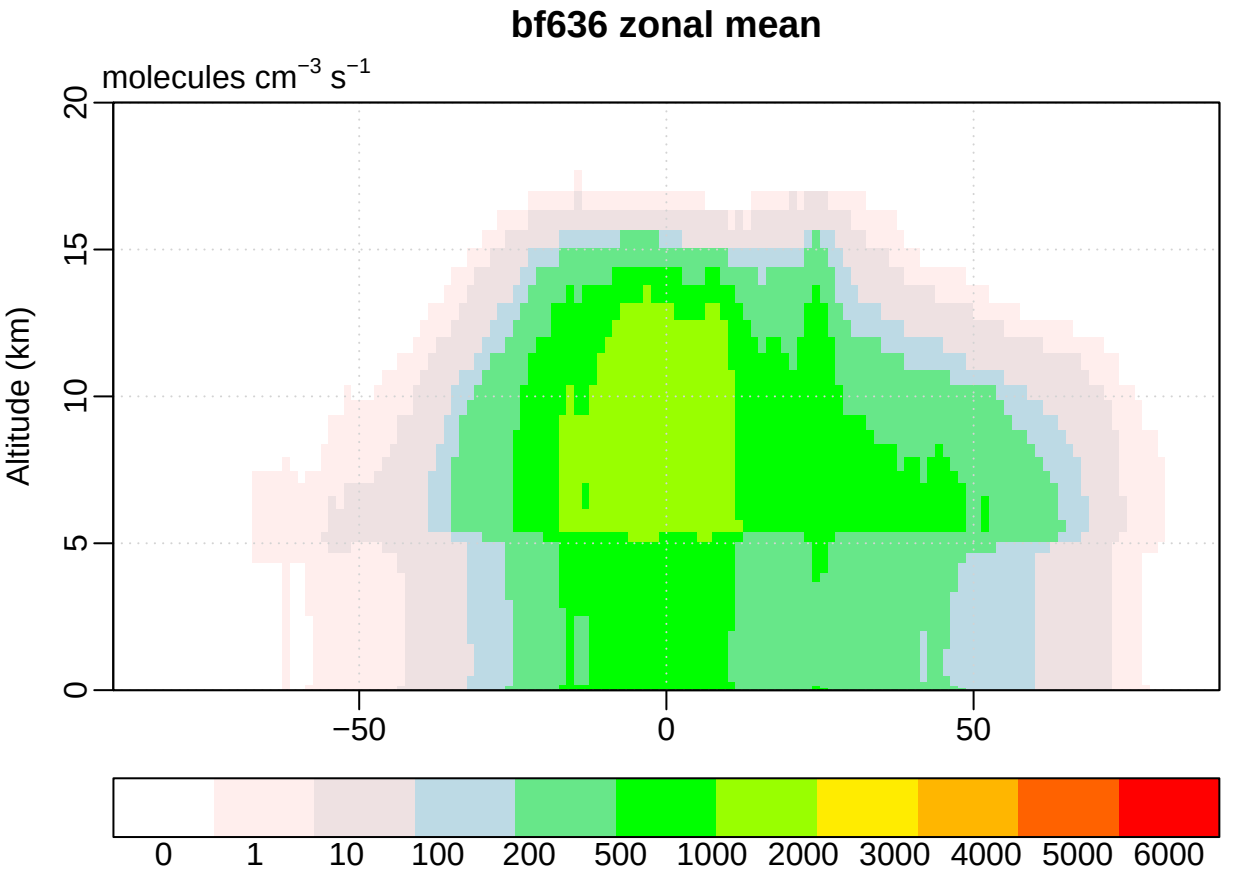
Mean Age, 23km (~50hPa)

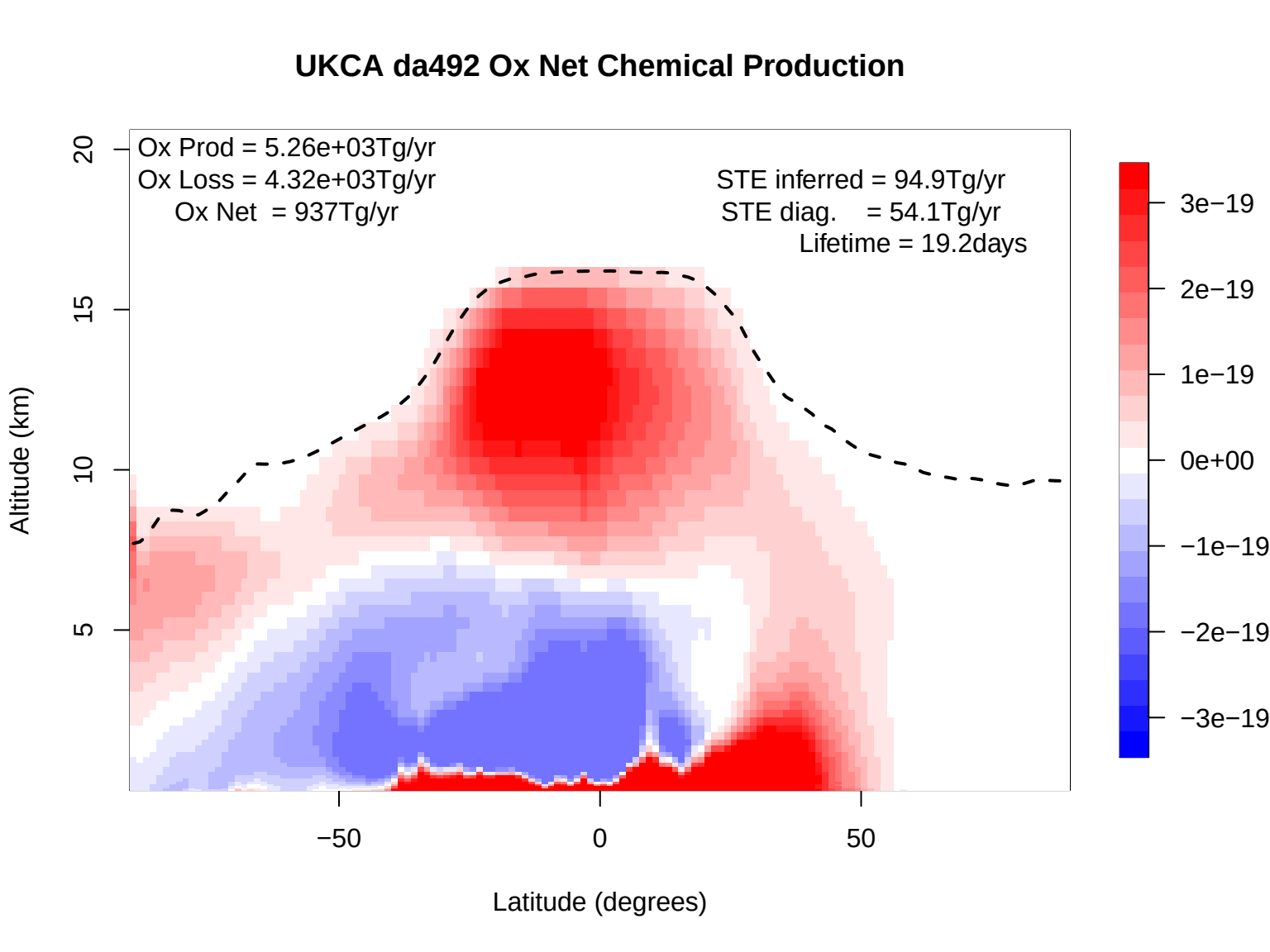


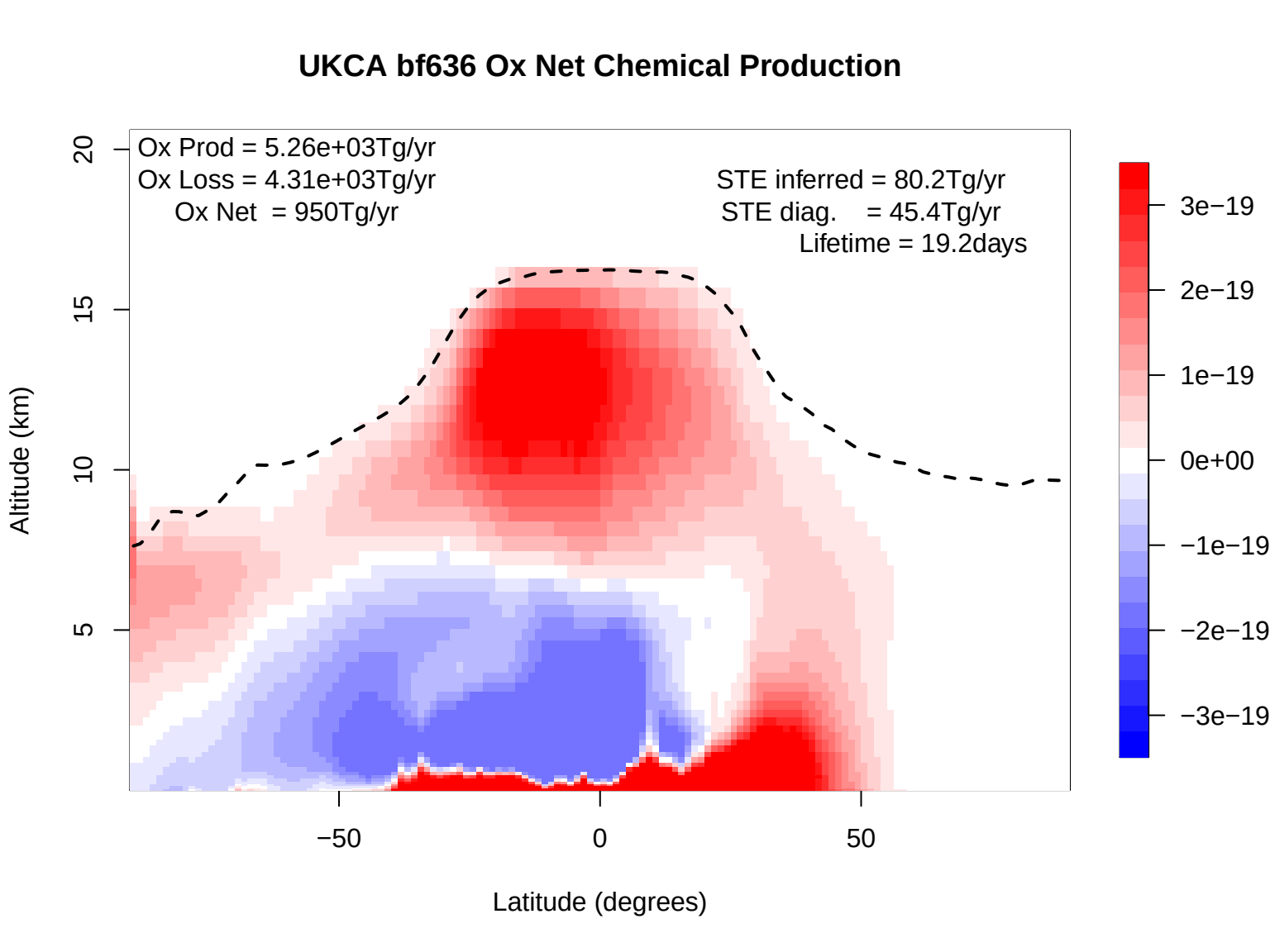

da492 total column
ng−N/m2/yr
Latitude (degrees)
50
0
−50
Total = 2.4 Tg(N)/yr
−150
−100
−50
0
50
100
150
0
0.01
0.1
1
2
5
10
20
50
100
150

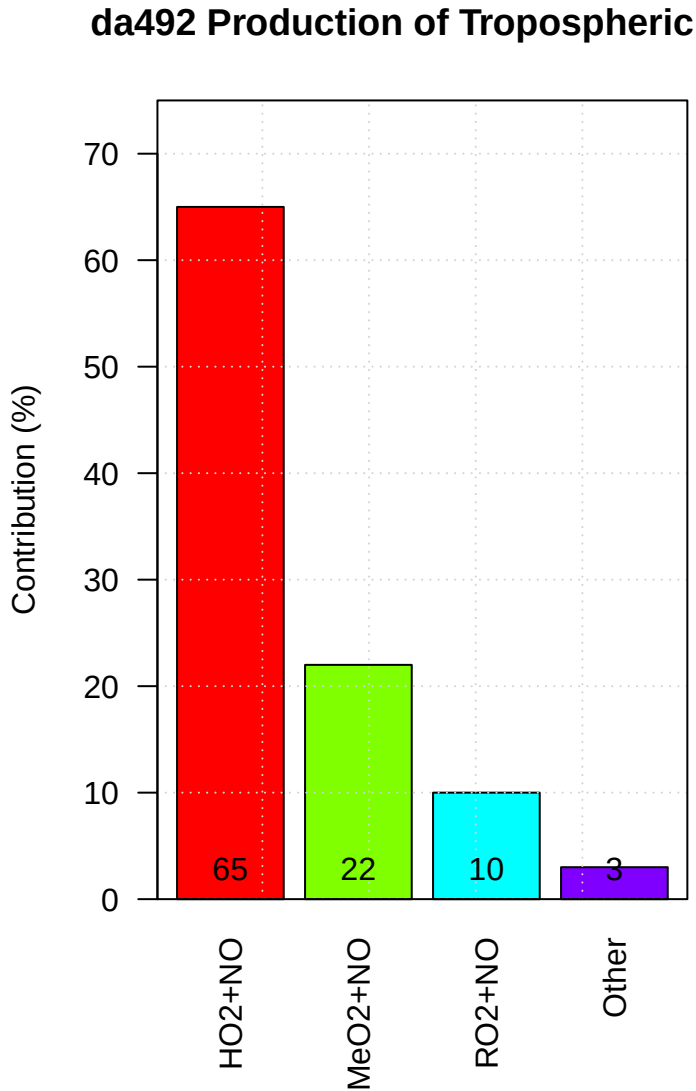

da492 zonal mean
molecules cm−3 s−1
Altitude (km)
20
15
10
5
0
−50
0
50
0
1
10
100
200
500
1000
2000
3000
4000
5000
6000

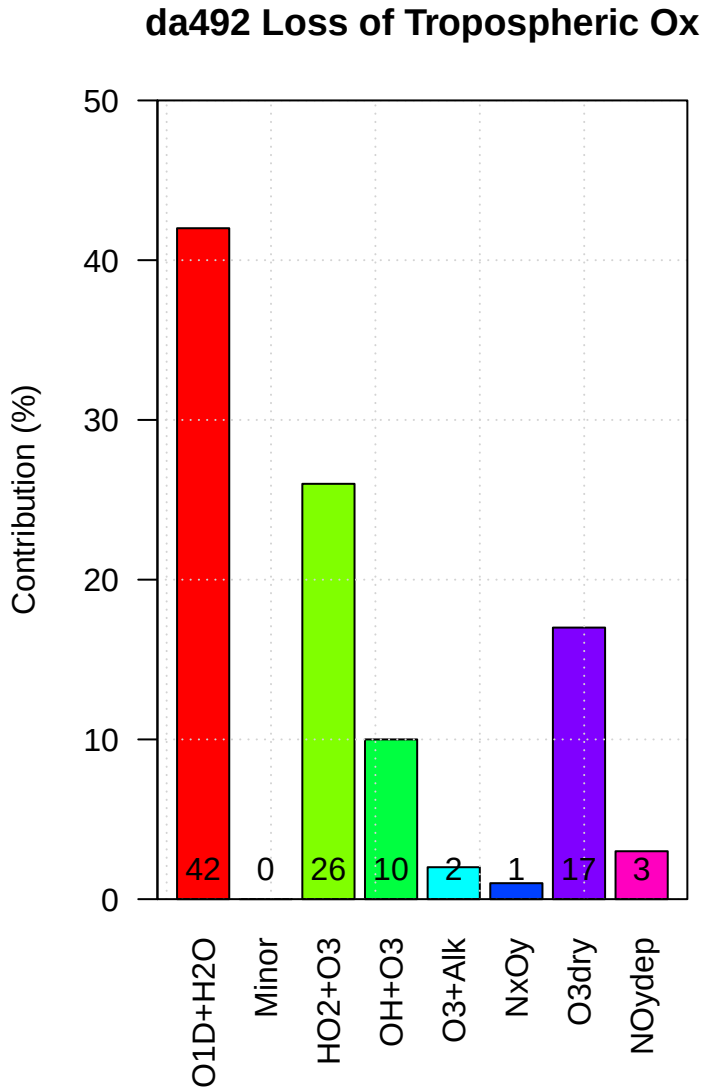

bf636 total column
ng−N/m2/yr
Latitude (degrees)
50
0
−50
Total = 2.39 Tg(N)/yr
−150
−100
−50
0
50
100
150
0
0.01
0.1
1
2
5
10
20
50
100
150

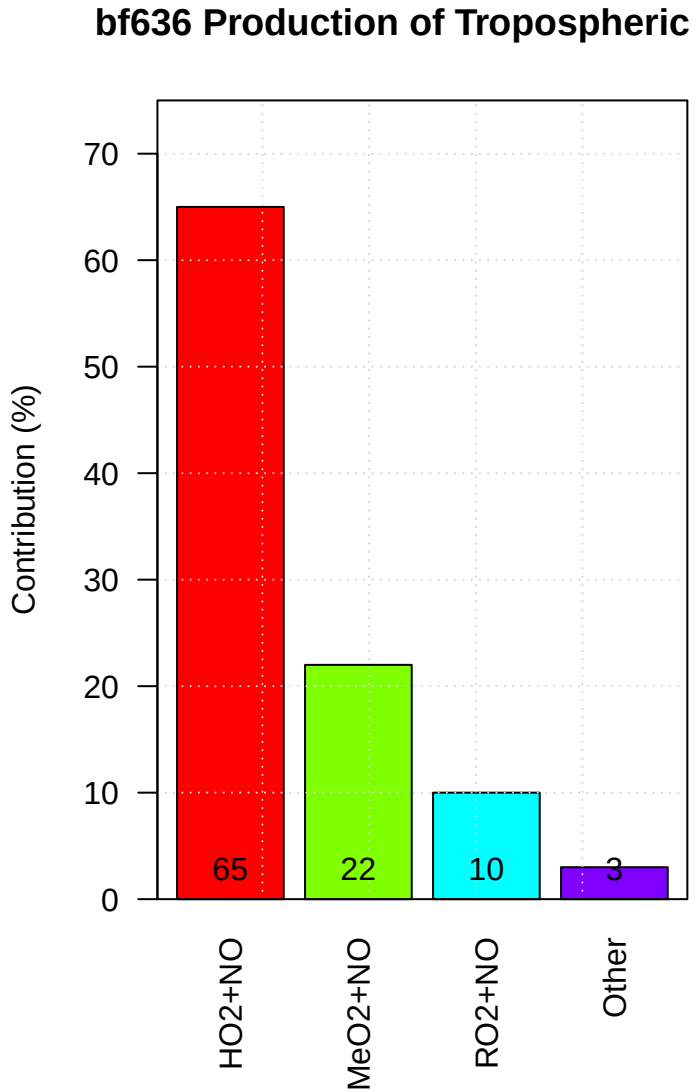

bf636 zonal mean
molecules cm−3 s−1
Altitude (km)
20
15
10
5
0
−50
0
50
0
1
10
100
200
500
1000
2000
3000
4000
5000
6000

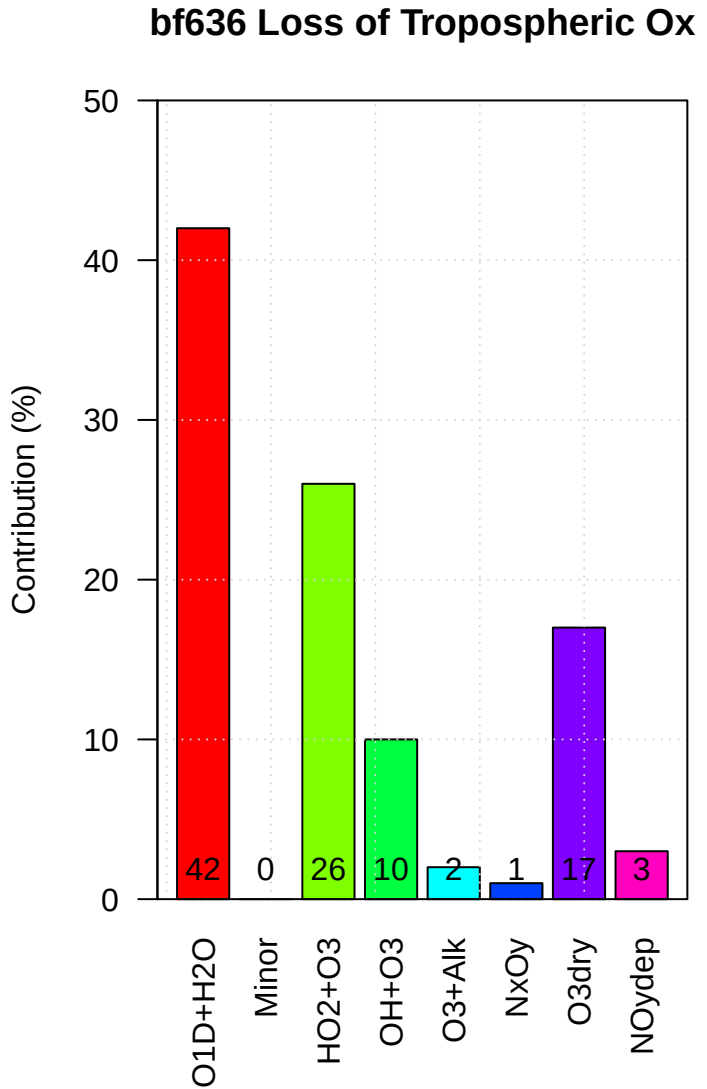

UKCA da492 Ox Net Chemical Production
Ox Prod = 5.26e+03Tg/yr
Ox Loss = 4.32e+03Tg/yr
Ox Net = 937Tg/yr
STE inferred = 94.9Tg/yr
STE diag. = 54.1Tg/yr
Lifetime = 19.2days
Altitude (km)
20
15
10
5
−50
0
50
Latitude (degrees)
3e−19
2e−19
1e−19
0e+00
−1e−19
−2e−19
−3e−19

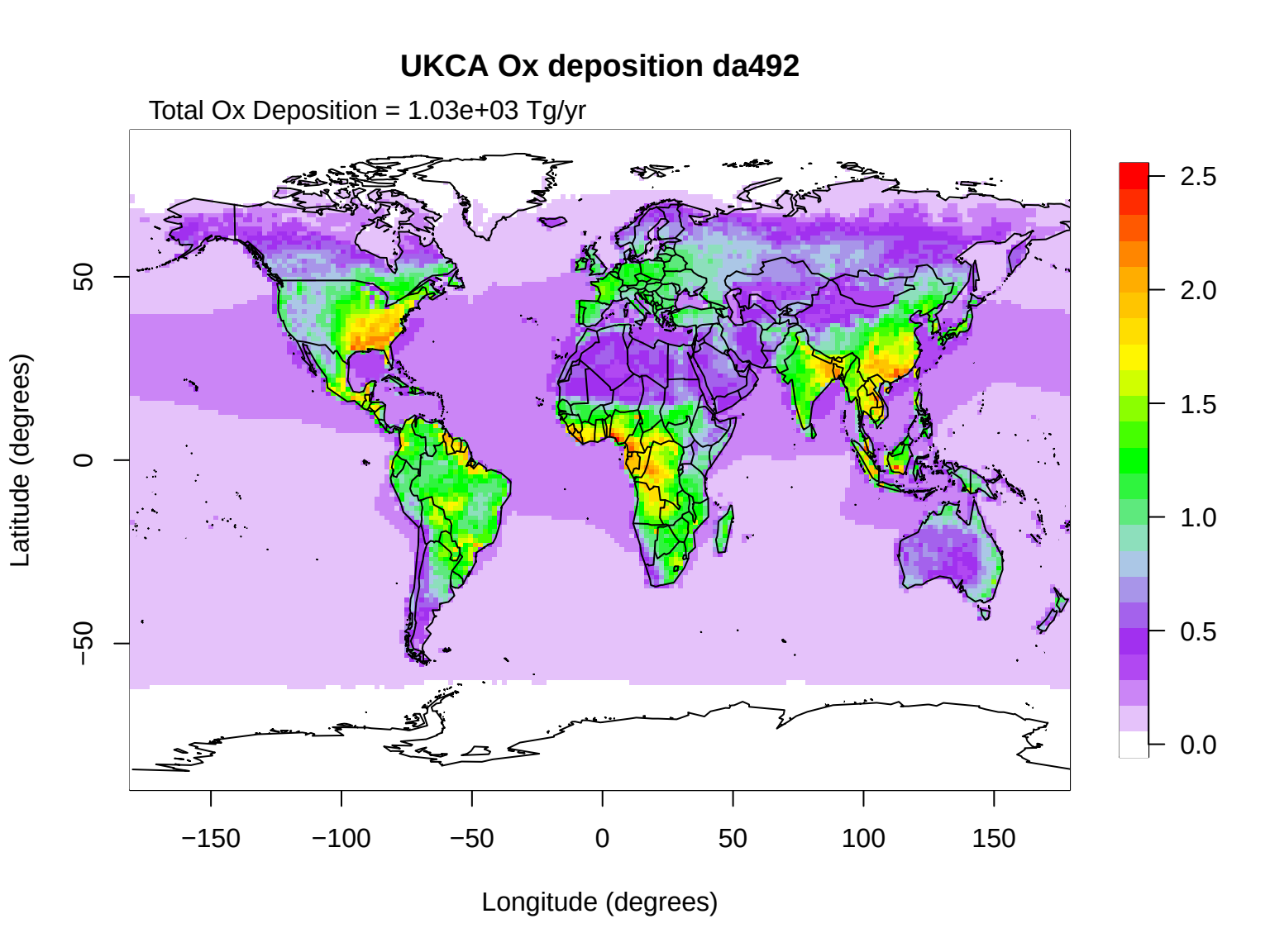

UKCA bf636 Ox Net Chemical Production
Ox Prod = 5.26e+03Tg/yr
Ox Loss = 4.31e+03Tg/yr
Ox Net = 950Tg/yr
STE inferred = 80.2Tg/yr
STE diag. = 45.4Tg/yr
Lifetime = 19.2days
Altitude (km)
20
15
10
5
−50
0
50
Latitude (degrees)
3e−19
2e−19
1e−19
0e+00
−1e−19
−2e−19
−3e−19

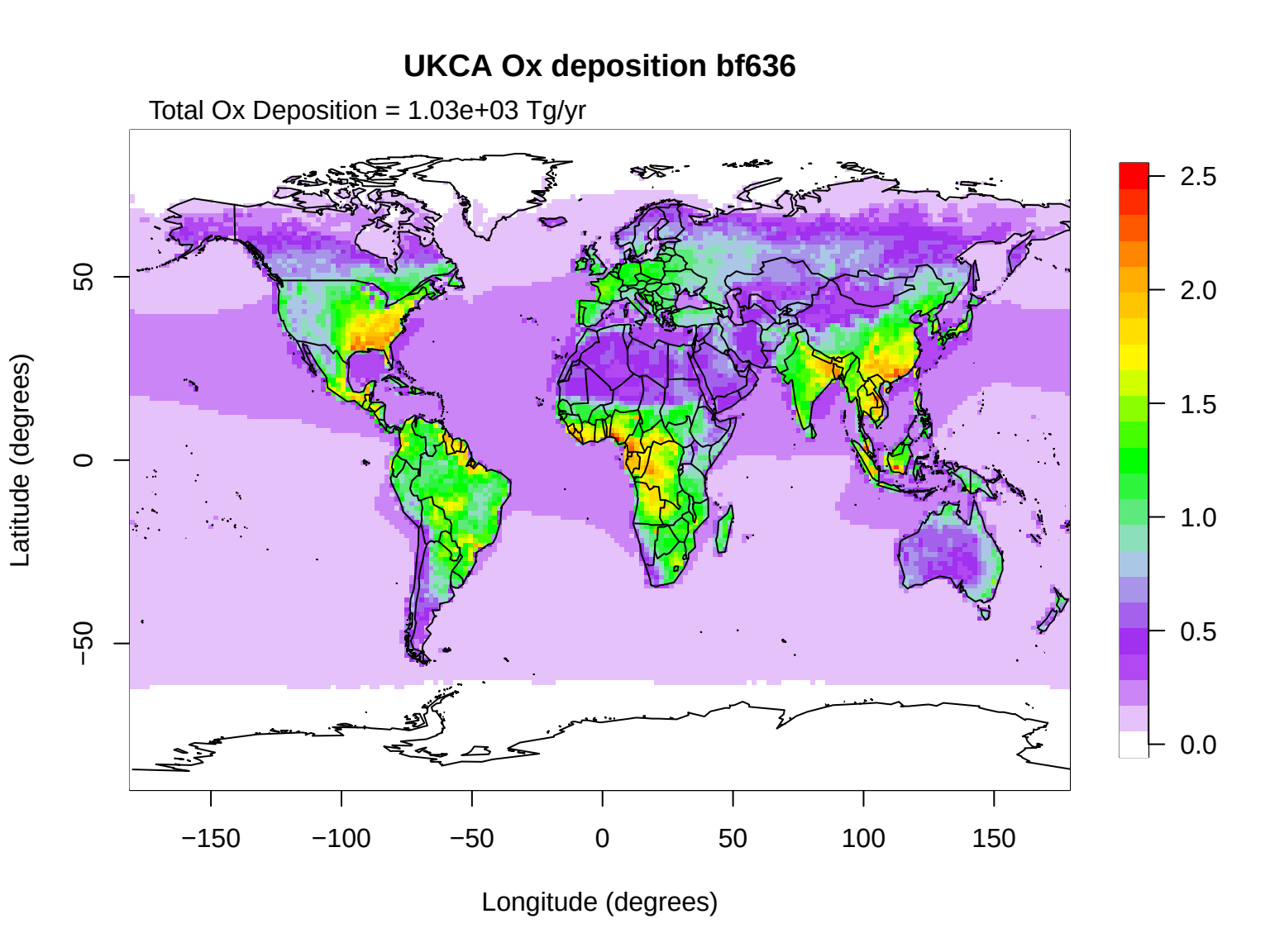

da492 Production of Tropospheric Ox
Contribution (%)
0
10
20
30
40
50
60
70
65
22
10
3
HO2+NO
MeO2+NO
RO2+NO
Other


da492 Loss of Tropospheric Ox
Contribution (%)
0
10
20
30
40
50
42
0
26
10
2
1
17
3
O1D+H2O
Minor
HO2+O3
OH+O3
O3+Alk
NxOy
O3dry
NOydep


bf636 Production of Tropospheric Ox
Contribution (%)
0
10
20
30
40
50
60
70
65
22
10
3
HO2+NO
MeO2+NO
RO2+NO
Other


bf636 Loss of Tropospheric Ox
Contribution (%)
0
10
20
30
40
50
42
0
26
10
2
1
17
3
O1D+H2O
Minor
HO2+O3
OH+O3
O3+Alk
NxOy
O3dry
NOydep


UKCA Ox deposition da492
Total Ox Deposition = 1.03e+03 Tg/yr
Latitude (degrees)
50
0
−50
−150
−100
−50
0
50
100
150
Longitude (degrees)
2.5
2.0
1.5
1.0
0.5
0.0


UKCA Ox deposition bf636
Total Ox Deposition = 1.03e+03 Tg/yr
Latitude (degrees)
50
0
−50
−150
−100
−50
0
50
100
150
Longitude (degrees)
2.5
2.0
1.5
1.0
0.5
0.0

90S − 60S

60S − 30S

30S − 30N

30N − 60N

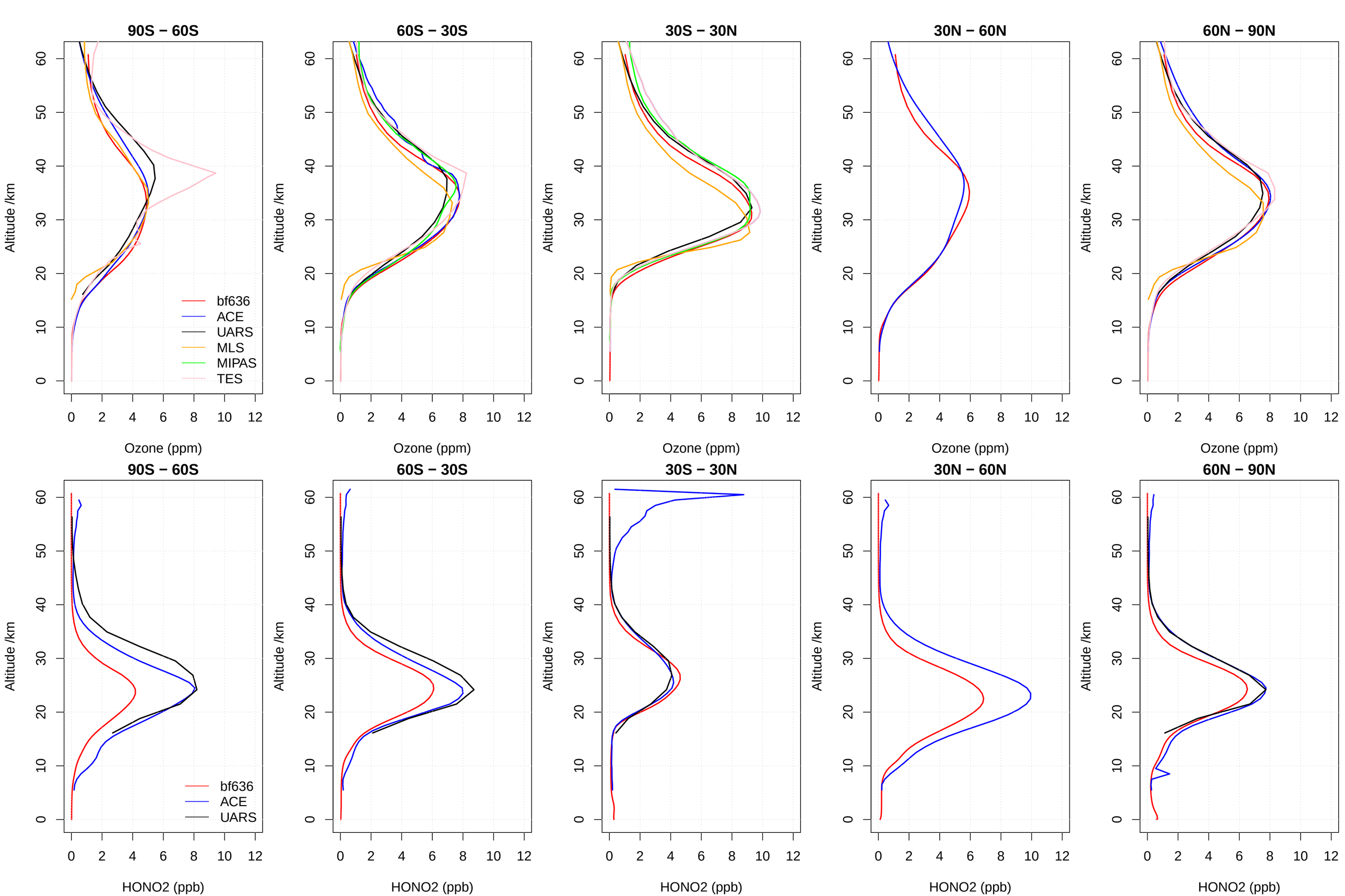
60N − 90N

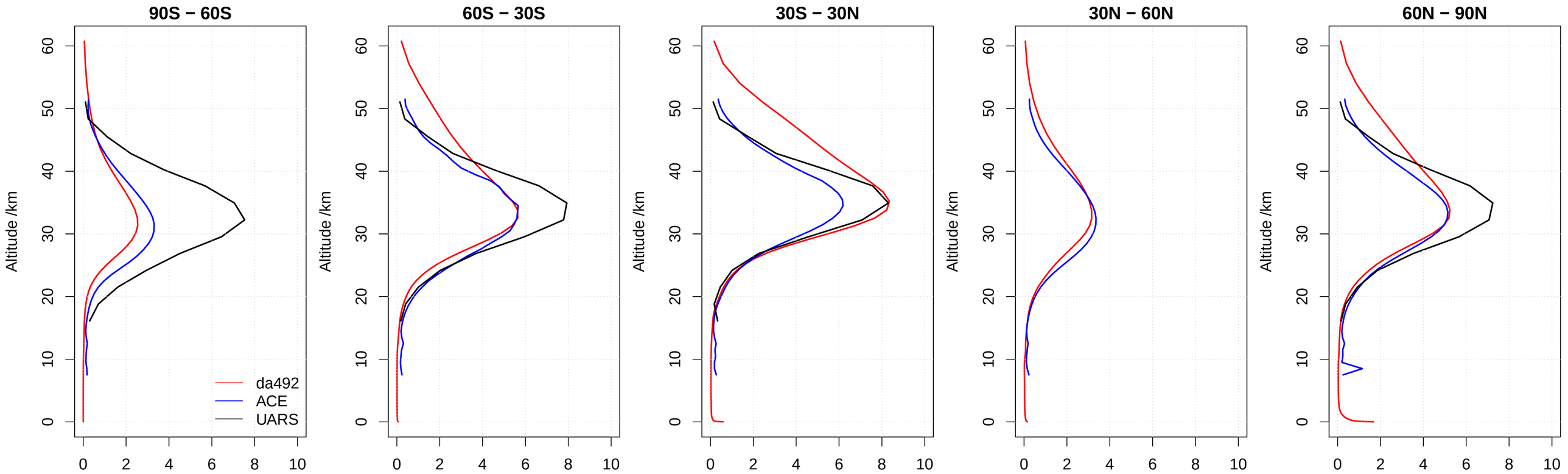
Altitude /km

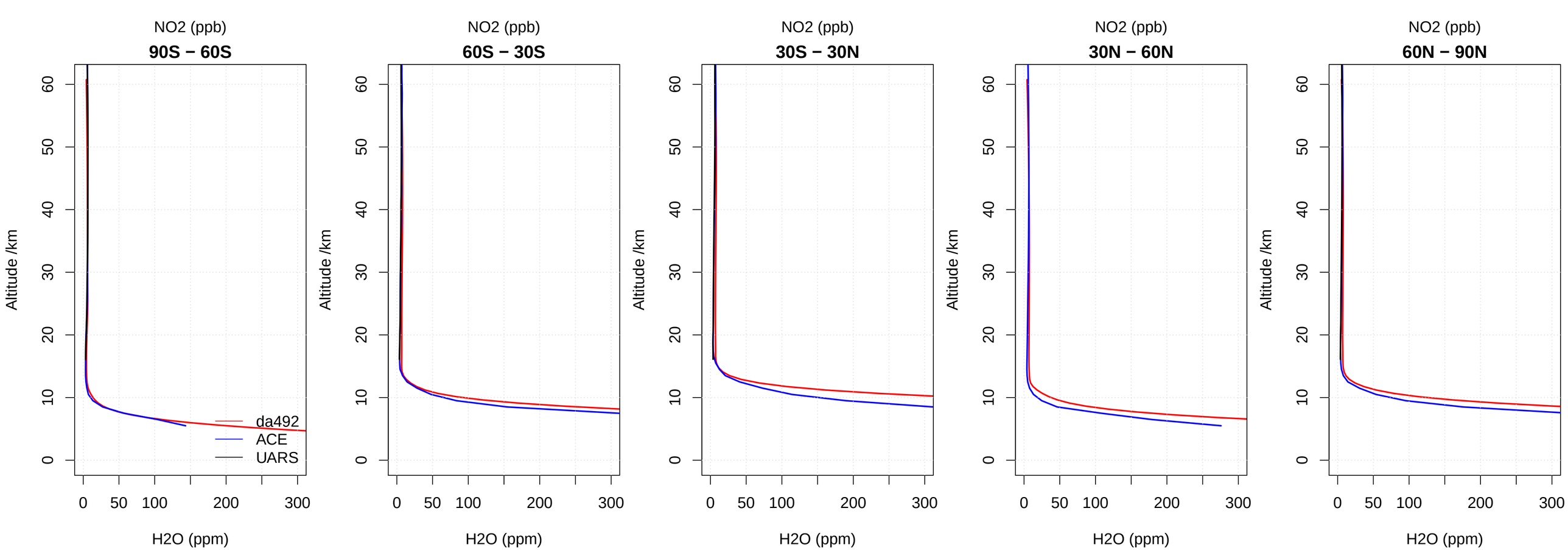
Ozone (ppm)

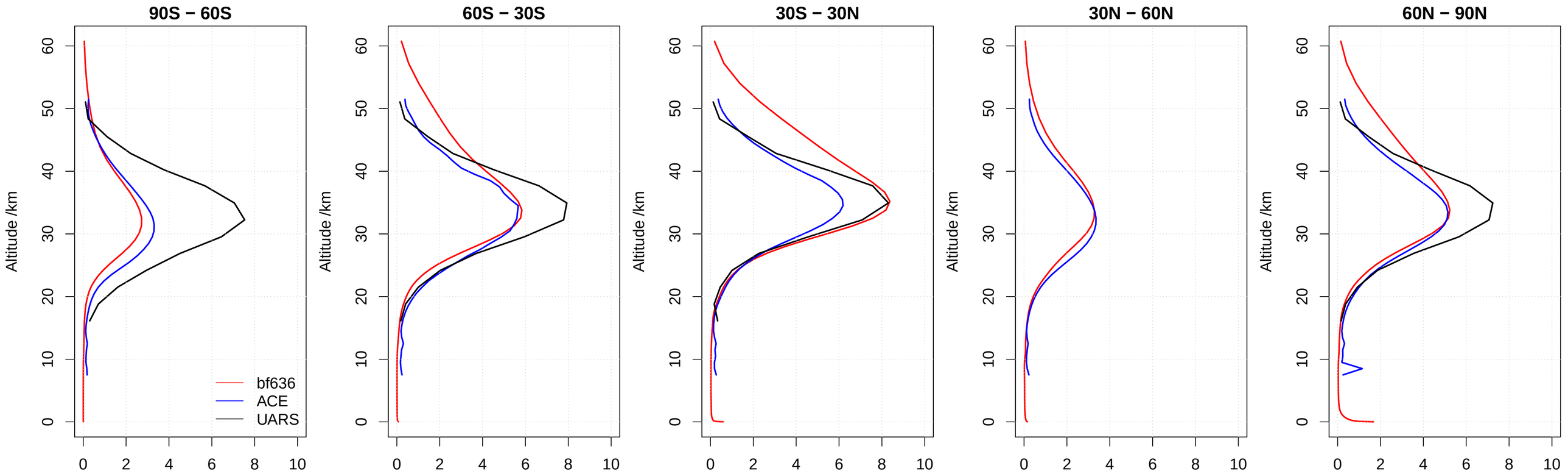
HONO2 (ppb)

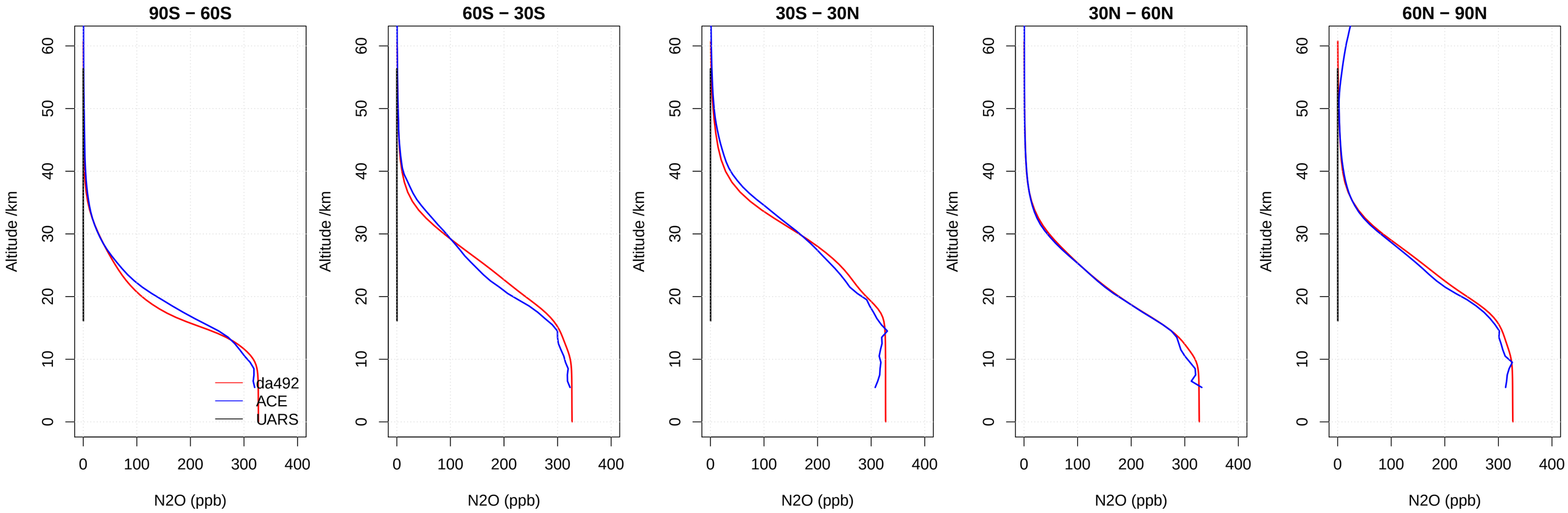
da492
ACE
UARS
MLS
MIPAS
TES

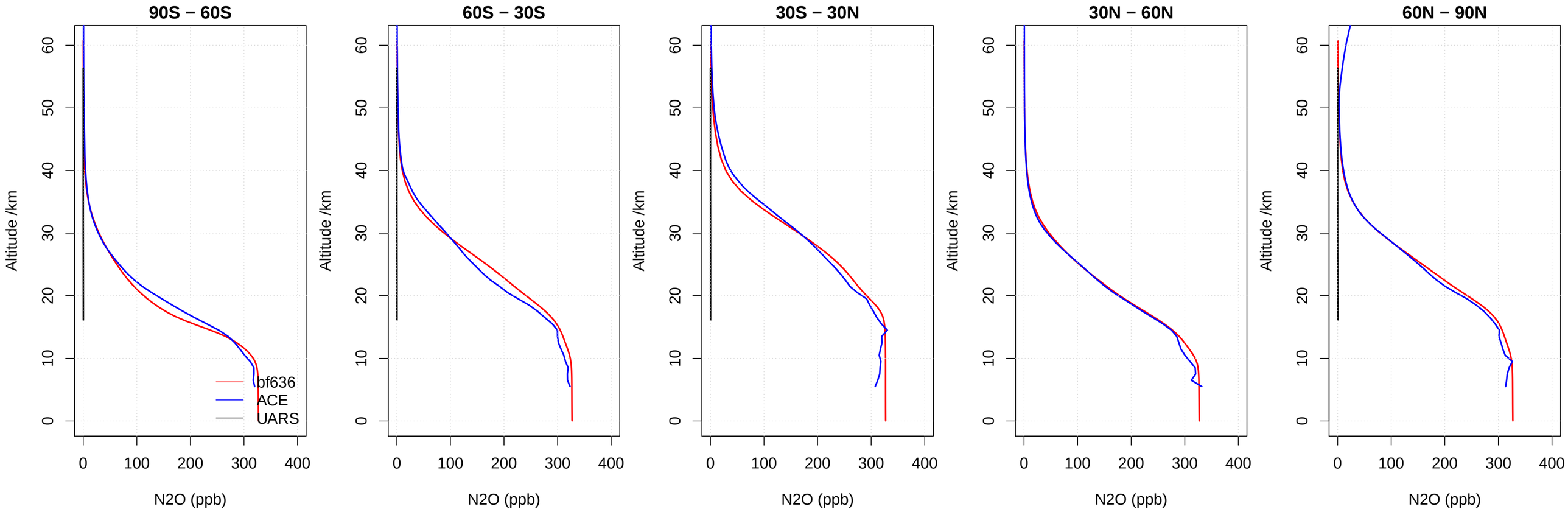

90S − 60S
60S − 30S
30S − 30N
30N − 60N
60N − 90N
Altitude /km
Ozone (ppm)
HONO2 (ppb)
bf636
ACE
UARS
MLS
MIPAS
TES

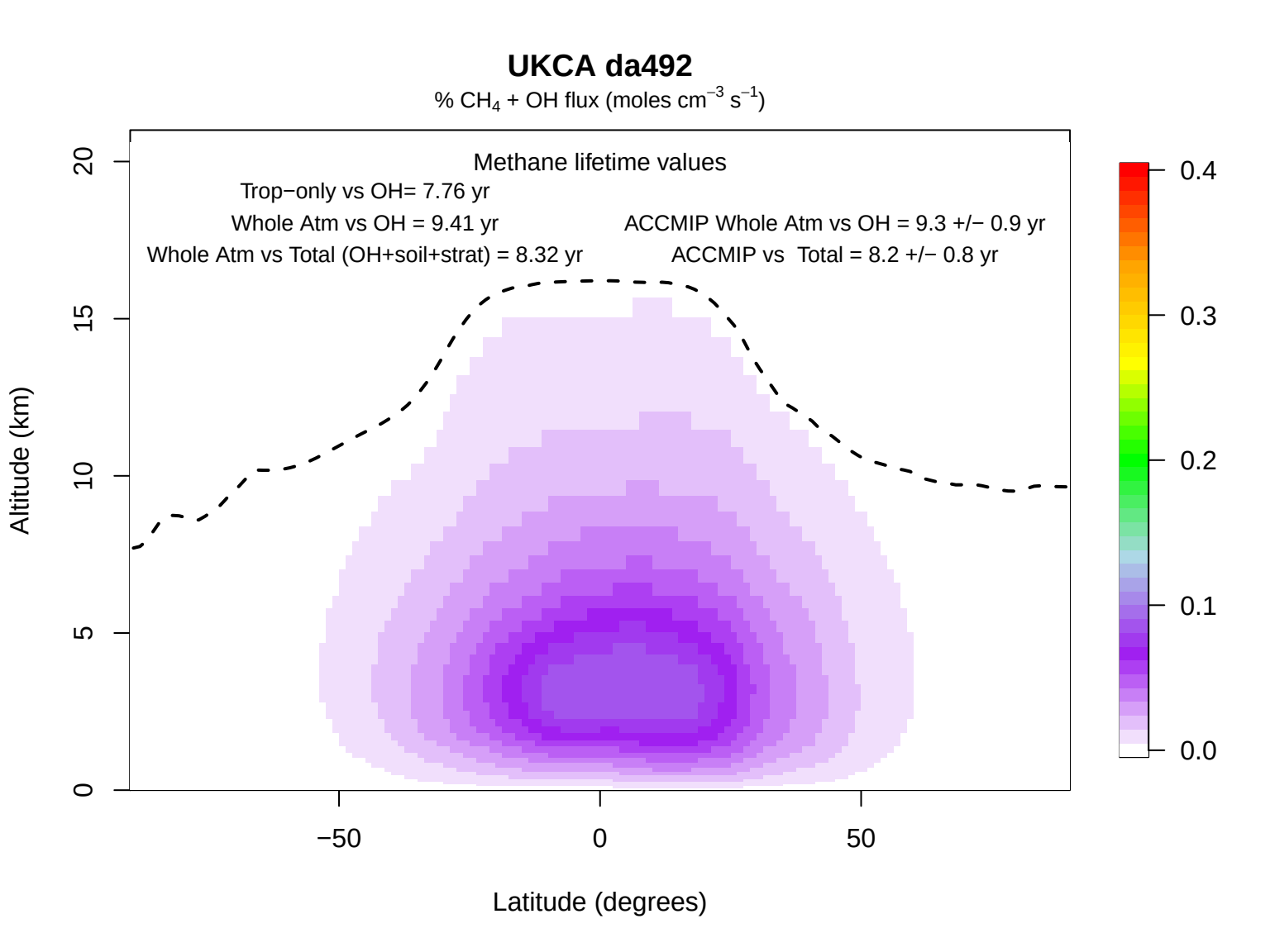

90S − 60S
60S − 30S
30S − 30N
30N − 60N
60N − 90N
Altitude /km
0
10
20
30
40
50
60
0
2
4
6
8
10
da492
ACE
UARS

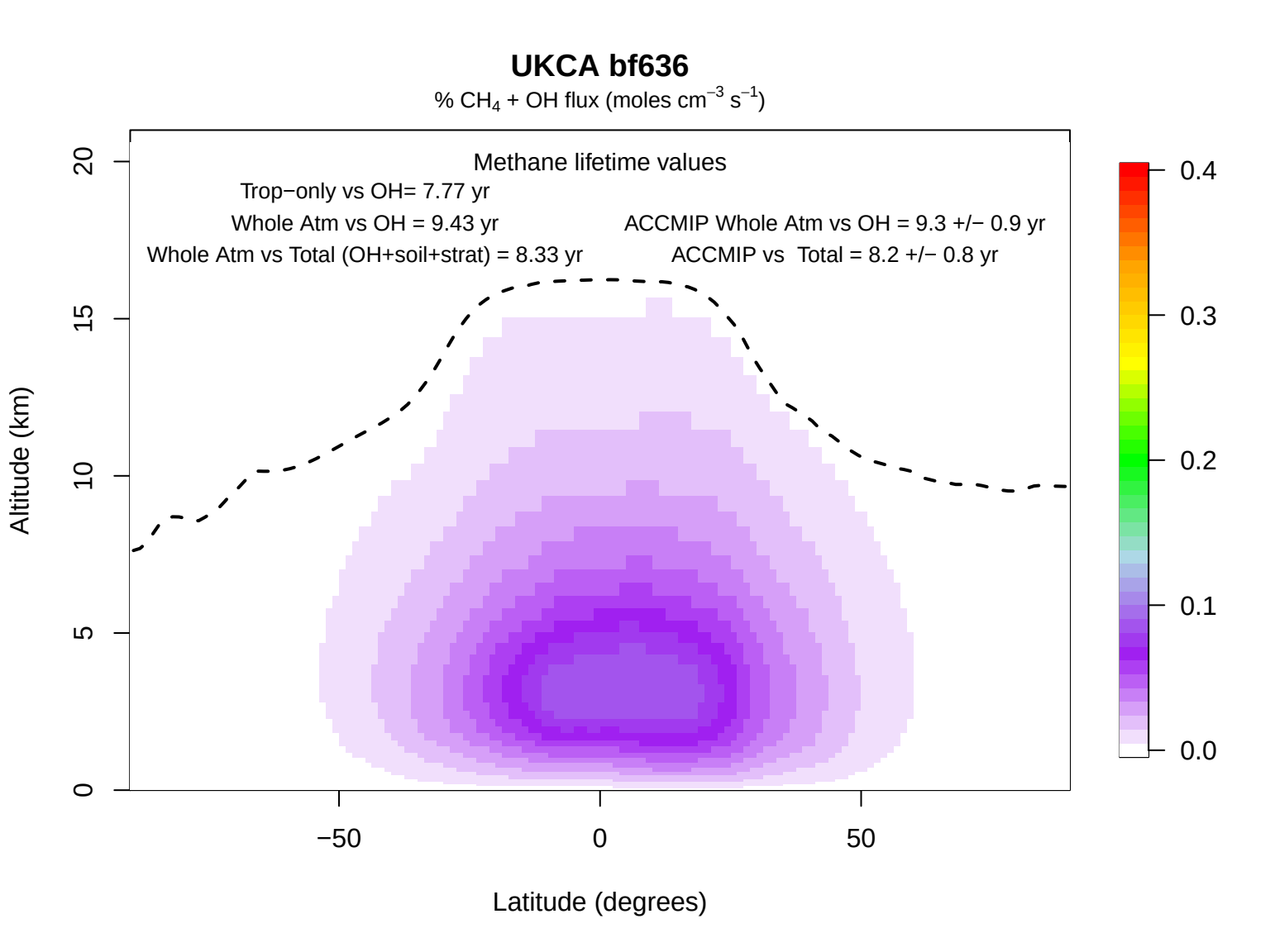

NO2 (ppb)
90S − 60S
60S − 30S
30S − 30N
30N − 60N
60N − 90N
Altitude /km
0
10
20
30
40
50
60
0
50
100
200
300
H2O (ppm)
da492
ACE
UARS


90S − 60S
60S − 30S
30S − 30N
30N − 60N
60N − 90N
Altitude /km
NO2 (ppb)
H2O (ppm)
bf636
ACE
UARS


90S − 60S
60S − 30S
30S − 30N
30N − 60N
60N − 90N
Altitude /km
N2O (ppb)
0
10
20
30
40
50
60
0
100
200
300
400
da492
ACE
UARS


90S − 60S
60S − 30S
30S − 30N
30N − 60N
60N − 90N
Altitude /km
N2O (ppb)
bf636
ACE
UARS
0
10
20
30
40
50
60
0
100
200
300
400


UKCA da492
% CH4 + OH flux (moles cm−3 s−1)
Methane lifetime values
Trop−only vs OH= 7.76 yr
Whole Atm vs OH = 9.41 yr
Whole Atm vs Total (OH+soil+strat) = 8.32 yr
ACCMIP Whole Atm vs OH = 9.3 +/− 0.9 yr
ACCMIP vs Total = 8.2 +/− 0.8 yr
Altitude (km)
0
5
10
15
20
−50
0
50
Latitude (degrees)
0.4
0.3
0.2
0.1
0.0


UKCA bf636
% CH4 + OH flux (moles cm−3 s−1)
Methane lifetime values
Trop−only vs OH= 7.77 yr
Whole Atm vs OH = 9.43 yr
Whole Atm vs Total (OH+soil+strat) = 8.33 yr
ACCMIP Whole Atm vs OH = 9.3 +/− 0.9 yr
ACCMIP vs Total = 8.2 +/− 0.8 yr
Altitude (km)
0
5
10
15
20
−50
0
50
Latitude (degrees)
0.4
0.3
0.2
0.1
0.0