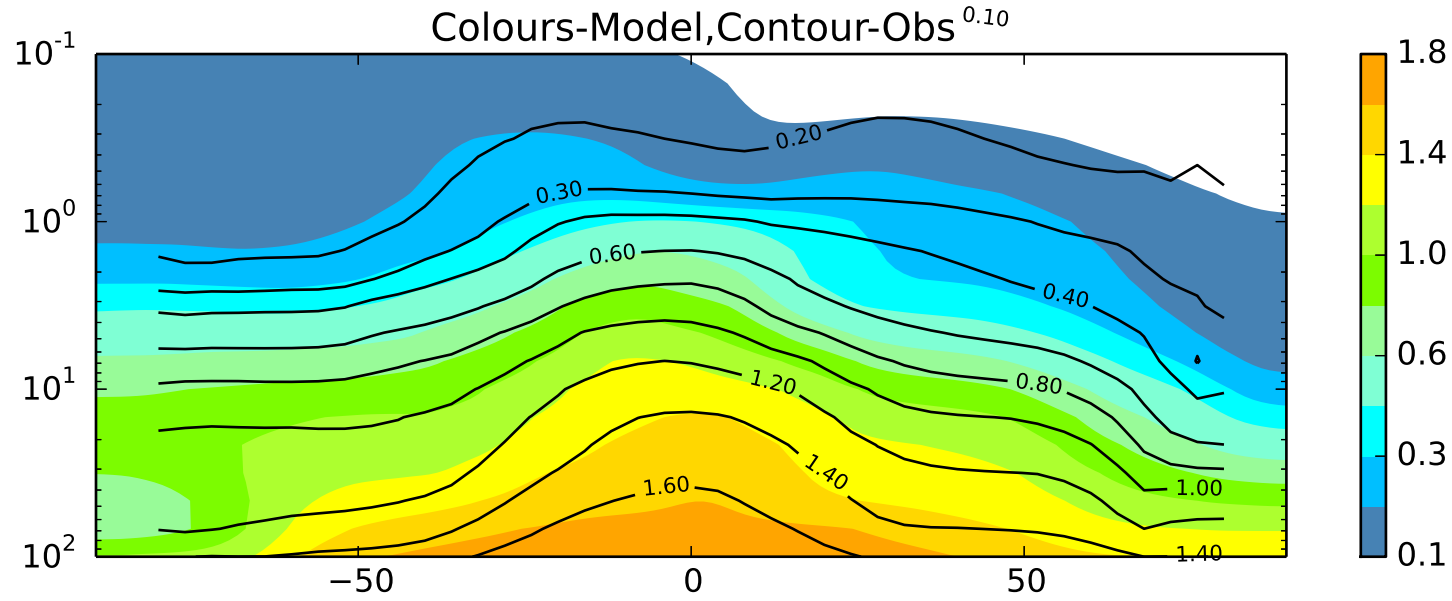
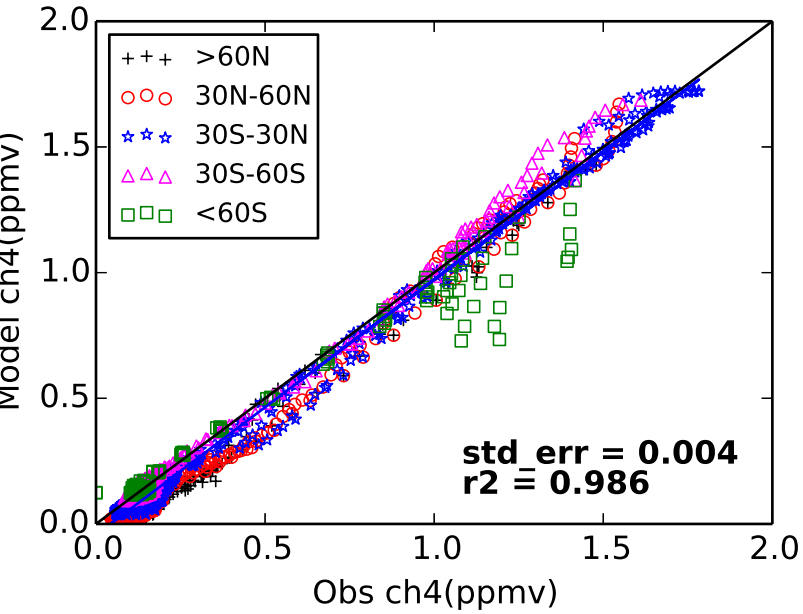
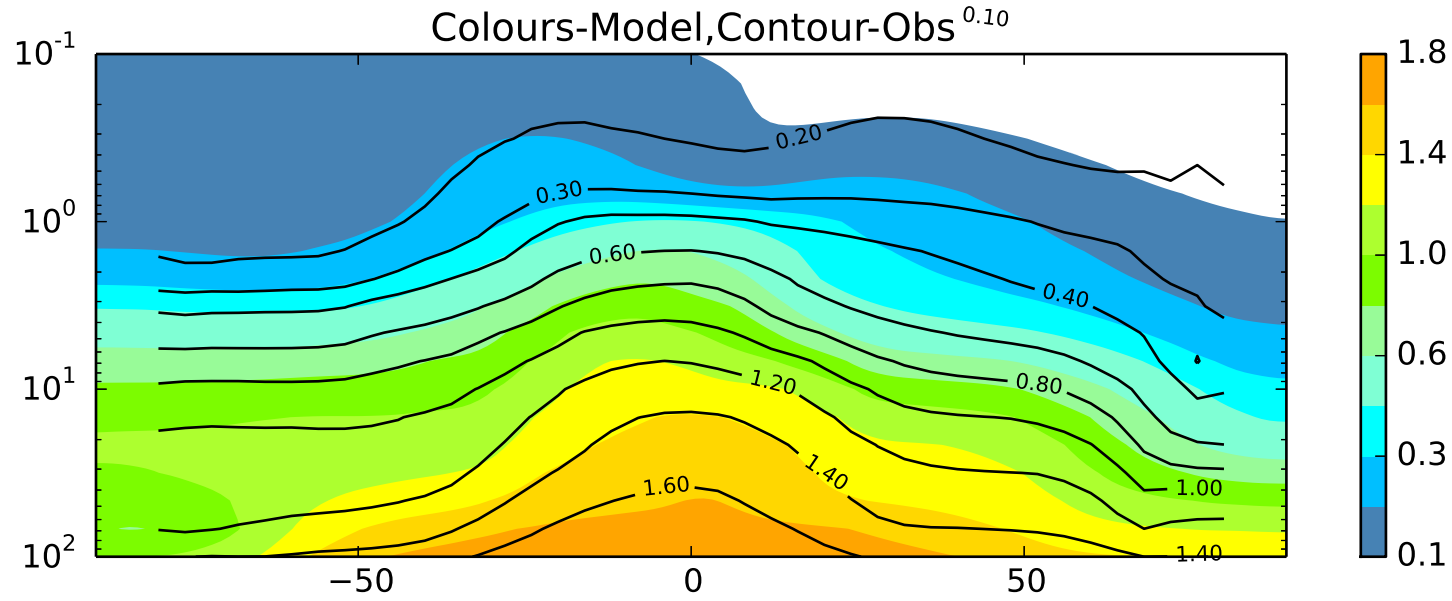
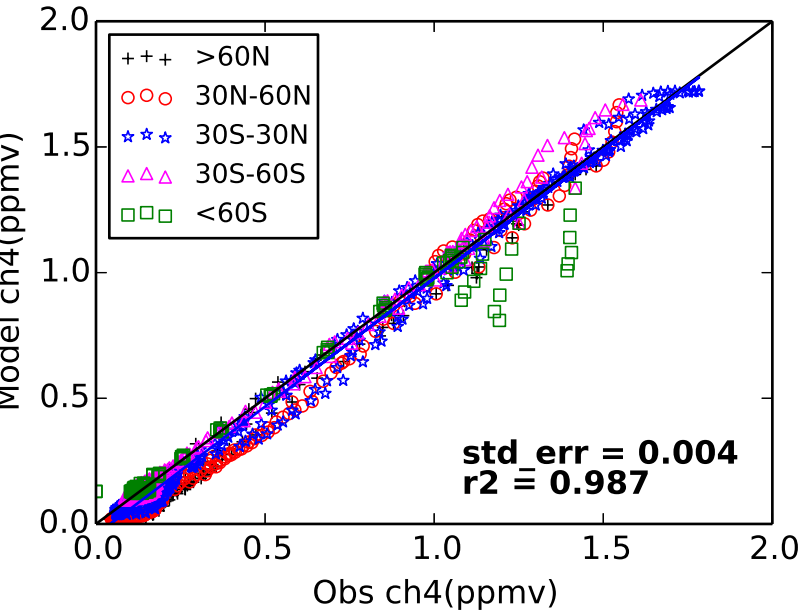


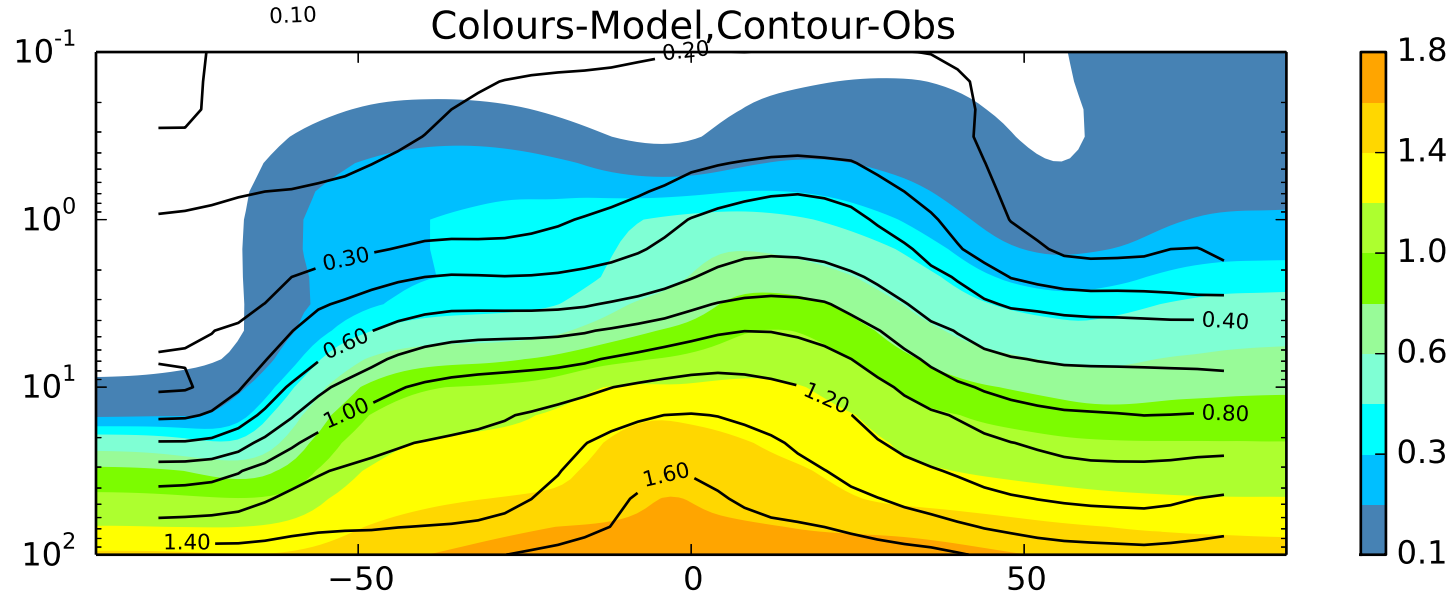


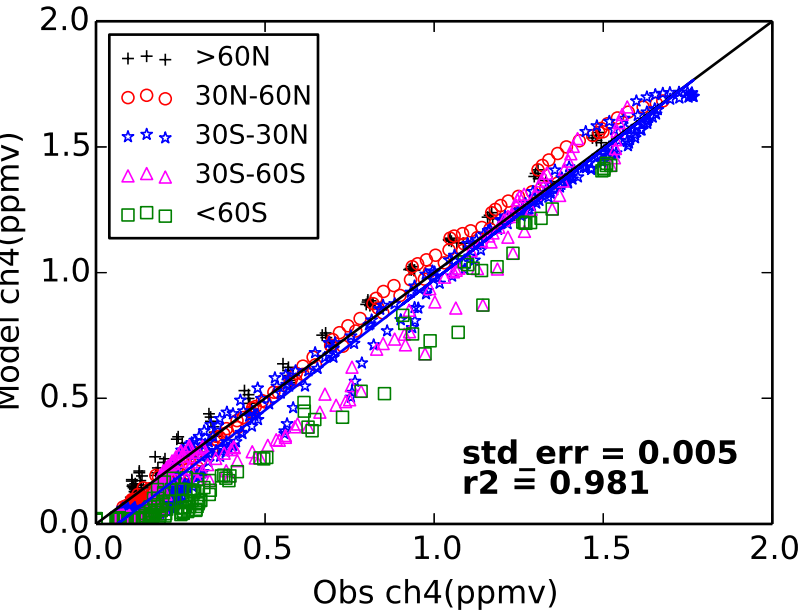
UKCA am124 vs HALOE:
CH4 (ppmv) Jan



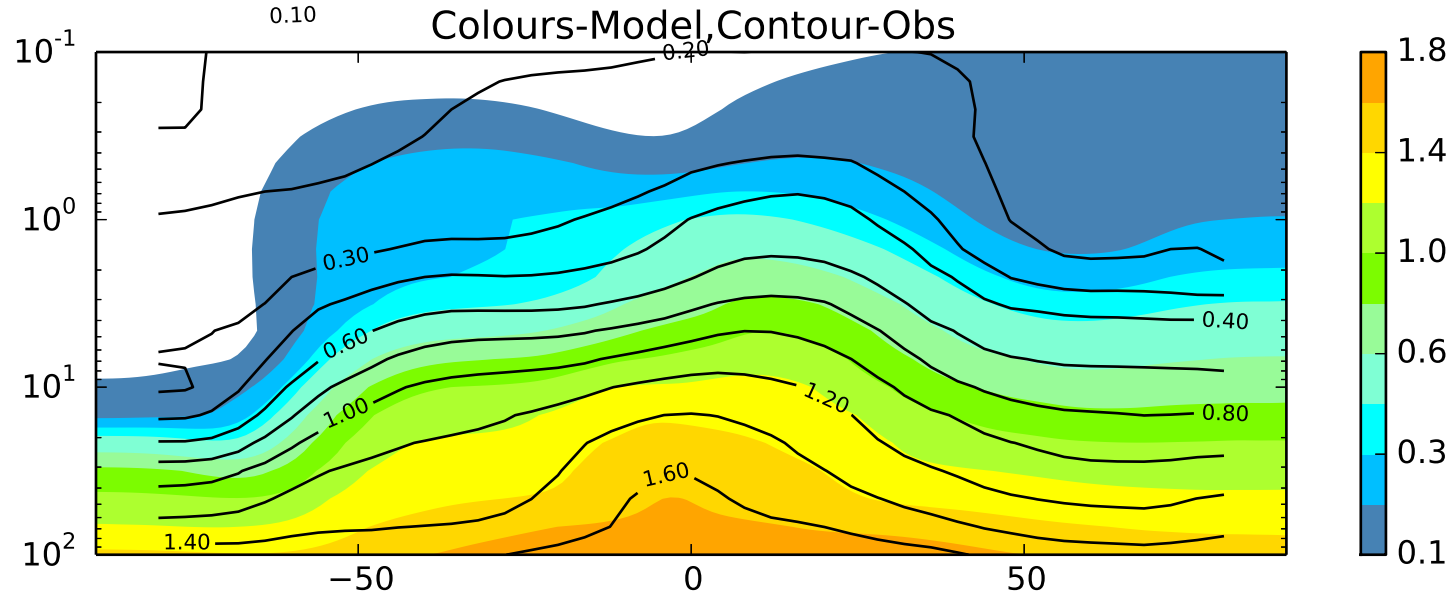


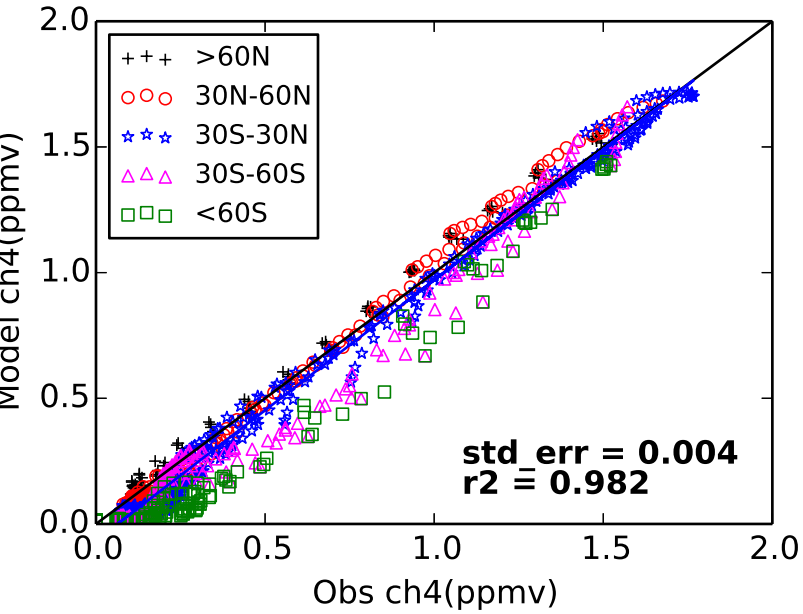
UKCA an188 vs HALOE:
CH4 (ppmv) Jan



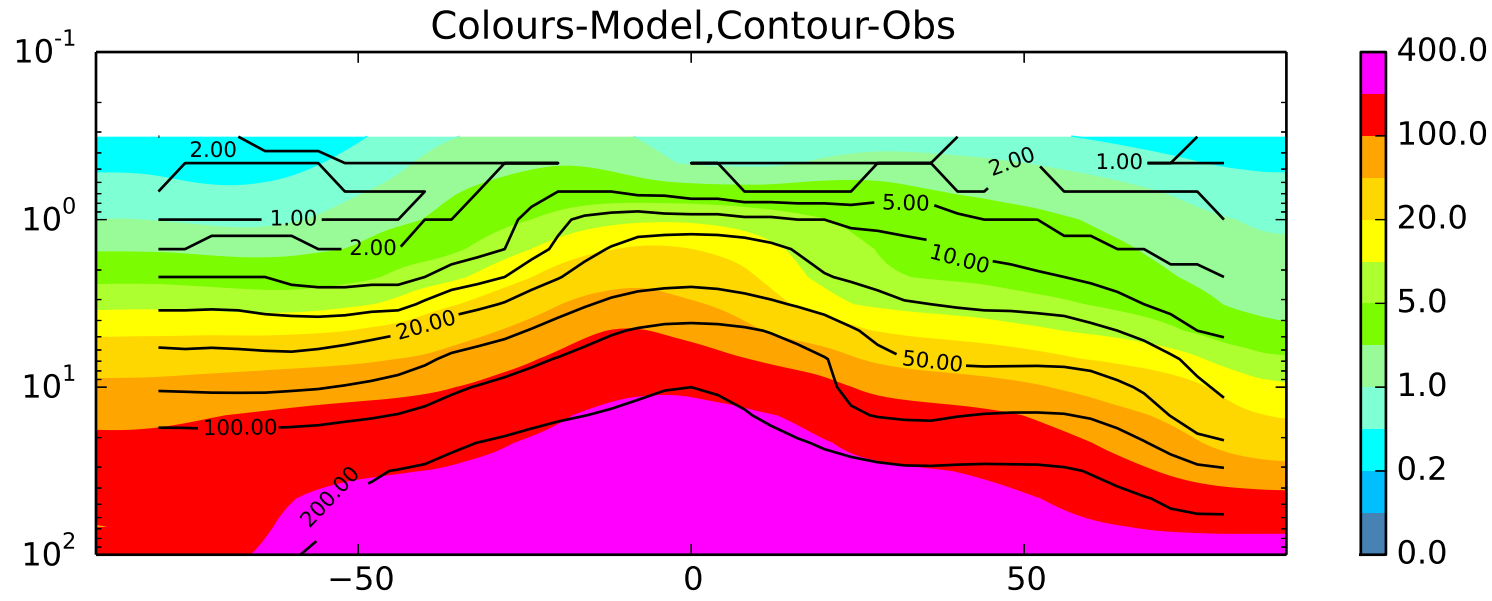


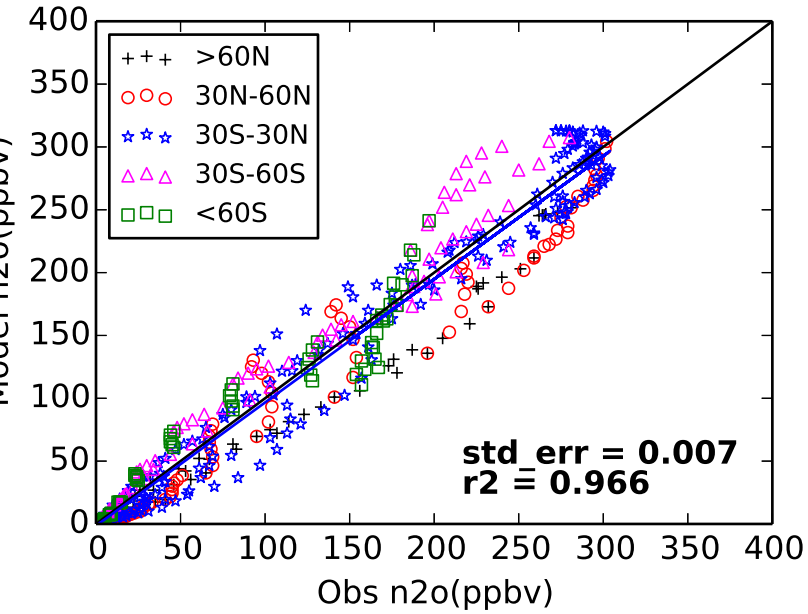
UKCA am124 vs HALOE:
CH4 (ppmv) Jul



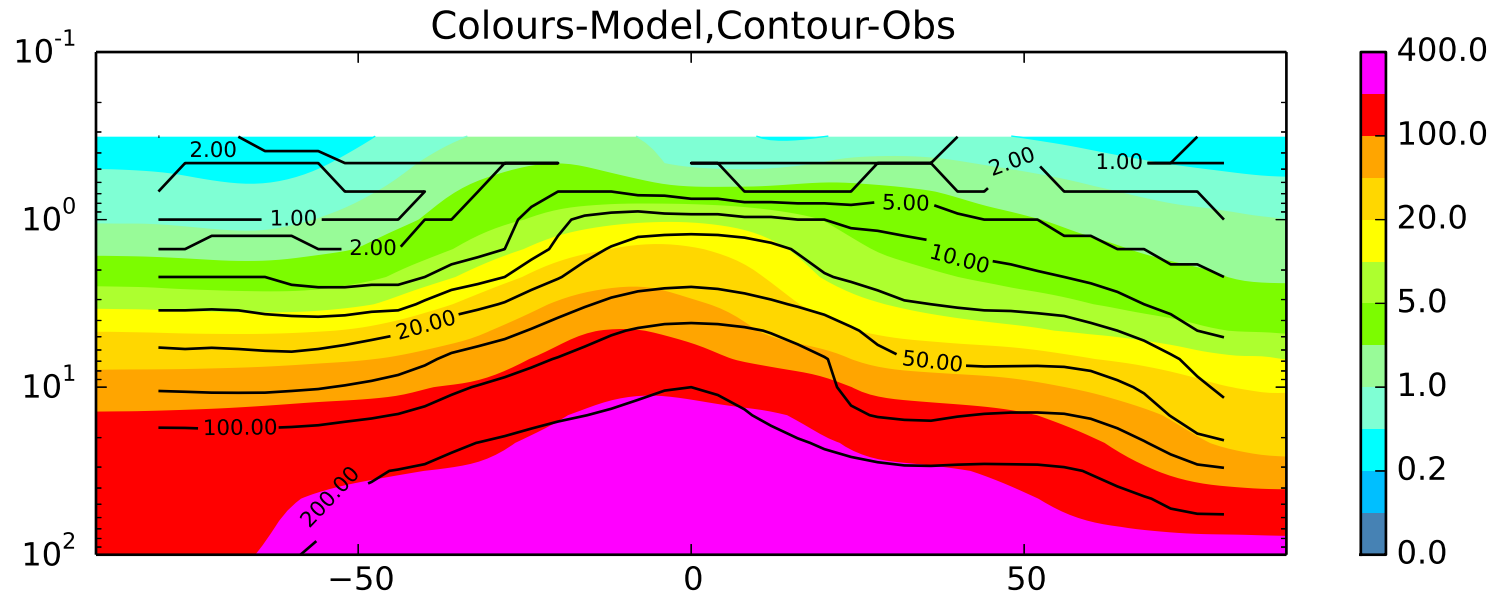


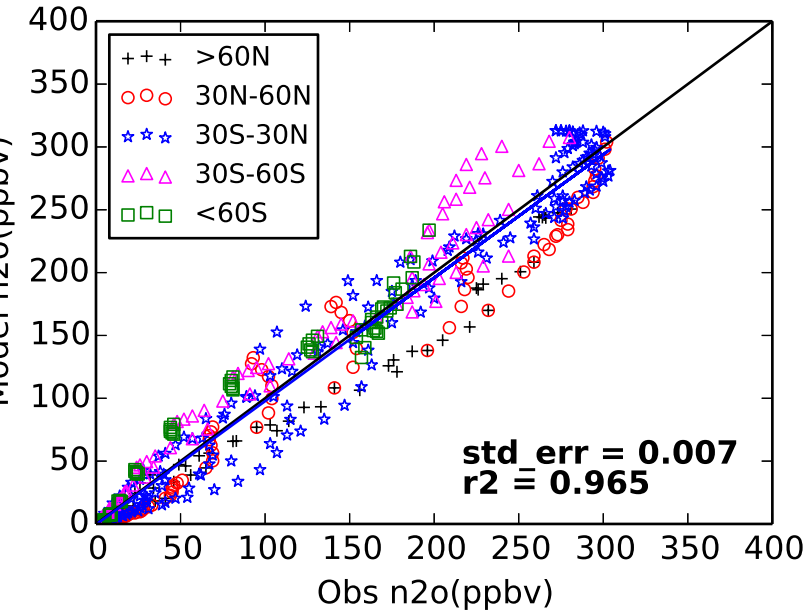
UKCA an188 vs HALOE:
CH4 (ppmv) Jul



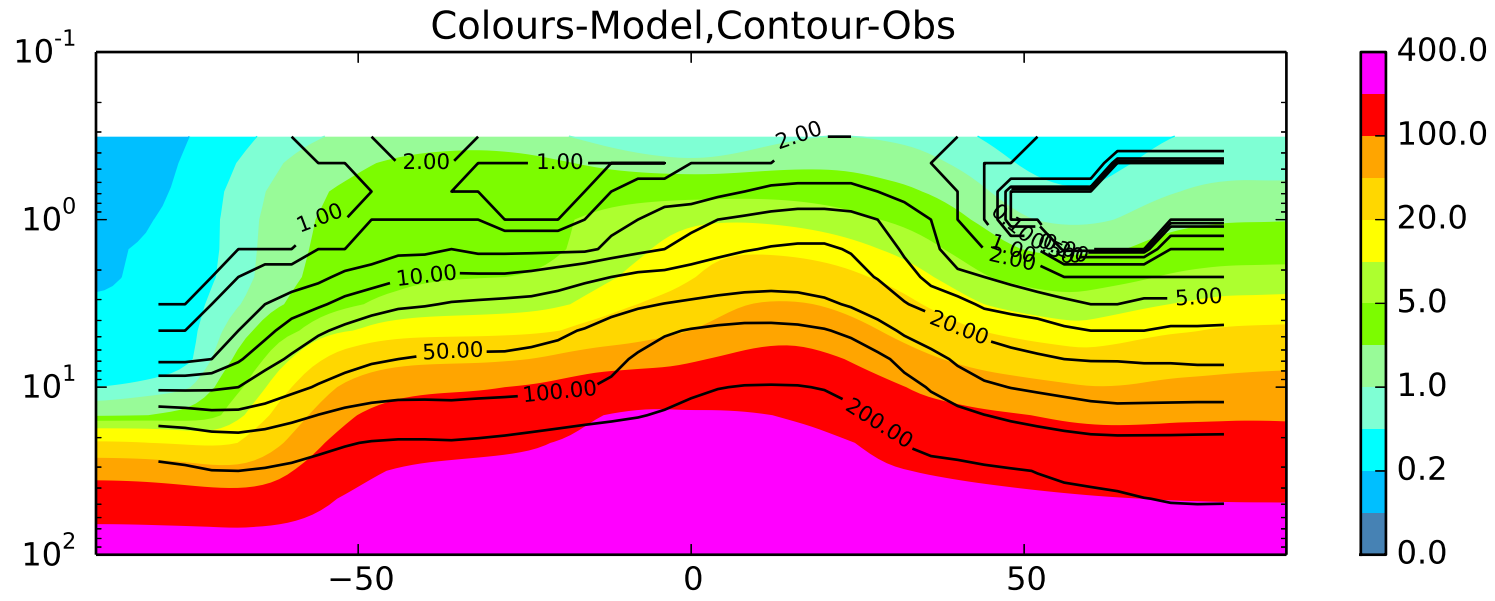


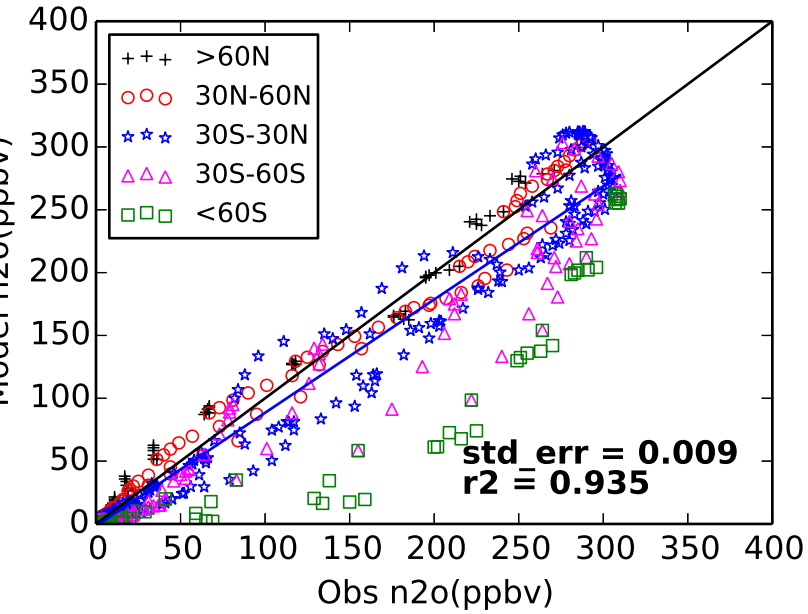
UKCA am124 vs HALOE:
N2O (ppmv) Jan



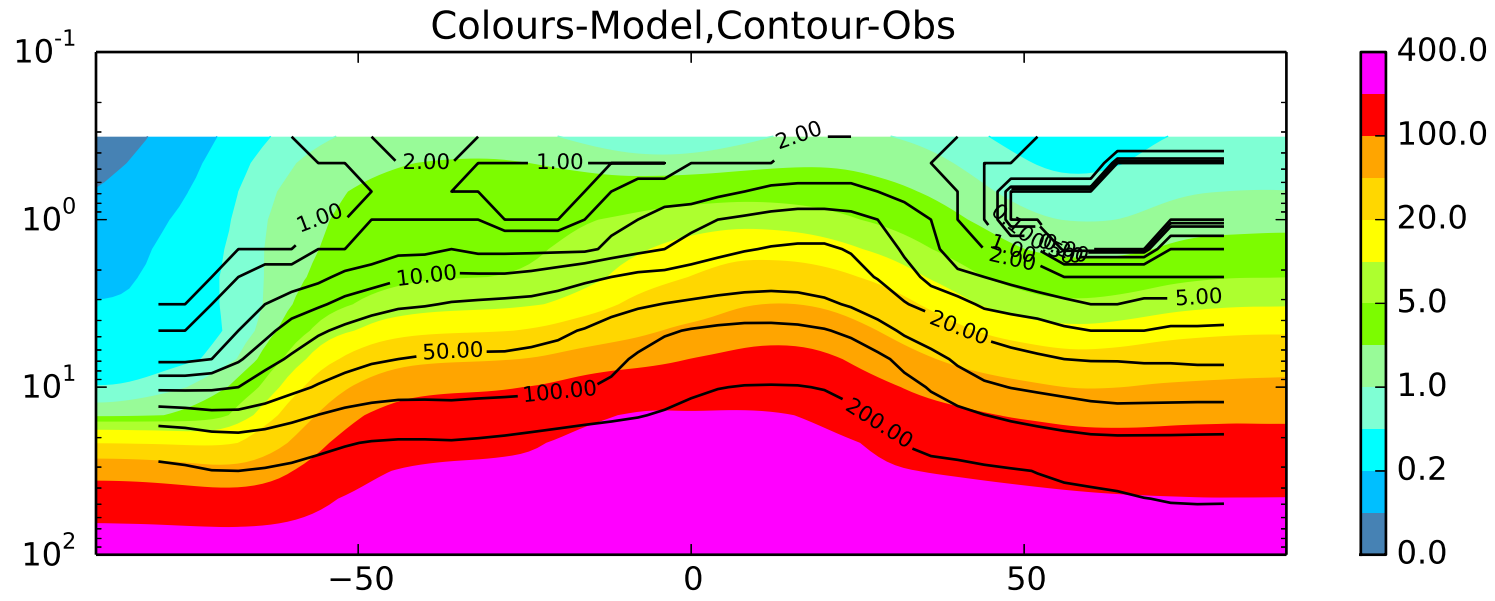


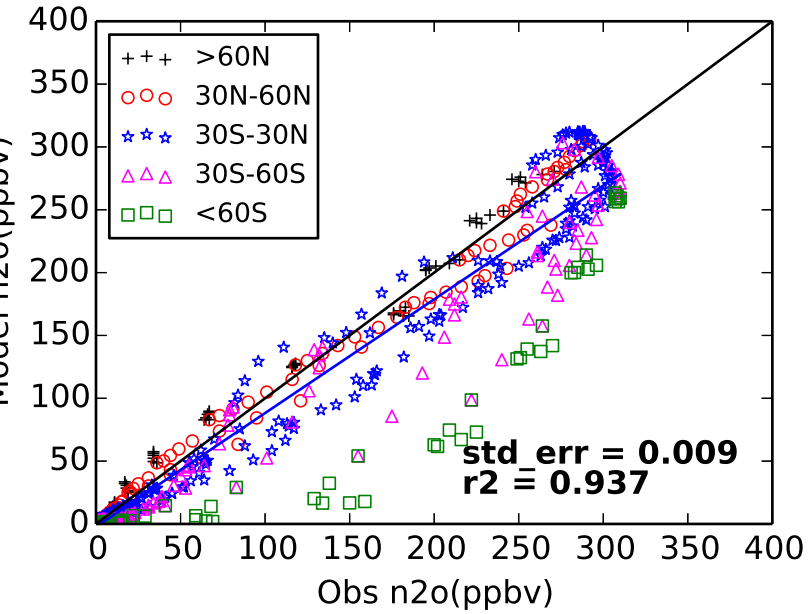
UKCA an188 vs HALOE:
N2O (ppmv) Jan



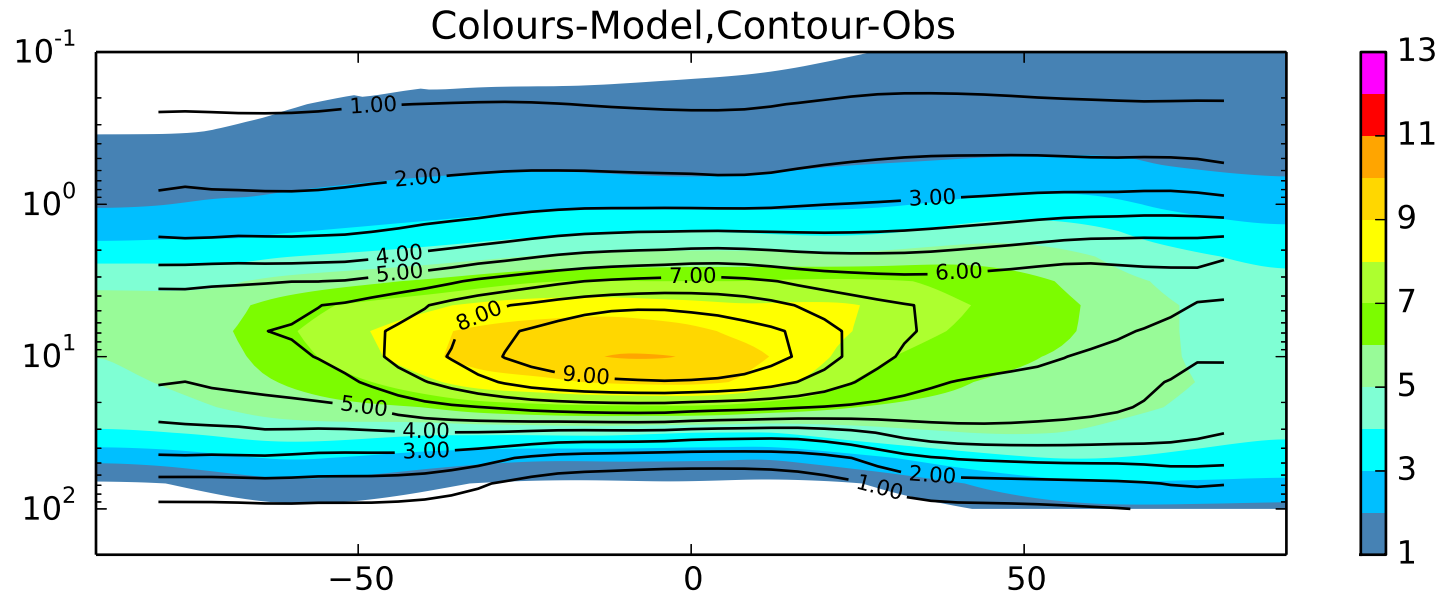


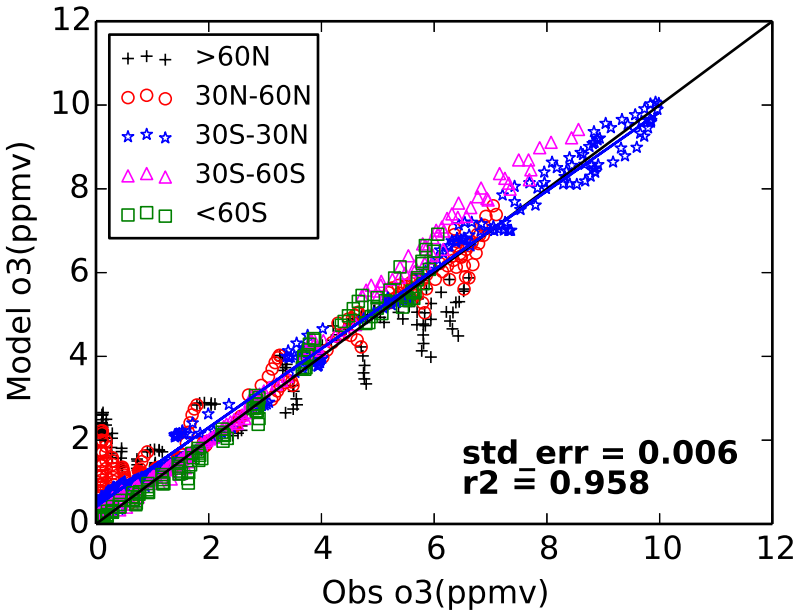
UKCA am124 vs HALOE:
N2O (ppmv) Jul



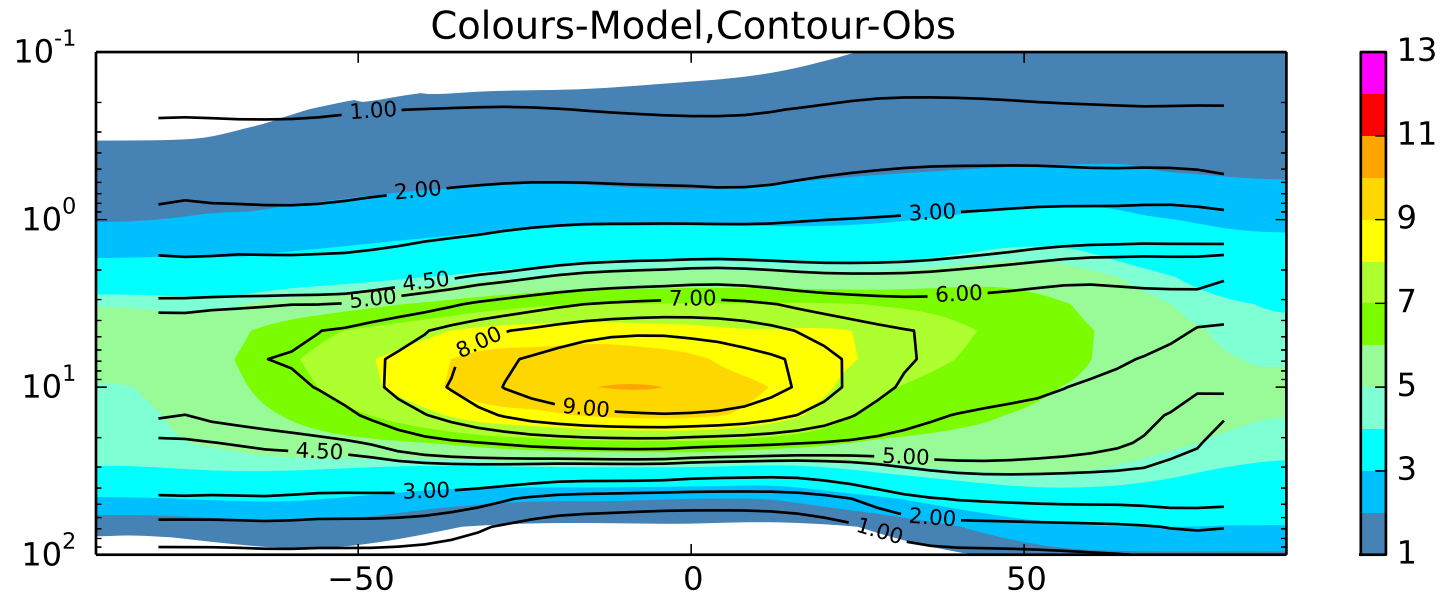


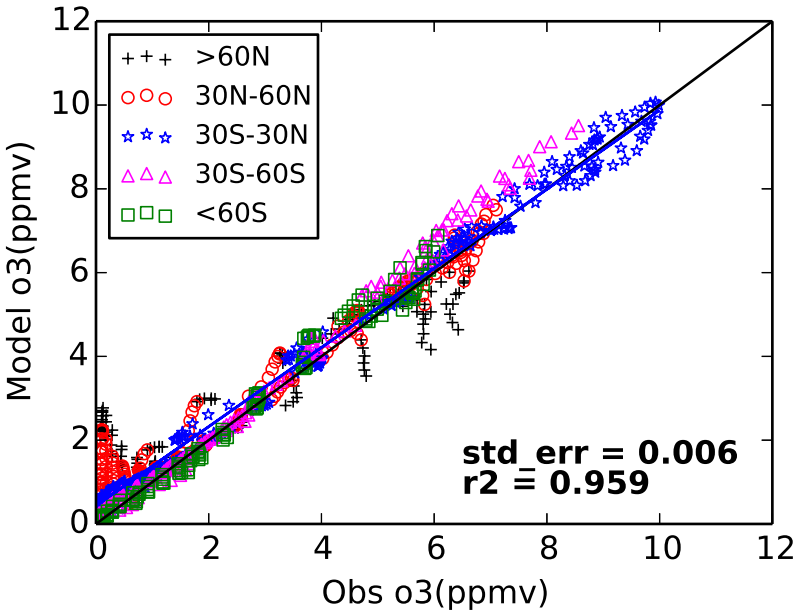
UKCA an188 vs HALOE:
N2O (ppmv) Jul



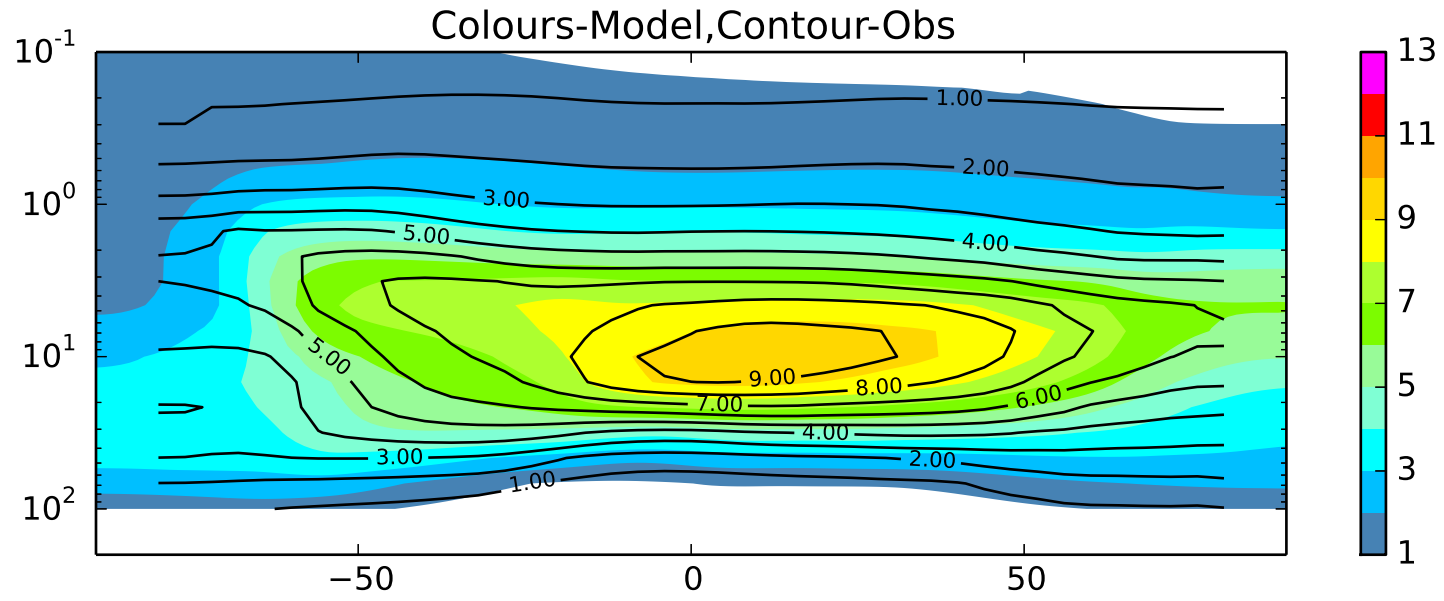


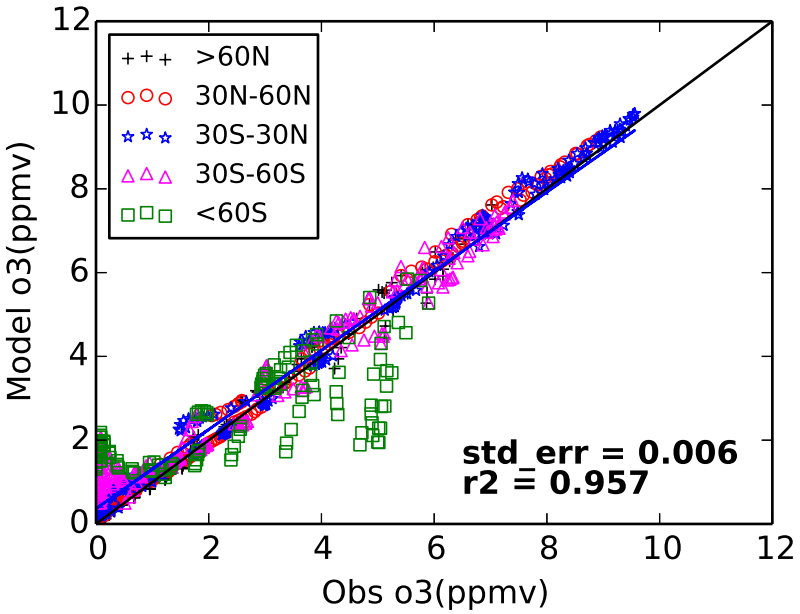
UKCA am124 vs HALOE:
O3 (ppmv) Jan



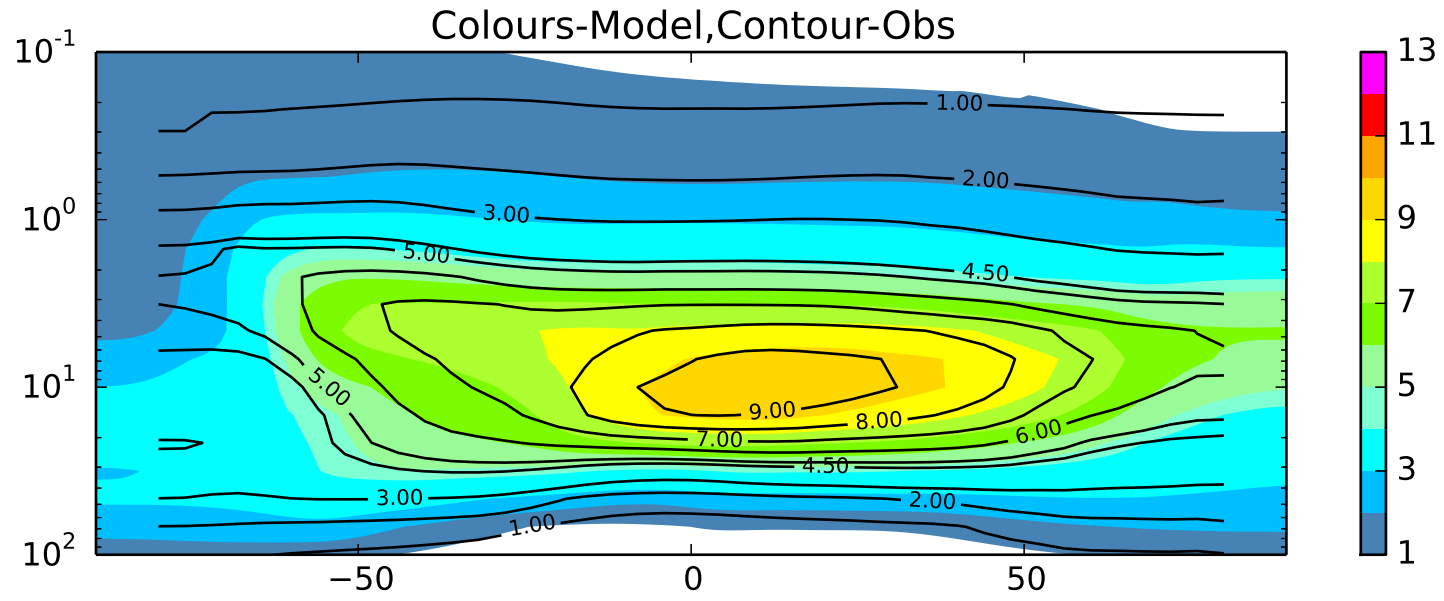


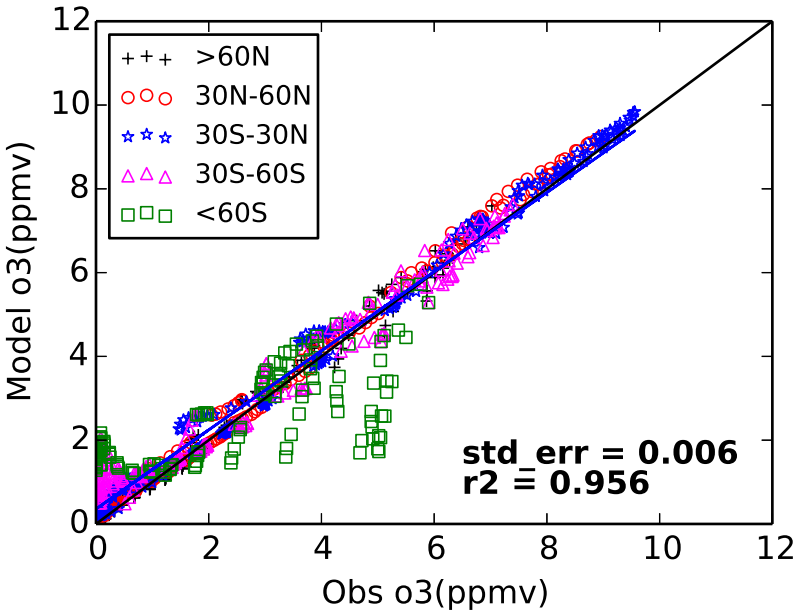
UKCA an188 vs HALOE:
O3 (ppmv) Jan



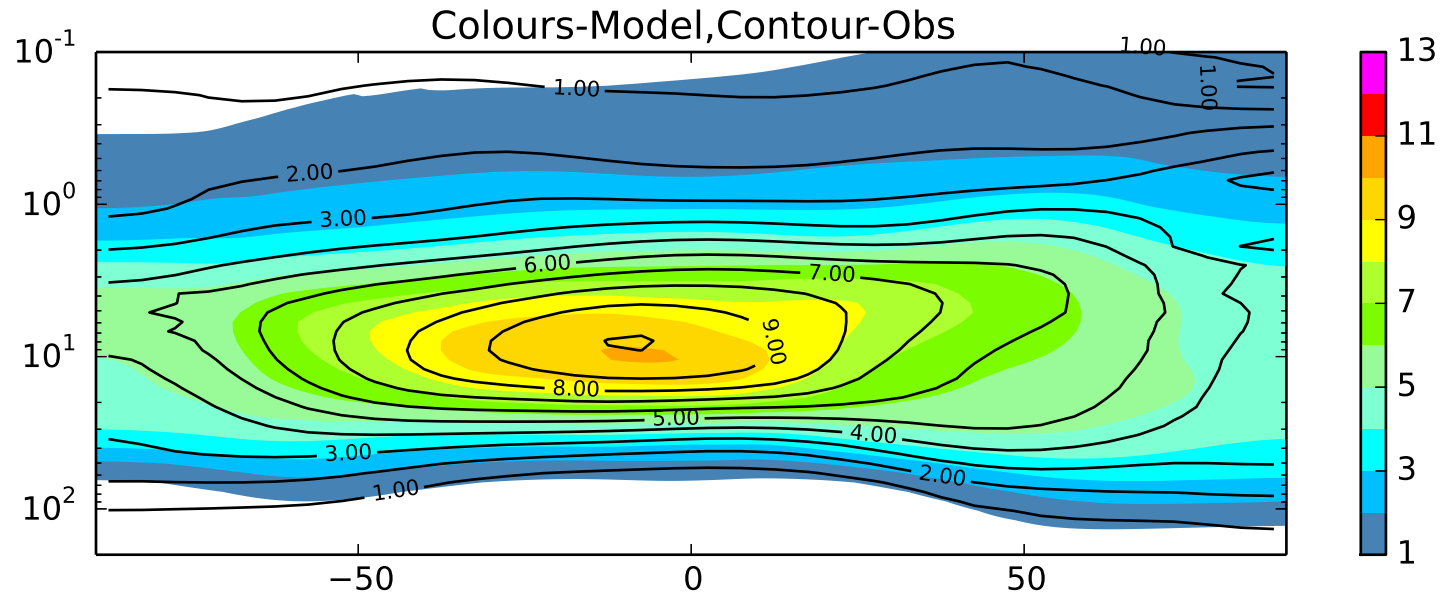


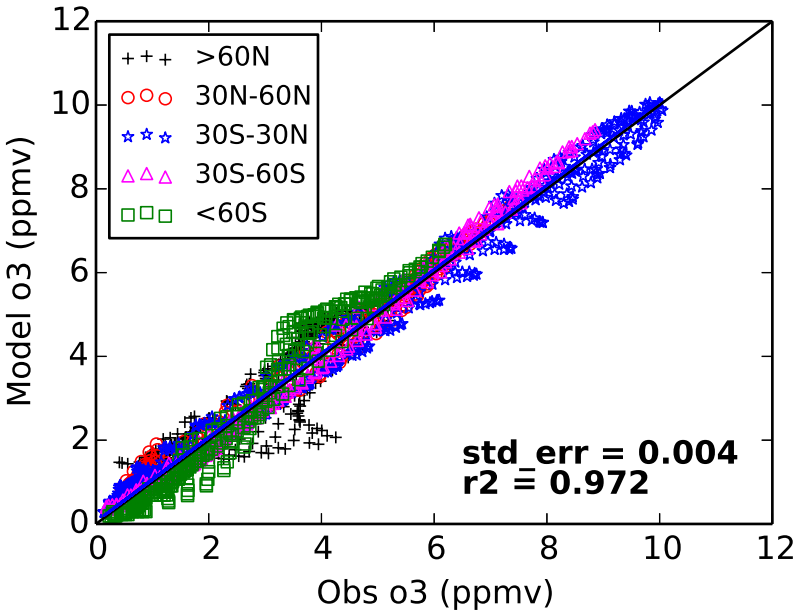
UKCA am124 vs HALOE:
O3 (ppmv) Jul



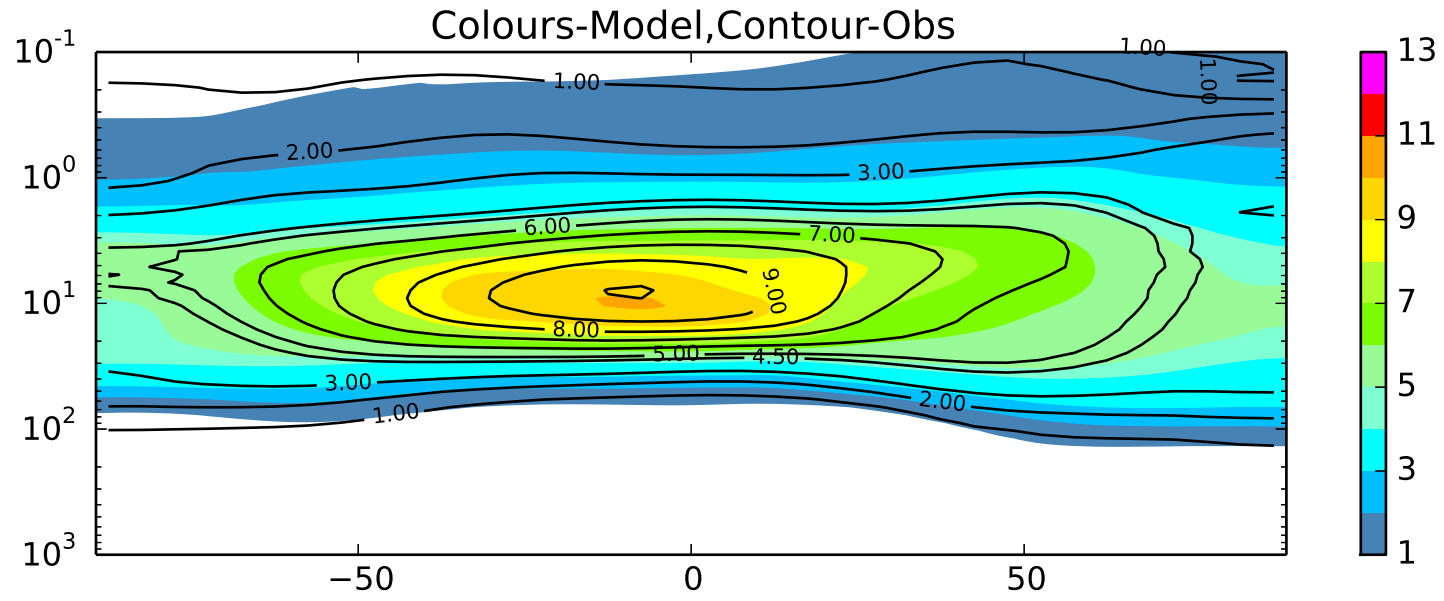


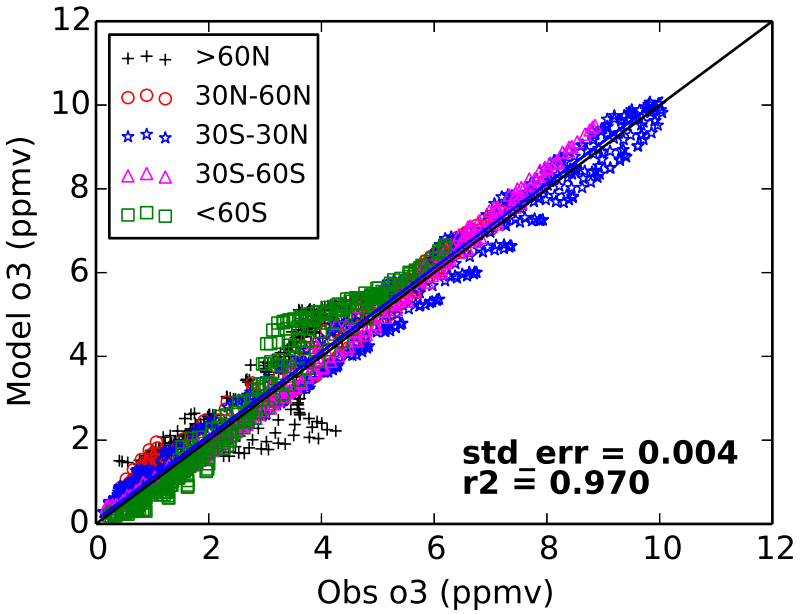
UKCA an188 vs HALOE:
O3 (ppmv) Jul



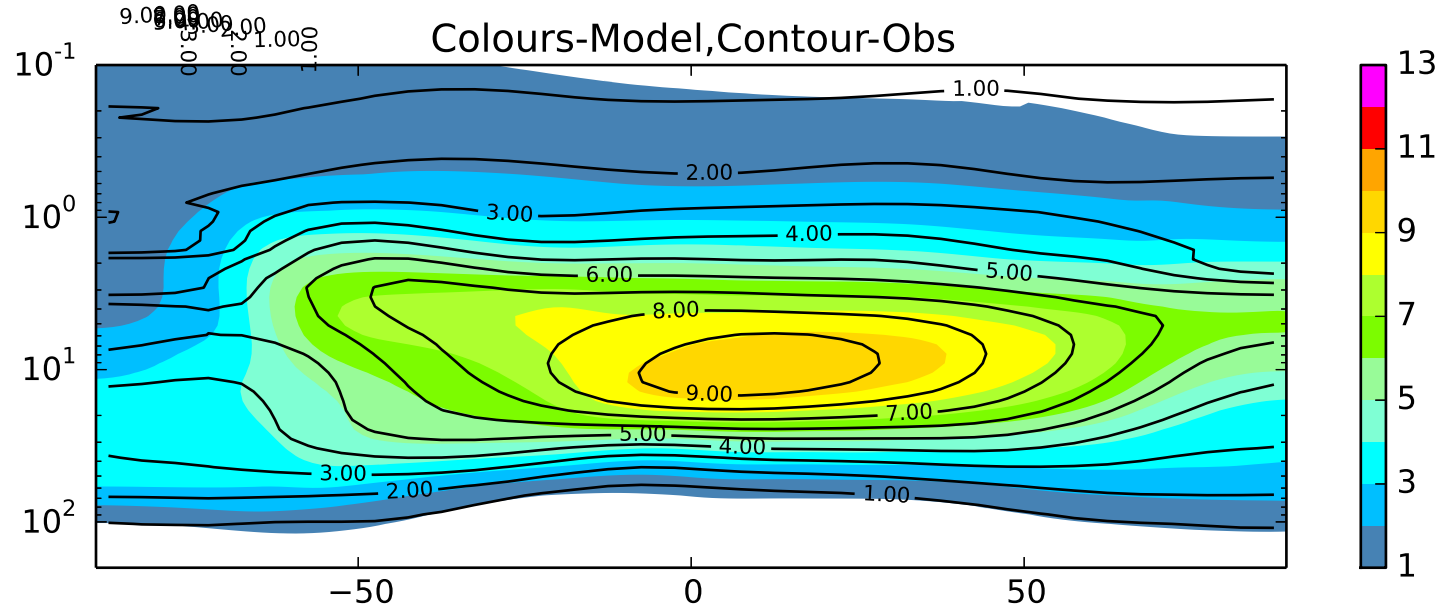


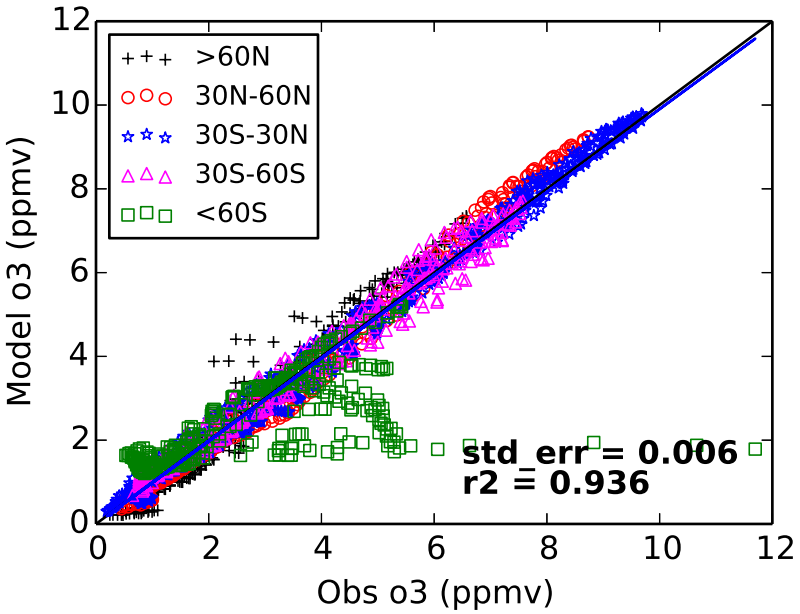
UKCA am124 vs NIWA-CCMVal:
O3 (ppmv) Jan



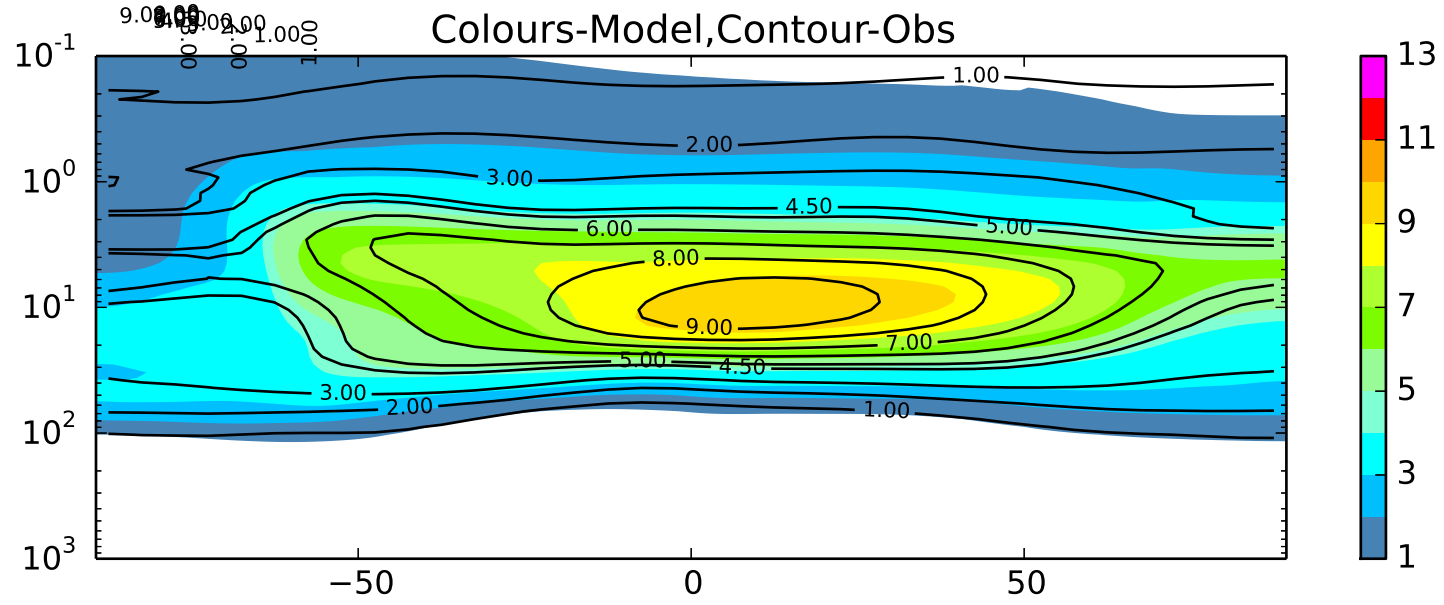


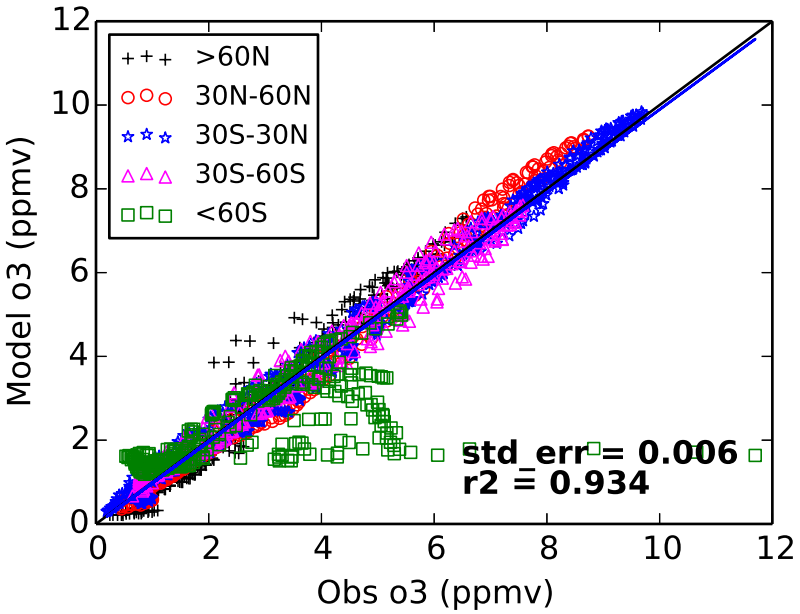
UKCA an188 vs NIWA-CCMVal:
O3 (ppmv) Jan



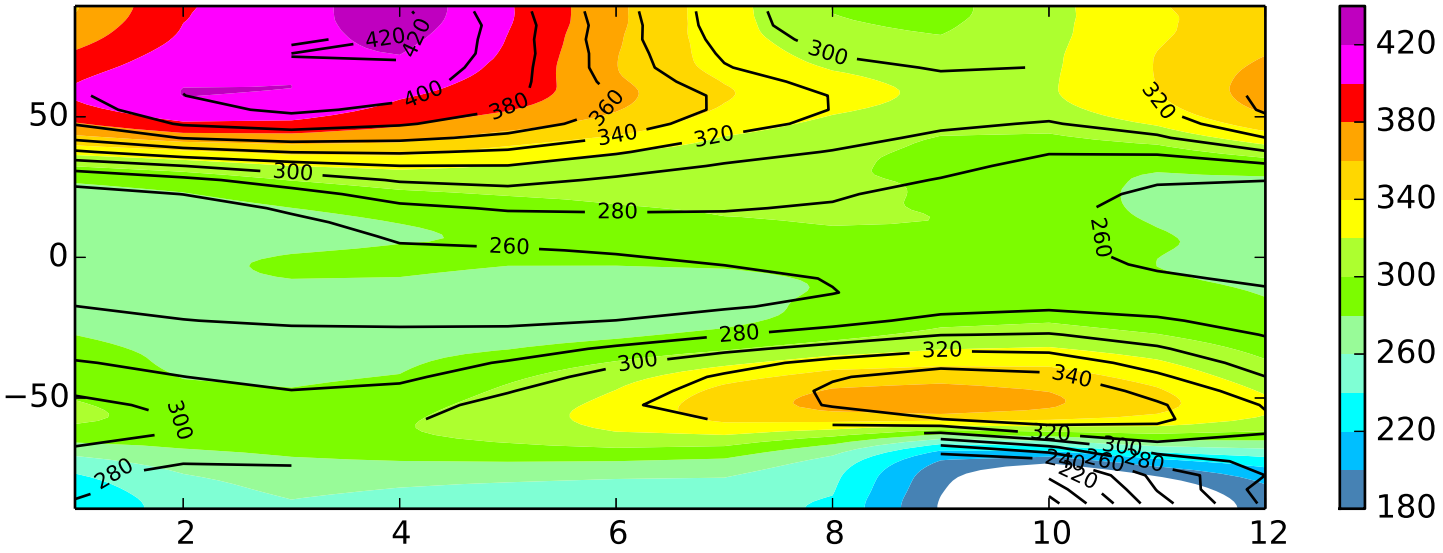


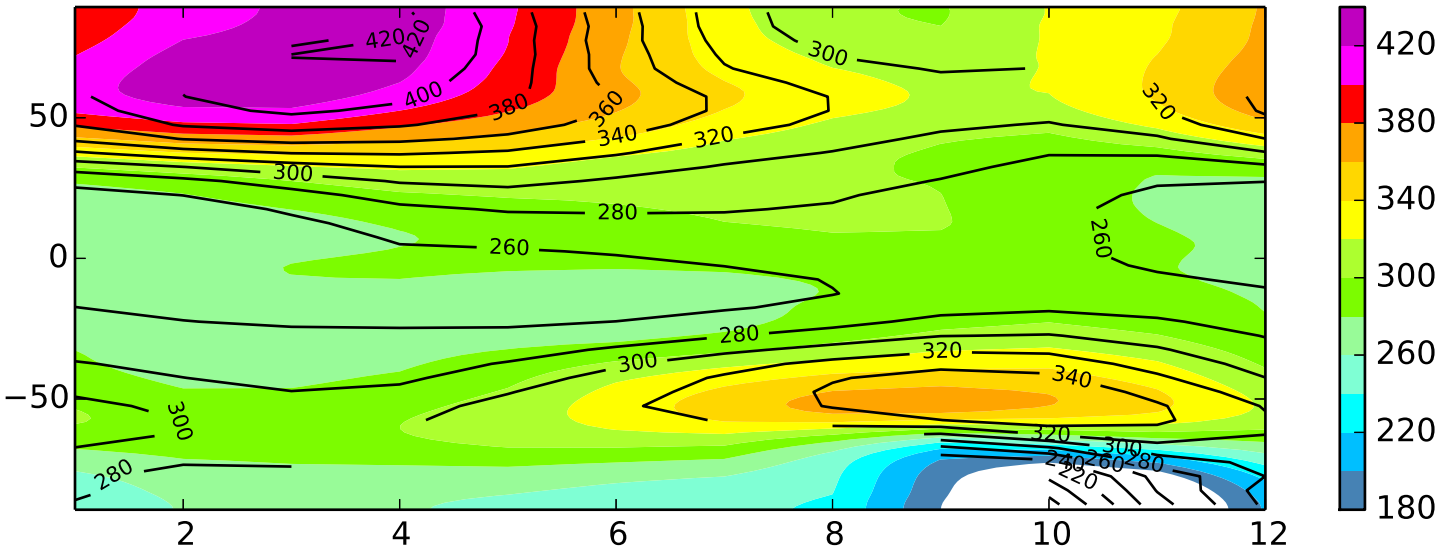
UKCA am124 vs NIWA-CCMVal:
O3 (ppmv) Jul

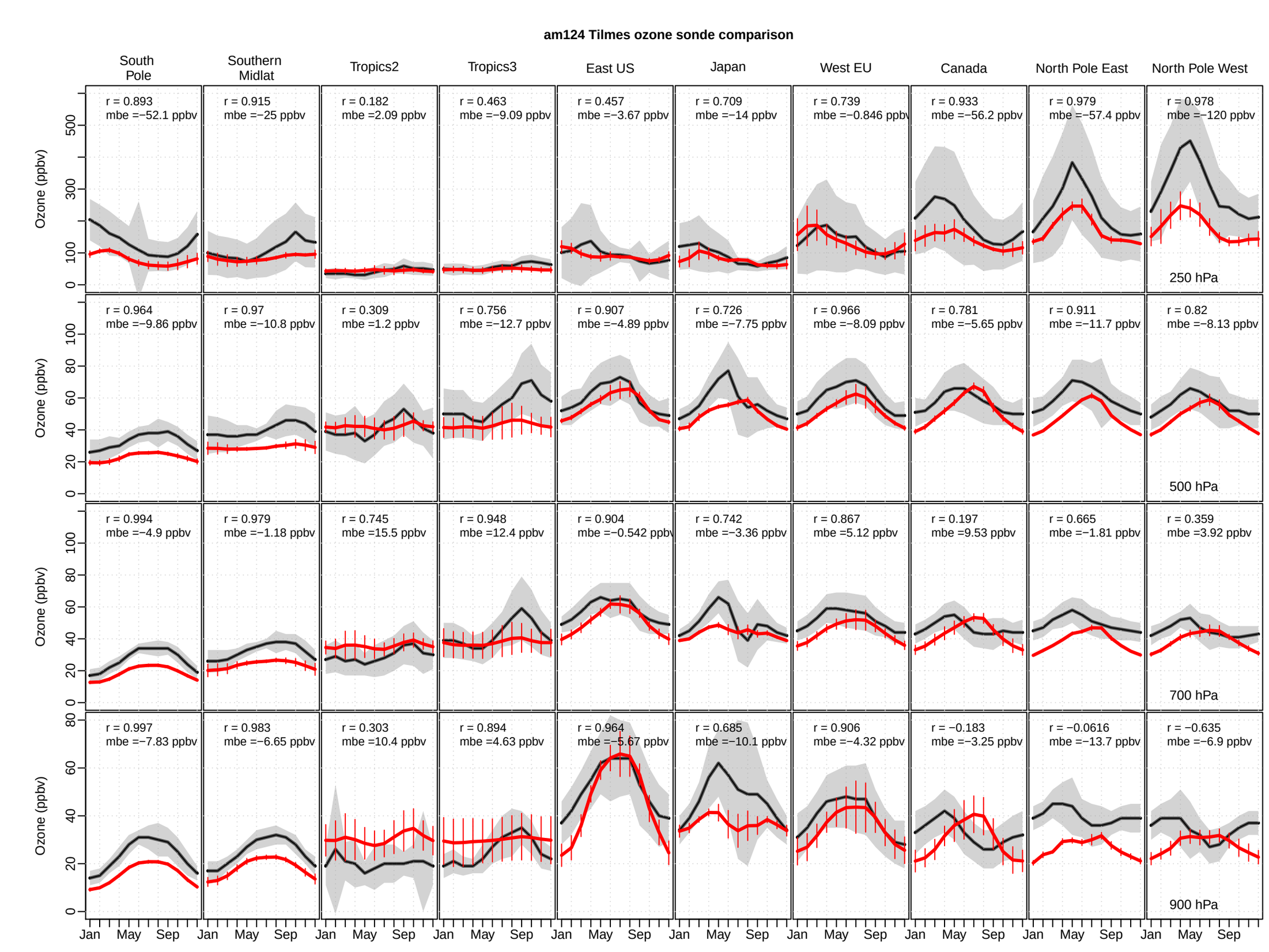


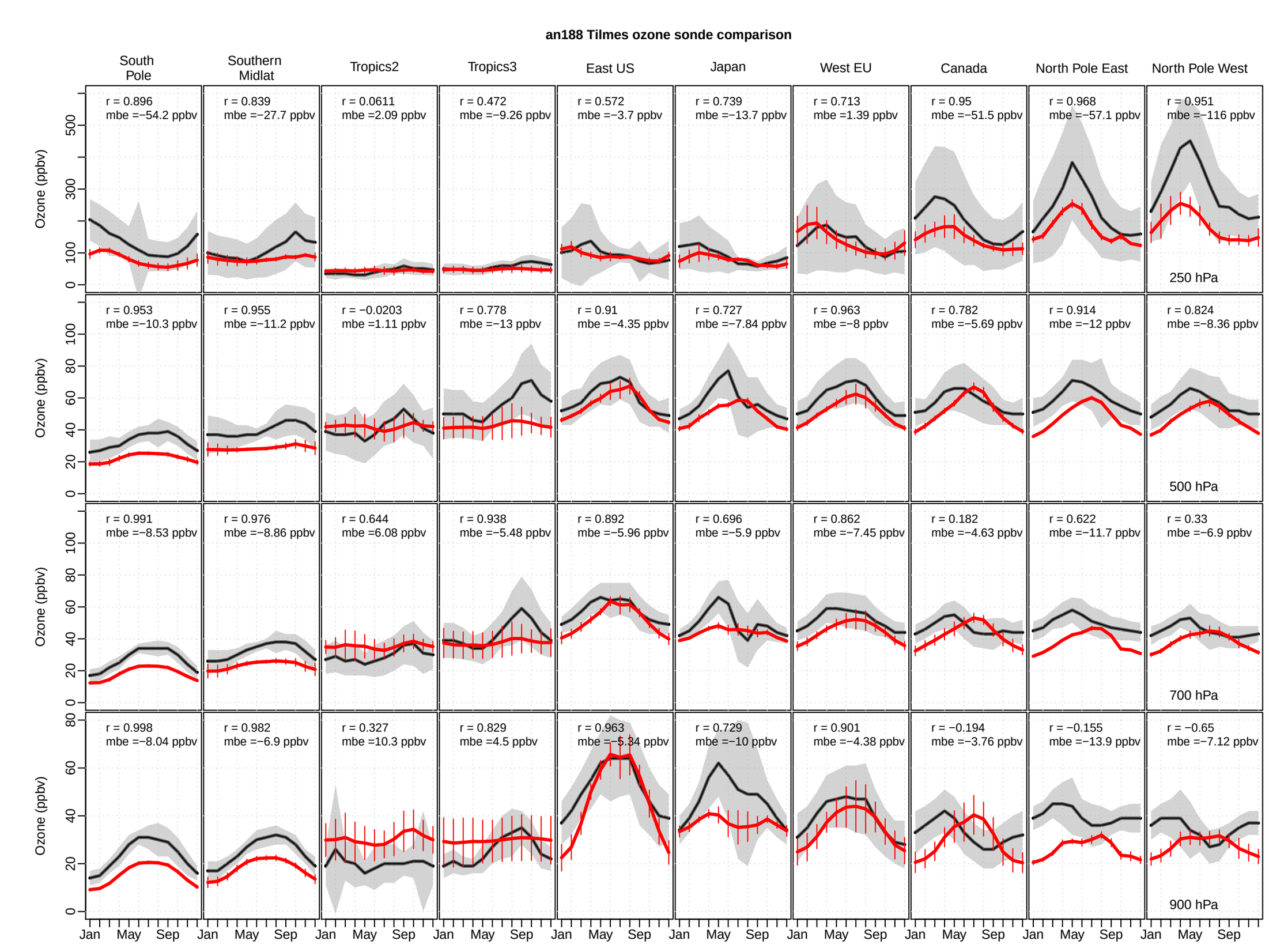


UKCA an188 vs NIWA-CCMVal:
O3 (ppmv) Jul


50
0
−50
2
4
6
8
10
12
420
380
340
300
260
220
180
UKCA am124 vs TOMS:
Column_Ozone (DU)

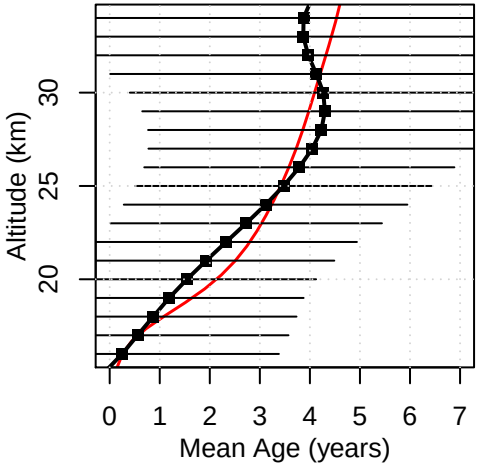

50
0
−50
2
4
6
8
10
12
420
380
340
300
260
220
180
UKCA an188 vs TOMS:
Column_Ozone (DU)


am124 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 = 0.893
mbe =−52.1 ppbv
r = 0.915
mbe =−25 ppbv
r = 0.182
mbe =2.09 ppbv
r = 0.463
mbe =−9.09 ppbv
r = 0.457
mbe =−3.67 ppbv
r = 0.709
mbe =−14 ppbv
r = 0.739
mbe =−0.846 ppbv
r = 0.933
mbe =−56.2 ppbv
r = 0.979
mbe =−57.4 ppbv
r = 0.978
mbe =−120 ppbv
250 hPa
r = 0.964
mbe =−9.86 ppbv
r = 0.97
mbe =−10.8 ppbv
r = 0.309
mbe =1.2 ppbv
r = 0.756
mbe =−12.7 ppbv
r = 0.907
mbe =−4.89 ppbv
r = 0.726
mbe =−7.75 ppbv
r = 0.966
mbe =−8.09 ppbv
r = 0.781
mbe =−5.65 ppbv
r = 0.911
mbe =−11.7 ppbv
r = 0.82
mbe =−8.13 ppbv
500 hPa
r = 0.994
mbe =−4.9 ppbv
r = 0.979
mbe =−1.18 ppbv
r = 0.745
mbe =15.5 ppbv
r = 0.948
mbe =12.4 ppbv
r = 0.904
mbe =−0.542 ppbv
r = 0.742
mbe =−3.36 ppbv
r = 0.867
mbe =5.12 ppbv
r = 0.197
mbe =9.53 ppbv
r = 0.665
mbe =−1.81 ppbv
r = 0.359
mbe =3.92 ppbv
700 hPa
r = 0.997
mbe =−7.83 ppbv
r = 0.983
mbe =−6.65 ppbv
r = 0.303
mbe =10.4 ppbv
r = 0.894
mbe =4.63 ppbv
r = 0.964
mbe =−5.67 ppbv
r = 0.685
mbe =−10.1 ppbv
r = 0.906
mbe =−4.32 ppbv
r = −0.183
mbe =−3.25 ppbv
r = −0.0616
mbe =−13.7 ppbv
r = −0.635
mbe =−6.9 ppbv
900 hPa
Jan
May
Sep

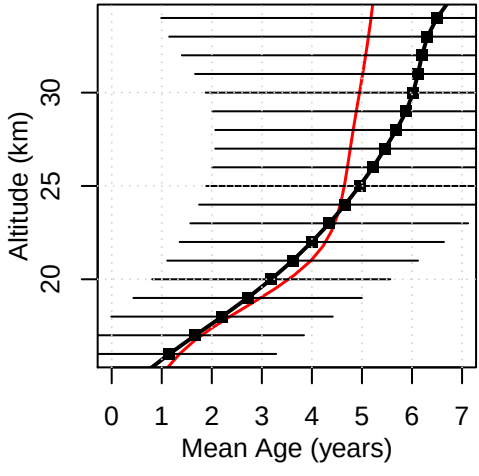

an188 Tilmes ozone sonde comparison
South Pole
Southern Midlat
Tropics2
Tropics3
East US
Japan
West EU
Canada
North Pole East
North Pole West
Ozone (ppbv)
r = 0.896
mbe =−54.2 ppbv
r = 0.839
mbe =−27.7 ppbv
r = 0.0611
mbe =2.09 ppbv
r = 0.472
mbe =−9.26 ppbv
r = 0.572
mbe =−3.7 ppbv
r = 0.739
mbe =−13.7 ppbv
r = 0.713
mbe =1.39 ppbv
r = 0.95
mbe =−51.5 ppbv
r = 0.968
mbe =−57.1 ppbv
r = 0.951
mbe =−116 ppbv
250 hPa
r = 0.953
mbe =−10.3 ppbv
r = 0.955
mbe =−11.2 ppbv
r = −0.0203
mbe =1.11 ppbv
r = 0.778
mbe =−13 ppbv
r = 0.91
mbe =−4.35 ppbv
r = 0.727
mbe =−7.84 ppbv
r = 0.963
mbe =−8 ppbv
r = 0.782
mbe =−5.69 ppbv
r = 0.914
mbe =−12 ppbv
r = 0.824
mbe =−8.36 ppbv
500 hPa
r = 0.991
mbe =−8.53 ppbv
r = 0.976
mbe =−8.86 ppbv
r = 0.644
mbe =6.08 ppbv
r = 0.938
mbe =−5.48 ppbv
r = 0.892
mbe =−5.96 ppbv
r = 0.696
mbe =−5.9 ppbv
r = 0.862
mbe =−7.45 ppbv
r = 0.182
mbe =−4.63 ppbv
r = 0.622
mbe =−11.7 ppbv
r = 0.33
mbe =−6.9 ppbv
700 hPa
r = 0.998
mbe =−8.04 ppbv
r = 0.982
mbe =−6.9 ppbv
r = 0.327
mbe =10.3 ppbv
r = 0.829
mbe =4.5 ppbv
r = 0.963
mbe =−5.34 ppbv
r = 0.729
mbe =−10 ppbv
r = 0.901
mbe =−4.38 ppbv
r = −0.194
mbe =−3.76 ppbv
r = −0.155
mbe =−13.9 ppbv
r = −0.65
mbe =−7.12 ppbv
900 hPa
Jan
May
Sep

UKCA am124 Mean Age of Air

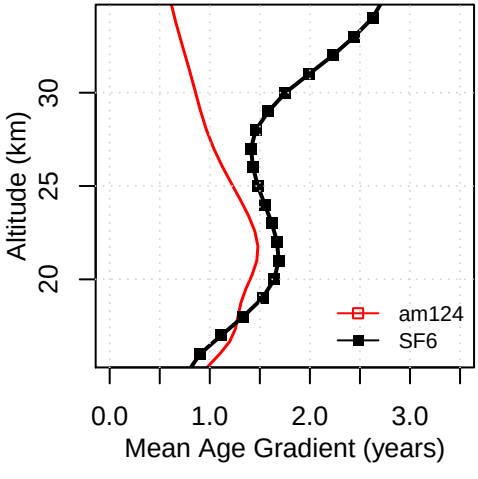
Tropical Mean Age Profile



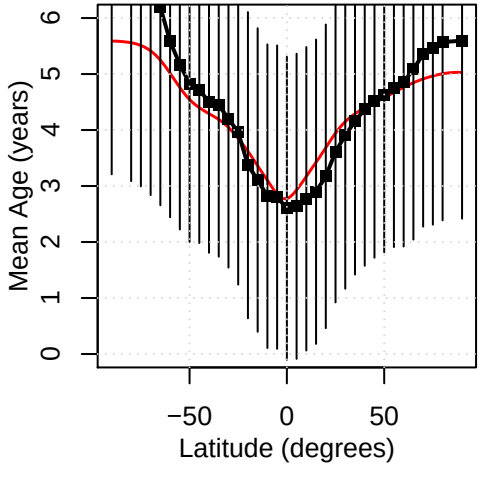
Midlatitude Mean Age Profile



Trop−Midlat Mean Age Gradient Prof

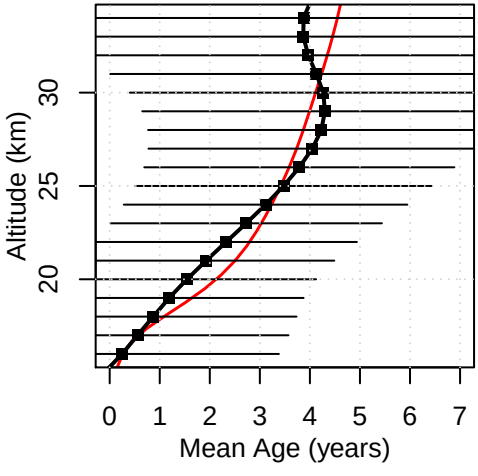


Mean Age, 23km (~50hPa)

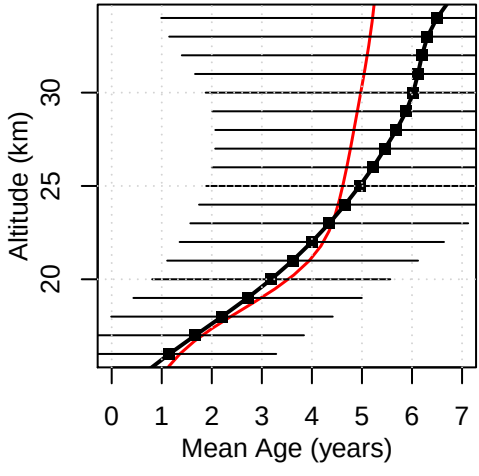


UKCA an188 Mean Age of Air

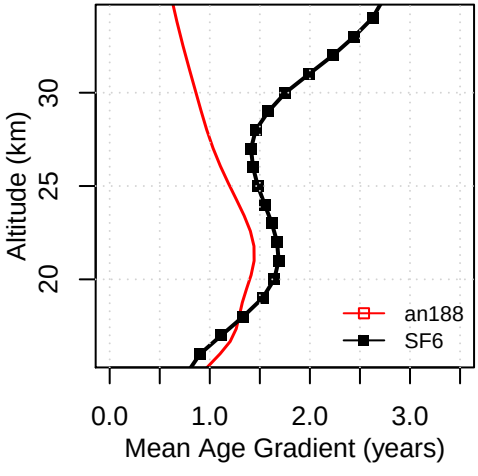
Tropical Mean Age Profile



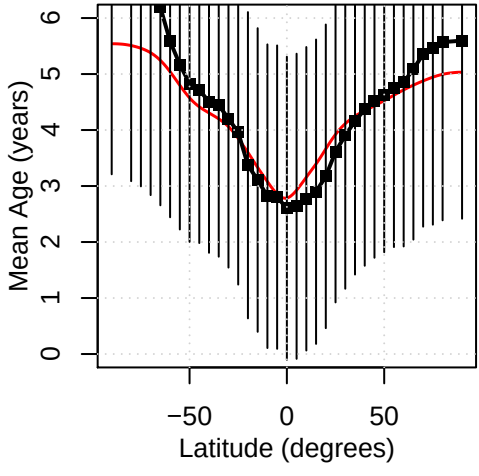
Midlatitude Mean Age Profile

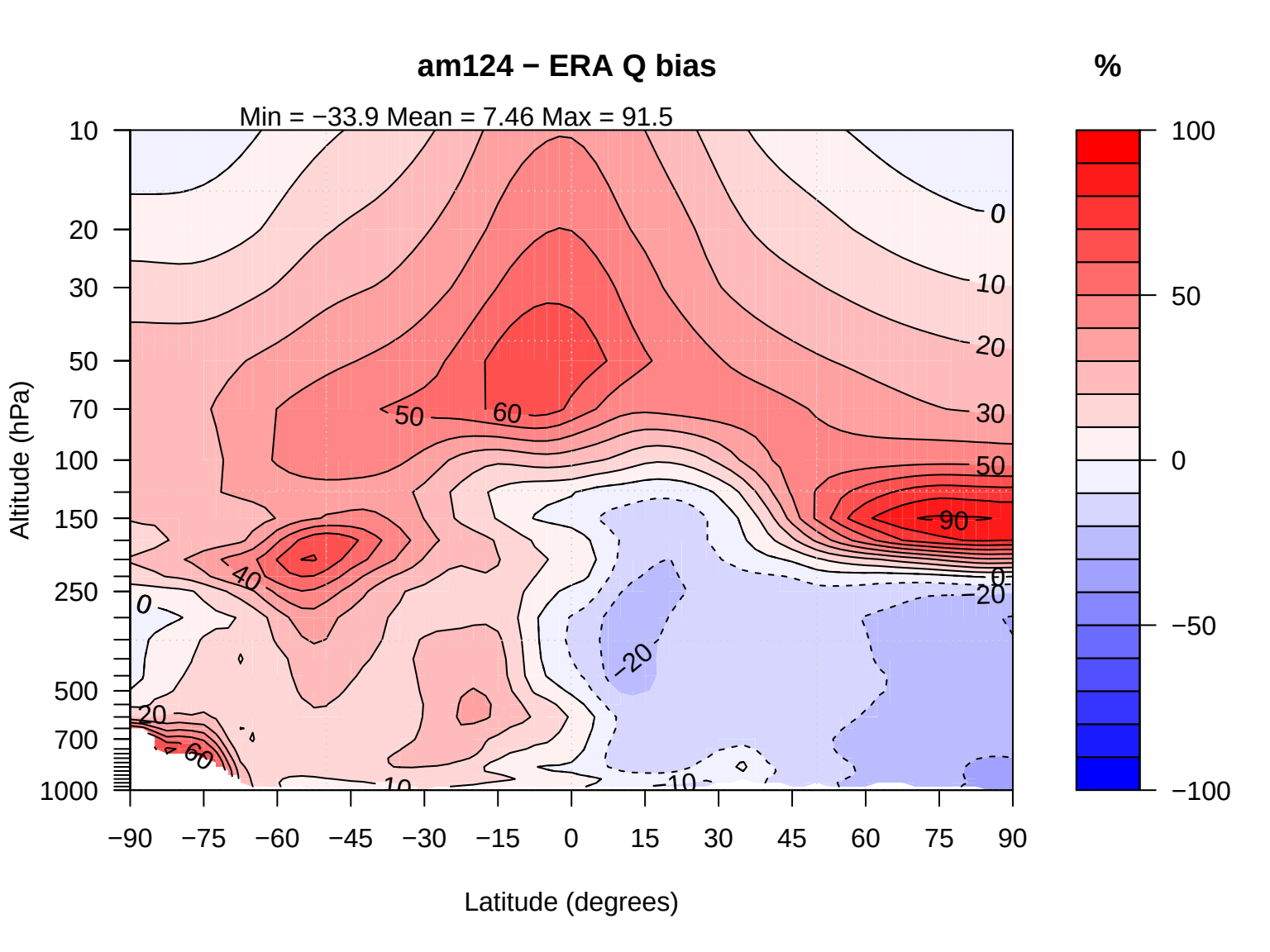


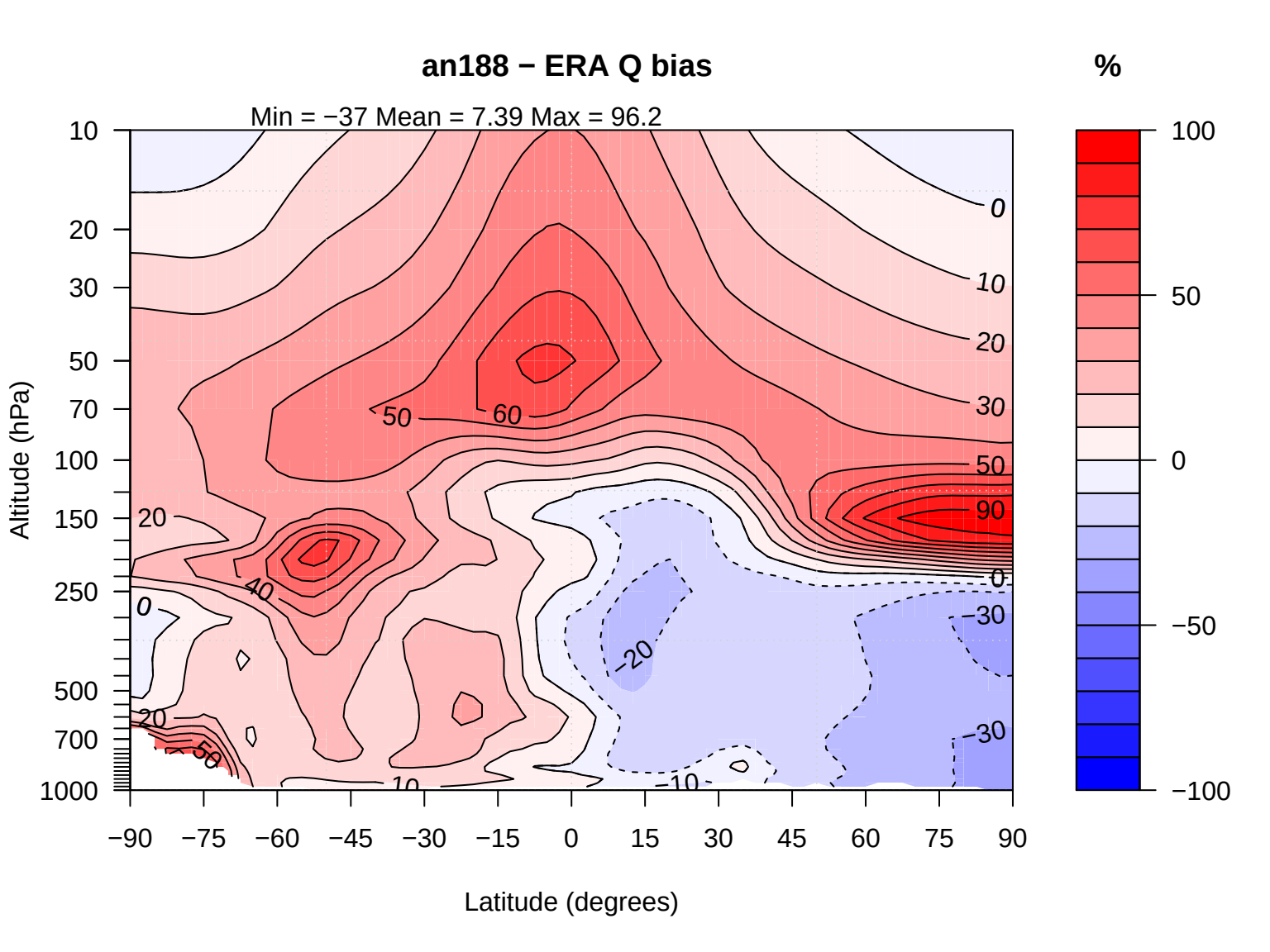
Trop−Midlat Mean Age Gradient Prof

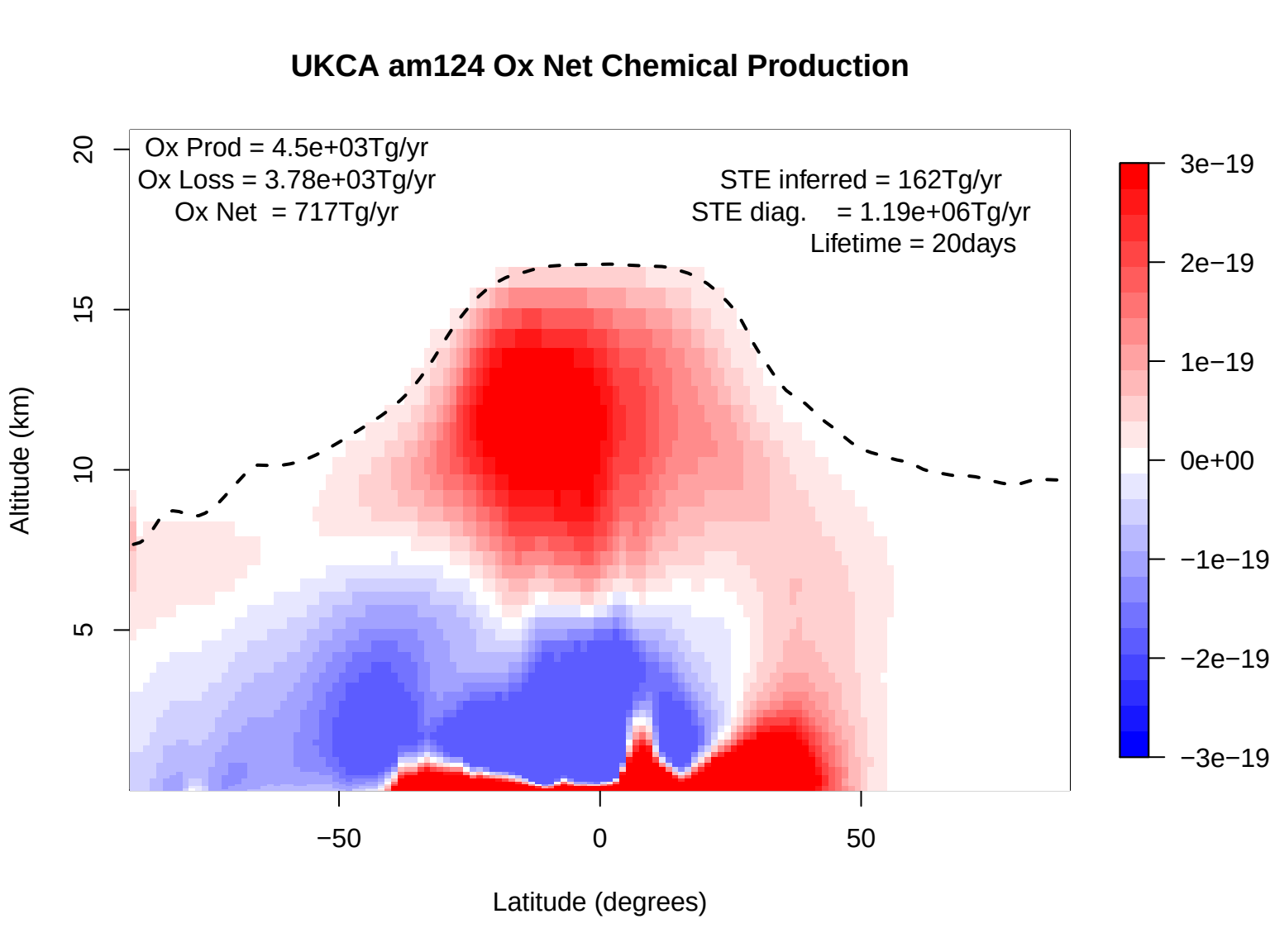


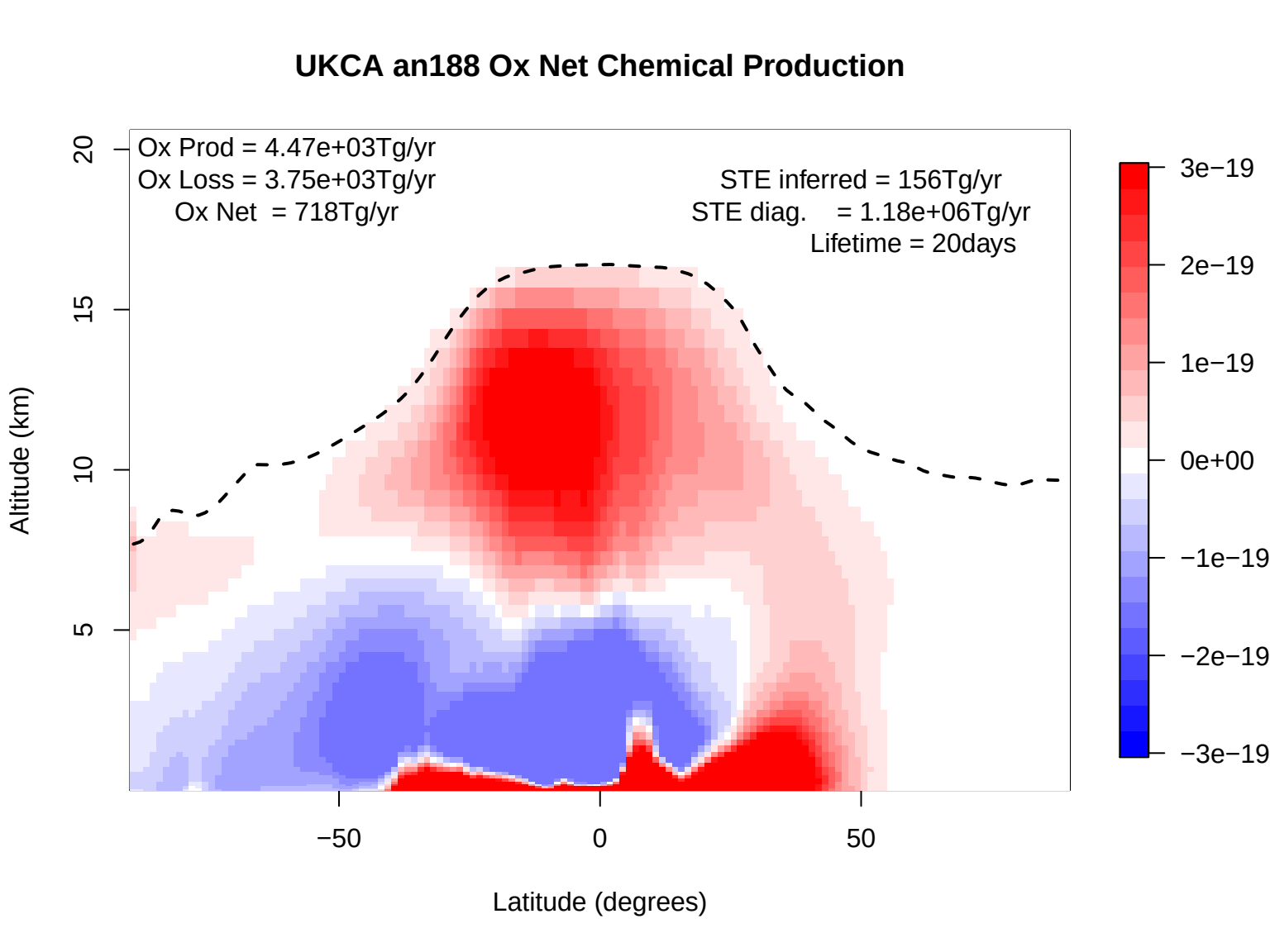
Mean Age, 23km (~50hPa)

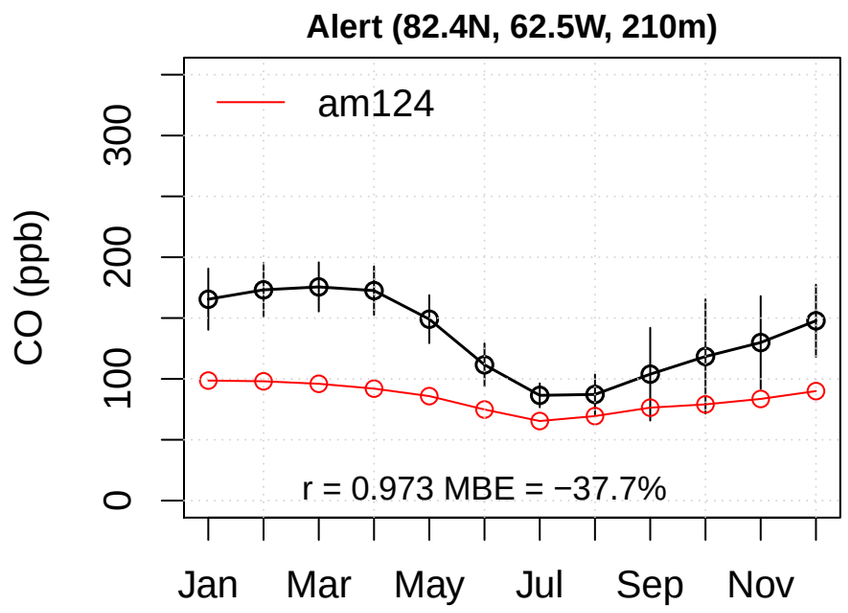


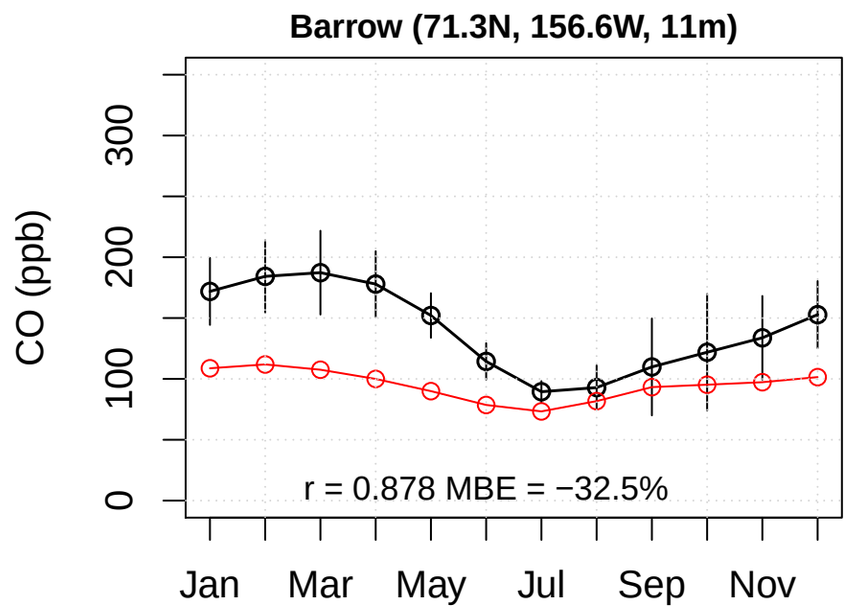

am124 − ERA Q bias
%
Min = −33.9 Mean = 7.46 Max = 91.5
Altitude (hPa)
10
20
30
50
70
100
150
250
500
700
1000
−90
−75
−60
−45
−30
−15
0
15
30
45
60
75
90
Latitude (degrees)
100
50
0
−50
−100

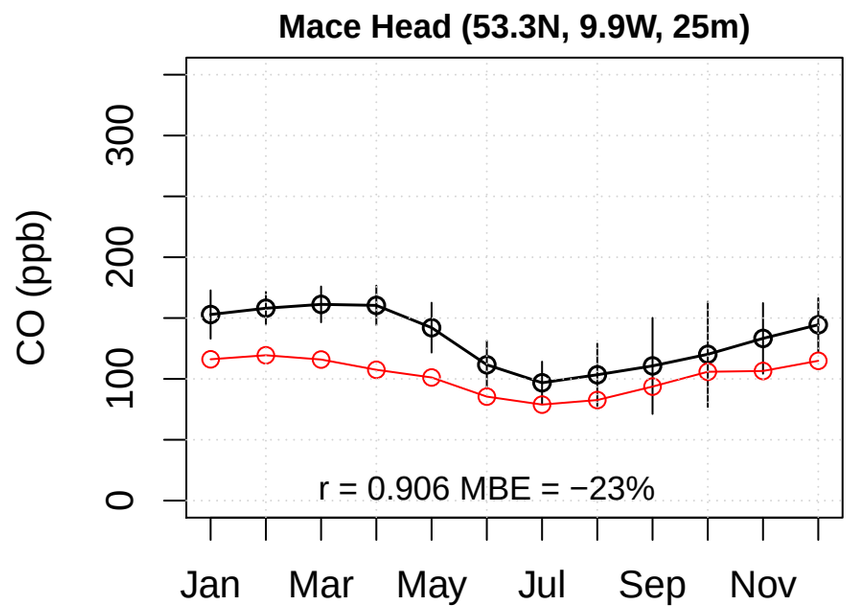

an188 − ERA Q bias
%
Min = −37 Mean = 7.39 Max = 96.2
Altitude (hPa)
10
20
30
50
70
100
150
250
500
700
1000
−90
−75
−60
−45
−30
−15
0
15
30
45
60
75
90
Latitude (degrees)
100
50
0
−50
−100

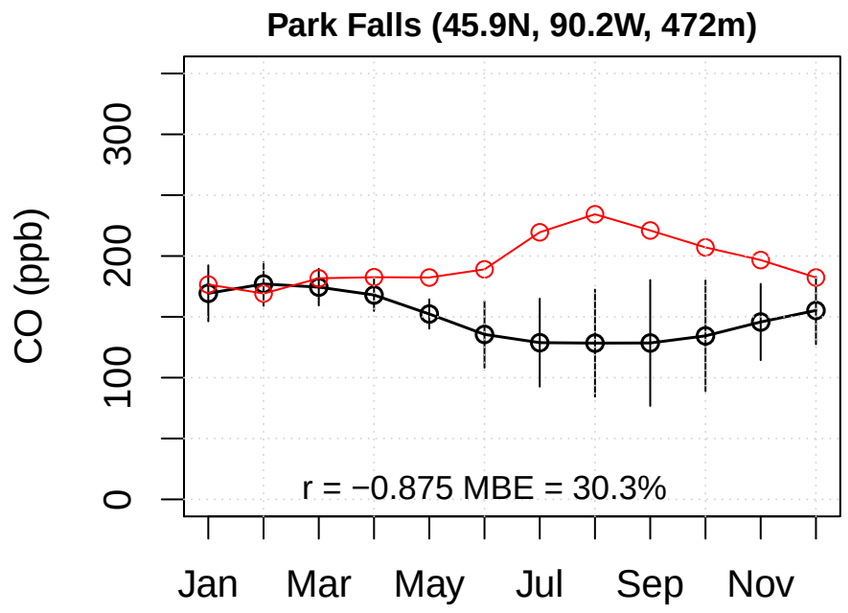

UKCA am124 Ox Net Chemical Production
Ox Prod = 4.5e+03Tg/yr
Ox Loss = 3.78e+03Tg/yr
Ox Net = 717Tg/yr
STE inferred = 162Tg/yr
STE diag. = 1.19e+06Tg/yr
Lifetime = 20days
Altitude (km)
20
15
10
5
−50
0
50
Latitude (degrees)
3e−19
2e−19
1e−19
0e+00
−1e−19
−2e−19
−3e−19

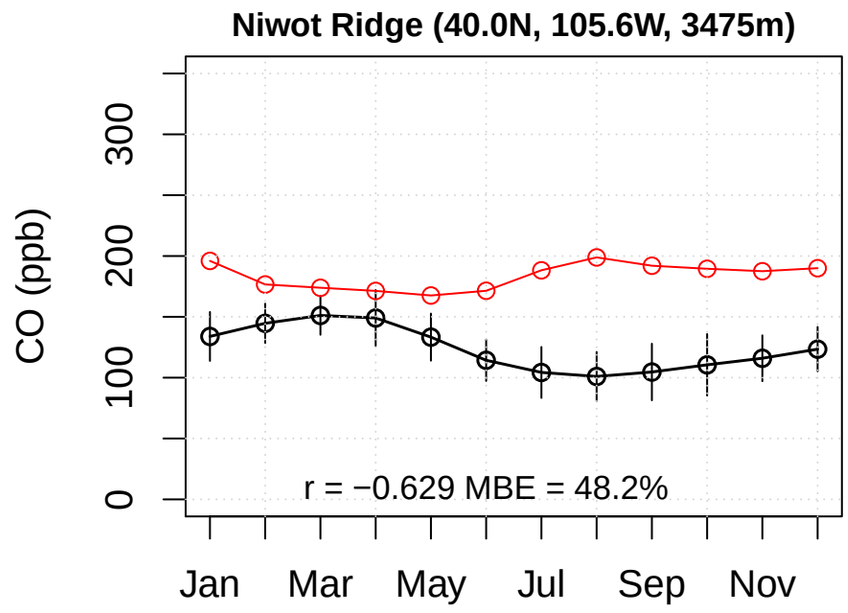

UKCA an188 Ox Net Chemical Production
Ox Prod = 4.47e+03Tg/yr
Ox Loss = 3.75e+03Tg/yr
Ox Net = 718Tg/yr
STE inferred = 156Tg/yr
STE diag. = 1.18e+06Tg/yr
Lifetime = 20days
Altitude (km)
5
10
15
20
−50
0
50
Latitude (degrees)
3e−19
2e−19
1e−19
0e+00
−1e−19
−2e−19
−3e−19

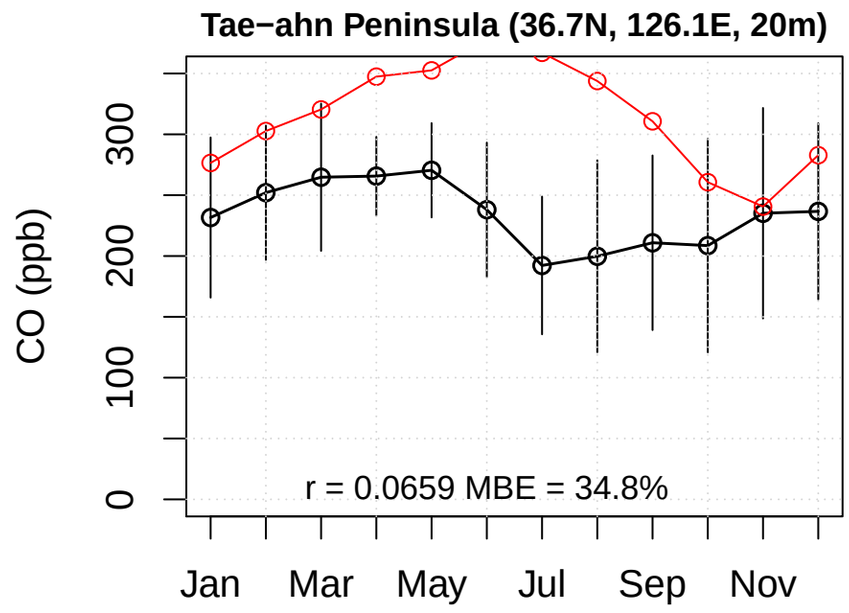

Alert (82.4N, 62.5W, 210m)
am124
CO (ppb)
0
100
200
300
r = 0.973 MBE = −37.7%
Jan
Mar
May
Jul
Sep
Nov

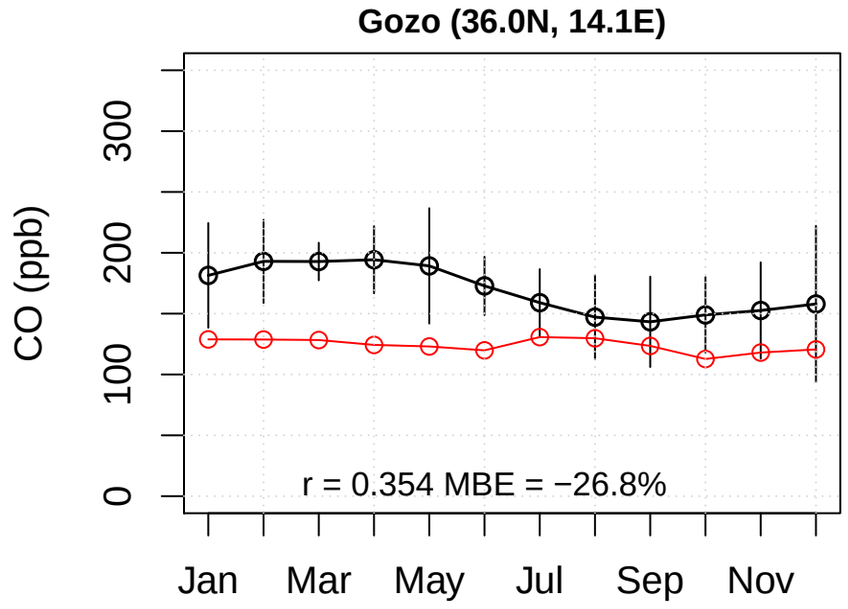

Barrow (71.3N, 156.6W, 11m)
CO (ppb)
0
100
200
300
r = 0.878 MBE = −32.5%
Jan
Mar
May
Jul
Sep
Nov

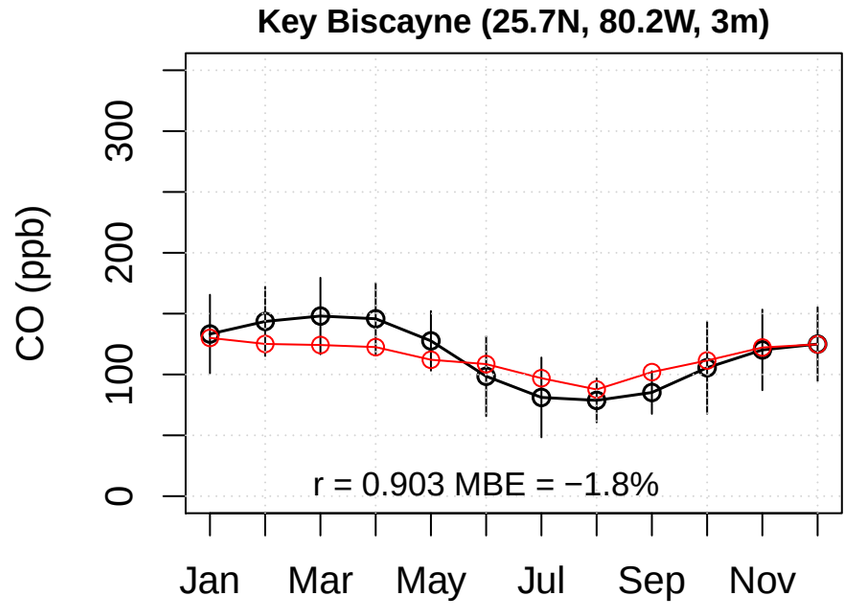

Mace Head (53.3N, 9.9W, 25m)
CO (ppb)
0
100
200
300
r = 0.906 MBE = −23%
Jan
Mar
May
Jul
Sep
Nov

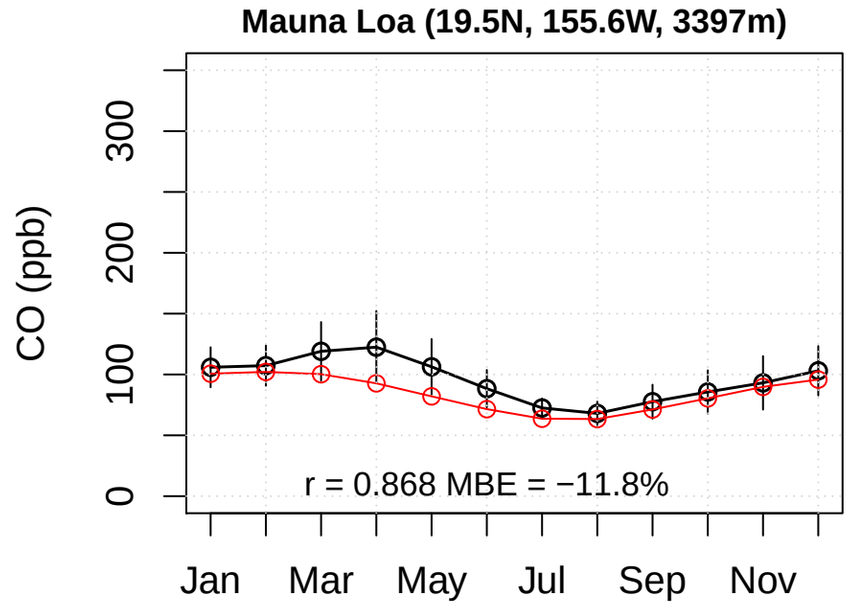

Park Falls (45.9N, 90.2W, 472m)
CO (ppb)
0
100
200
300
r = −0.875 MBE = 30.3%
Jan
Mar
May
Jul
Sep
Nov

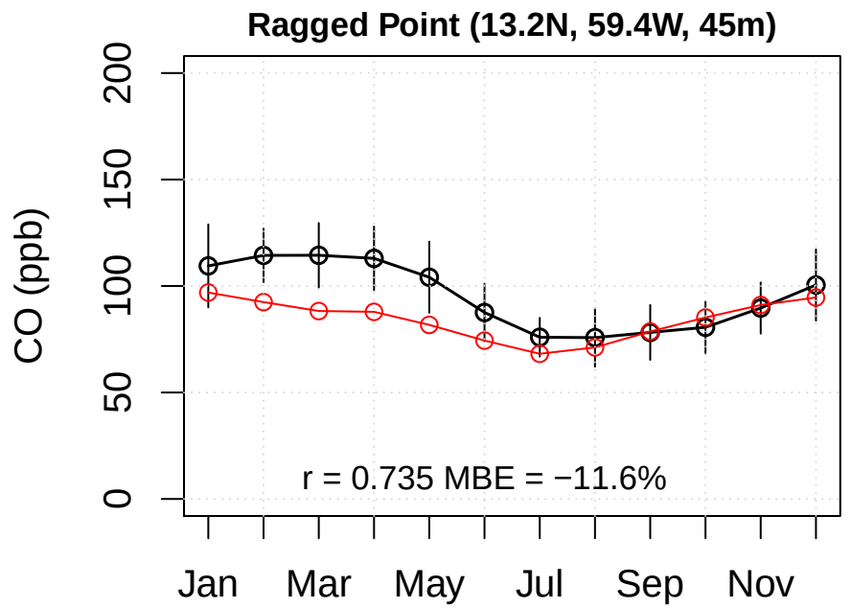

Niwot Ridge (40.0N, 105.6W, 3475m)
CO (ppb)
0
100
200
300
r = −0.629 MBE = 48.2%
Jan
Mar
May
Jul
Sep
Nov

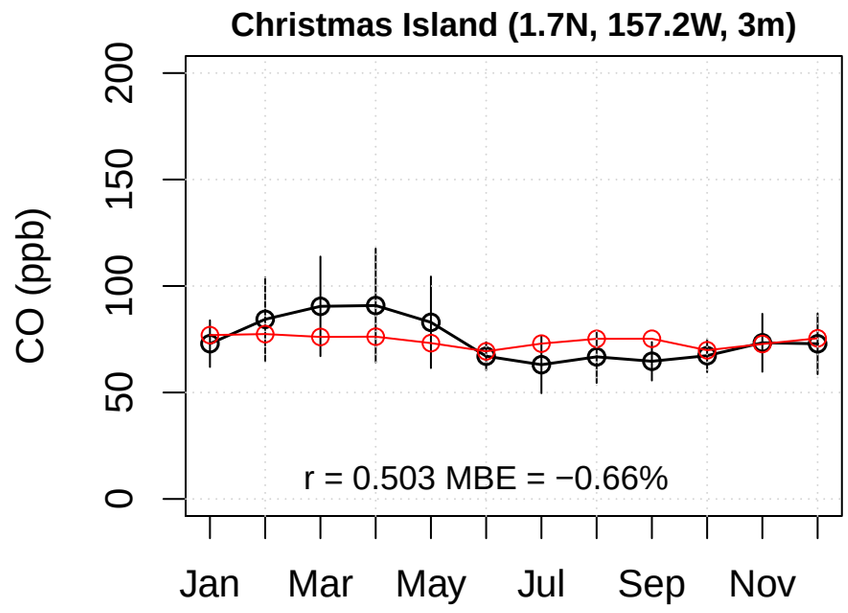

Tae−ahn Peninsula (36.7N, 126.1E, 20m)
CO (ppb)
0
100
200
300
r = 0.0659 MBE = 34.8%
Jan
Mar
May
Jul
Sep
Nov

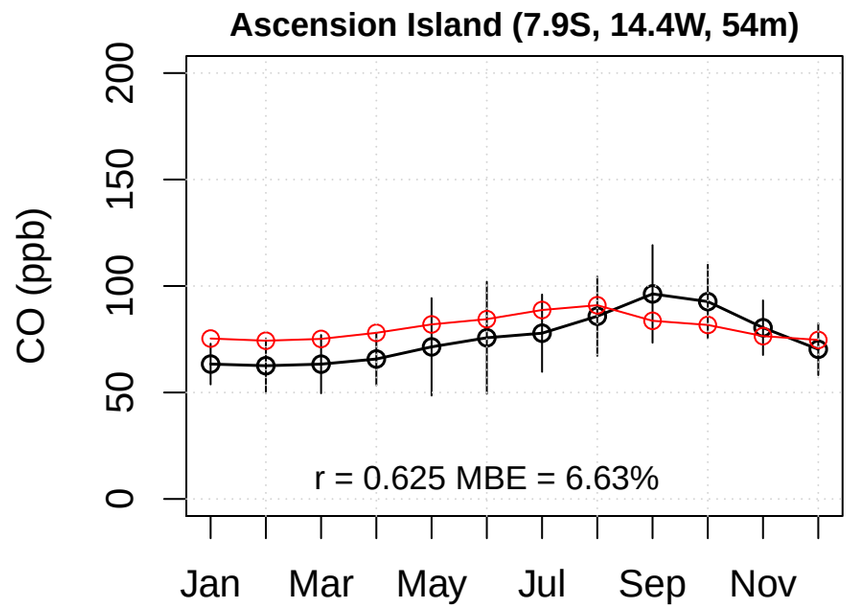

Gozo (36.0N, 14.1E)
CO (ppb)
0
100
200
300
r = 0.354 MBE = −26.8%
Jan
Mar
May
Jul
Sep
Nov

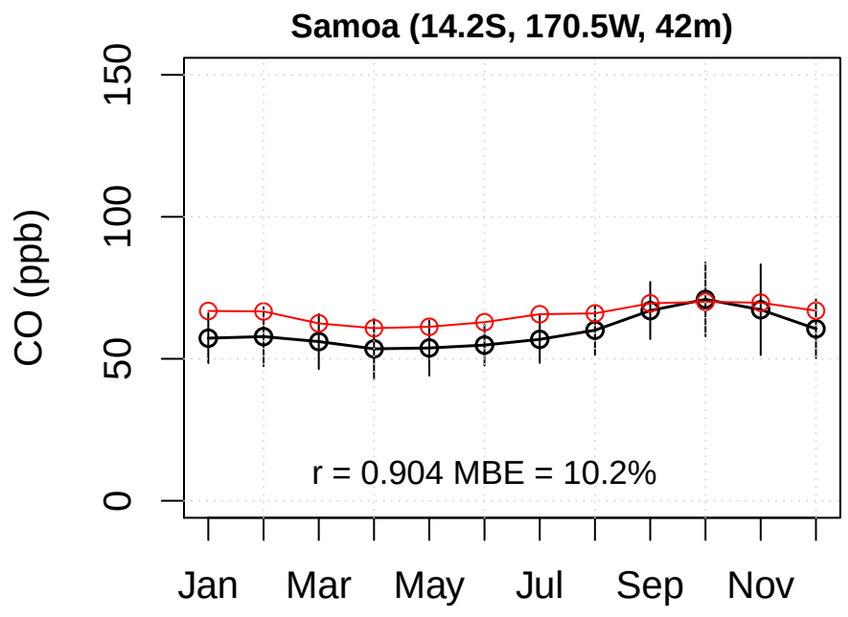

Key Biscayne (25.7N, 80.2W, 3m)
CO (ppb)
0
100
200
300
r = 0.903 MBE = −1.8%
Jan
Mar
May
Jul
Sep
Nov

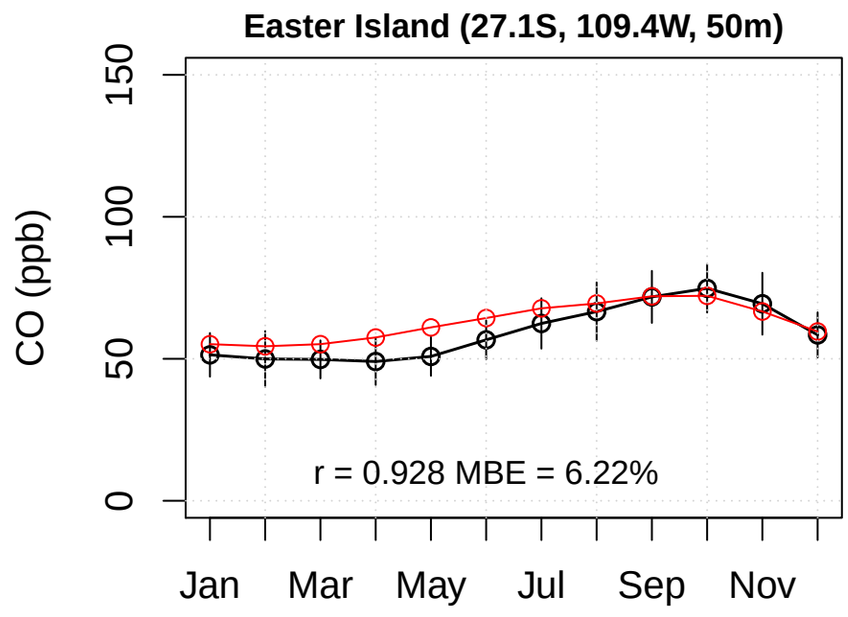

Mauna Loa (19.5N, 155.6W, 3397m)
CO (ppb)
0
100
200
300
r = 0.868 MBE = −11.8%
Jan
Mar
May
Jul
Sep
Nov

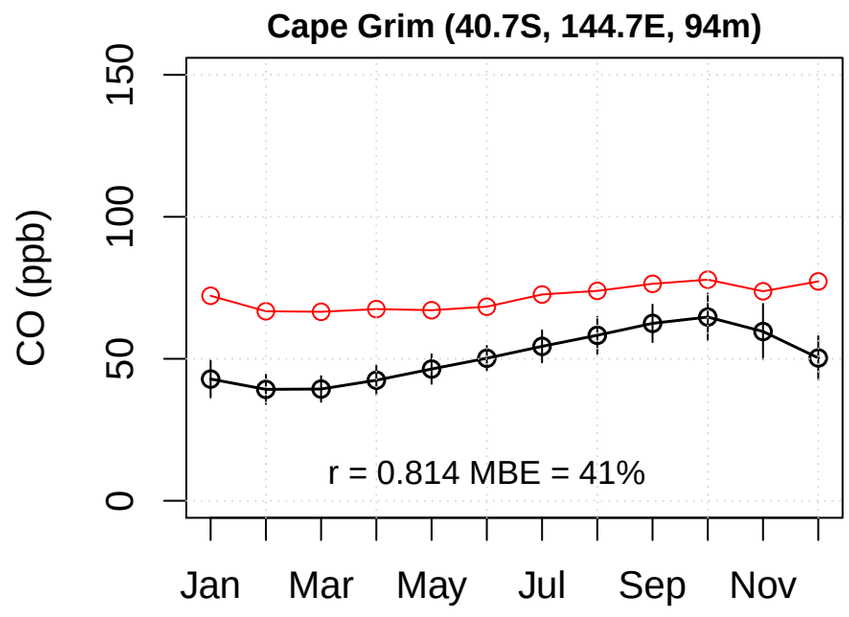

Ragged Point (13.2N, 59.4W, 45m)
CO (ppb)
0
50
100
150
200
r = 0.735 MBE = −11.6%
Jan
Mar
May
Jul
Sep
Nov

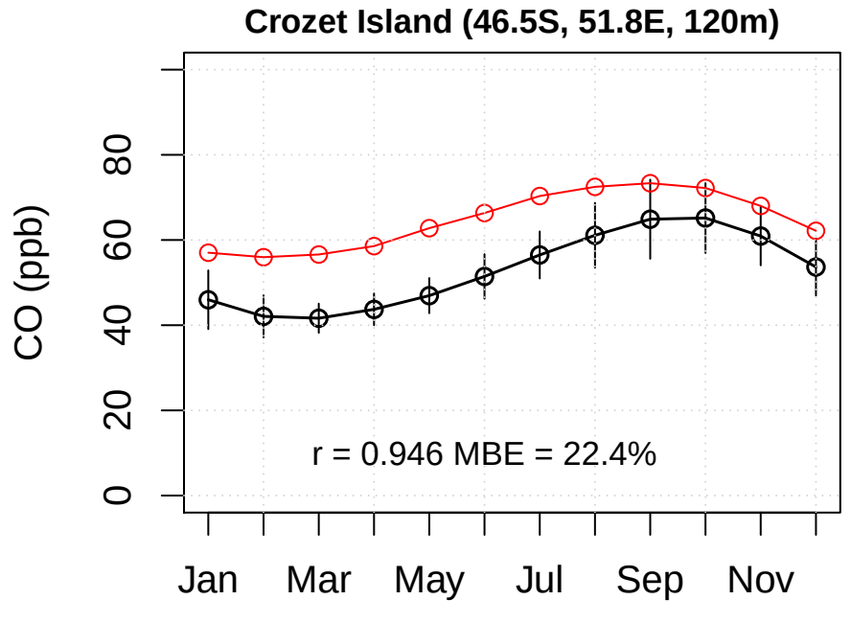

Christmas Island (1.7N, 157.2W, 3m)
CO (ppb)
0
50
100
150
200
r = 0.503 MBE = −0.66%
Jan
Mar
May
Jul
Sep
Nov

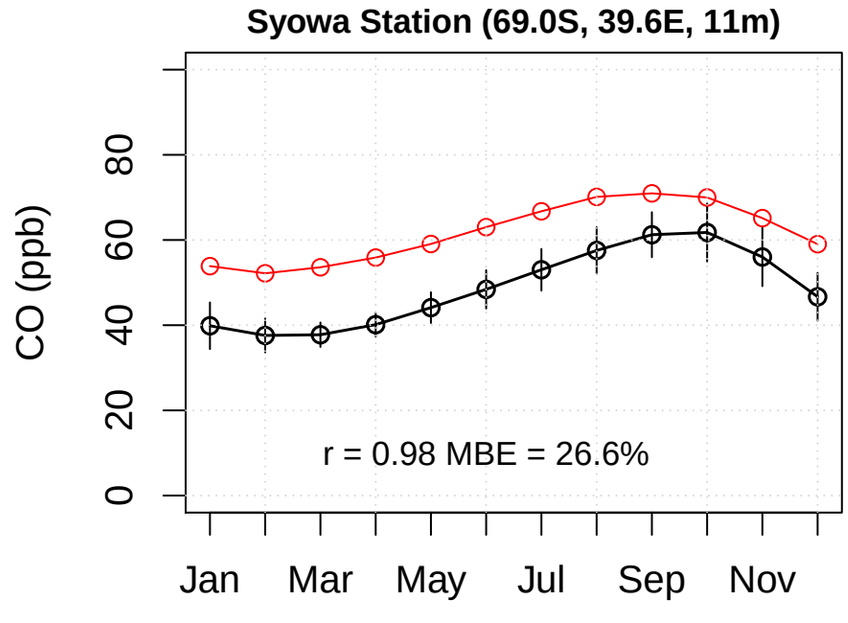

Ascension Island (7.9S, 14.4W, 54m)
CO (ppb)
0
50
100
150
200
r = 0.625 MBE = 6.63%
Jan
Mar
May
Jul
Sep
Nov

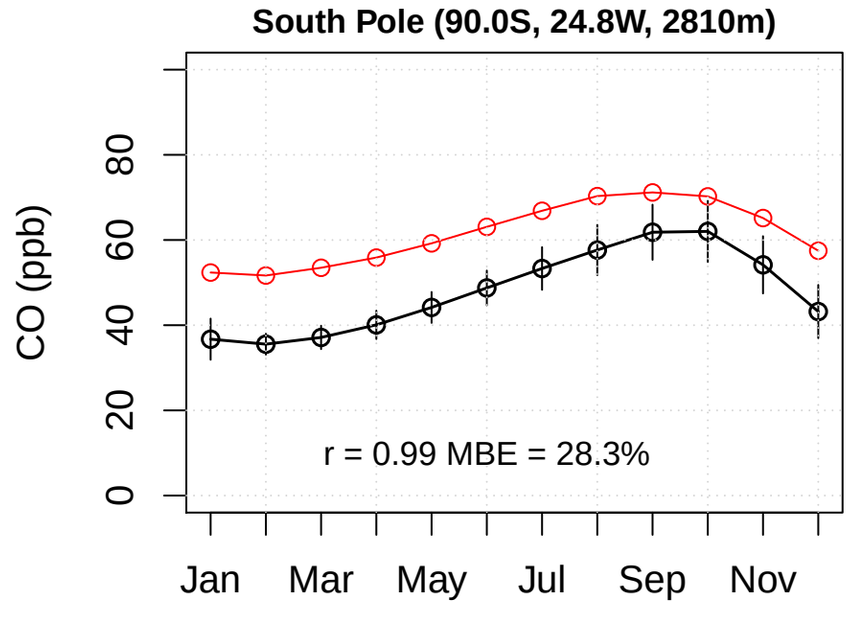

Samoa (14.2S, 170.5W, 42m)
CO (ppb)
0
50
100
150
r = 0.904 MBE = 10.2%
Jan
Mar
May
Jul
Sep
Nov

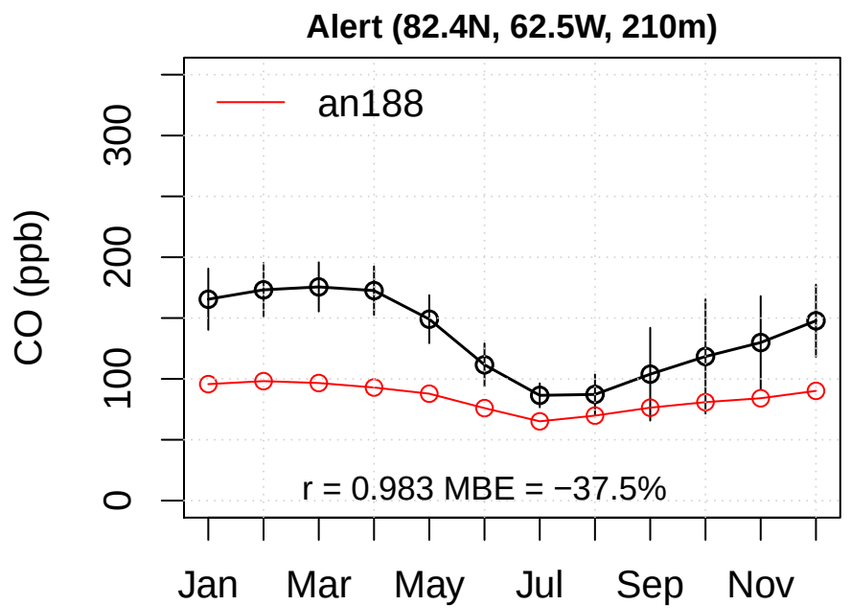

Easter Island (27.1S, 109.4W, 50m)
CO (ppb)
0
50
100
150
r = 0.928 MBE = 6.22%
Jan
Mar
May
Jul
Sep
Nov

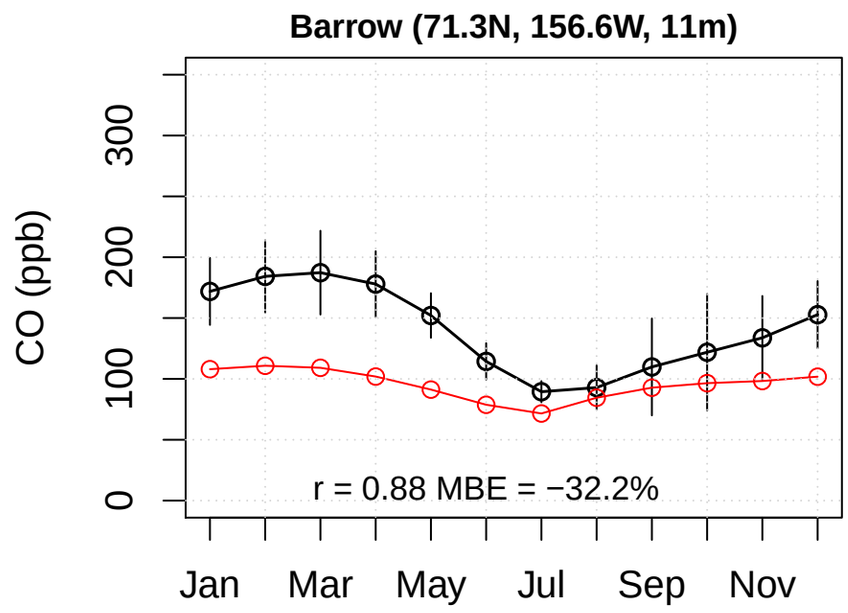

Cape Grim (40.7S, 144.7E, 94m)
CO (ppb)
0
50
100
150
r = 0.814 MBE = 41%
Jan
Mar
May
Jul
Sep
Nov

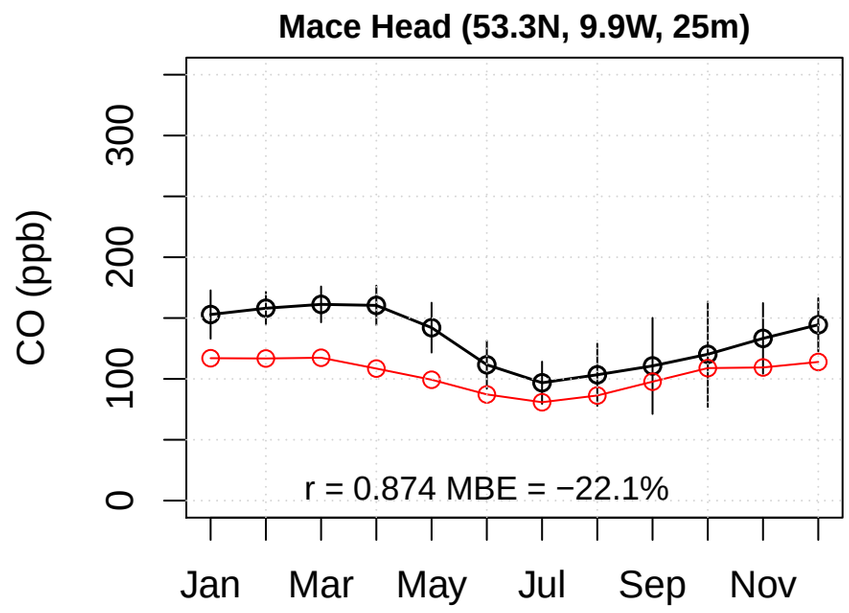

Crozet Island (46.5S, 51.8E, 120m)
CO (ppb)
0
20
40
60
80
r = 0.946 MBE = 22.4%
Jan
Mar
May
Jul
Sep
Nov

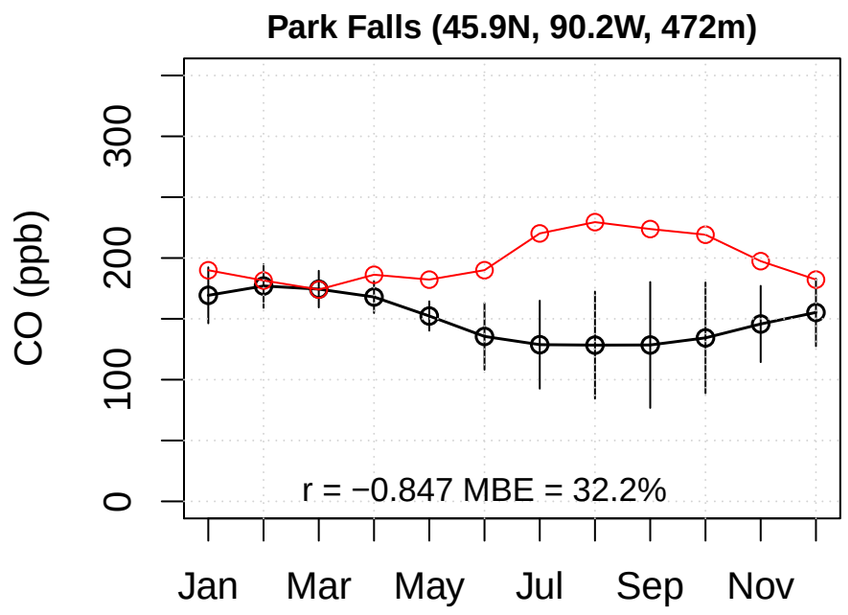

Syowa Station (69.0S, 39.6E, 11m)
CO (ppb)
0
20
40
60
80
r = 0.98 MBE = 26.6%
Jan
Mar
May
Jul
Sep
Nov

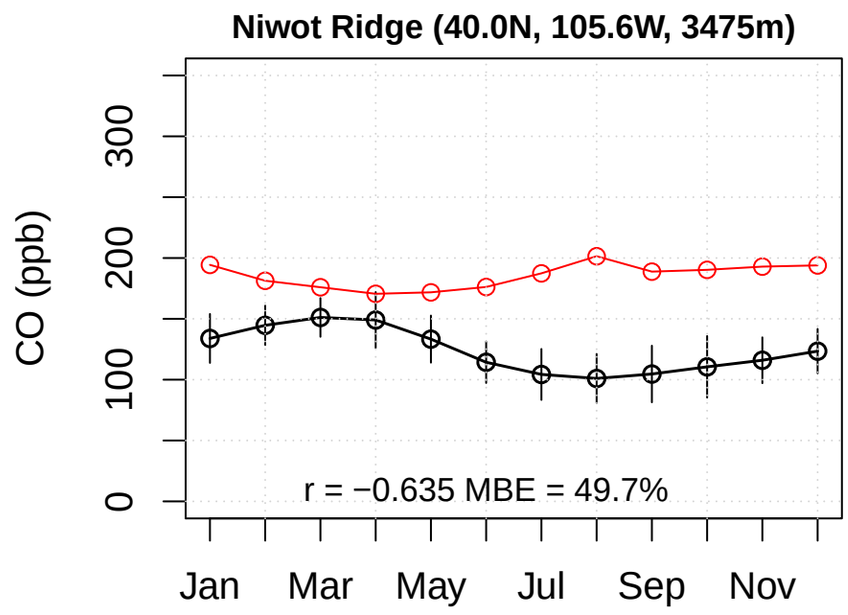

South Pole (90.0S, 24.8W, 2810m)
CO (ppb)
0
20
40
60
80
r = 0.99 MBE = 28.3%
Jan
Mar
May
Jul
Sep
Nov

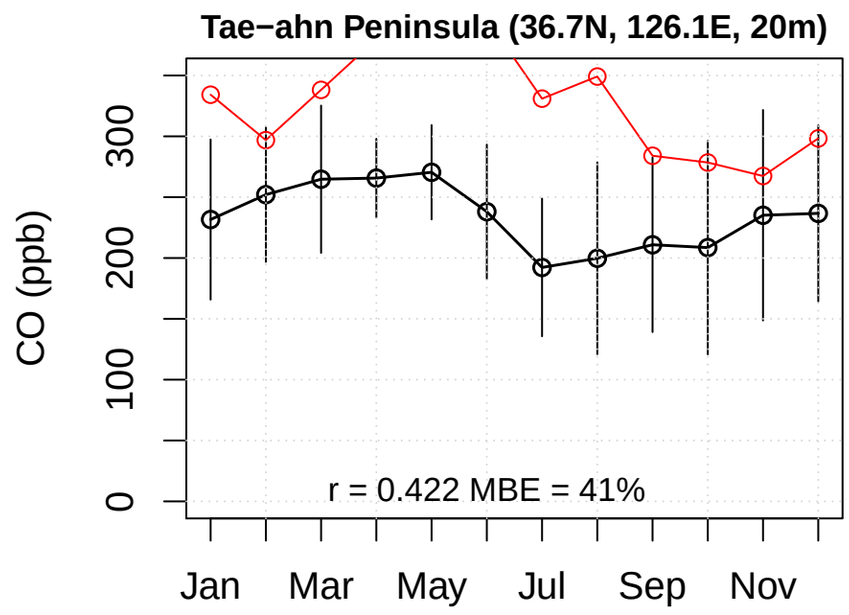

Alert (82.4N, 62.5W, 210m)
an188
CO (ppb)
0
100
200
300
r = 0.983 MBE = −37.5%
Jan
Mar
May
Jul
Sep
Nov

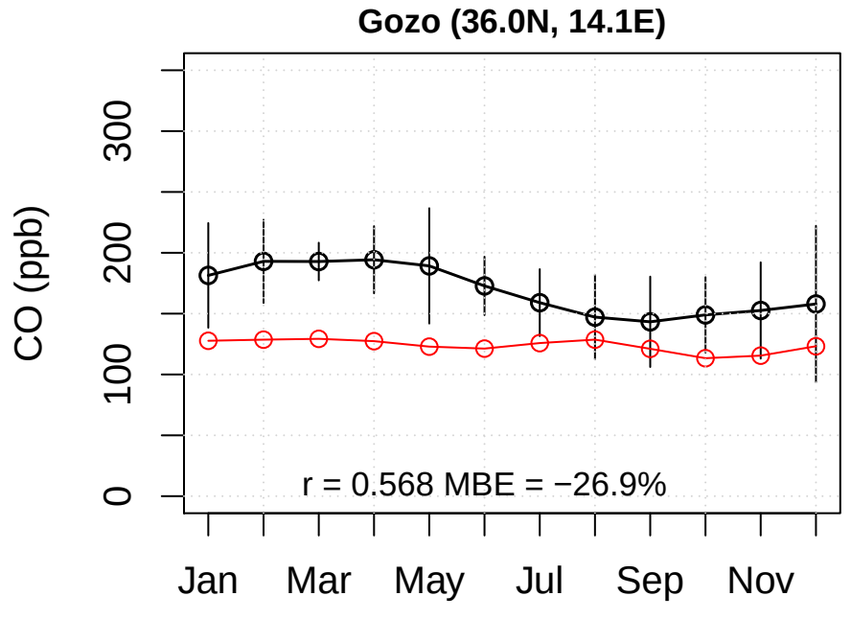

Barrow (71.3N, 156.6W, 11m)
CO (ppb)
0
100
200
300
r = 0.88 MBE = −32.2%
Jan
Mar
May
Jul
Sep
Nov

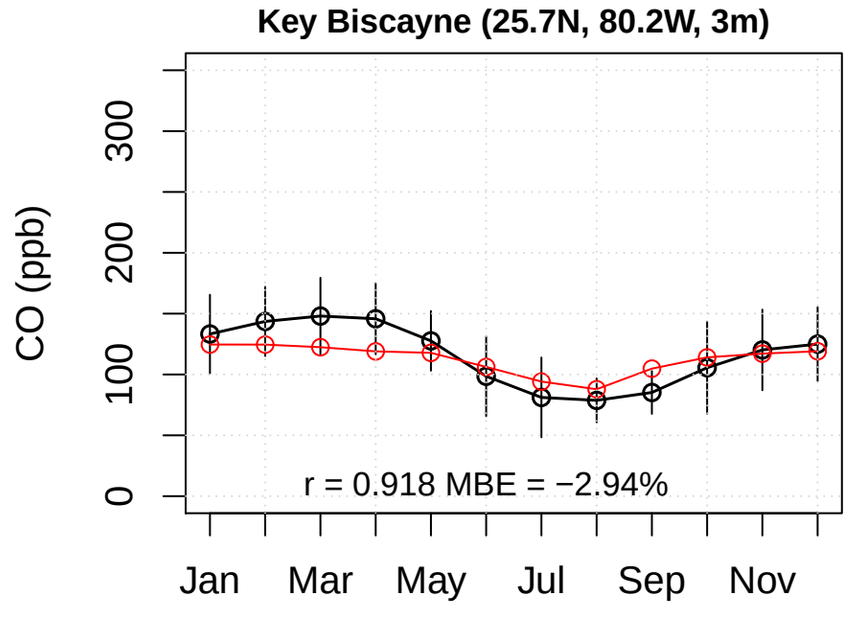

Mace Head (53.3N, 9.9W, 25m)
CO (ppb)
0
100
200
300
r = 0.874 MBE = −22.1%
Jan
Mar
May
Jul
Sep
Nov

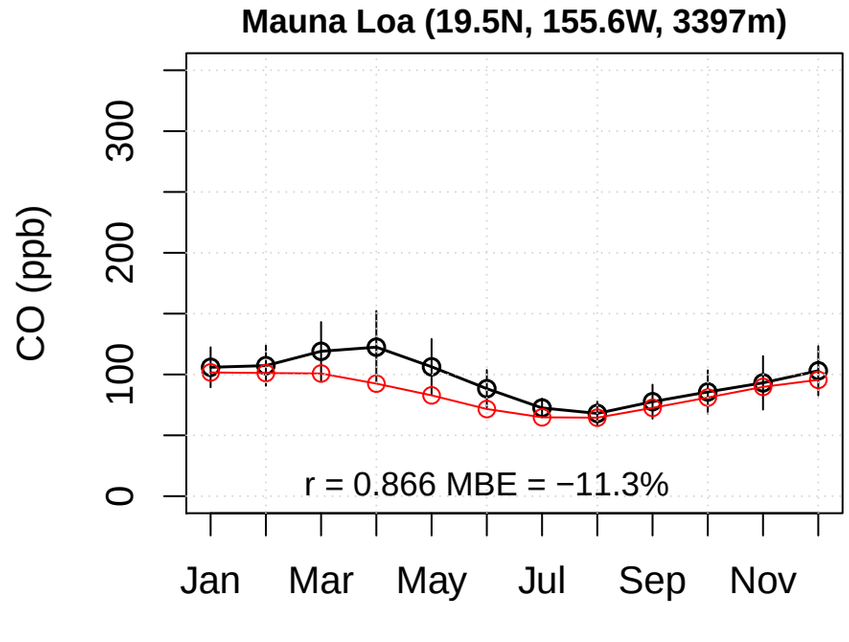

Park Falls (45.9N, 90.2W, 472m)
CO (ppb)
0
100
200
300
r = −0.847 MBE = 32.2%
Jan
Mar
May
Jul
Sep
Nov

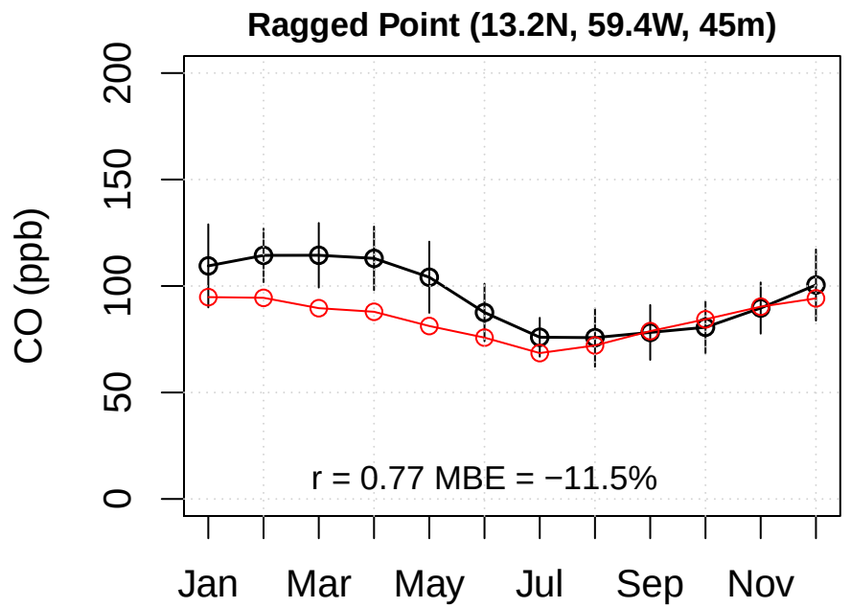

Niwot Ridge (40.0N, 105.6W, 3475m)
CO (ppb)
0
100
200
300
r = −0.635 MBE = 49.7%
Jan
Mar
May
Jul
Sep
Nov

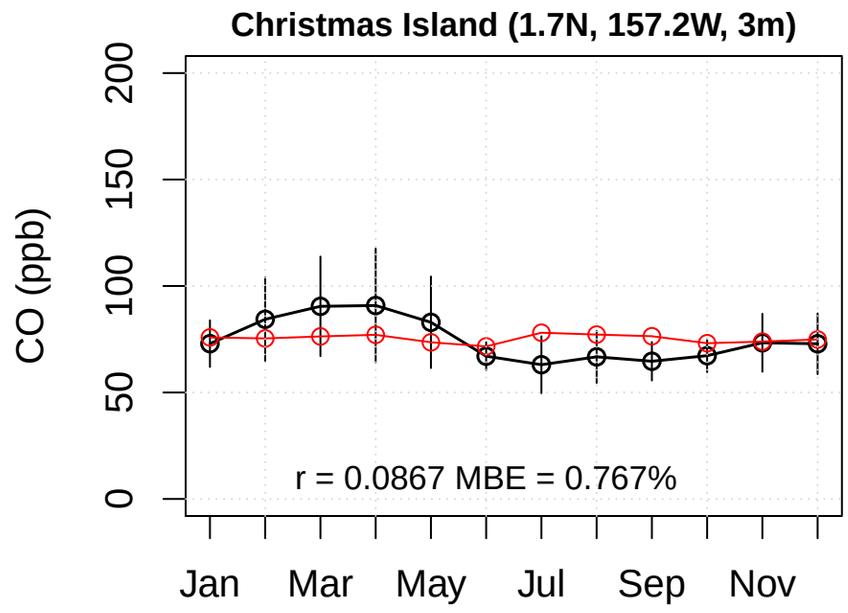

Tae−ahn Peninsula (36.7N, 126.1E, 20m)
CO (ppb)
0
100
200
300
r = 0.422 MBE = 41%
Jan
Mar
May
Jul
Sep
Nov

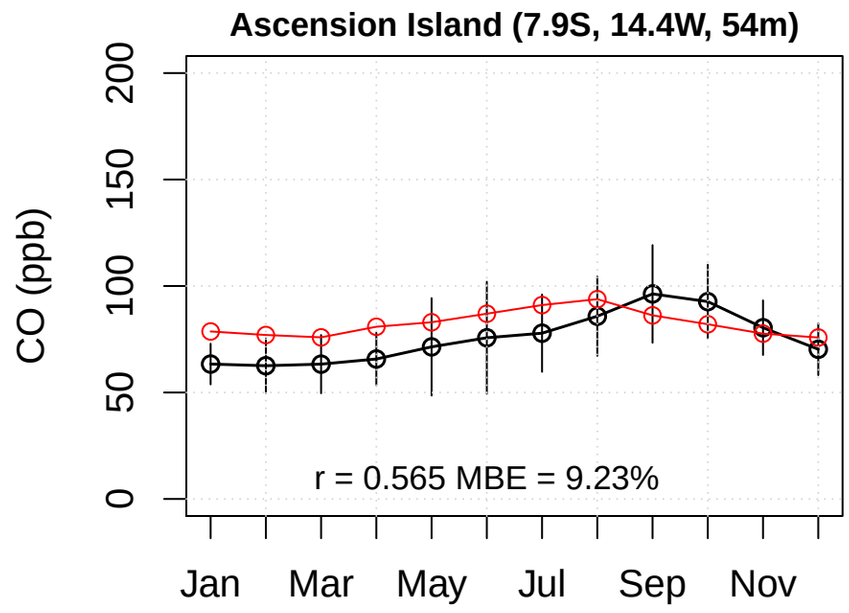

Gozo (36.0N, 14.1E)
CO (ppb)
0
100
200
300
r = 0.568 MBE = −26.9%
Jan
Mar
May
Jul
Sep
Nov

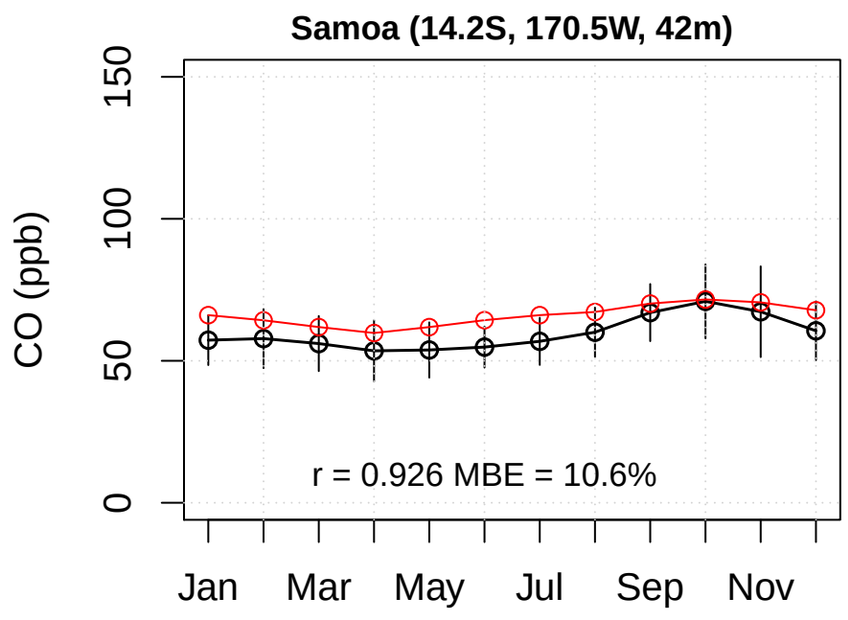

Key Biscayne (25.7N, 80.2W, 3m)
CO (ppb)
0
100
200
300
r = 0.918 MBE = −2.94%
Jan
Mar
May
Jul
Sep
Nov

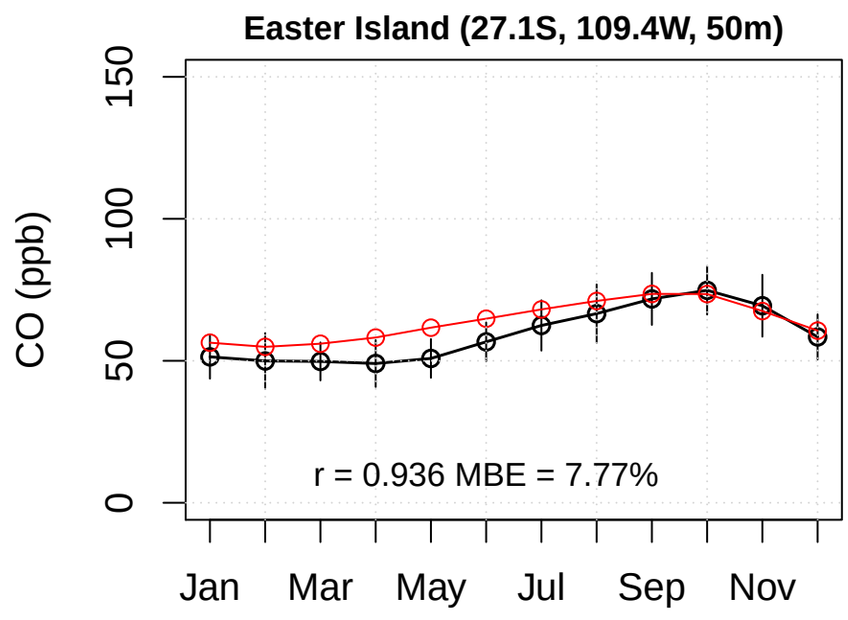

Mauna Loa (19.5N, 155.6W, 3397m)
CO (ppb)
0
100
200
300
r = 0.866 MBE = −11.3%
Jan
Mar
May
Jul
Sep
Nov

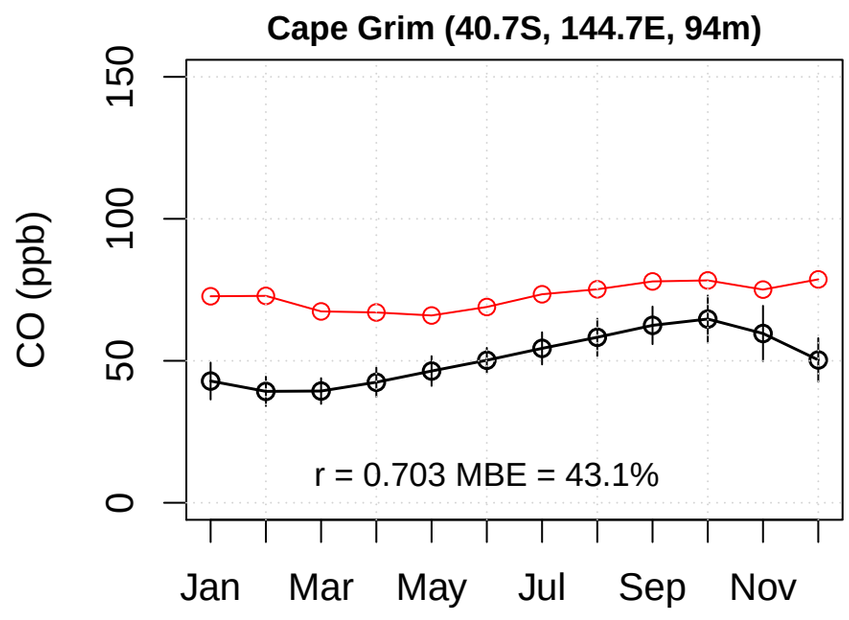

Ragged Point (13.2N, 59.4W, 45m)
CO (ppb)
0
50
100
150
200
r = 0.77 MBE = −11.5%
Jan
Mar
May
Jul
Sep
Nov

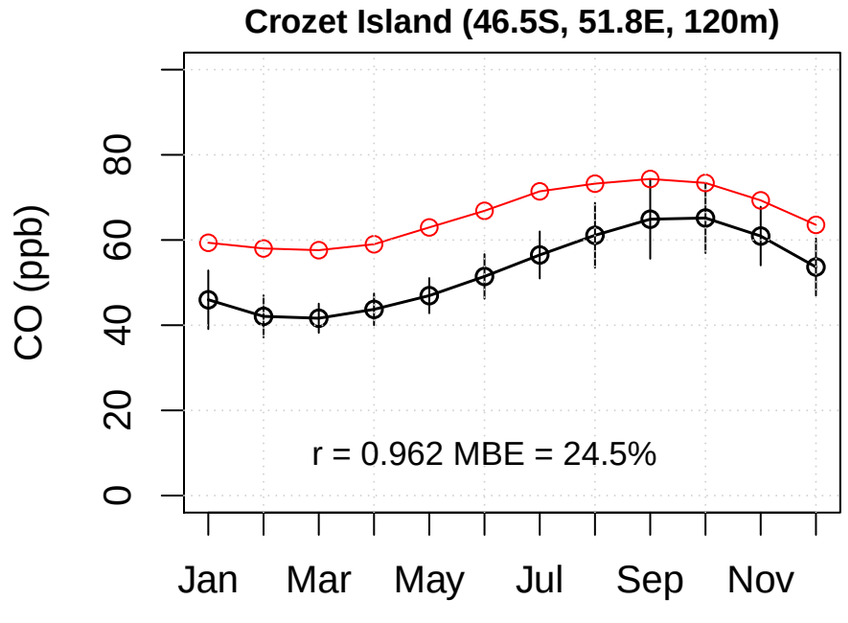

Christmas Island (1.7N, 157.2W, 3m)
CO (ppb)
0
50
100
150
200
r = 0.0867 MBE = 0.767%
Jan
Mar
May
Jul
Sep
Nov

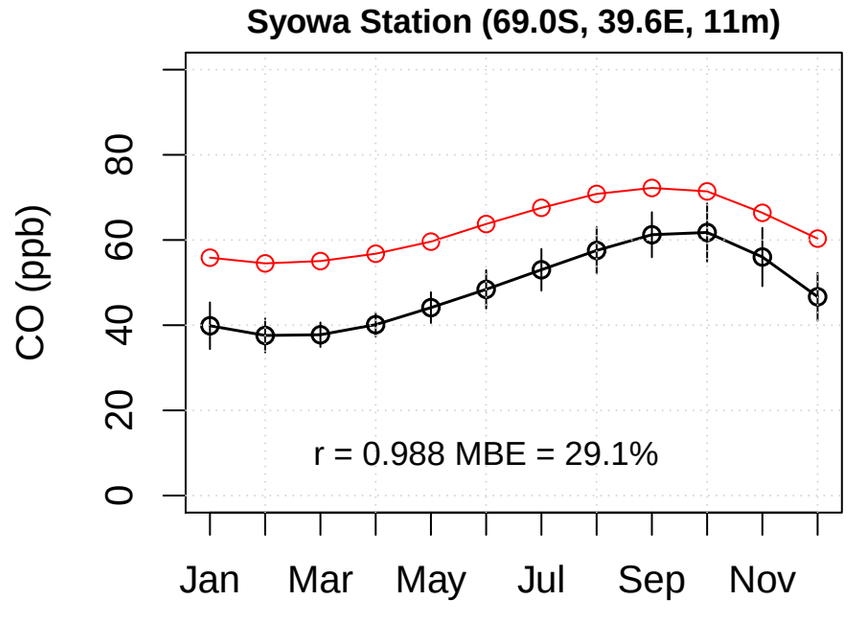

Ascension Island (7.9S, 14.4W, 54m)
CO (ppb)
0
50
100
150
200
r = 0.565 MBE = 9.23%
Jan
Mar
May
Jul
Sep
Nov

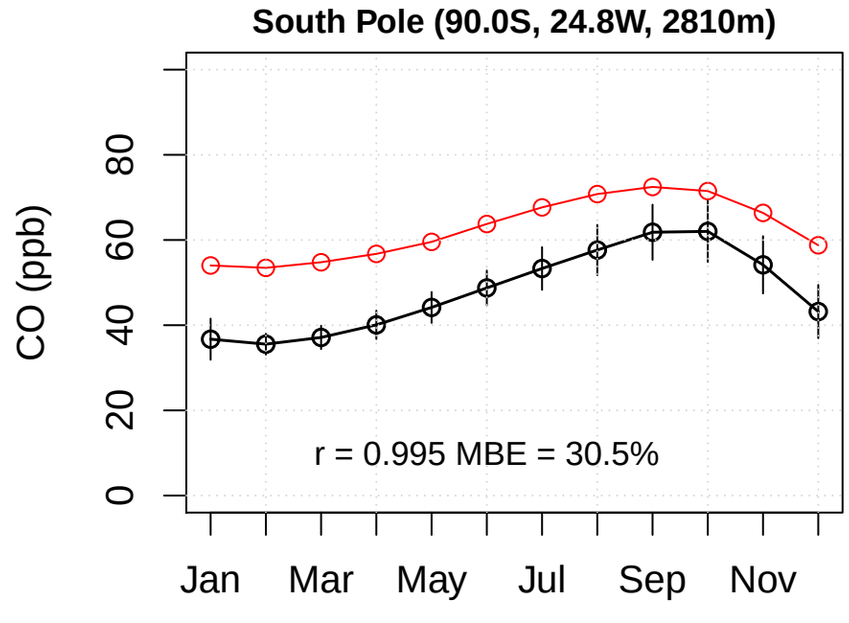

Samoa (14.2S, 170.5W, 42m)
CO (ppb)
0
50
100
150
r = 0.926 MBE = 10.6%
Jan
Mar
May
Jul
Sep
Nov

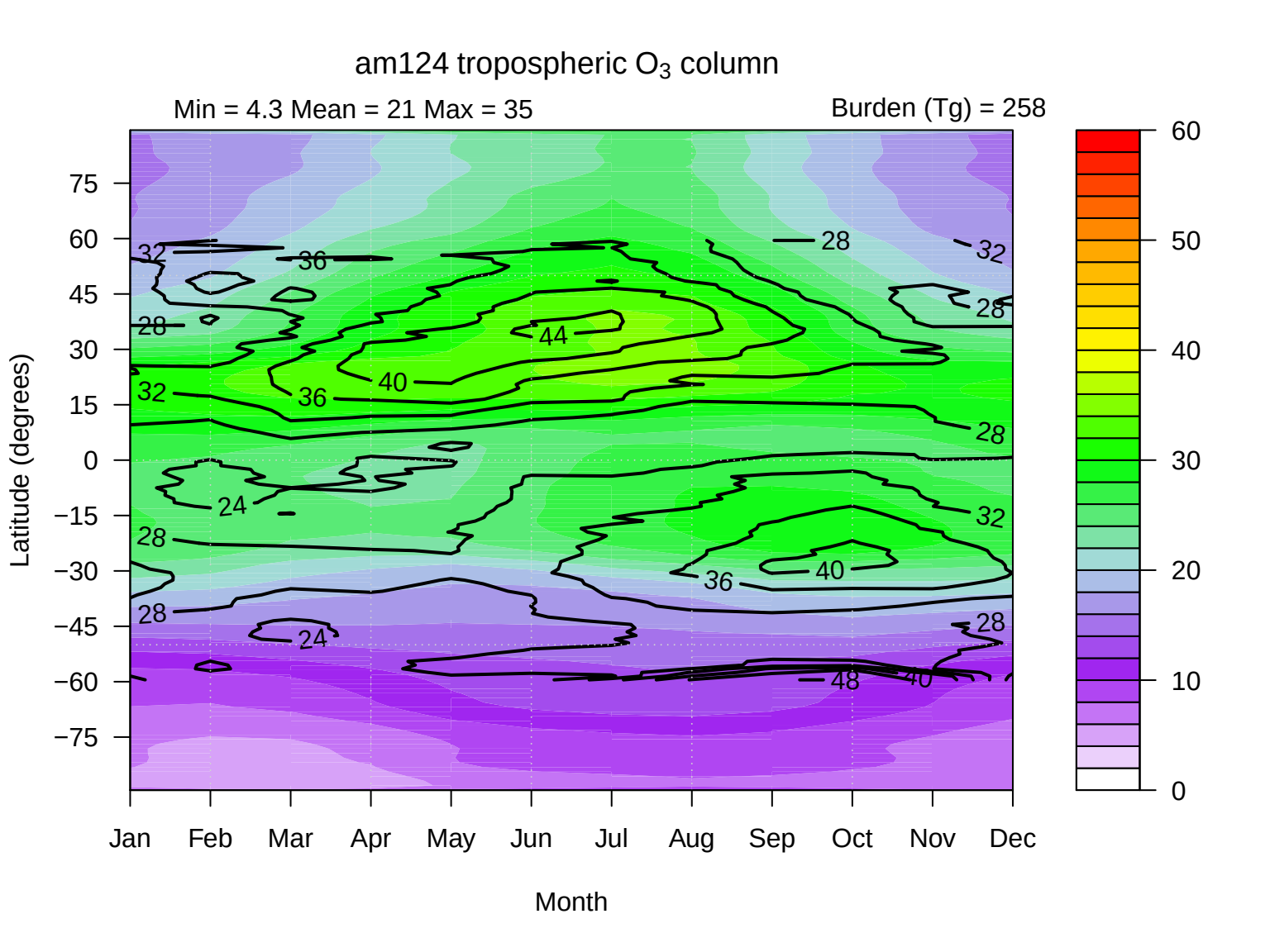

Easter Island (27.1S, 109.4W, 50m)
CO (ppb)
0
50
100
150
r = 0.936 MBE = 7.77%
Jan
Mar
May
Jul
Sep
Nov

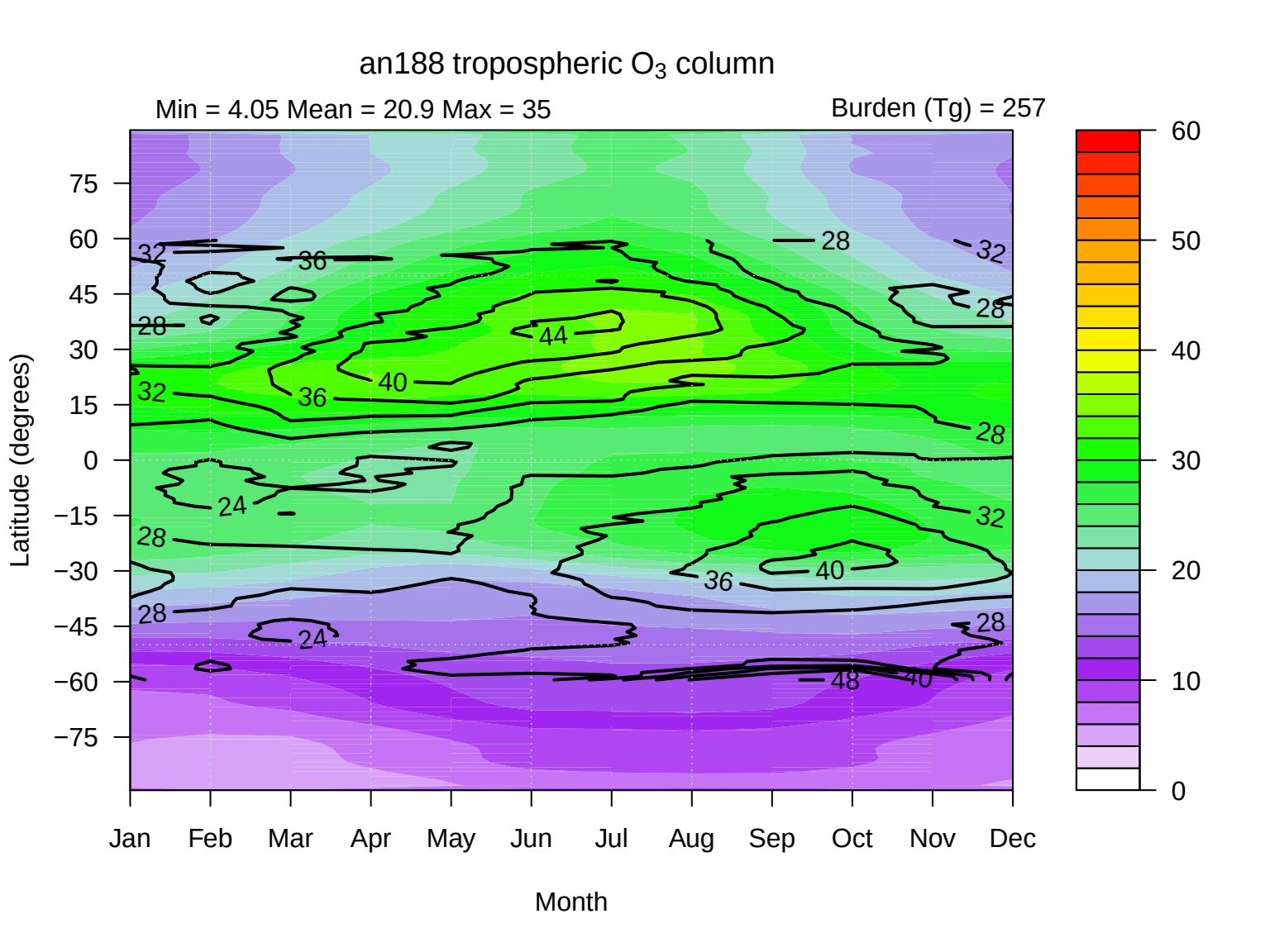

Cape Grim (40.7S, 144.7E, 94m)
CO (ppb)
0
50
100
150
r = 0.703 MBE = 43.1%
Jan
Mar
May
Jul
Sep
Nov

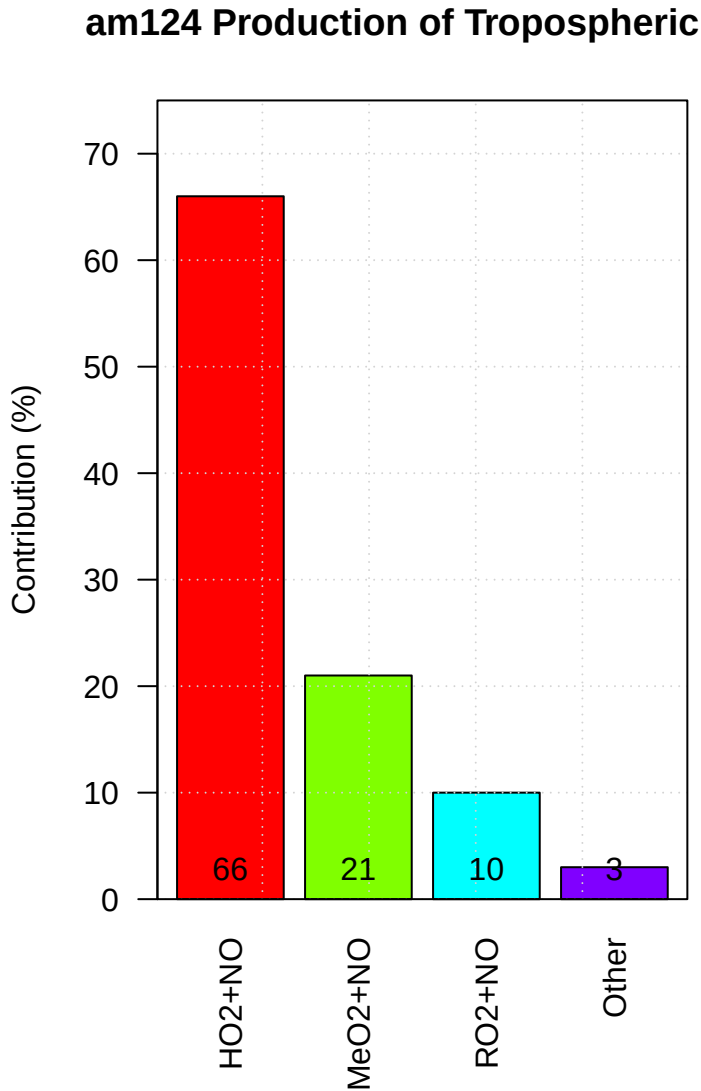

Crozet Island (46.5S, 51.8E, 120m)
CO (ppb)
0
20
40
60
80
r = 0.962 MBE = 24.5%
Jan
Mar
May
Jul
Sep
Nov

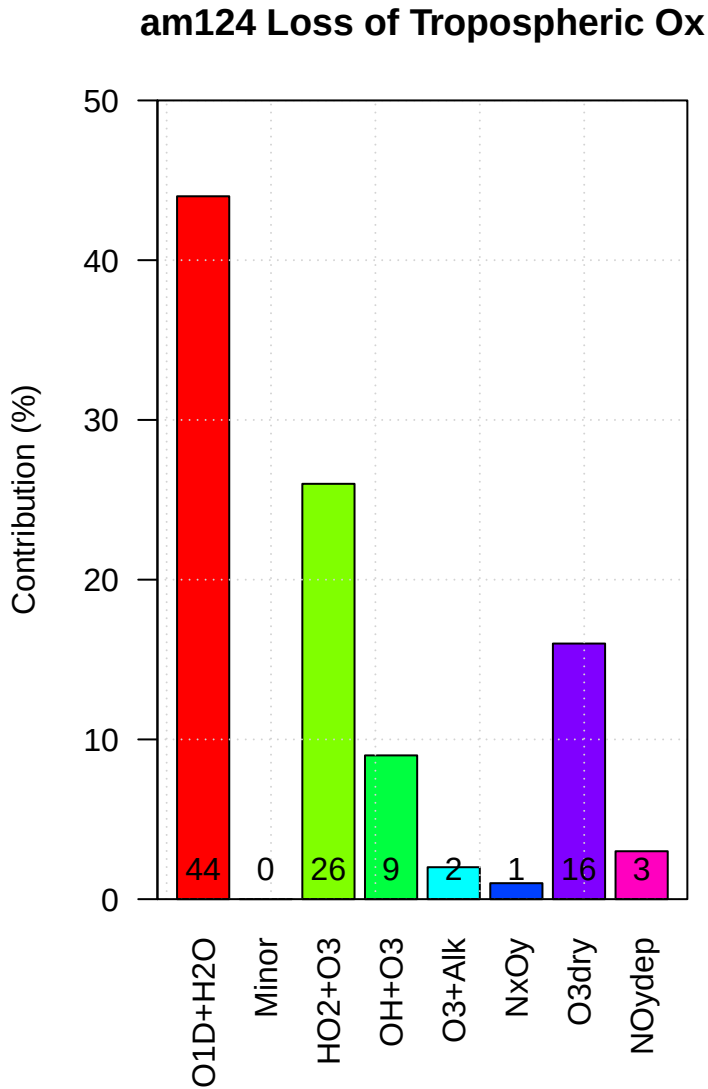

Syowa Station (69.0S, 39.6E, 11m)
CO (ppb)
0
20
40
60
80
r = 0.988 MBE = 29.1%
Jan
Mar
May
Jul
Sep
Nov

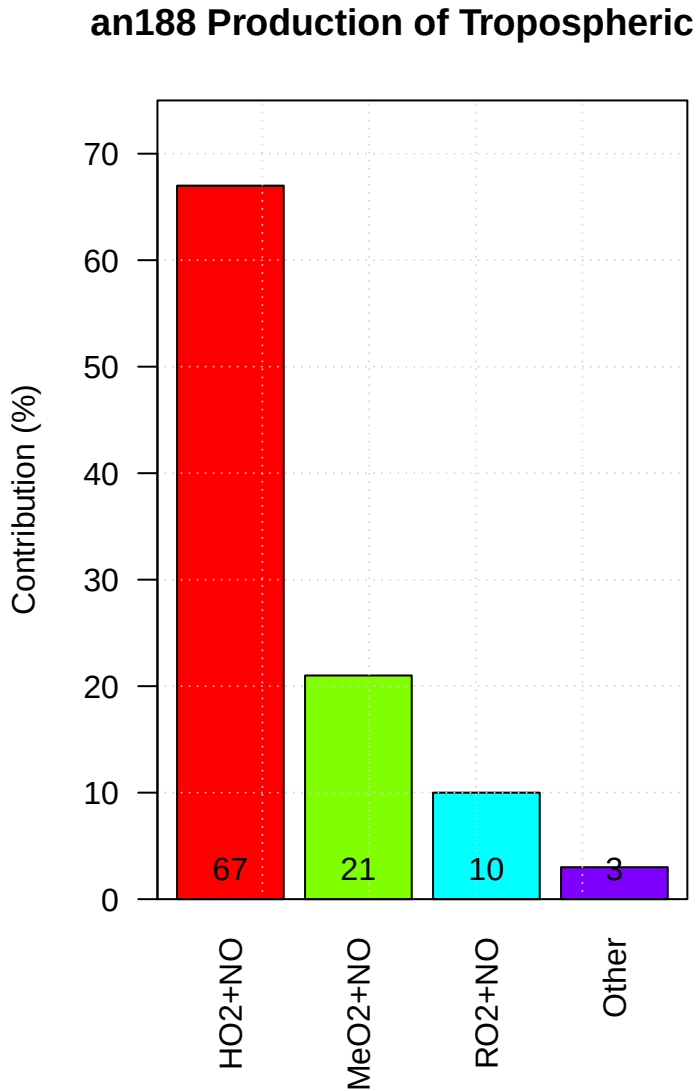

South Pole (90.0S, 24.8W, 2810m)
CO (ppb)
0
20
40
60
80
r = 0.995 MBE = 30.5%
Jan
Mar
May
Jul
Sep
Nov

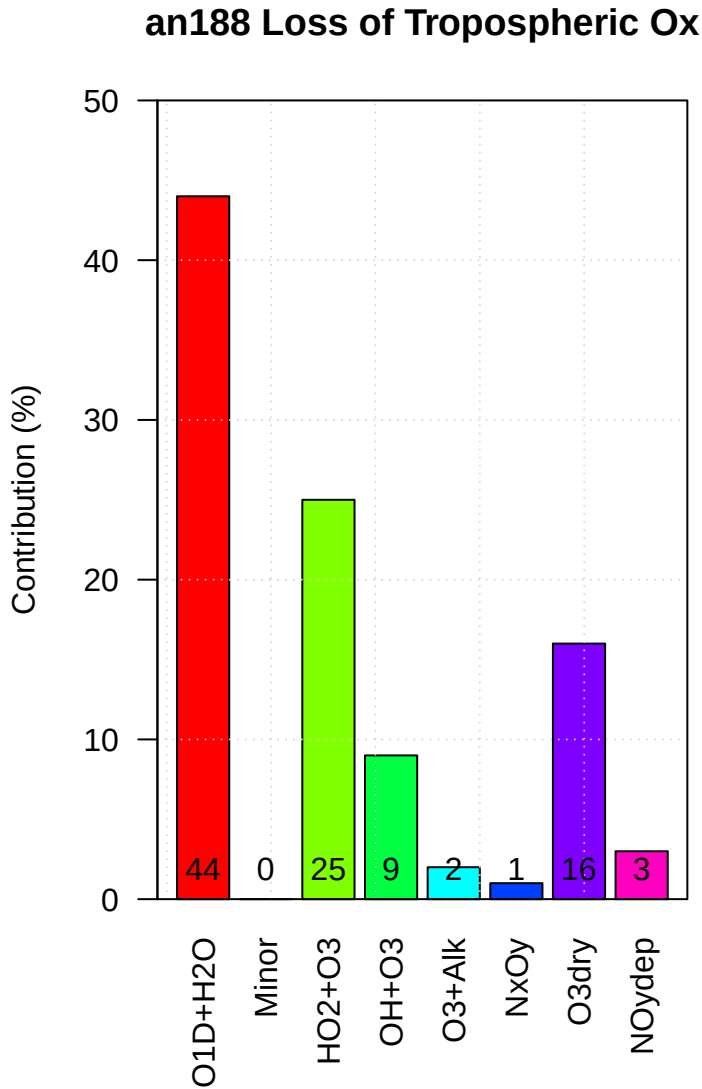

am124 tropospheric O_3 column
Min = 4.3 Mean = 21 Max = 35
Burden (Tg) = 258
Latitude (degrees)
75
60
45
30
15
0
−15
−30
−45
−60
−75
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month
60
50
40
30
20
10
0

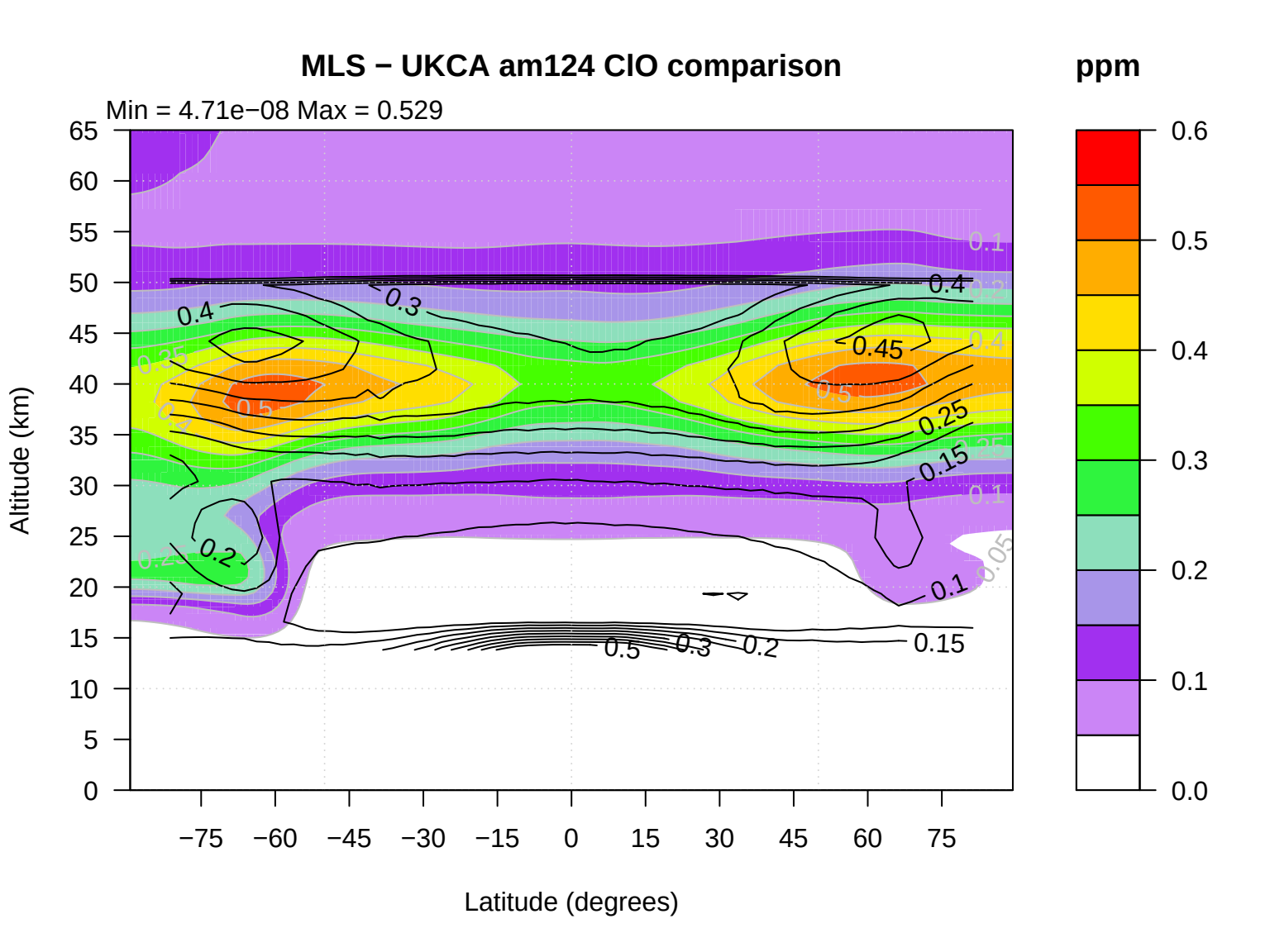

an188 tropospheric O_3 column
Min = 4.05 Mean = 20.9 Max = 35
Burden (Tg) = 257
Latitude (degrees)
75
60
45
30
15
0
−15
−30
−45
−60
−75
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month
60
50
40
30
20
10
0
32
36
28
44
40
24
48

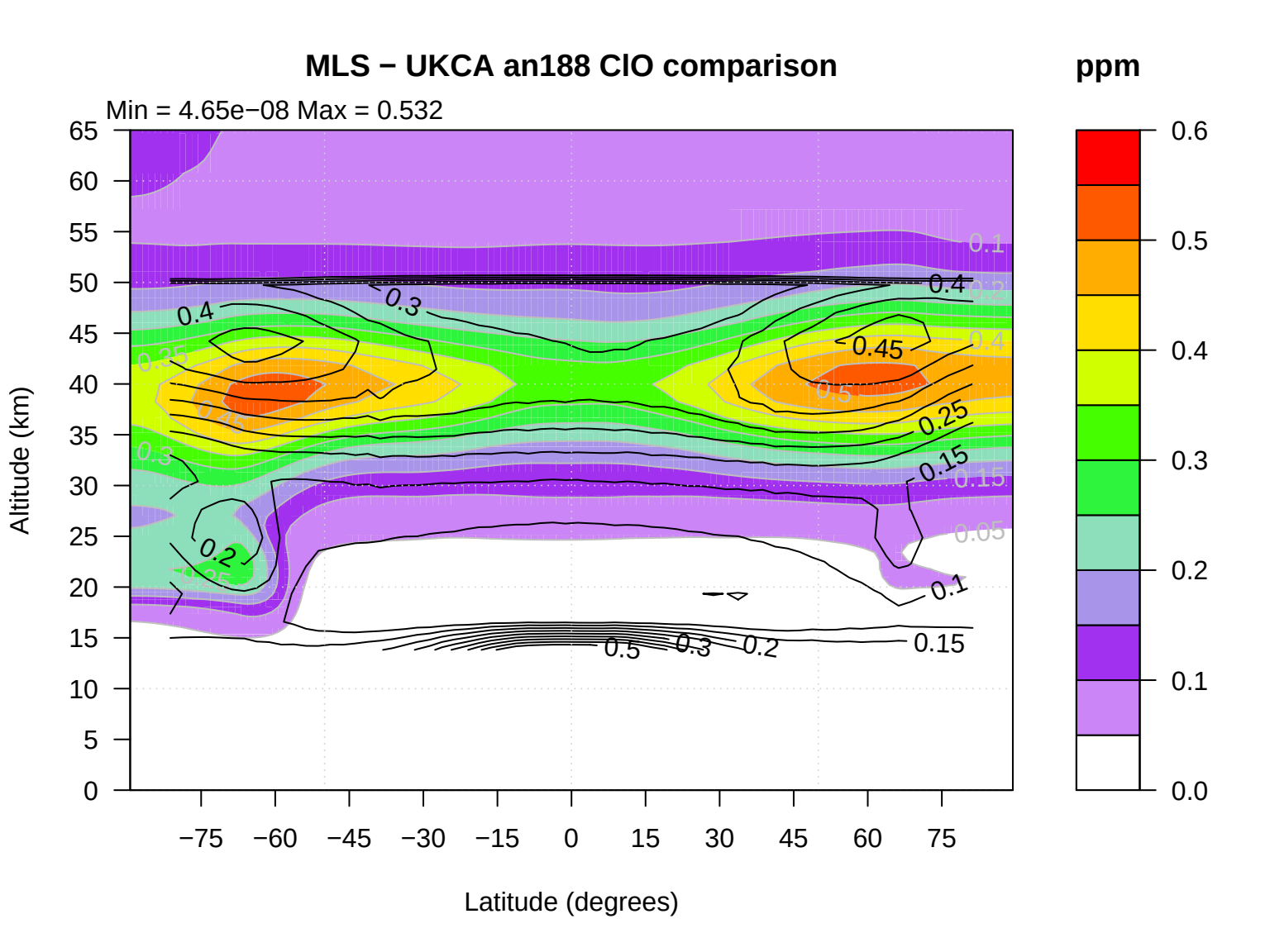

am124 Production of Tropospheric Ox
Contribution (%)
0
10
20
30
40
50
60
70
66
21
10
3
HO2+NO
MeO2+NO
RO2+NO
Other

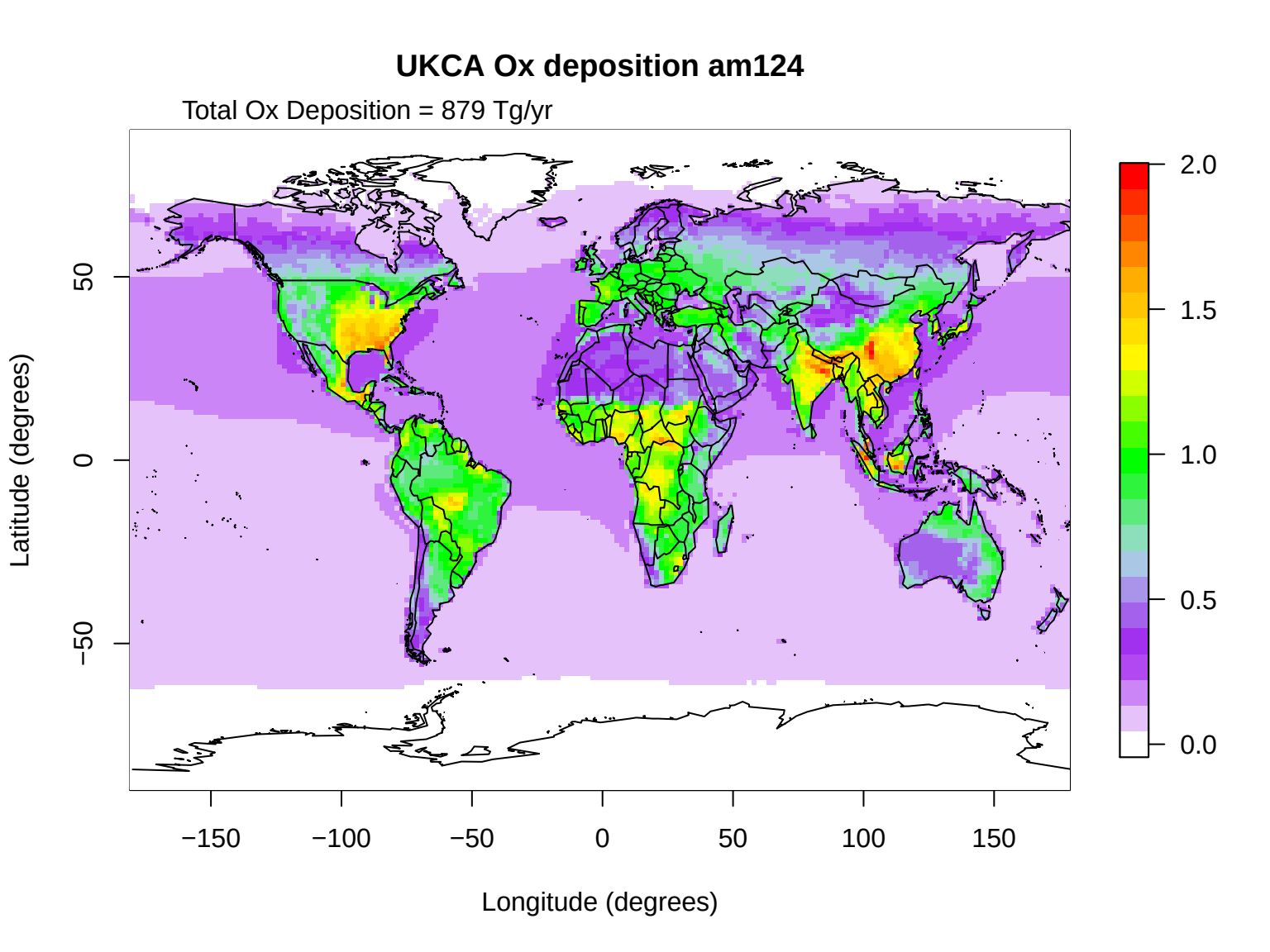

am124 Loss of Tropospheric Ox
Contribution (%)
0
10
20
30
40
50
44
0
26
9
2
1
16
3
O1D+H2O
Minor
HO2+O3
OH+O3
O3+Alk
NxOy
O3dry
NOydep

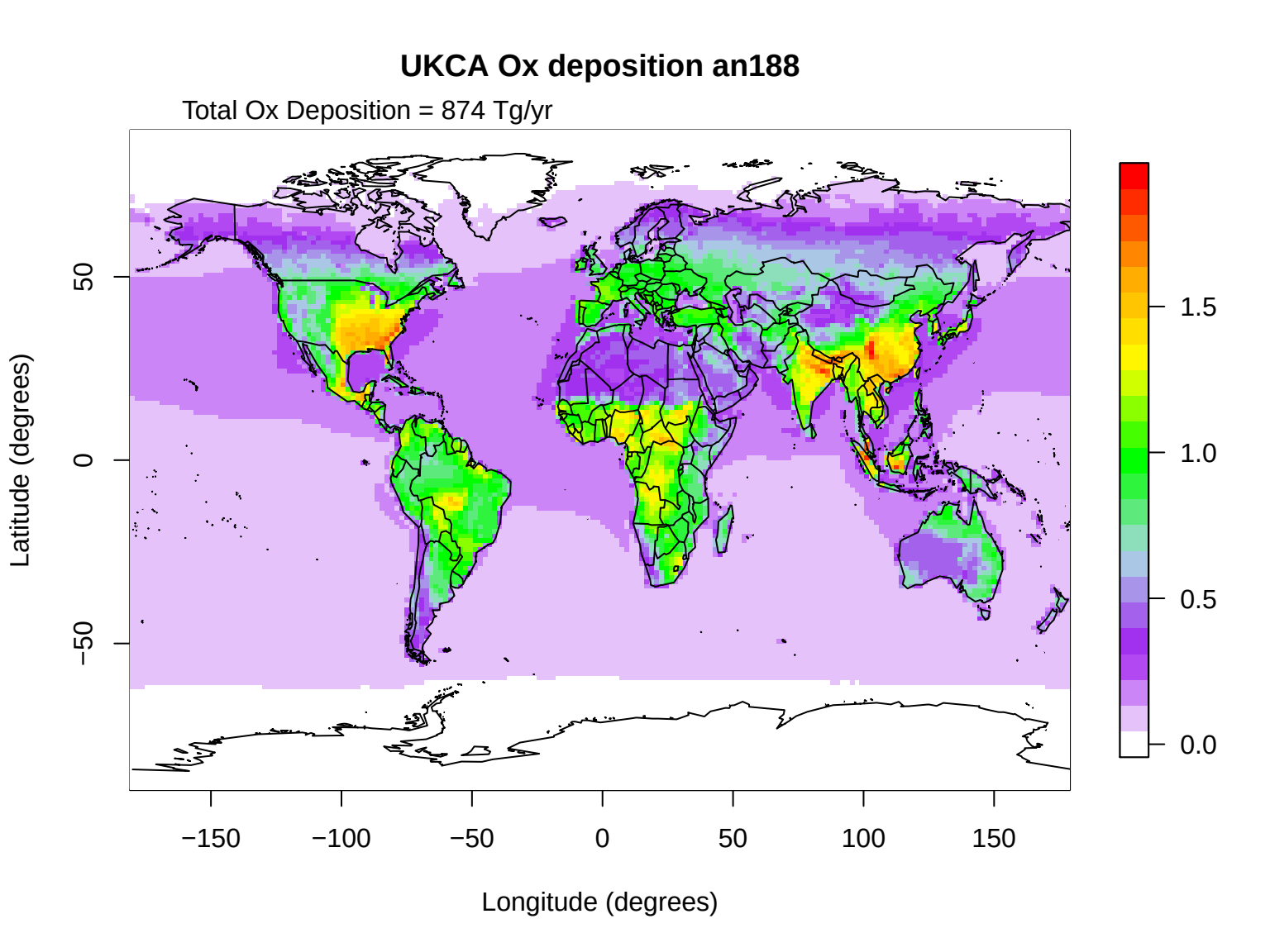

an188 Production of Tropospheric Ox
Contribution (%)
0
10
20
30
40
50
60
70
67
21
10
3
HO2+NO
MeO2+NO
RO2+NO
Other


an188 Loss of Tropospheric Ox
Contribution (%)
0
10
20
30
40
50
44
0
25
9
2
1
16
3
O1D+H2O
Minor
HO2+O3
OH+O3
O3+Alk
NxOy
O3dry
NOydep

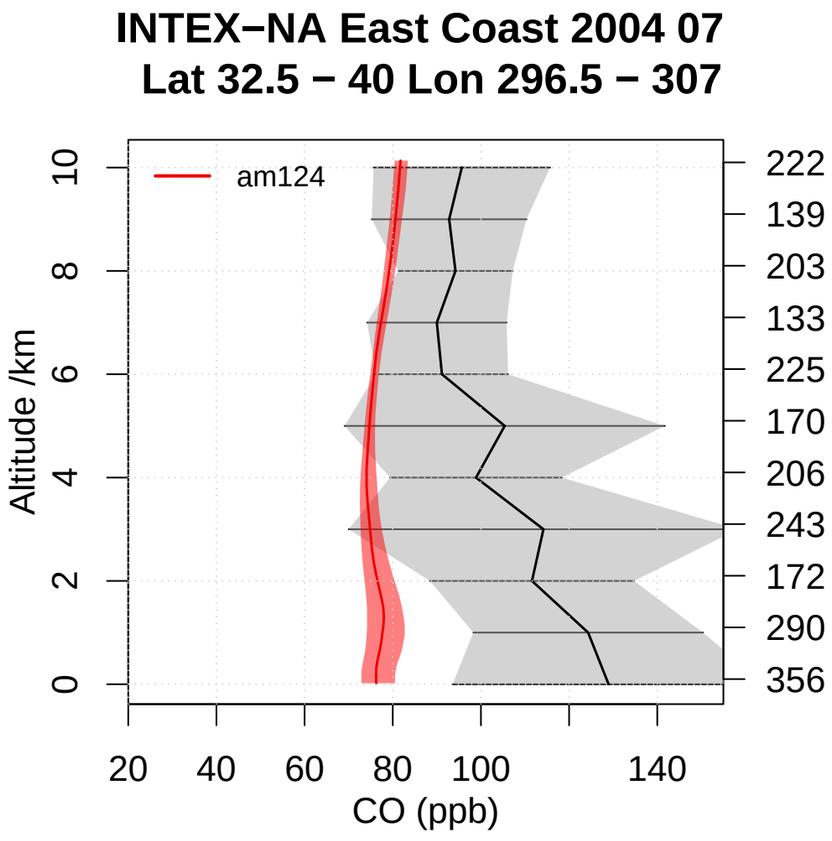

MLS − UKCA am124 ClO comparison
ppm
Min = 4.71e−08 Max = 0.529
Altitude (km)
Latitude (degrees)
65
60
55
50
45
40
35
30
25
20
15
10
5
0
−75
−60
−45
−30
−15
0
15
30
45
60
75
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.4
0.3
0.4
0.45
0.5
0.25
0.15
0.1
0.2
0.1
0.05
0.5
0.3
0.2
0.15

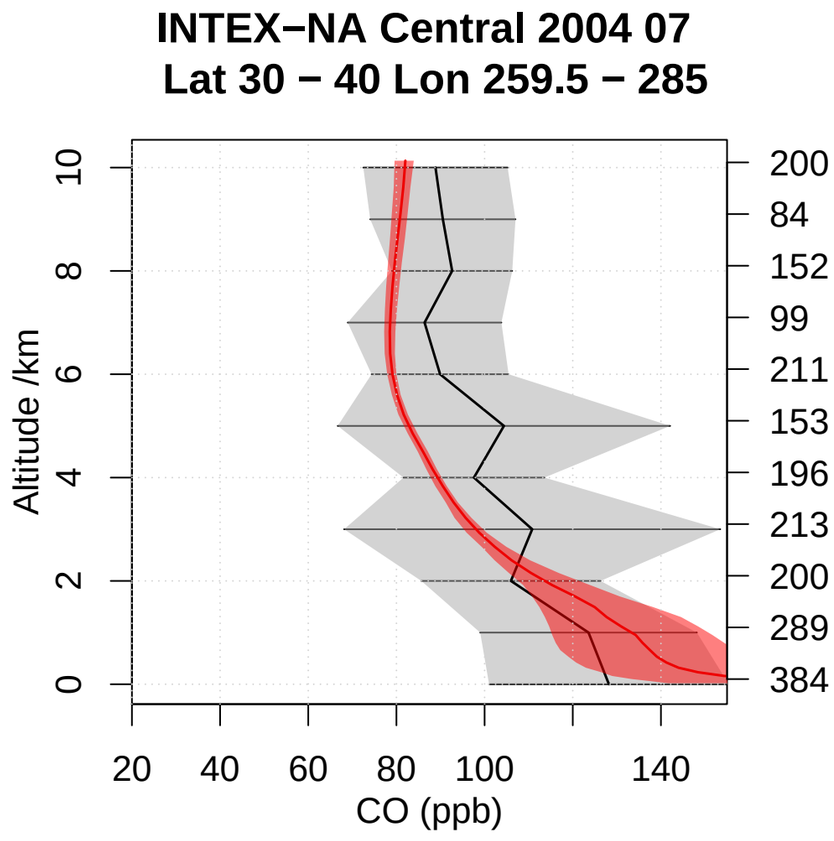

MLS − UKCA an188 ClO comparison
ppm
Min = 4.65e−08 Max = 0.532
Altitude (km)
Latitude (degrees)
65
60
55
50
45
40
35
30
25
20
15
10
5
0
−75
−60
−45
−30
−15
0
15
30
45
60
75
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.4
0.3
0.45
0.5
0.25
0.15
0.1
0.2
0.5
0.3
0.2
0.15

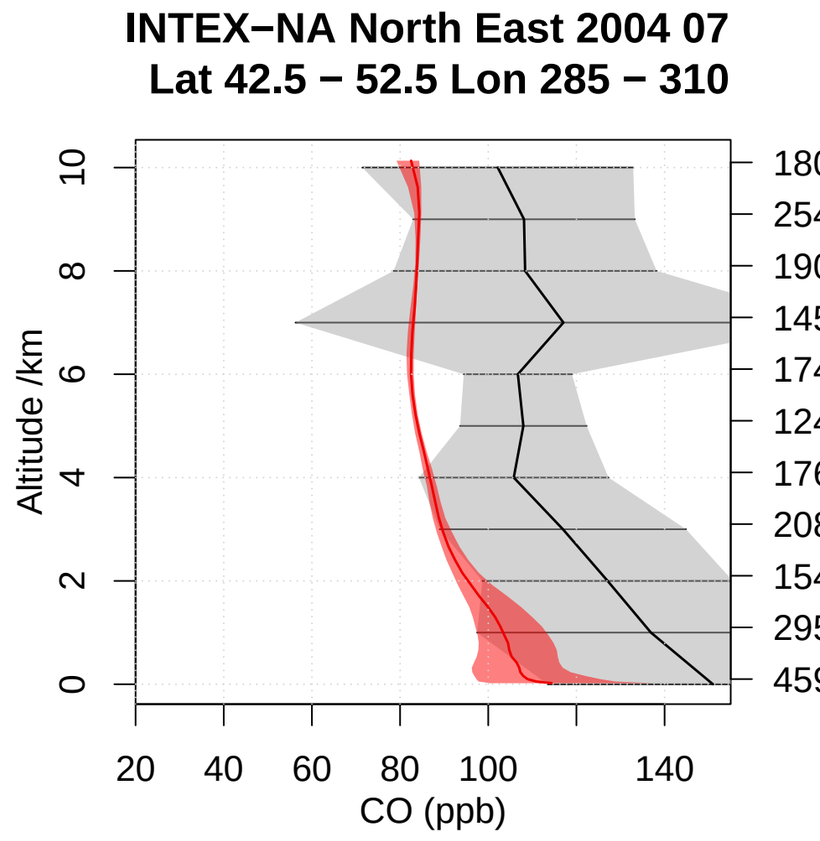

UKCA Ox deposition am124
Total Ox Deposition = 879 Tg/yr
Latitude (degrees)
50
0
−50
−150
−100
−50
0
50
100
150
Longitude (degrees)
2.0
1.5
1.0
0.5
0.0

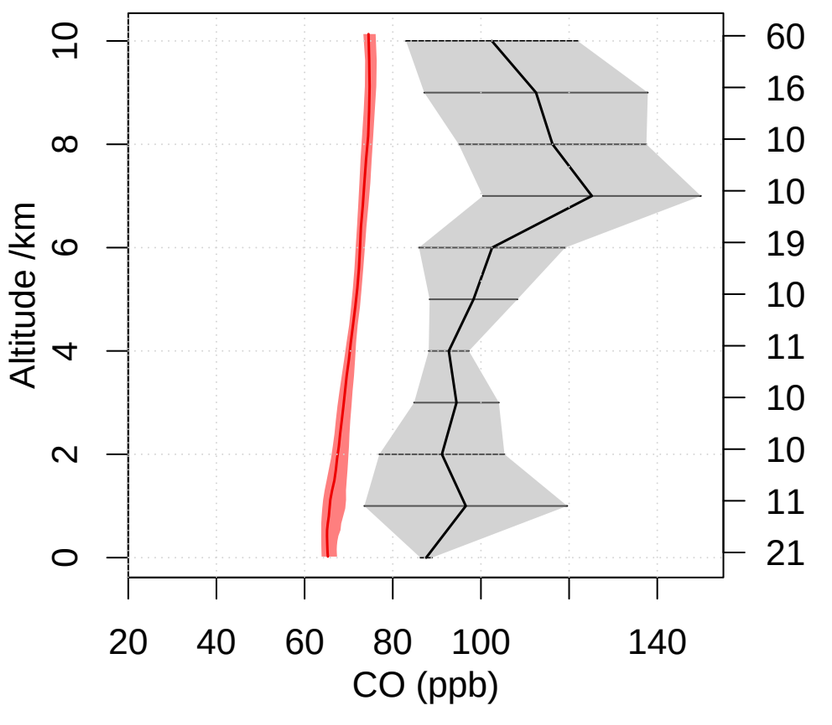

UKCA Ox deposition an188
Total Ox Deposition = 874 Tg/yr
Latitude (degrees)
50
0
−50
−150
−100
−50
0
50
100
150
Longitude (degrees)
1.5
1.0
0.5
0.0

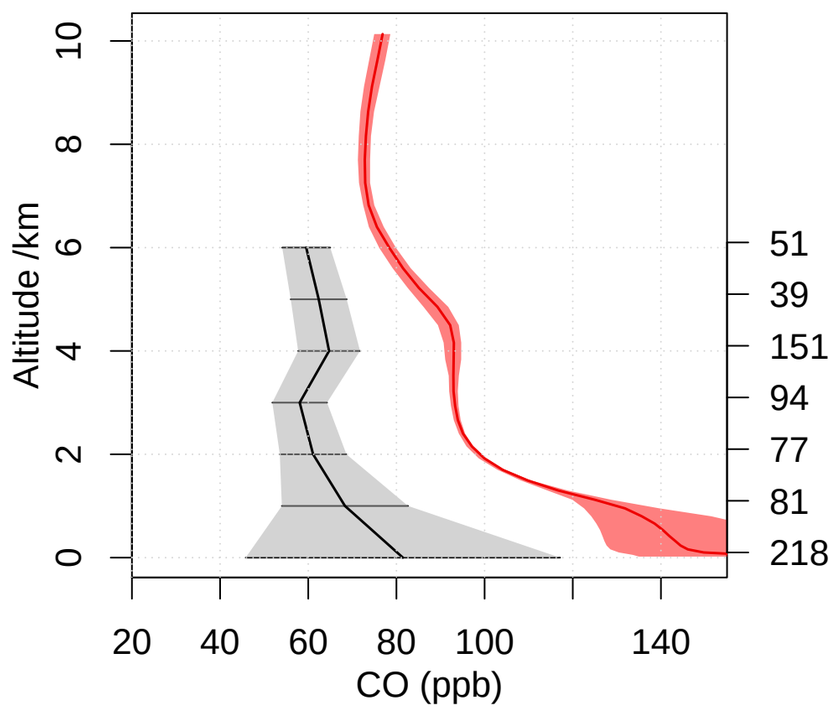
Emmons CO comparison

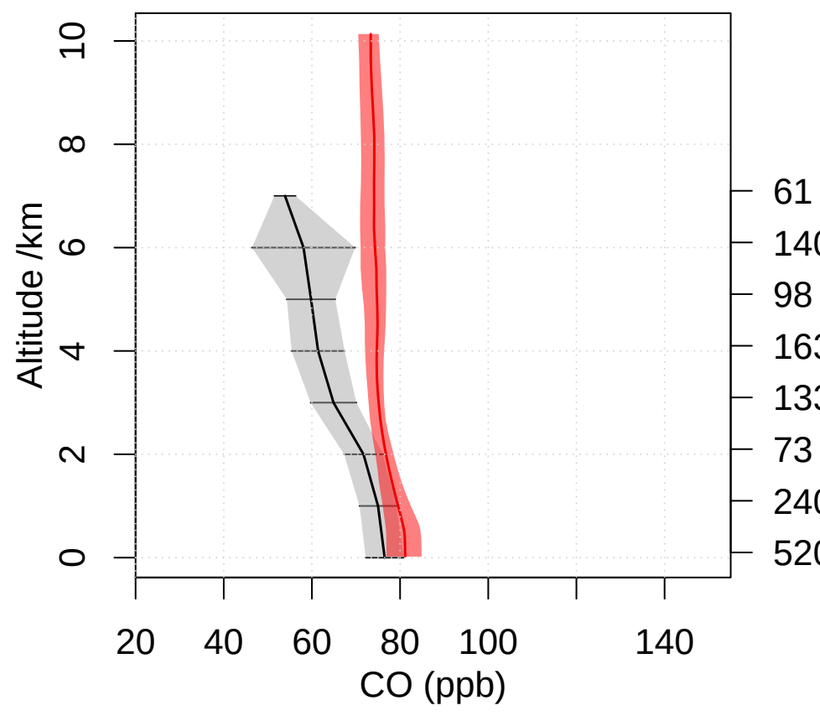


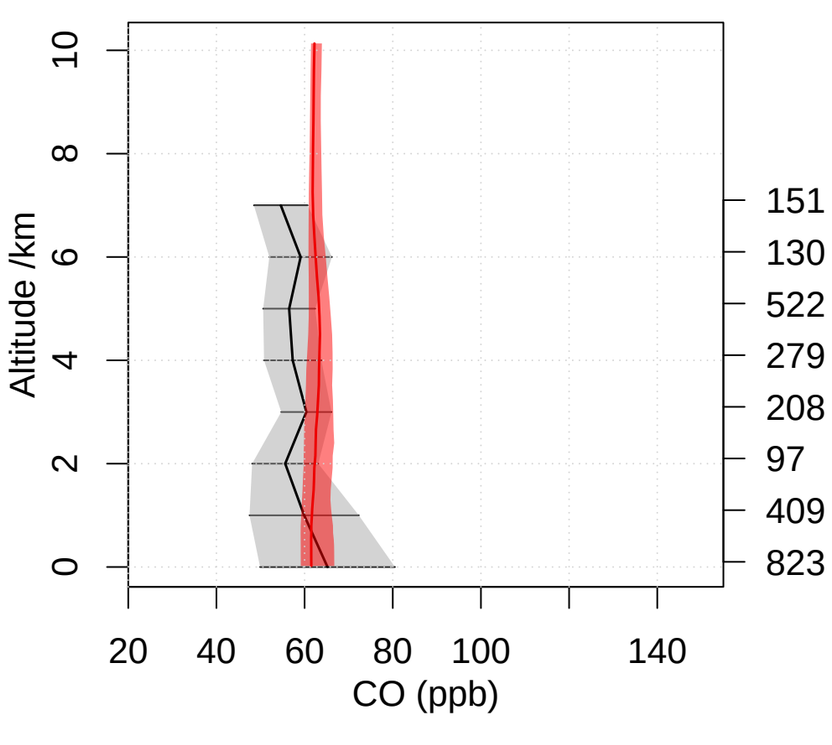


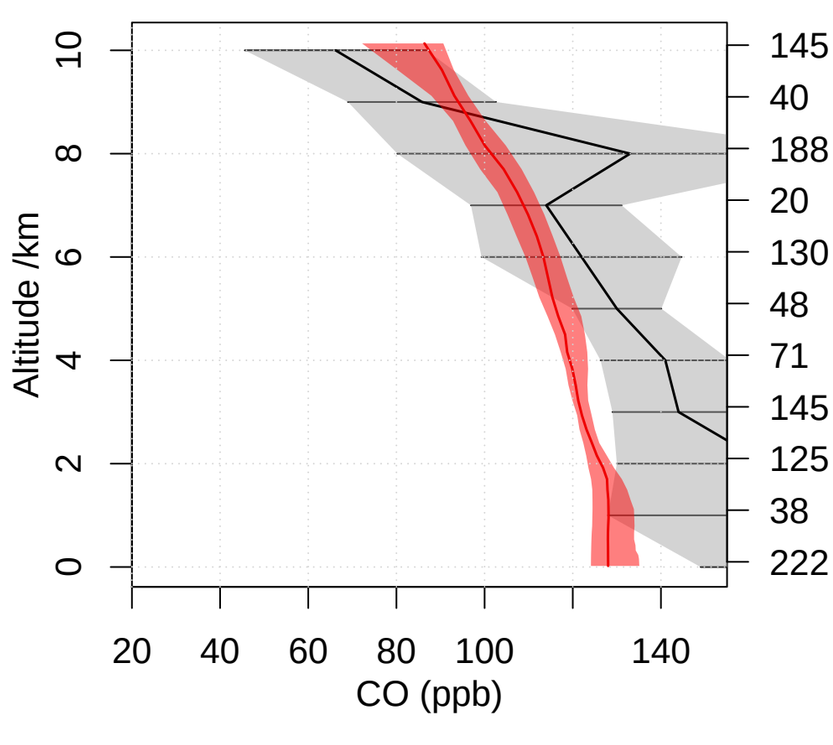


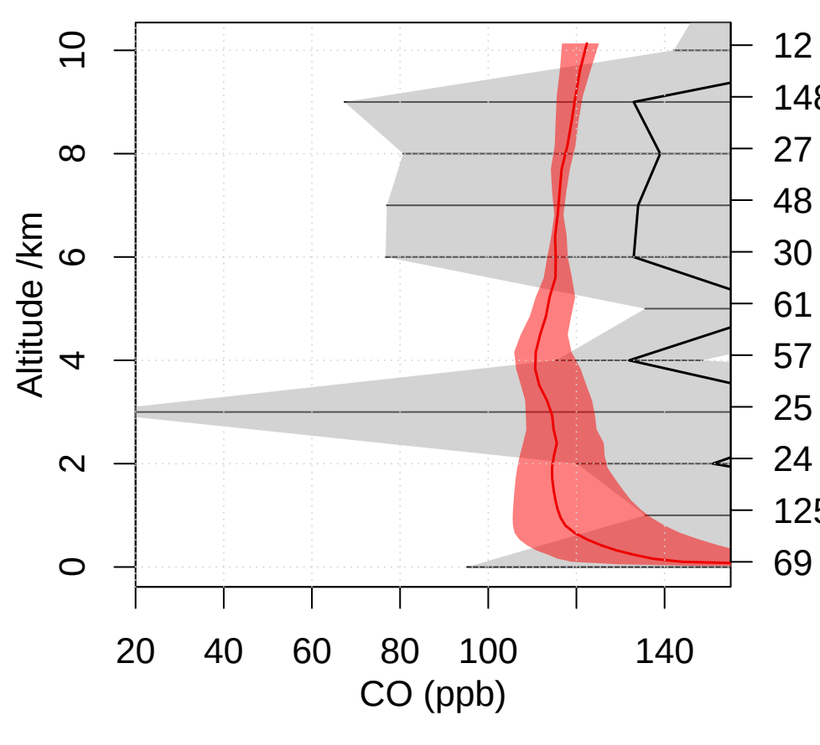


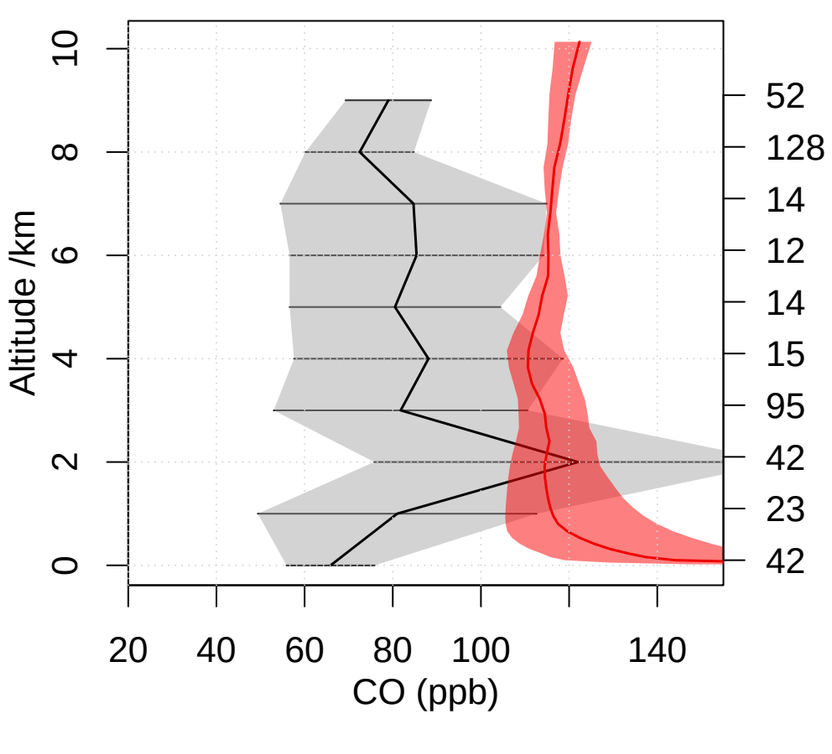


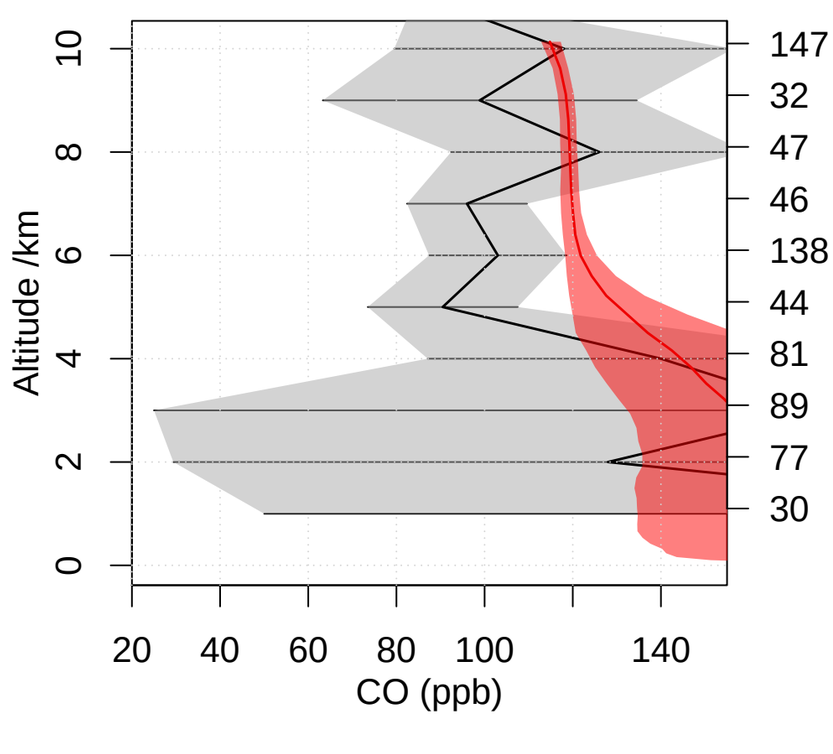


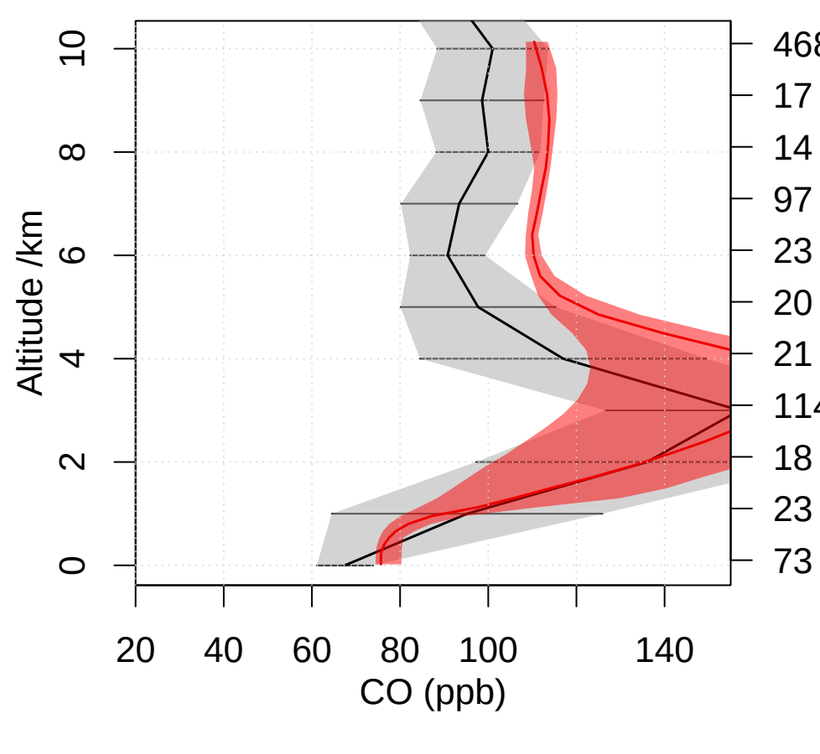




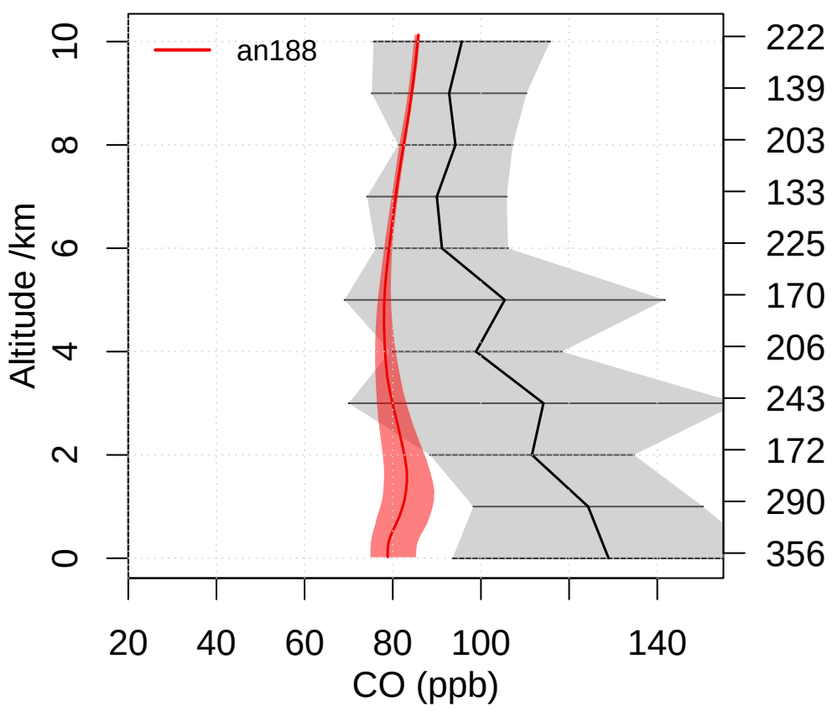


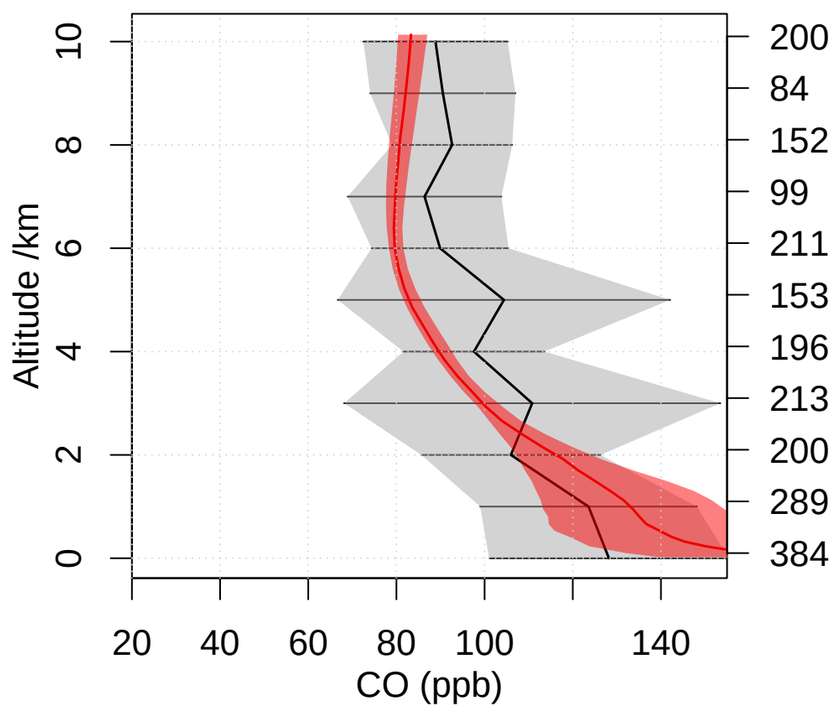


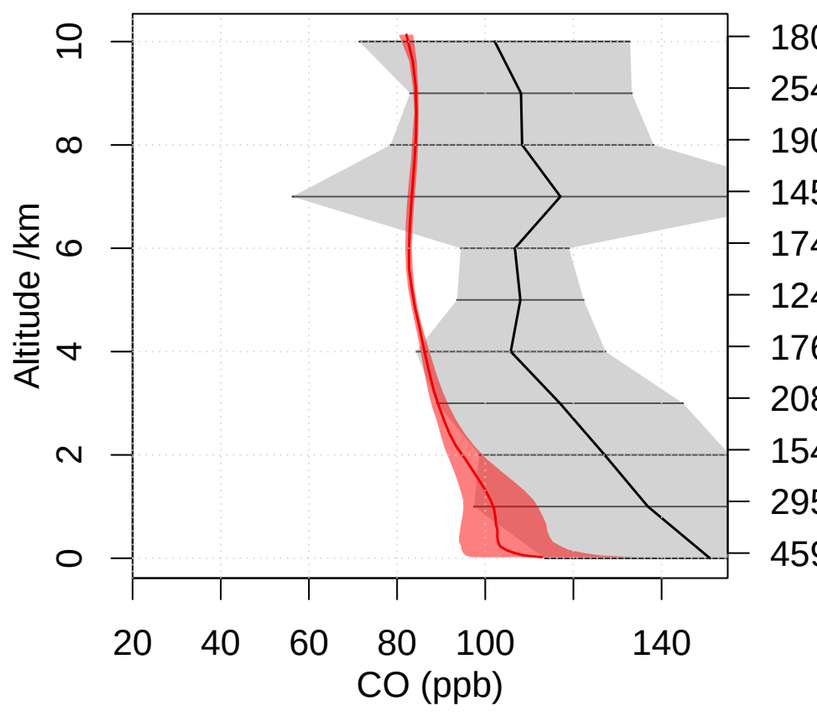


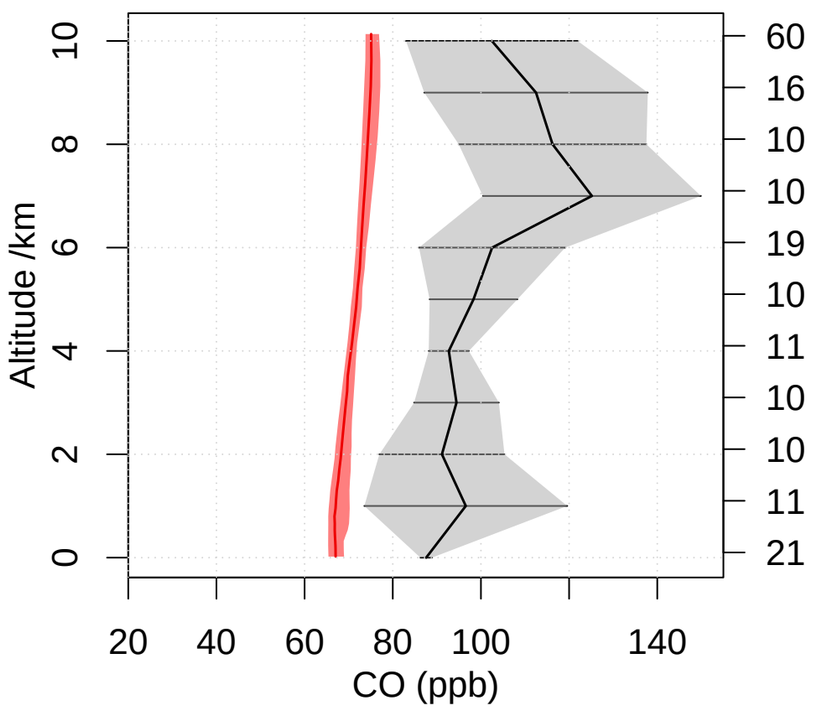


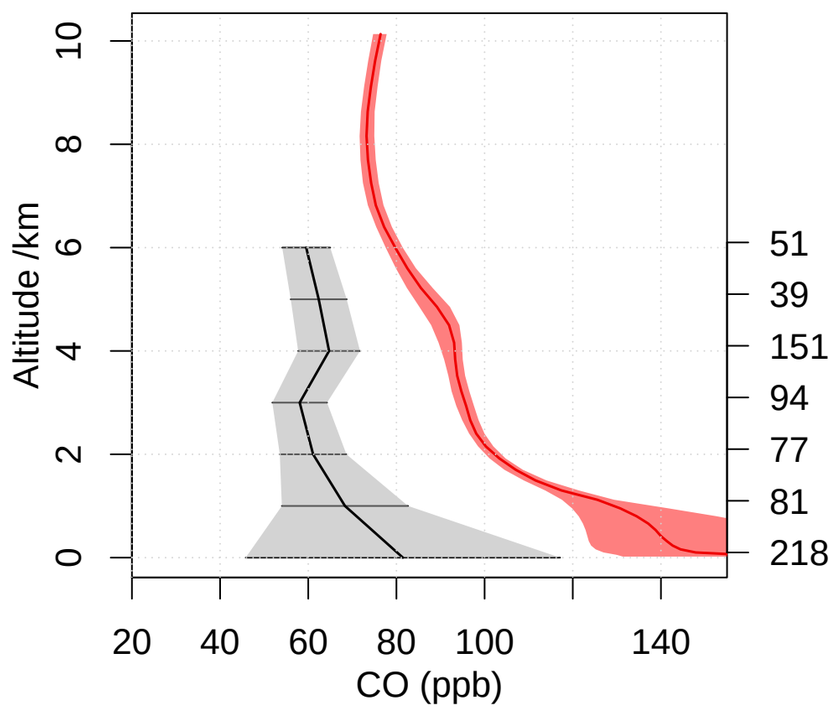
Emmons CO comparison

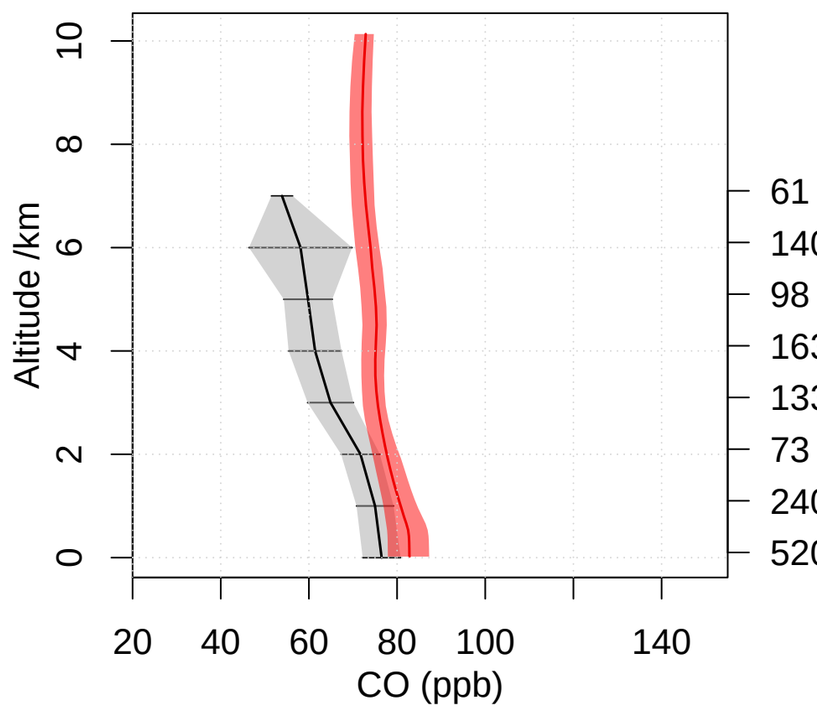


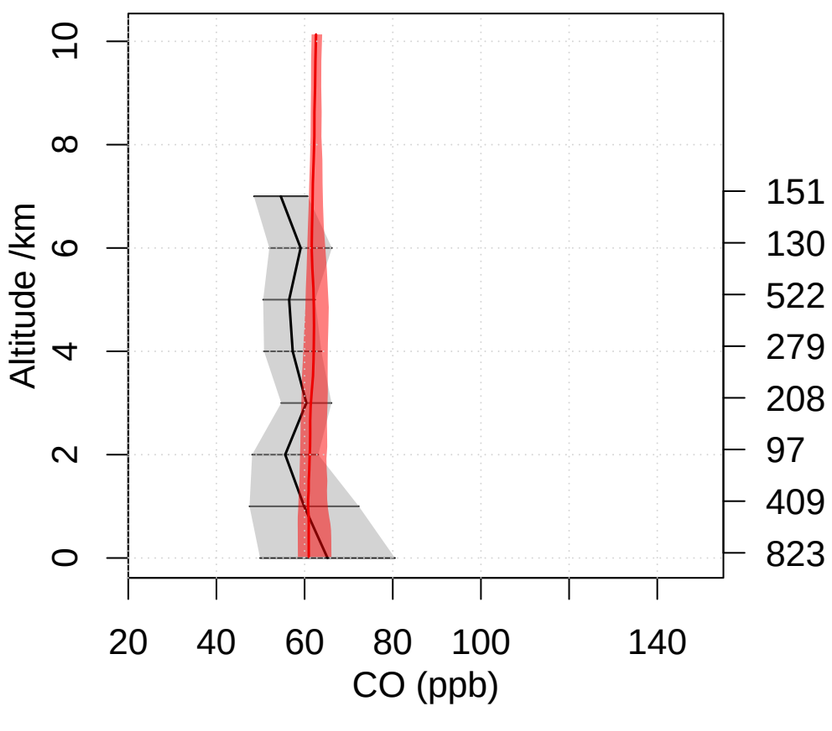


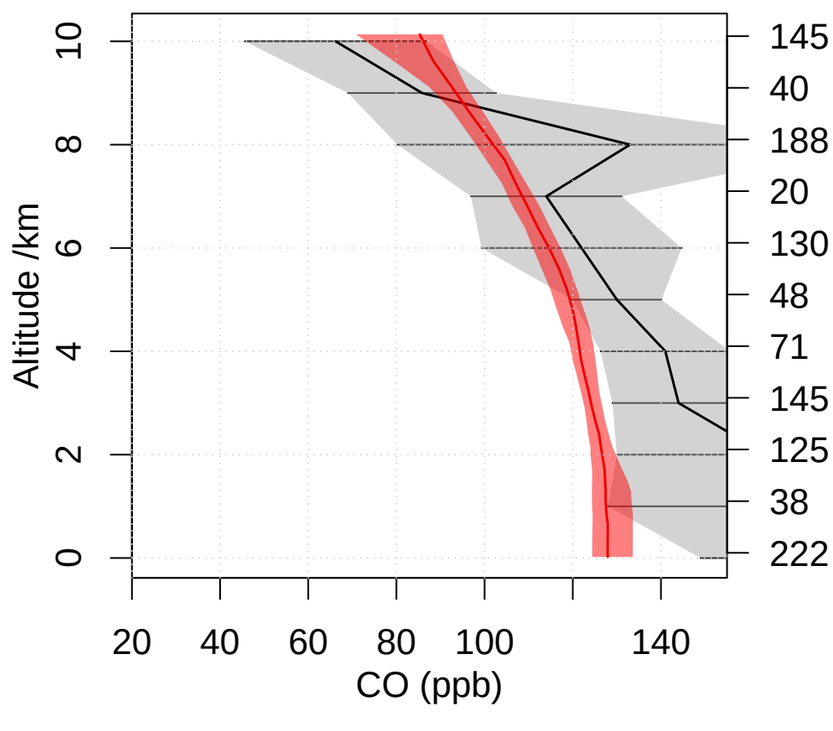


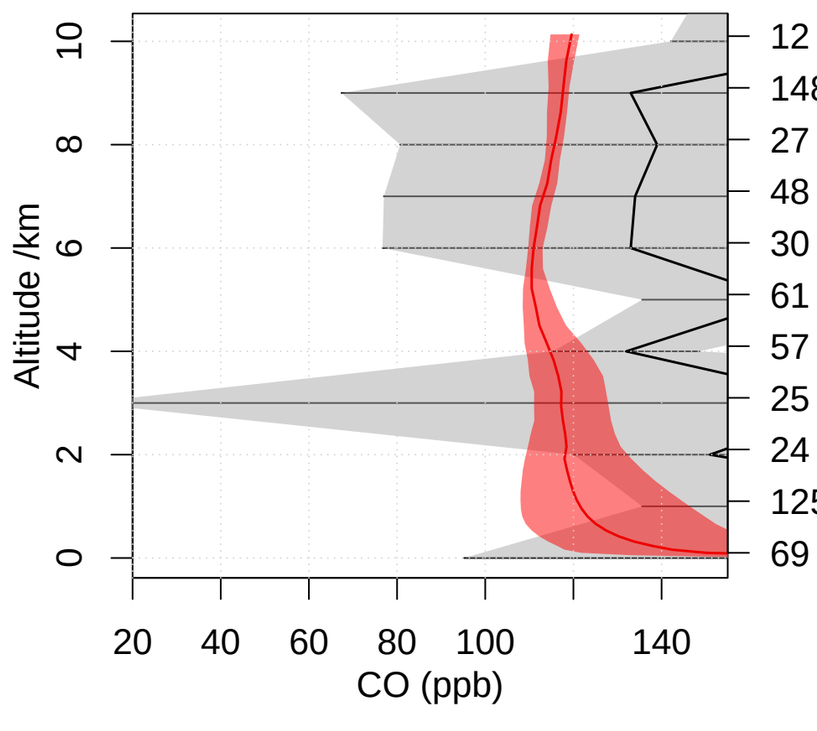


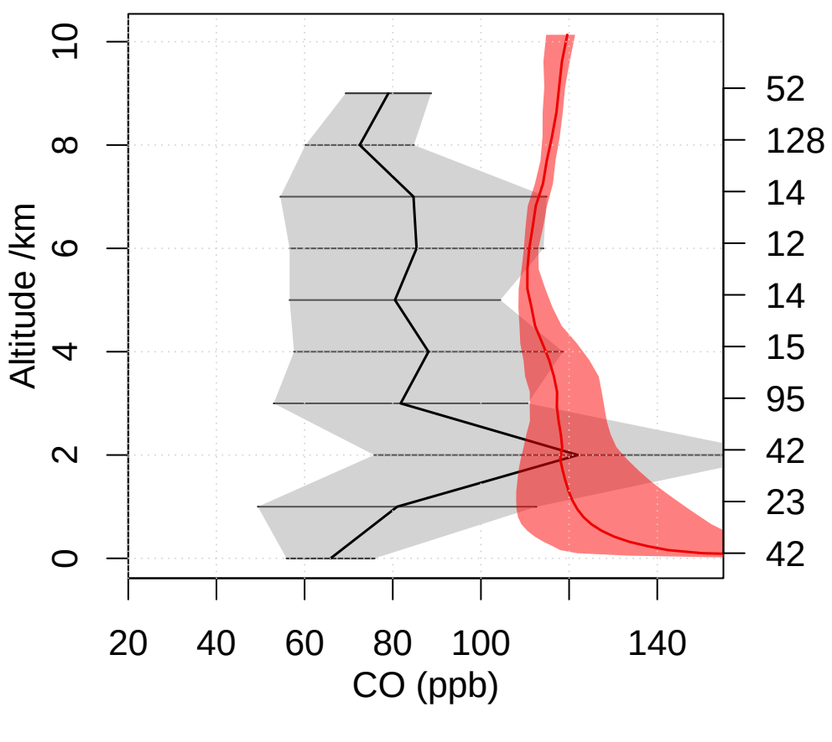


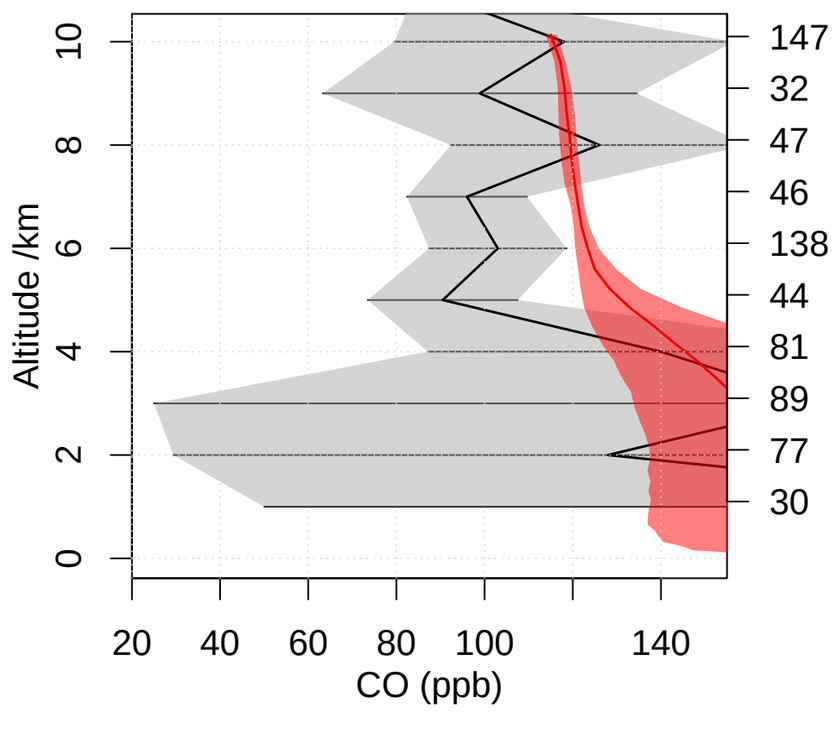


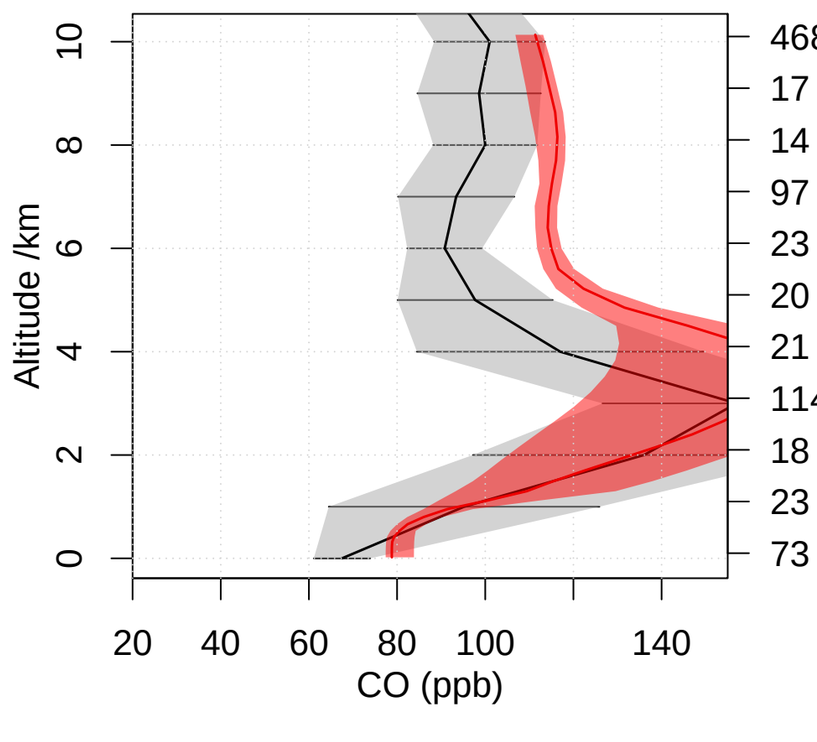


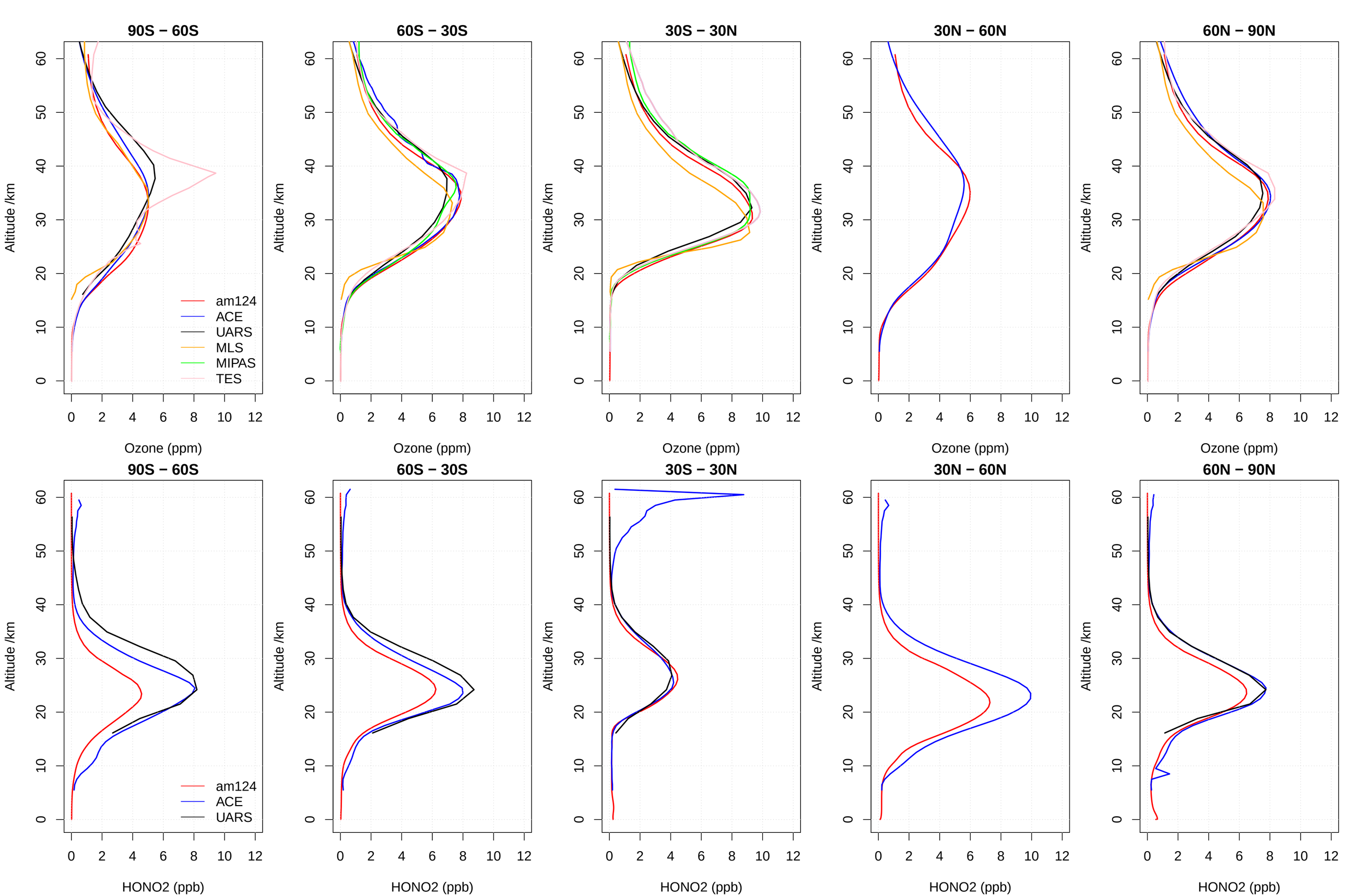




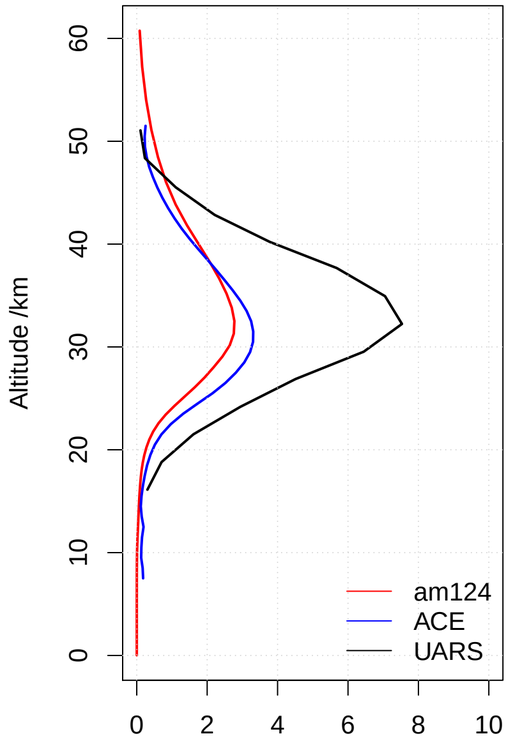




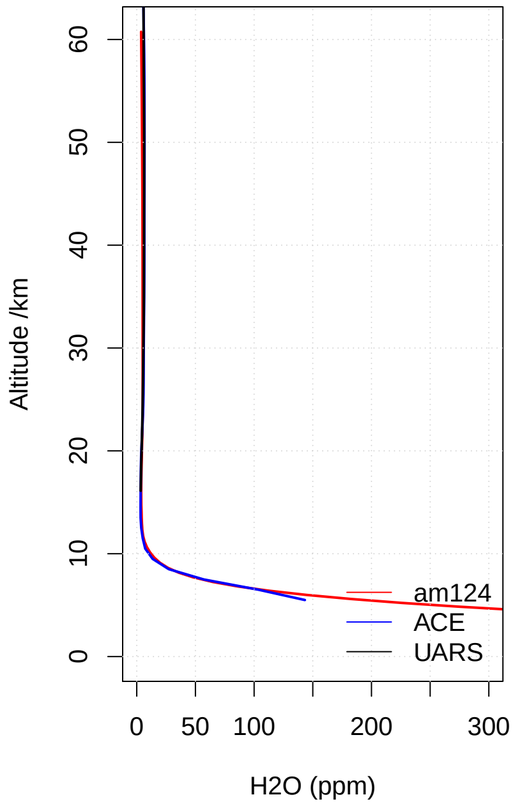



90S − 60S
60S − 30S
30S − 30N
30N − 60N
60N − 90N
Altitude /km
Ozone (ppm)
HONO2 (ppb)
am124
ACE
UARS
MLS
MIPAS
TES

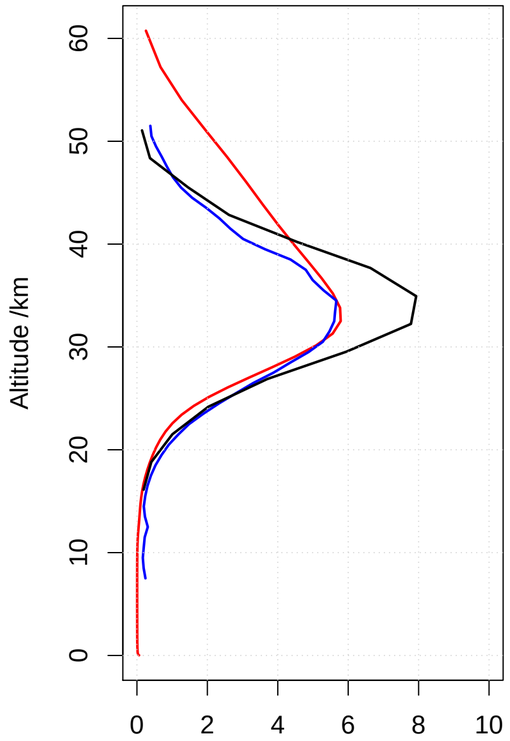
90S − 60S



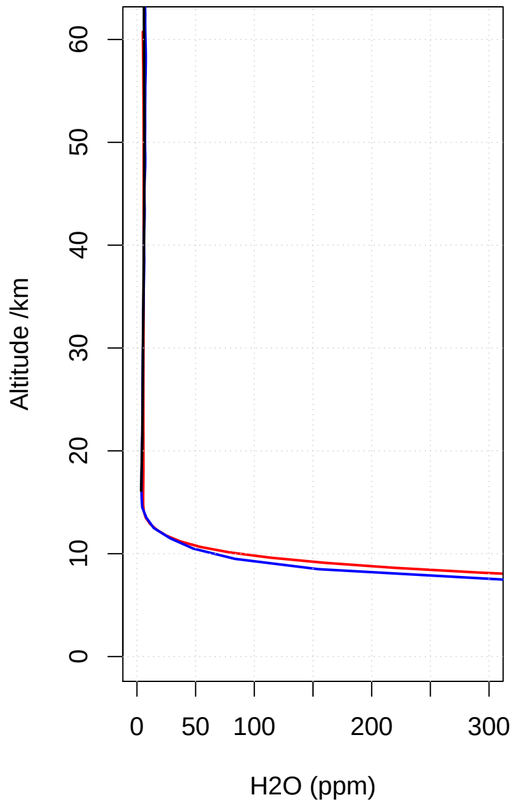
NO2 (ppb)



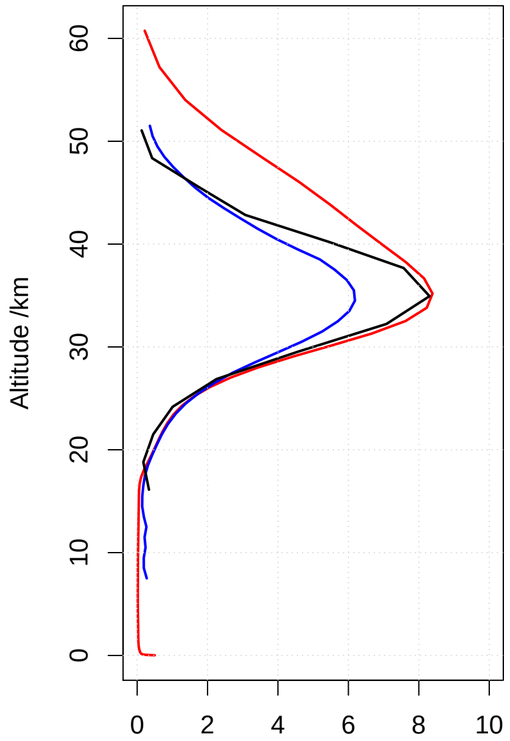
60S − 30S



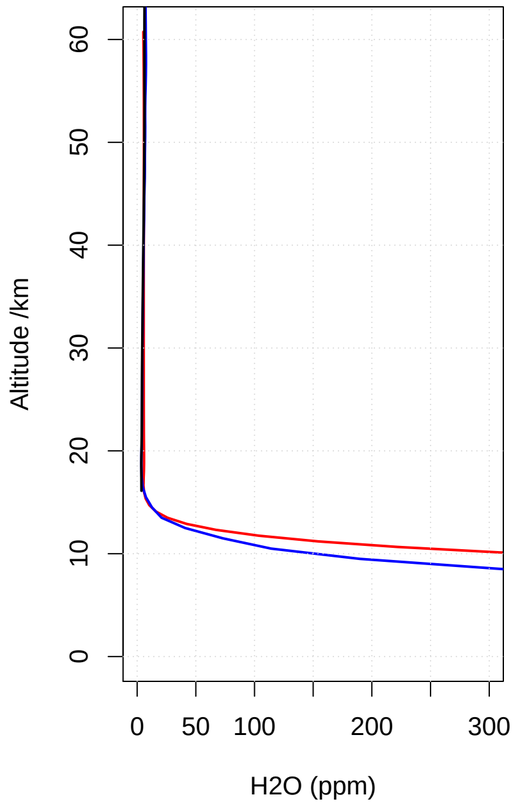
NO2 (ppb)



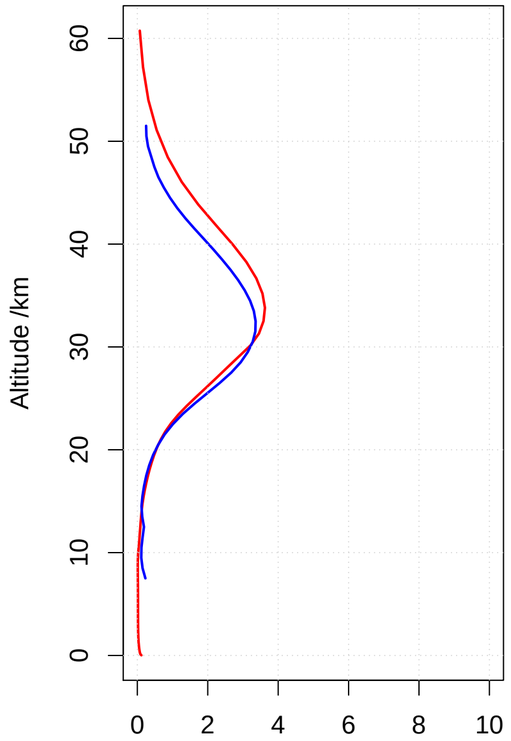
30S − 30N



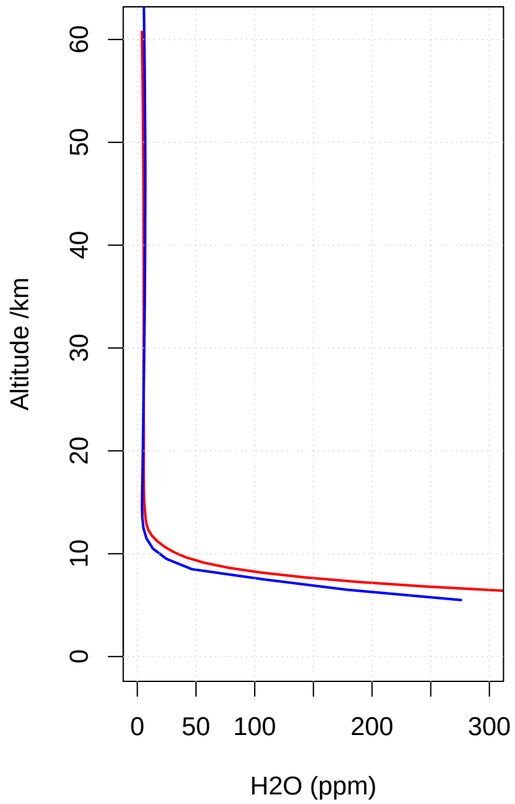
NO2 (ppb)



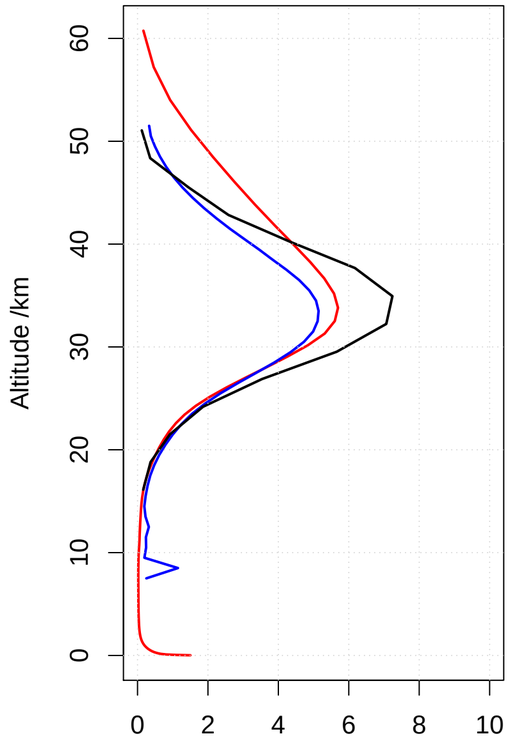
30N − 60N



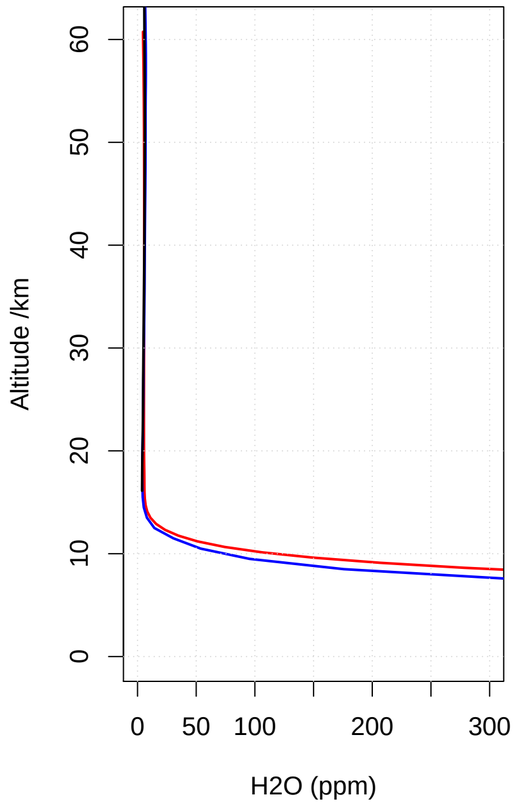
NO2 (ppb)

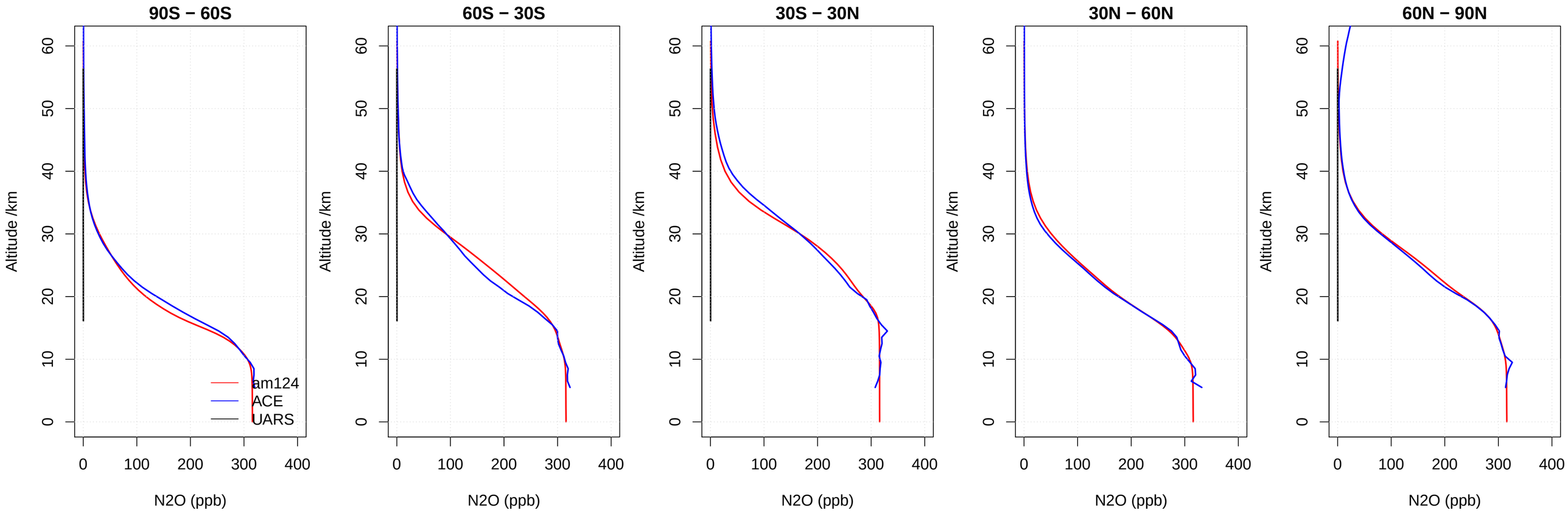


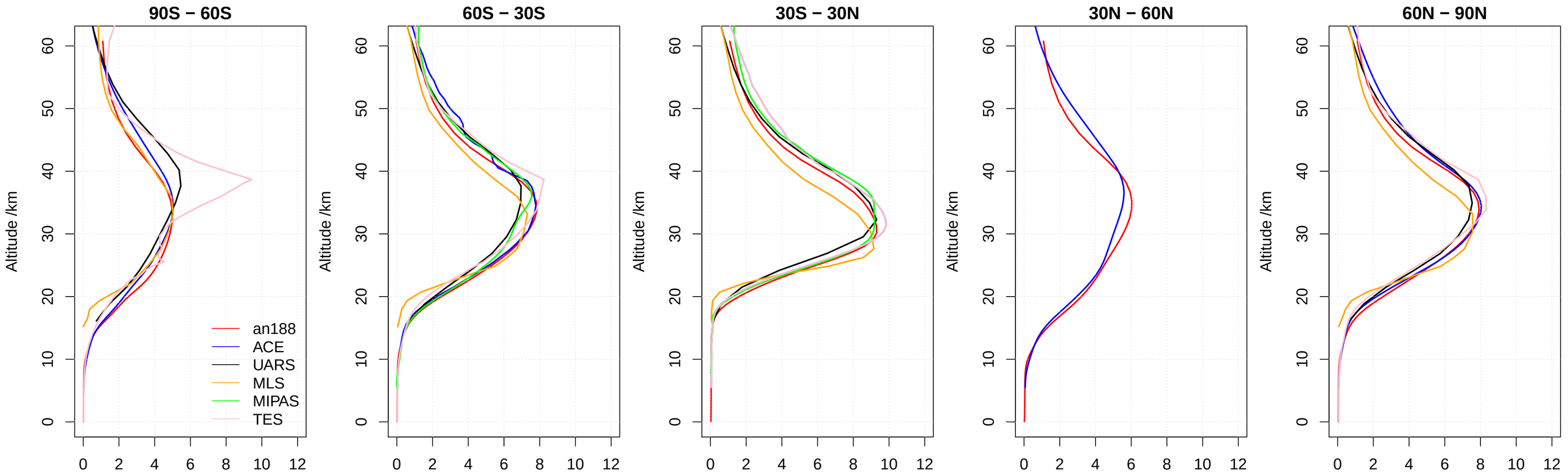
60N − 90N



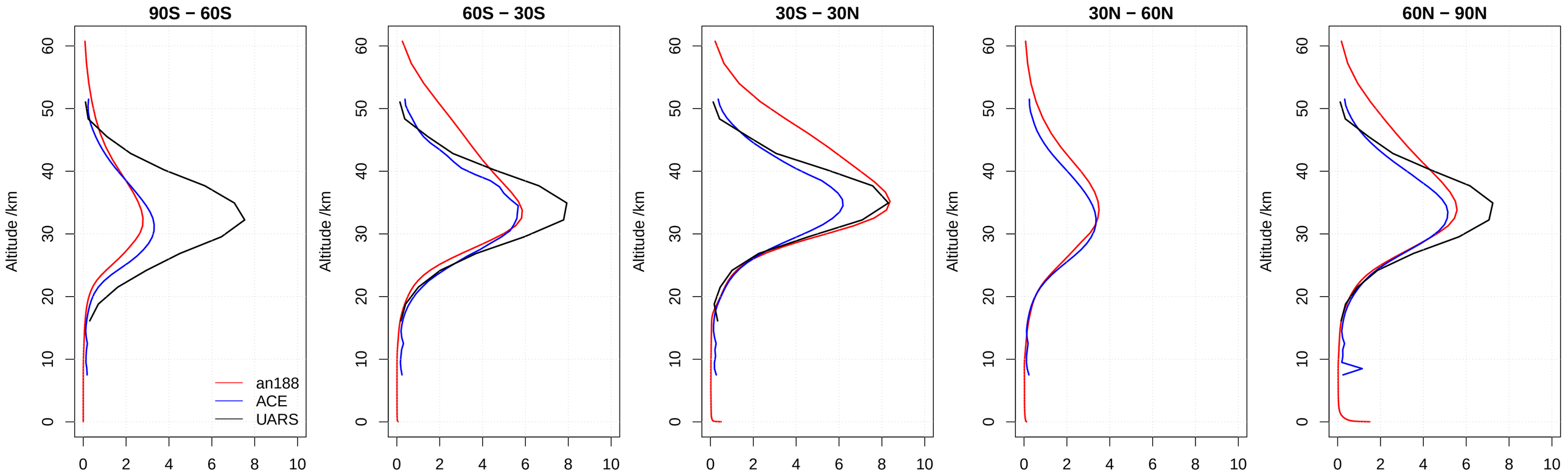
NO2 (ppb)

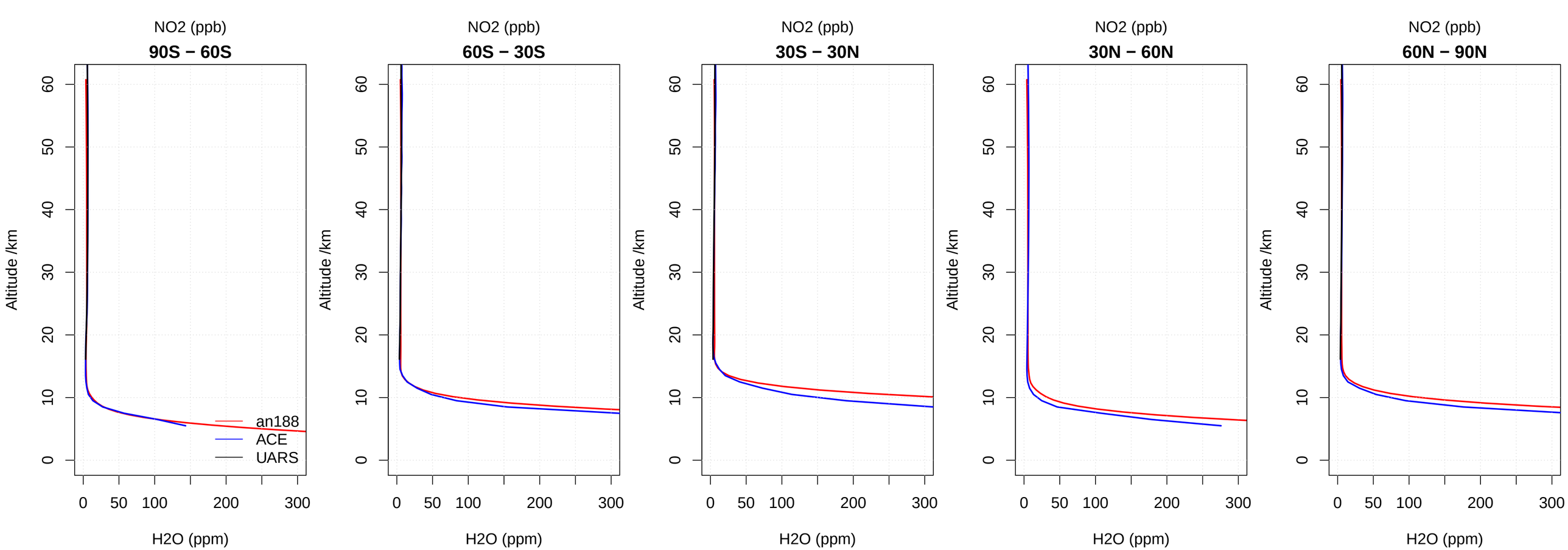


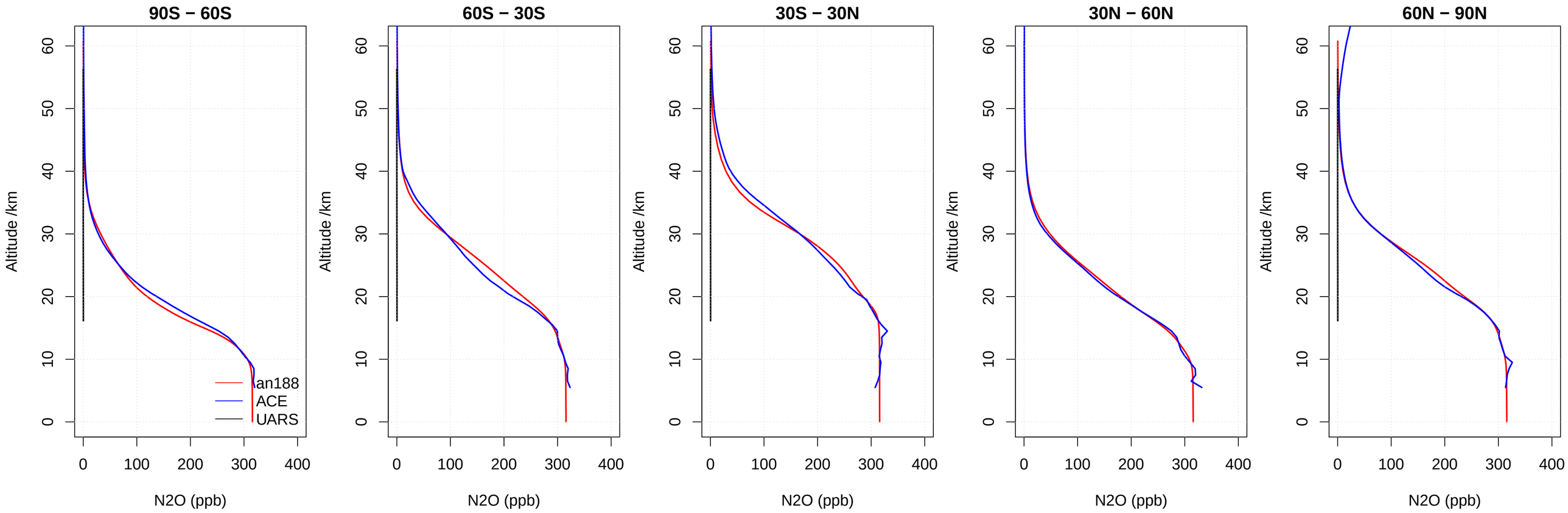

90S − 60S
60S − 30S
30S − 30N
30N − 60N
60N − 90N
Altitude /km
N2O (ppb)
0
10
20
30
40
50
60
0
100
200
300
400
am124
ACE
UARS


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
12
an188
ACE
UARS
MLS
MIPAS
TES

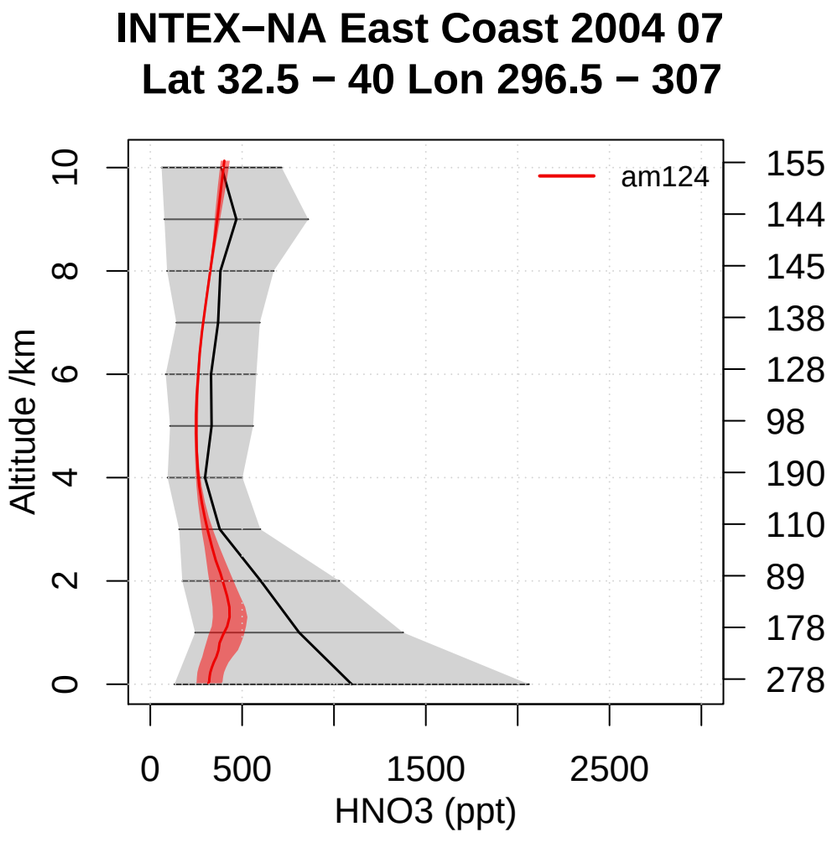
Ozone (ppm)
90S − 60S
60S − 30S
30S − 30N
30N − 60N
60N − 90N
Altitude /km
0
10
20
30
40
50
60
0
2
4
6
8
10
12
an188
ACE
UARS
HONO2 (ppb)

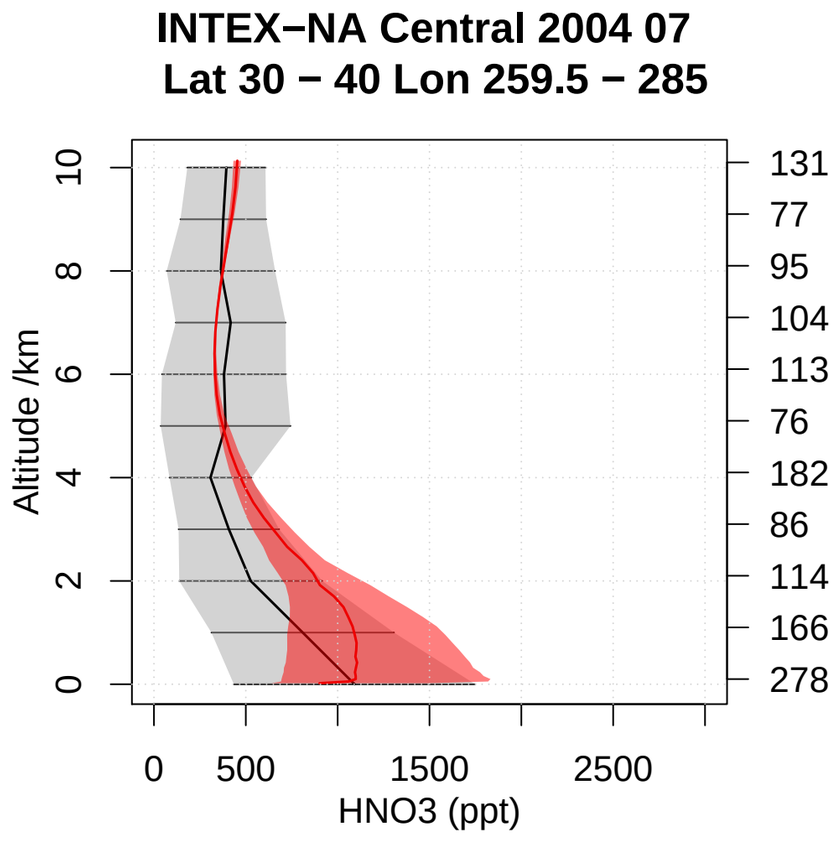

90S − 60S
60S − 30S
30S − 30N
30N − 60N
60N − 90N
Altitude /km
0
10
20
30
40
50
60
0
2
4
6
8
10
an188
ACE
UARS

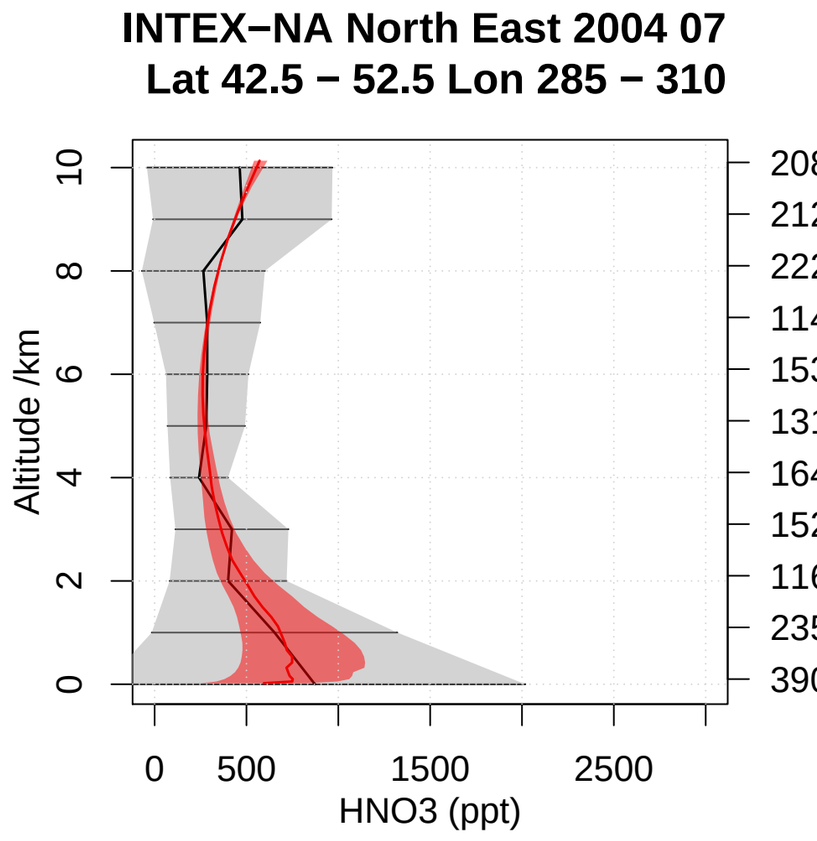

NO2 (ppb)
90S − 60S
60S − 30S
30S − 30N
30N − 60N
60N − 90N
Altitude /km
0
10
20
30
40
50
60
0
50
100
200
300
H2O (ppm)
an188
ACE
UARS

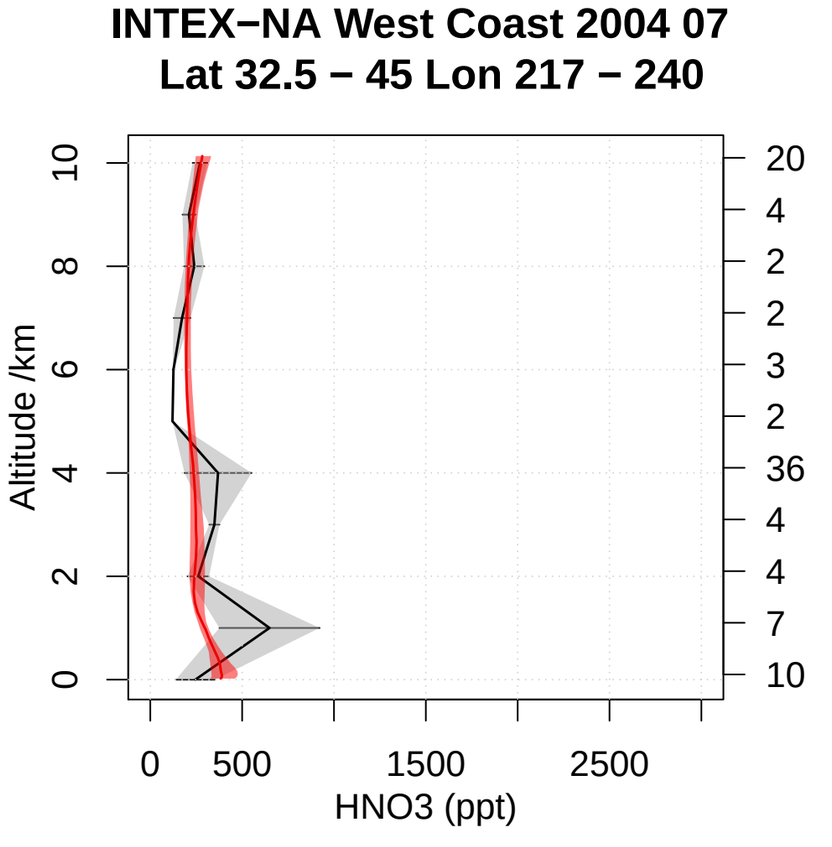

90S − 60S
60S − 30S
30S − 30N
30N − 60N
60N − 90N
Altitude /km
0
10
20
30
40
50
60
0
100
200
300
400
N2O (ppb)
an188
ACE
UARS

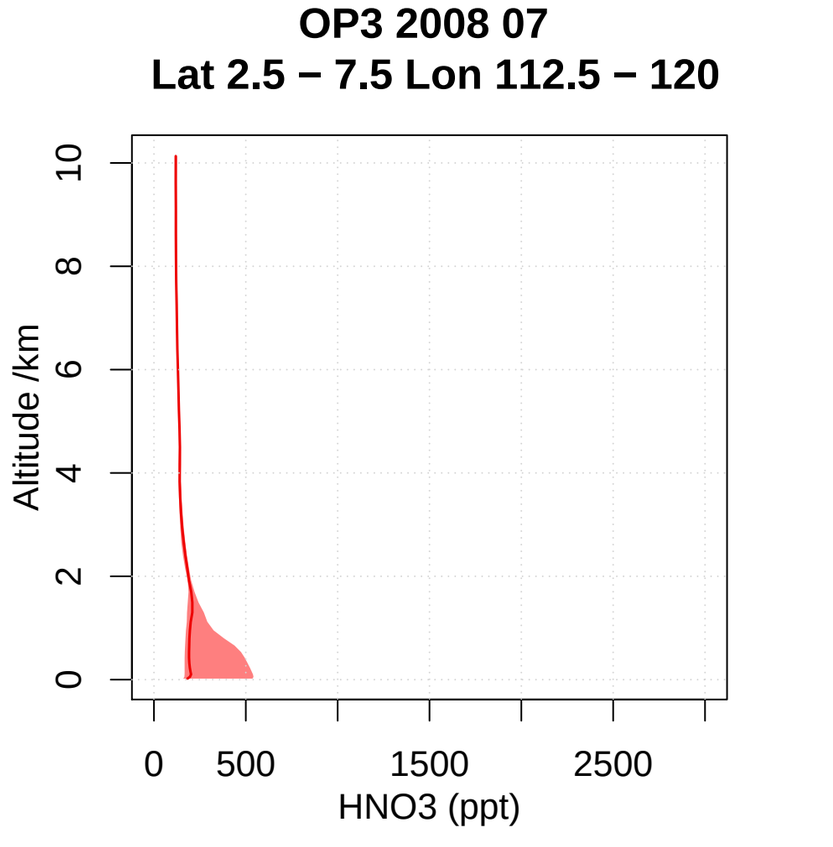
Emmons HNO3 comparison

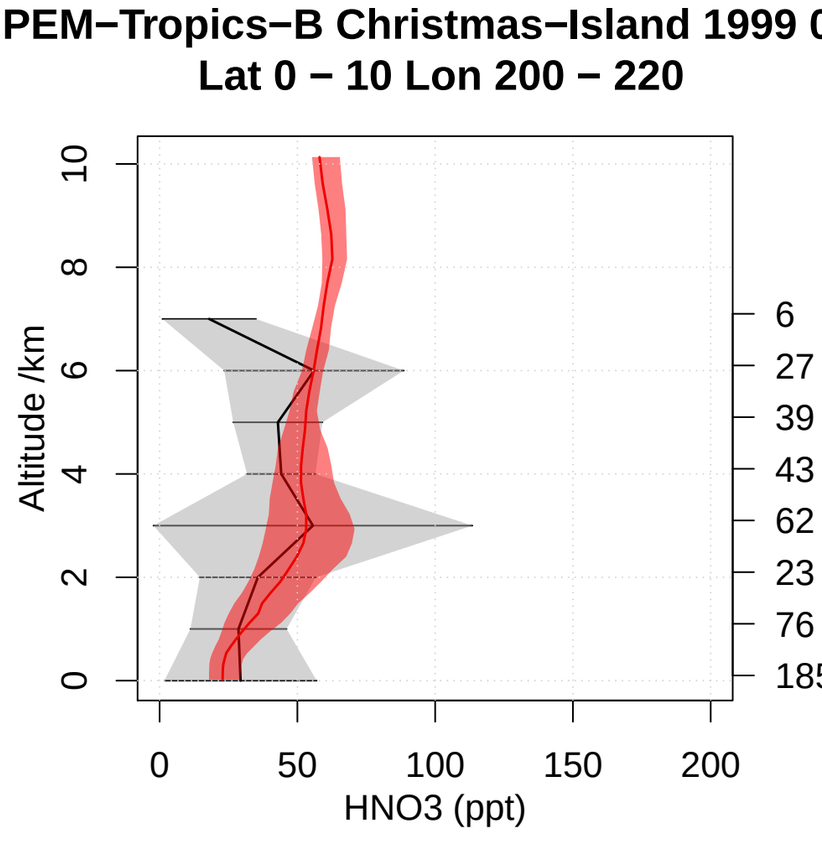


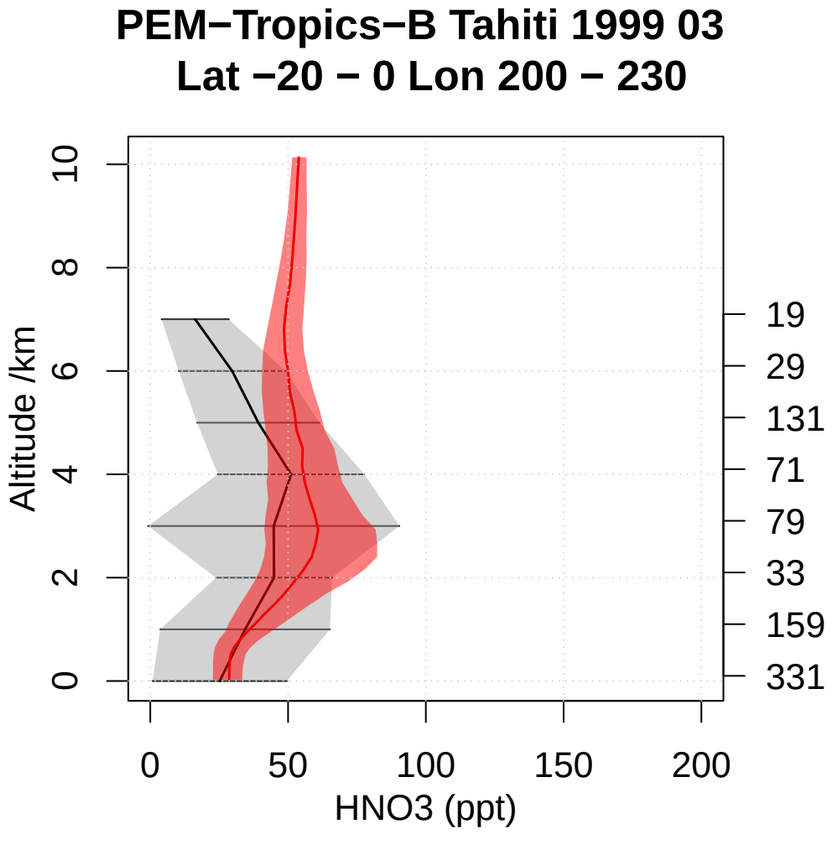


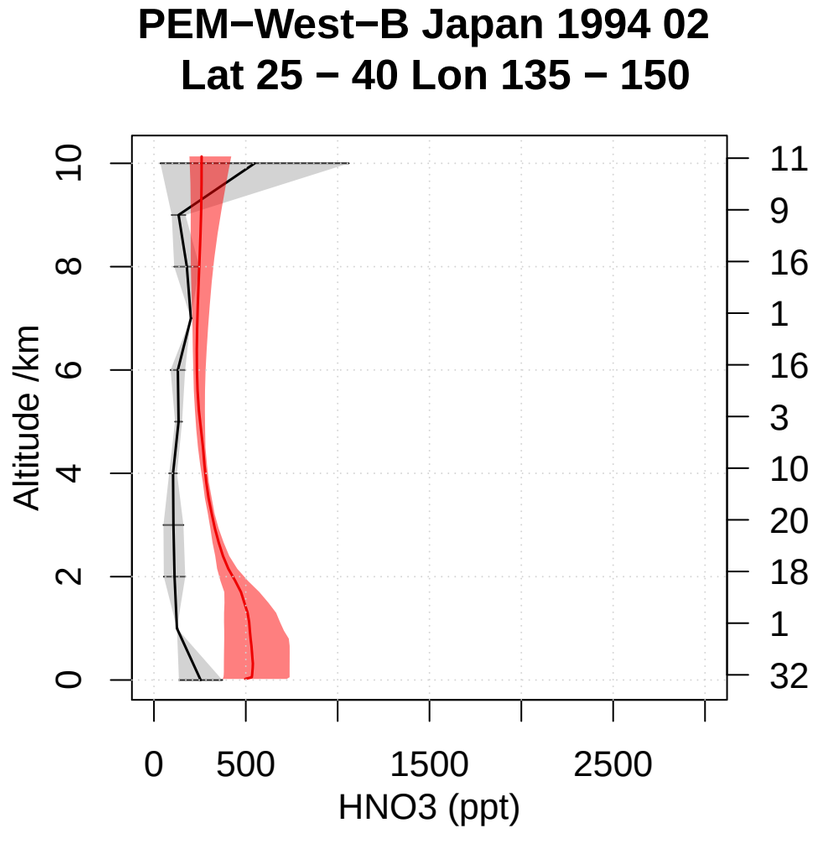


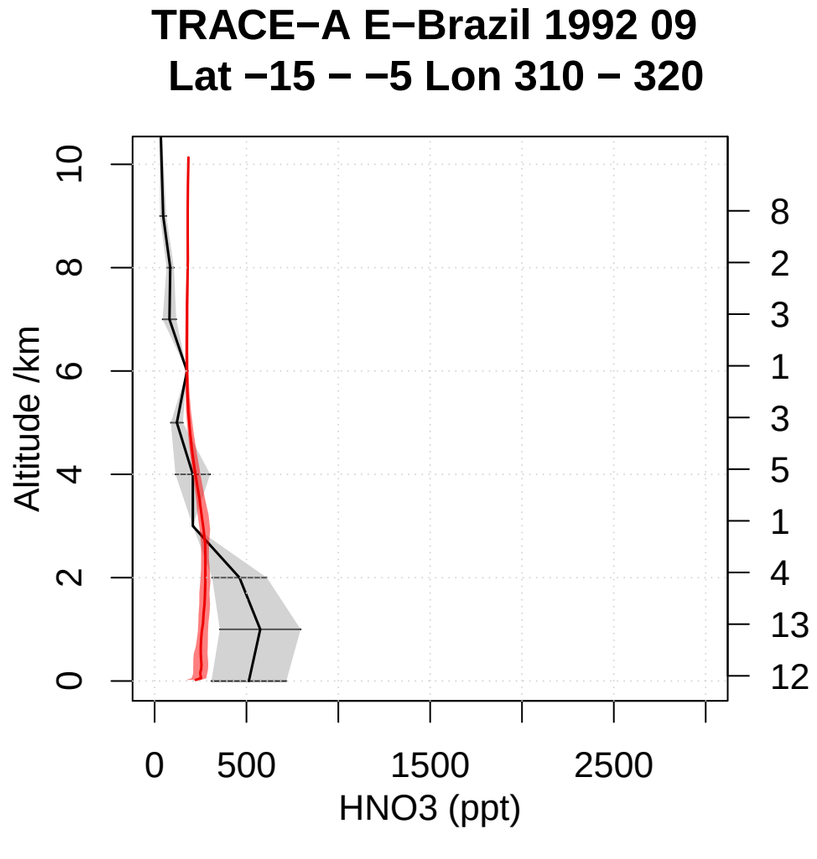


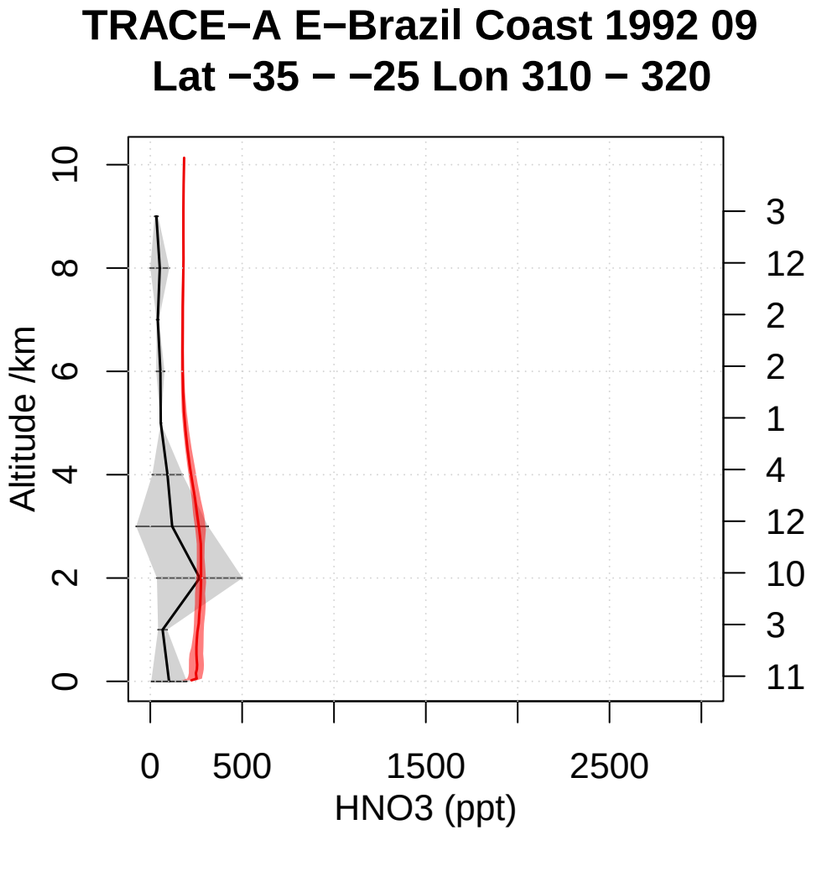


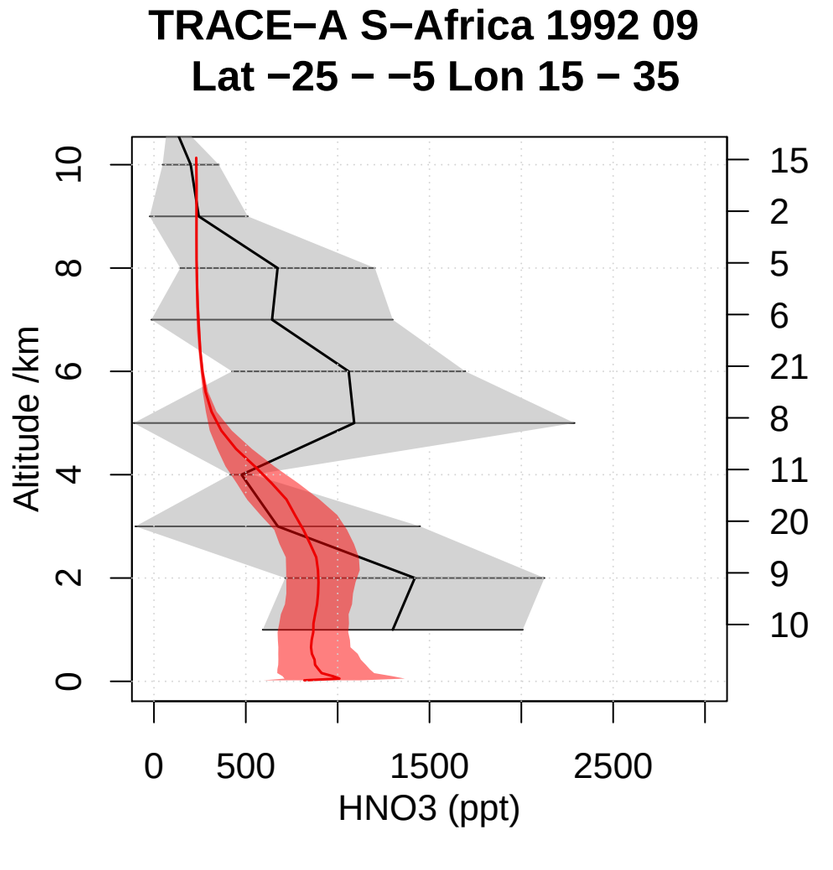


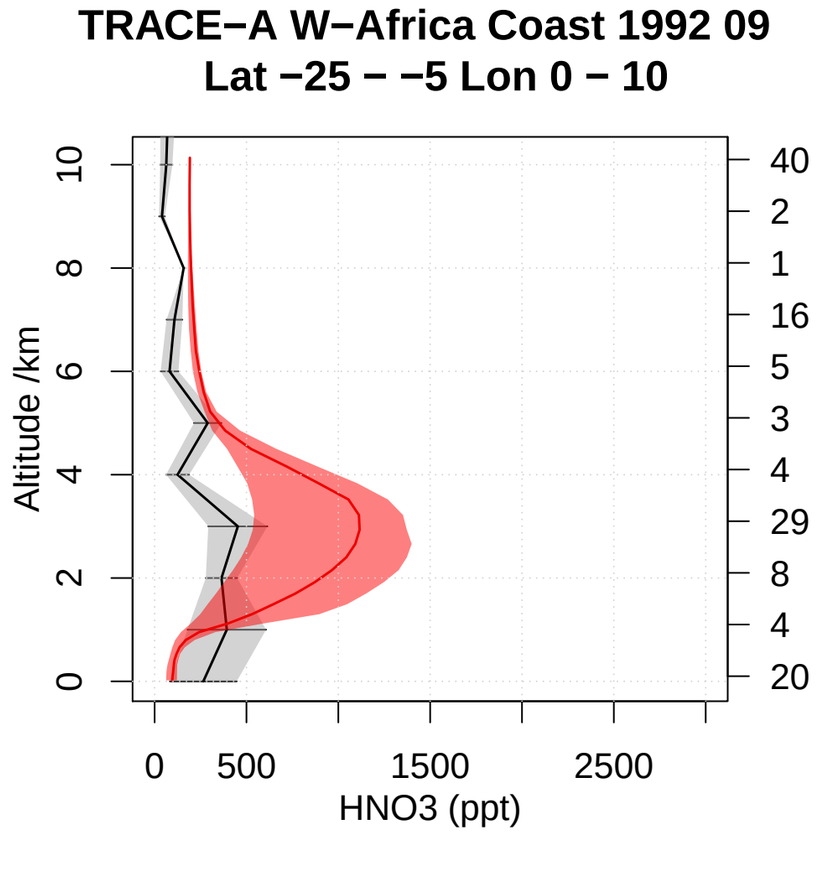




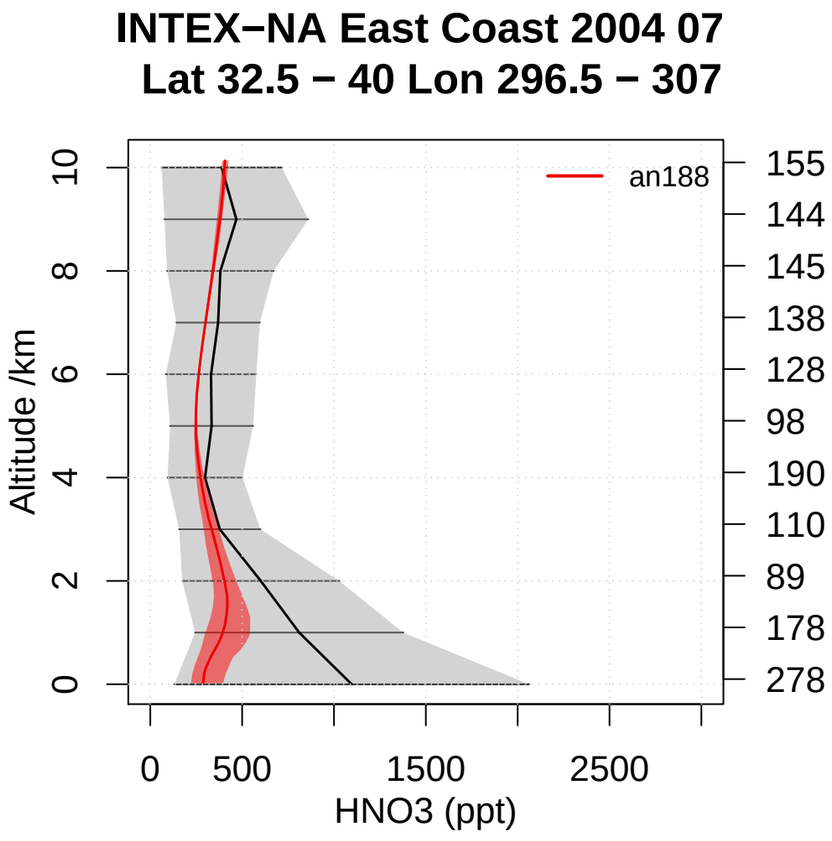


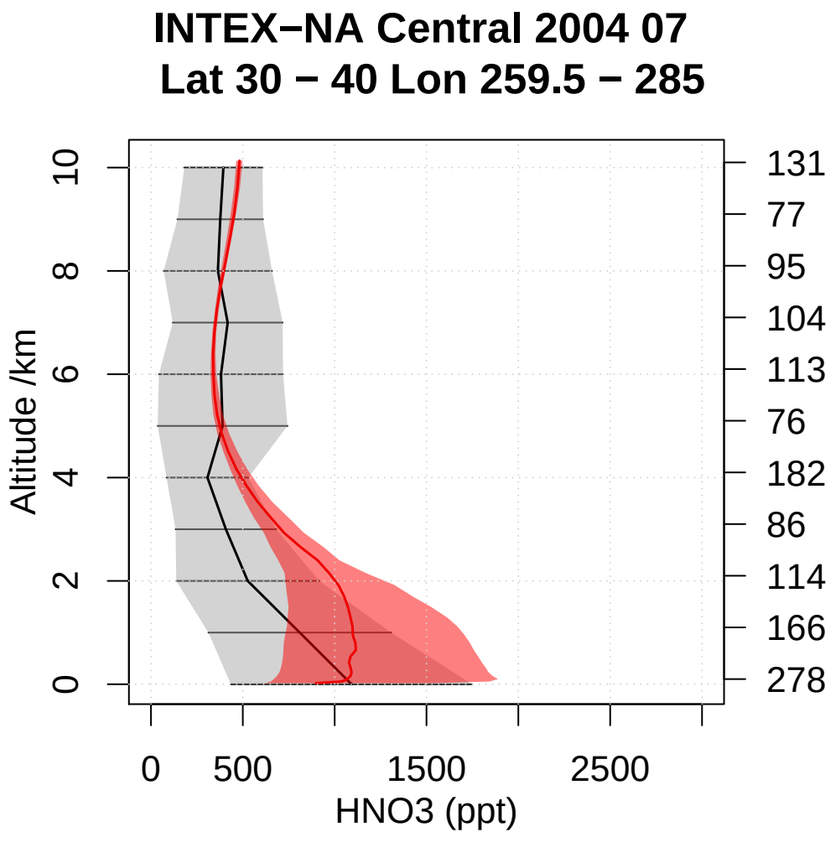


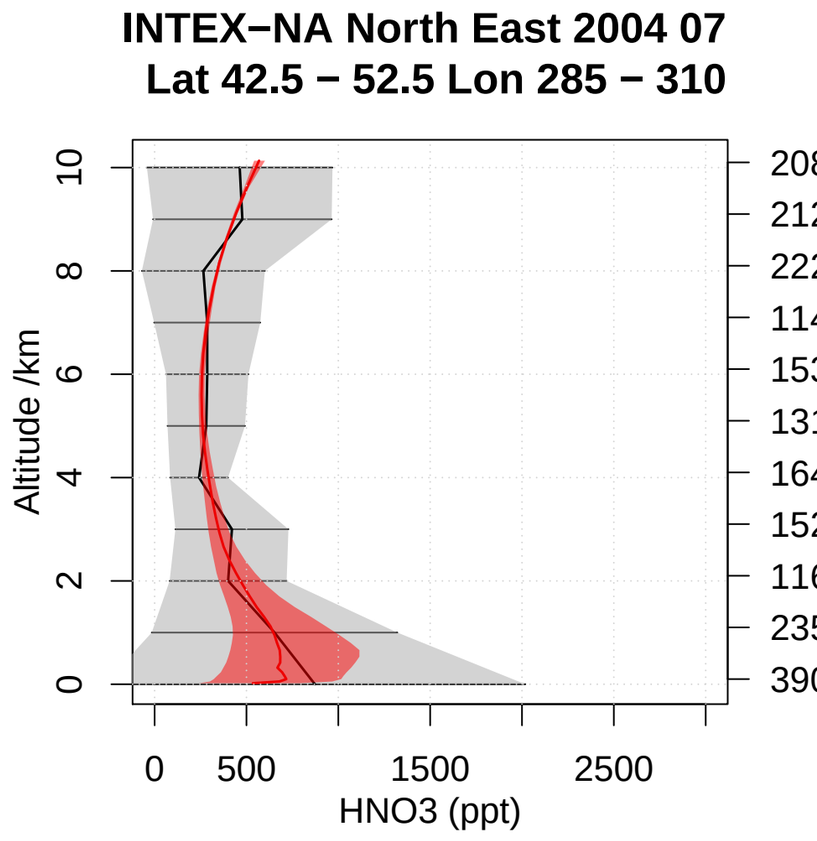


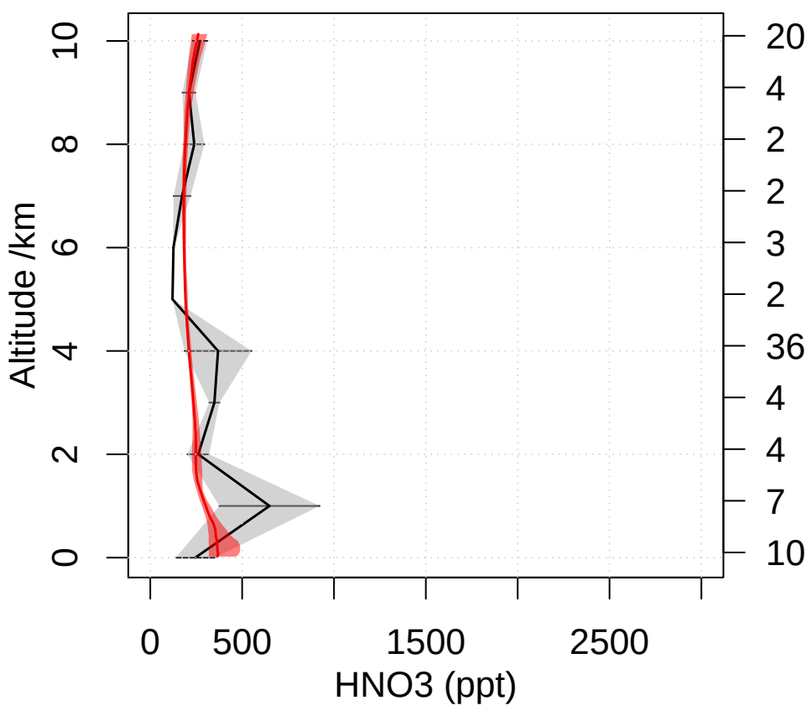


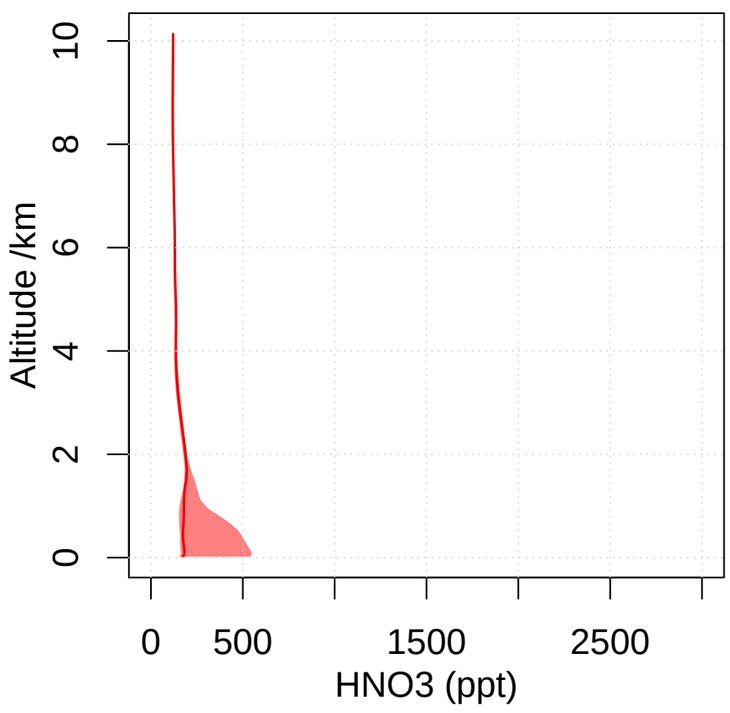
Emmons HNO3 comparison

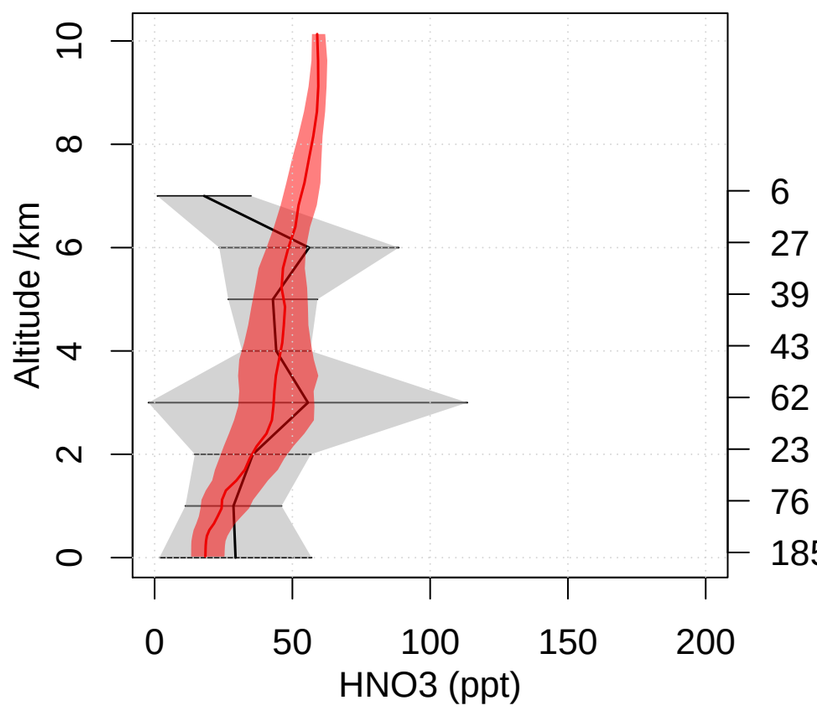


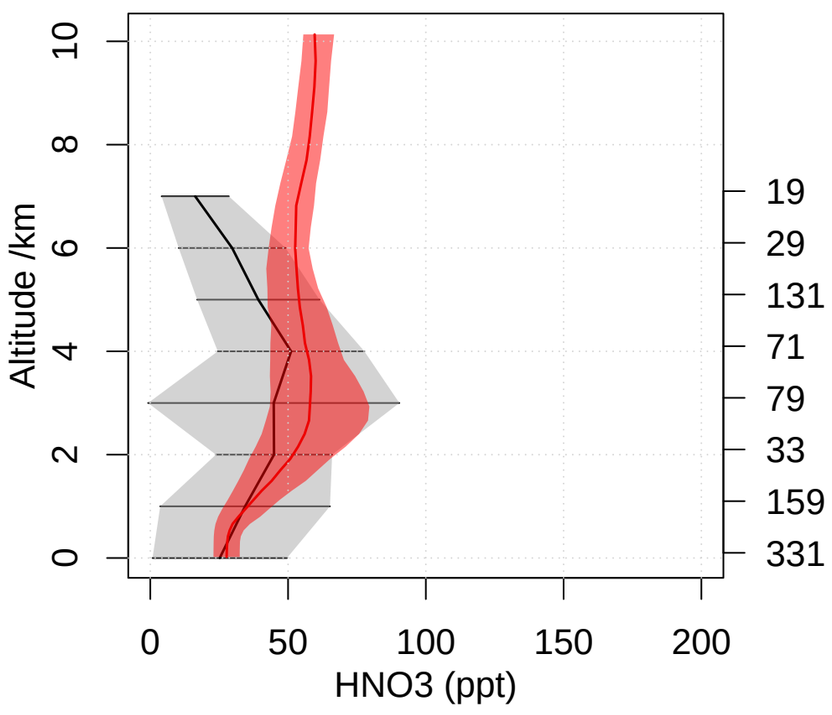


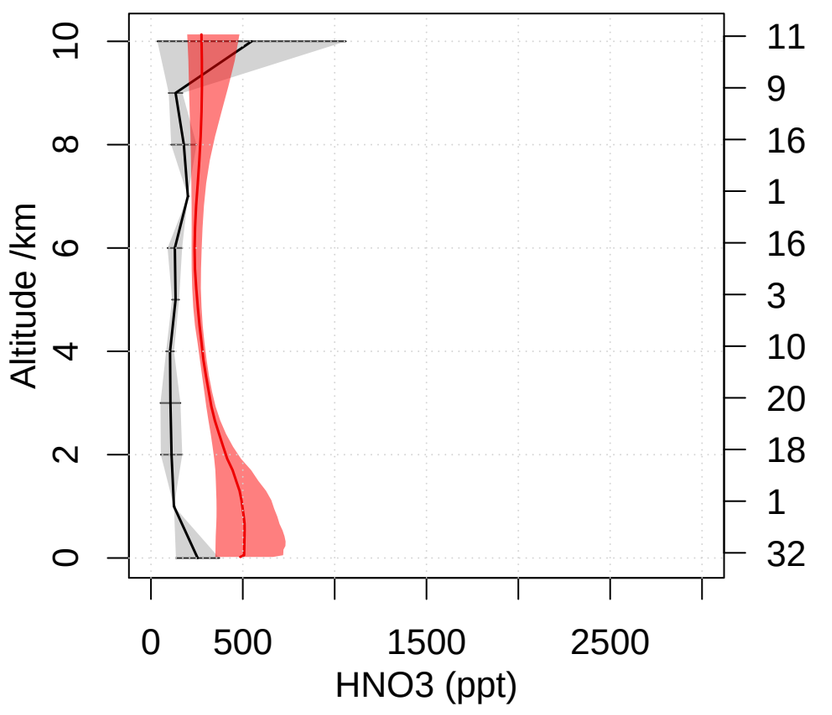


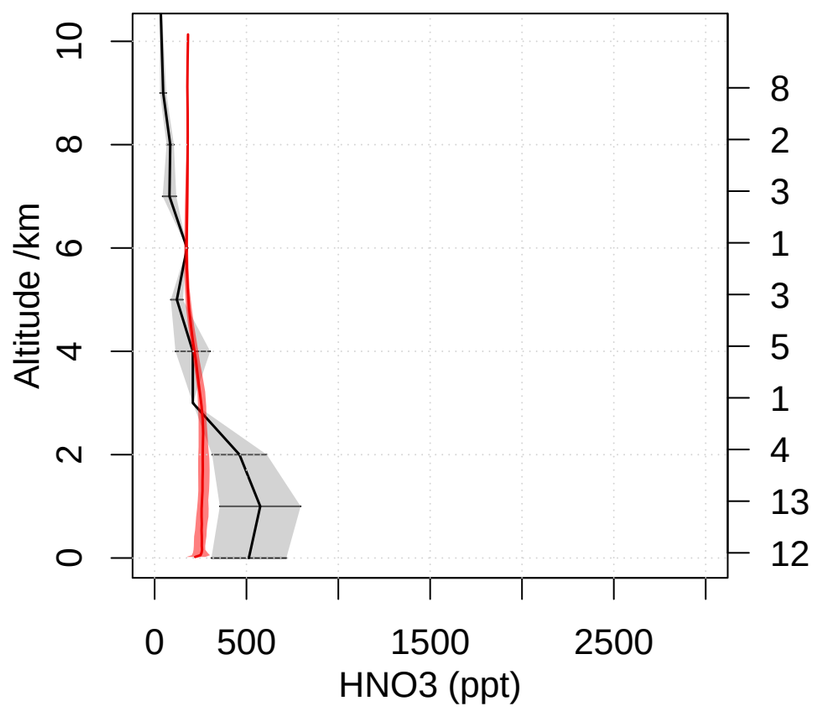


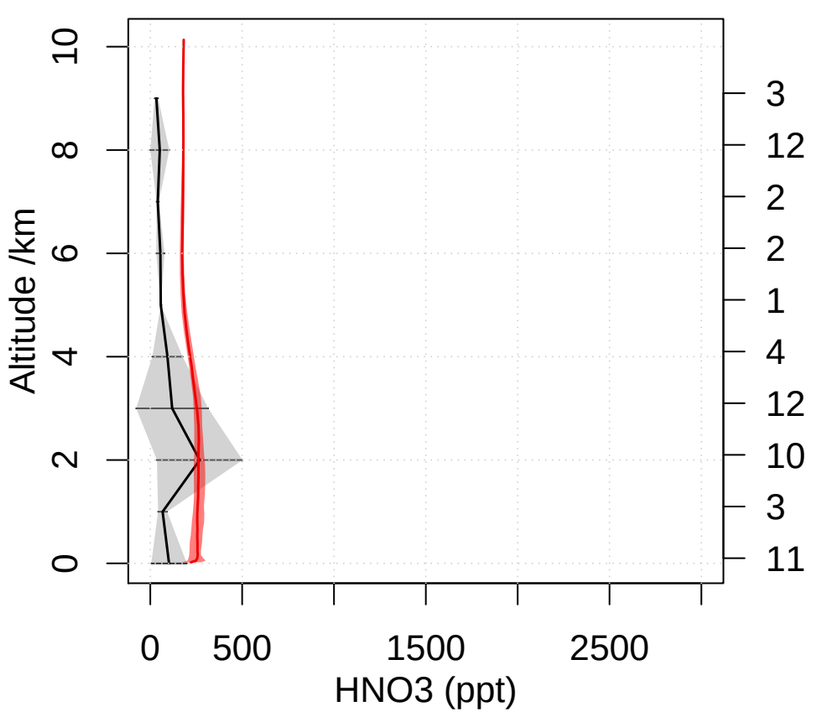


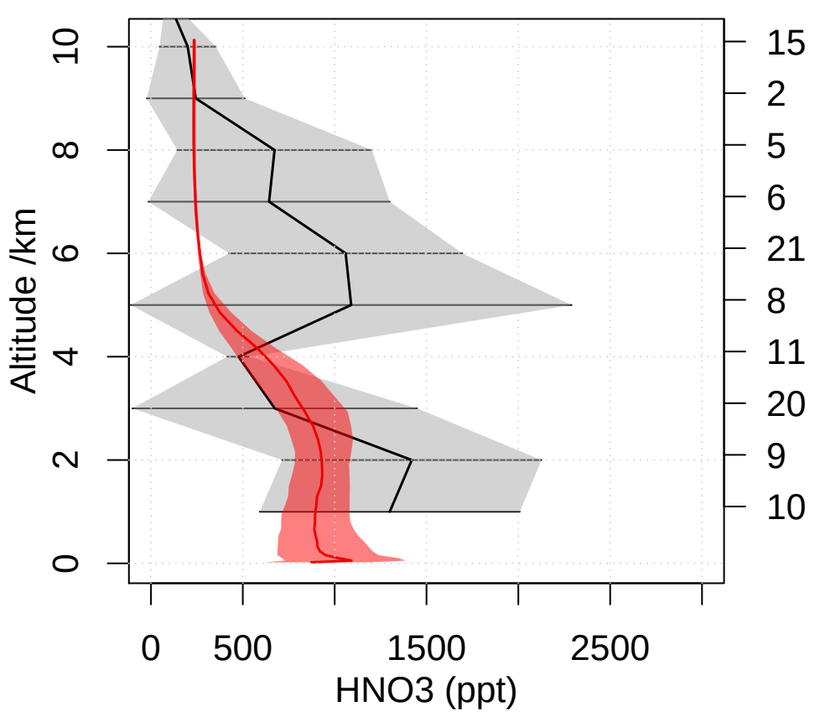


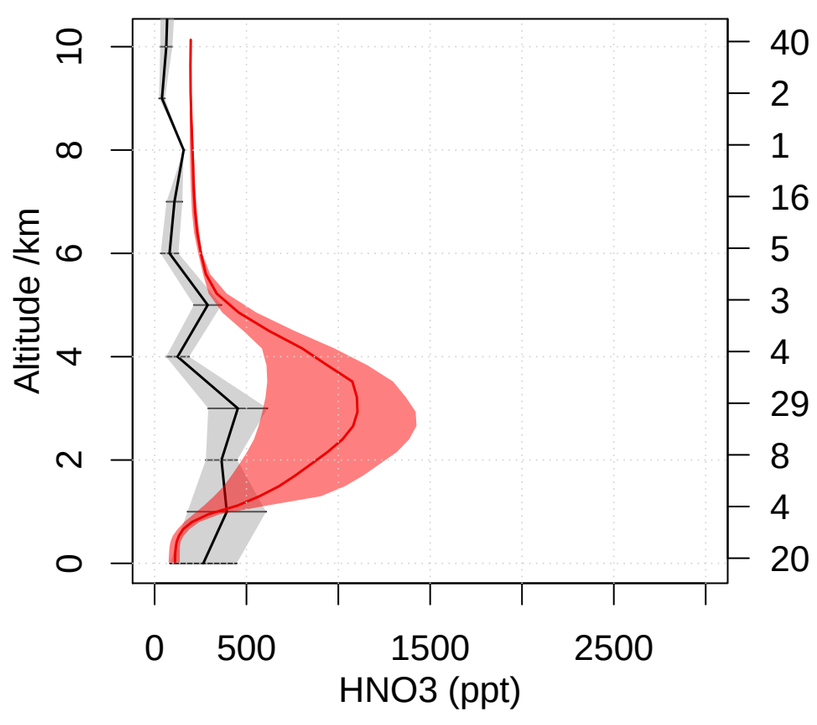


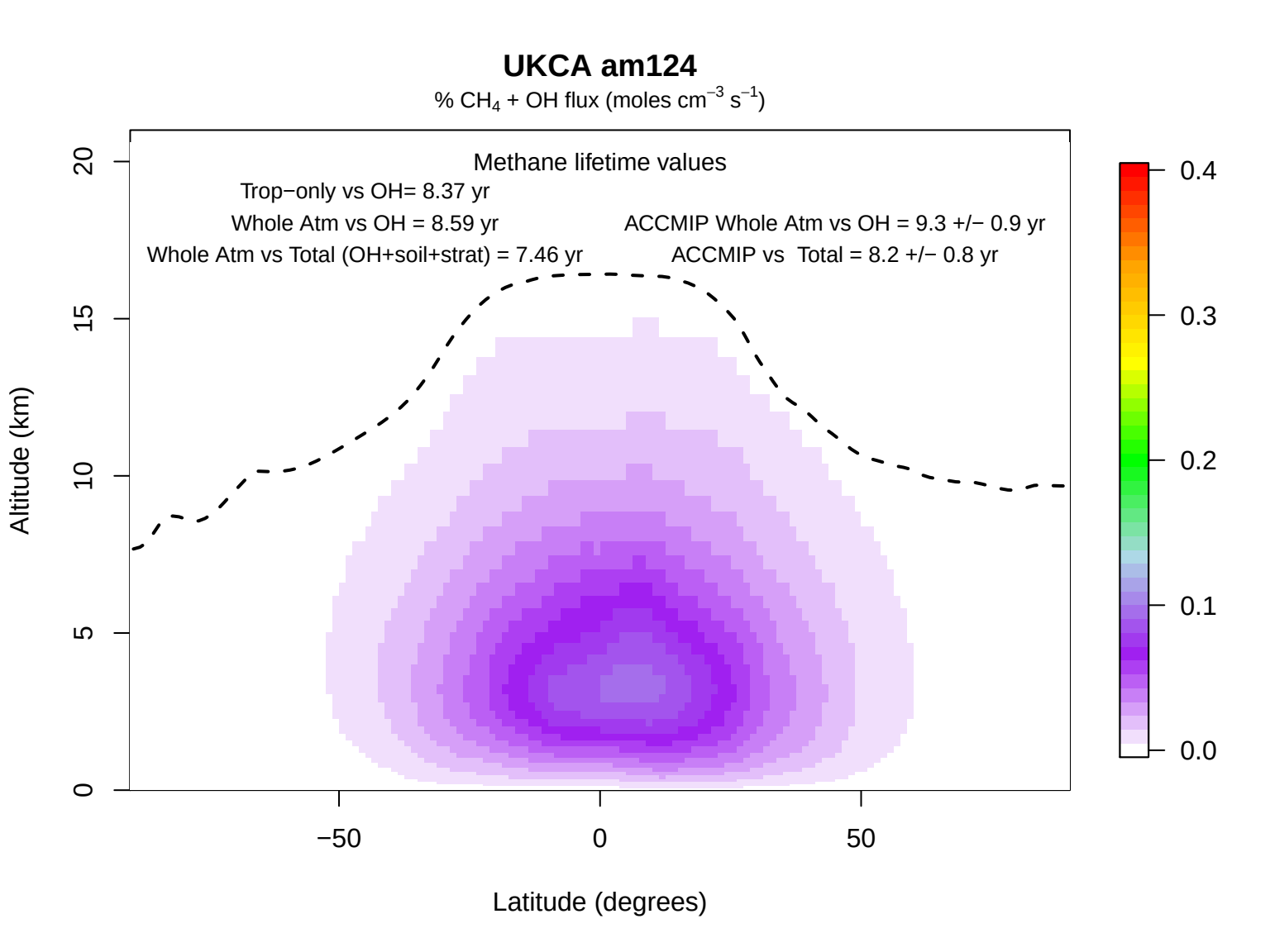


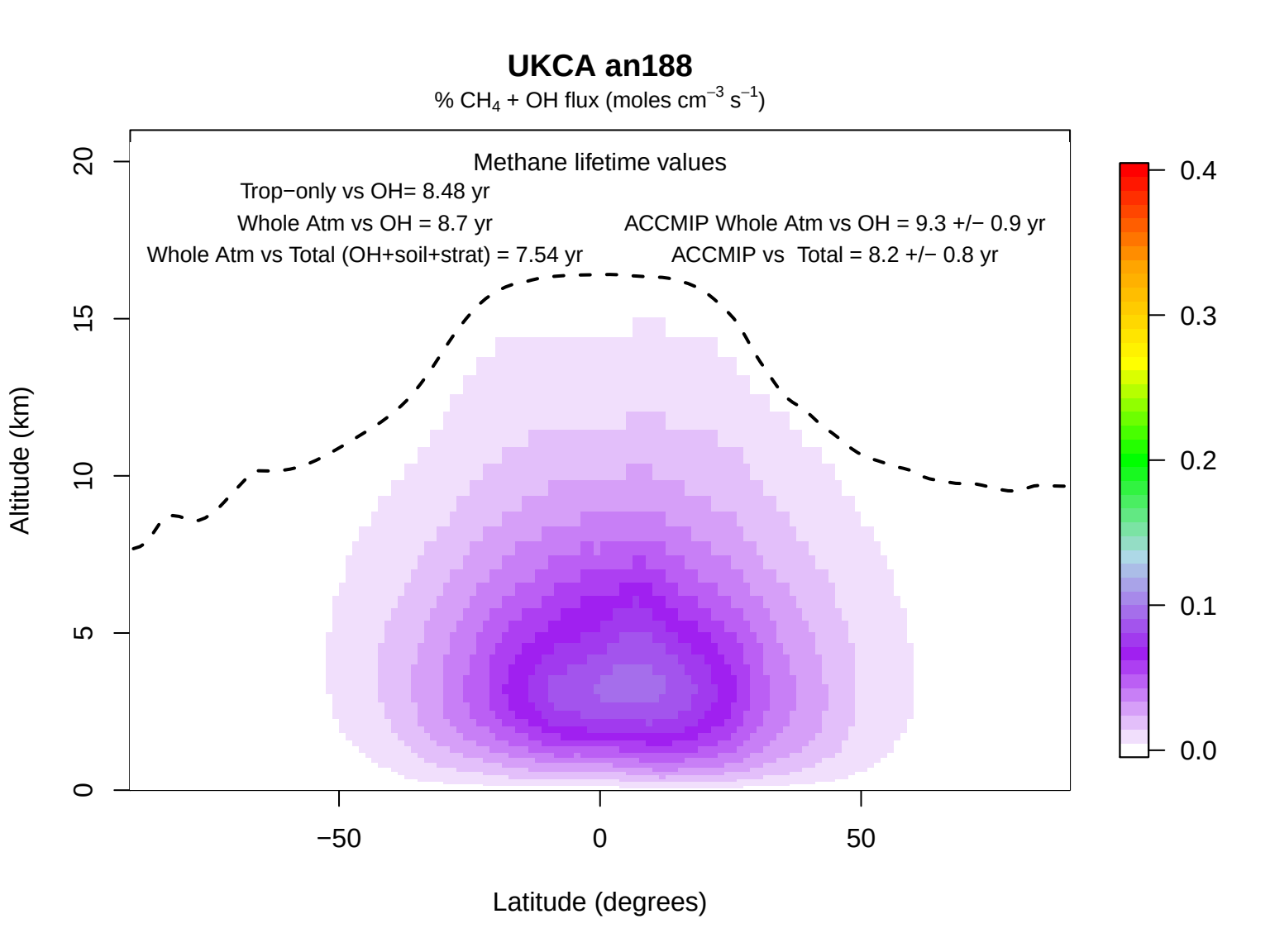




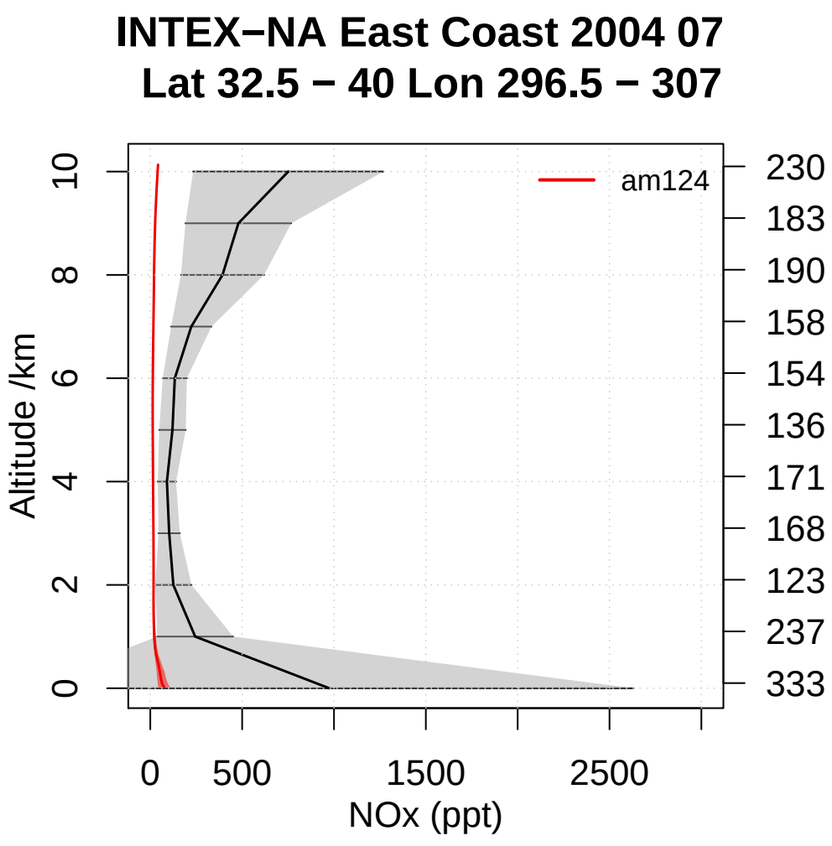


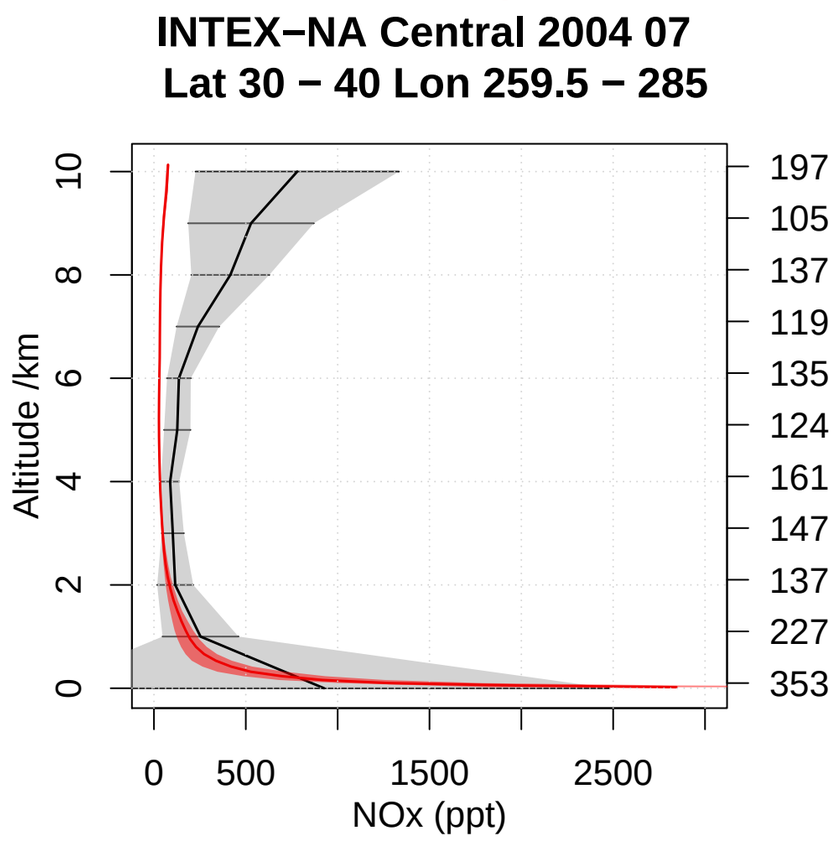


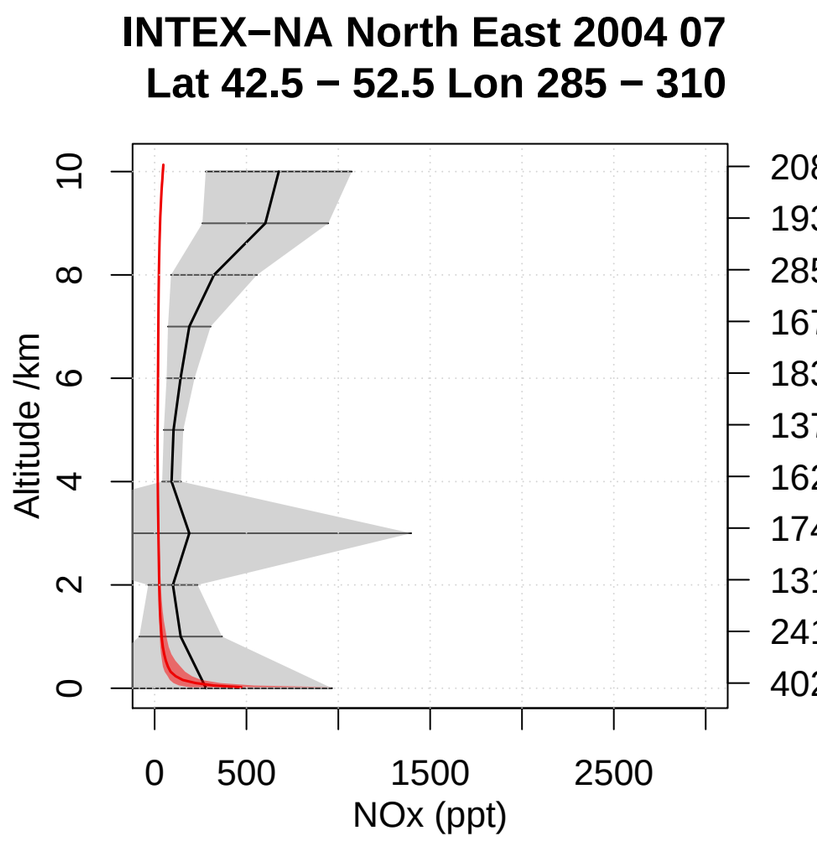

UKCA am124
% CH4 + OH flux (moles cm−3 s−1)
Methane lifetime values
Trop−only vs OH= 8.37 yr
Whole Atm vs OH = 8.59 yr
Whole Atm vs Total (OH+soil+strat) = 7.46 yr
ACCMIP Whole Atm vs OH = 9.3 +/− 0.9 yr
ACCMIP vs Total = 8.2 +/− 0.8 yr
Altitude (km)
0
5
10
15
20
−50
0
50
Latitude (degrees)
0.4
0.3
0.2
0.1
0.0

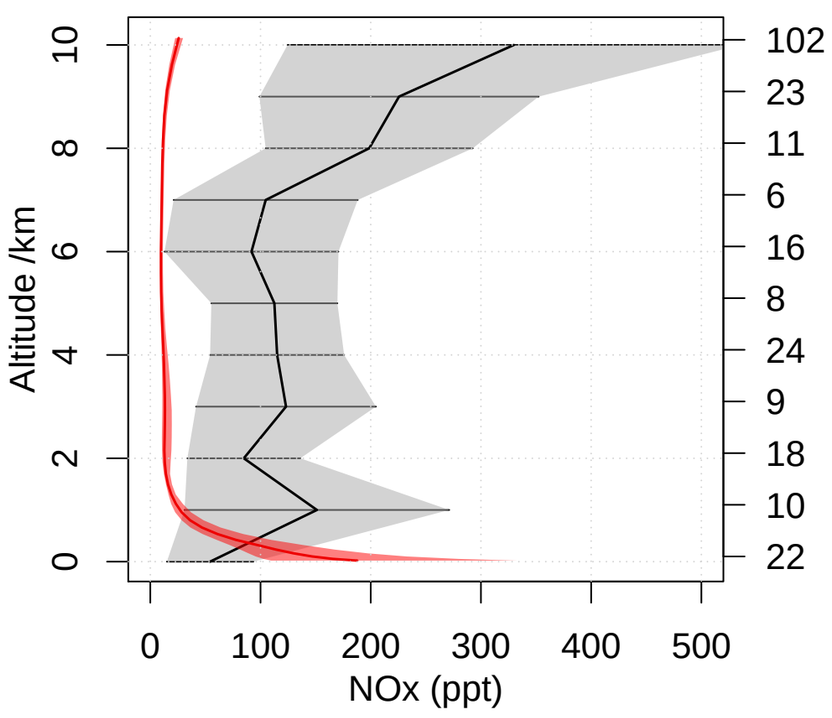

UKCA an188
% CH4 + OH flux (moles cm−3 s−1)
Methane lifetime values
Trop−only vs OH= 8.48 yr
Whole Atm vs OH = 8.7 yr
Whole Atm vs Total (OH+soil+strat) = 7.54 yr
ACCMIP Whole Atm vs OH = 9.3 +/− 0.9 yr
ACCMIP vs Total = 8.2 +/− 0.8 yr
Altitude (km)
0
5
10
15
20
−50
0
50
Latitude (degrees)
0.4
0.3
0.2
0.1
0.0

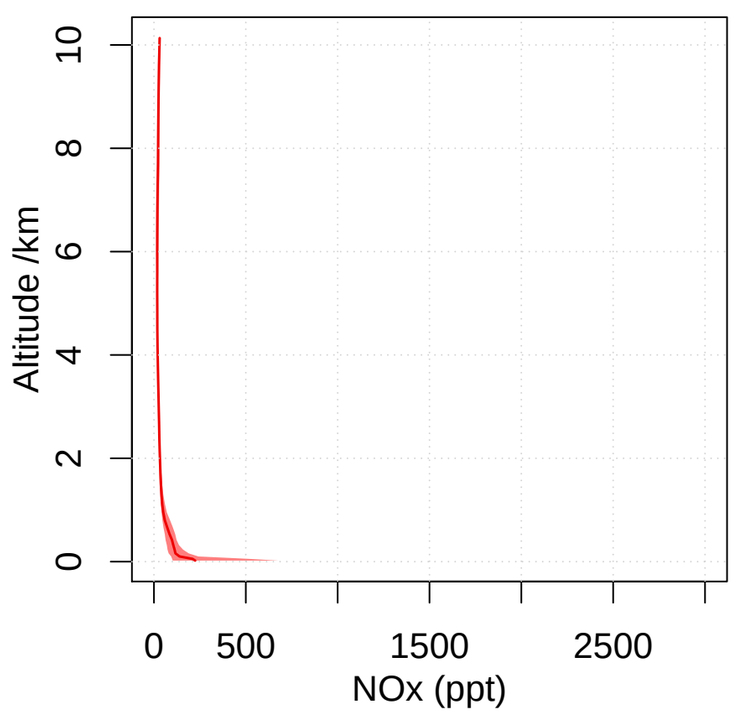
Emmons NOx comparison

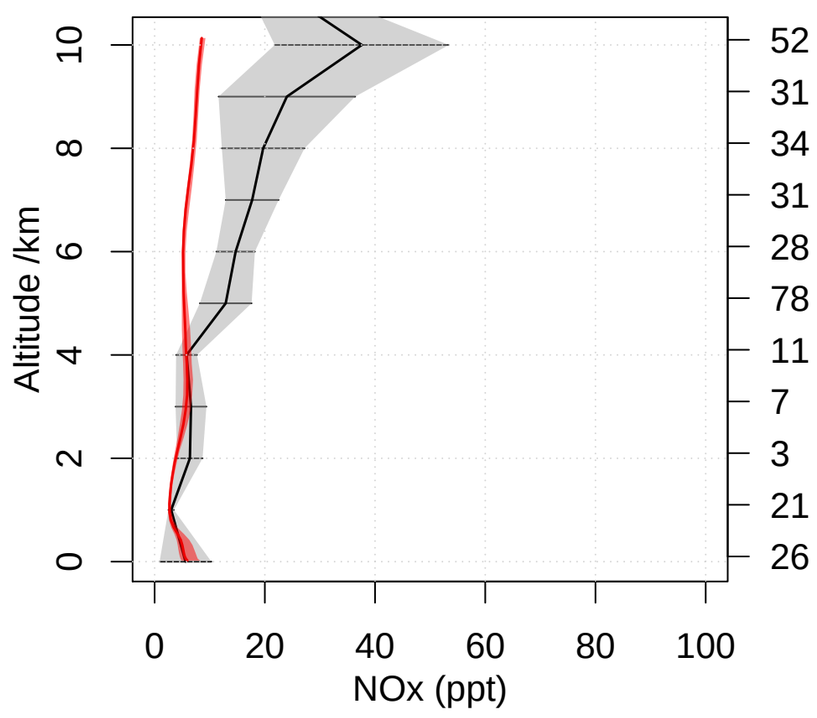


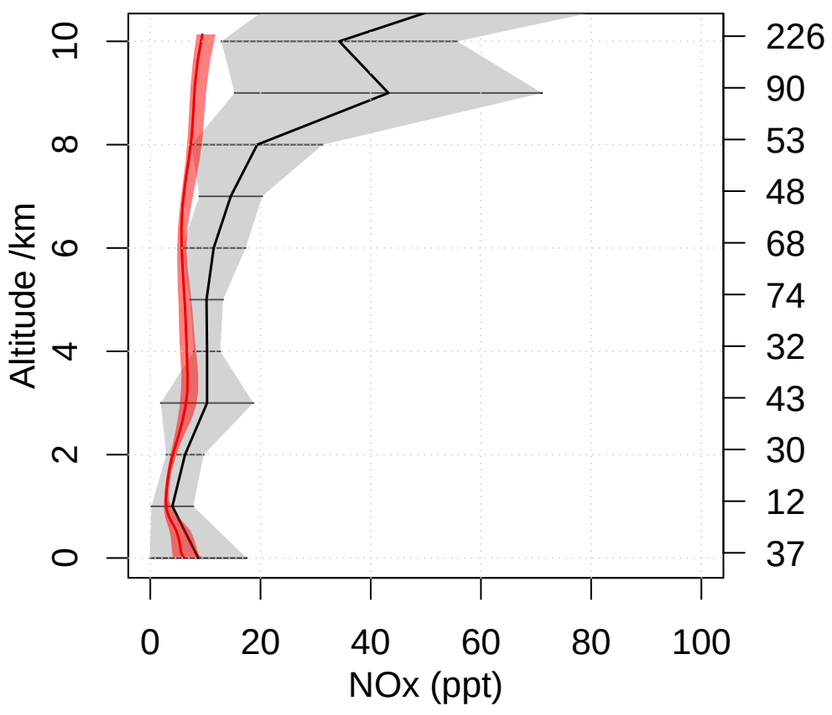


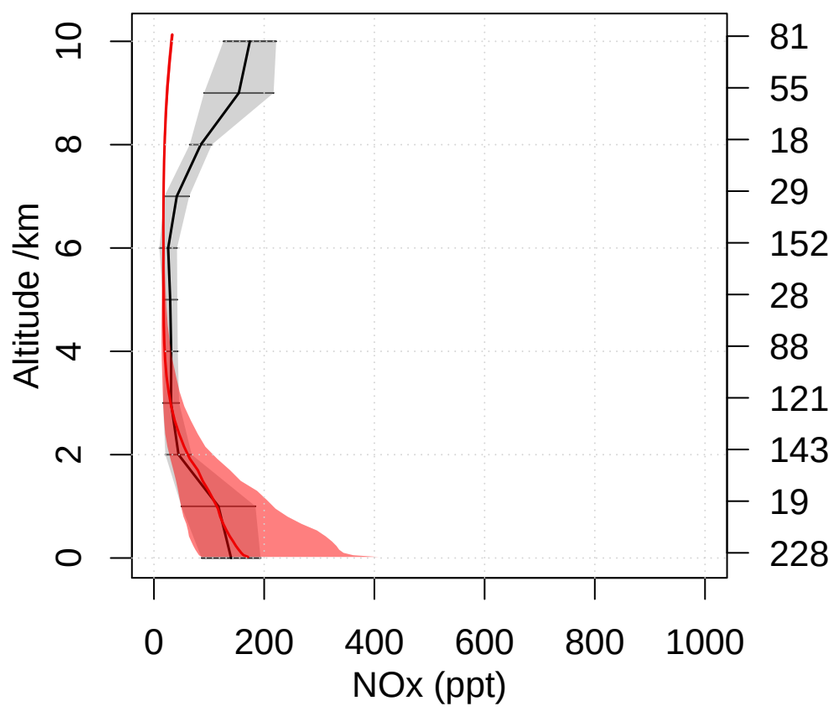


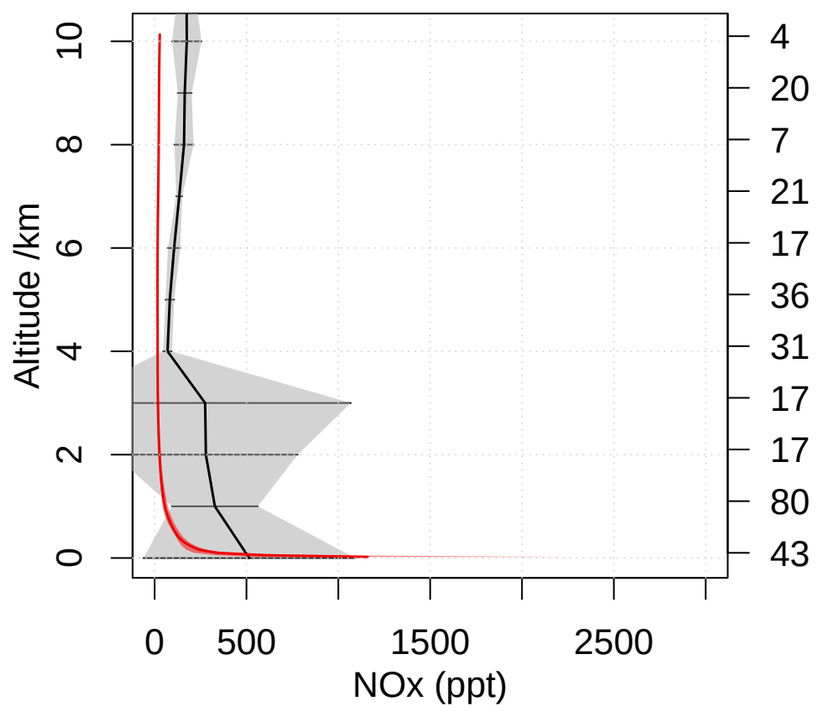


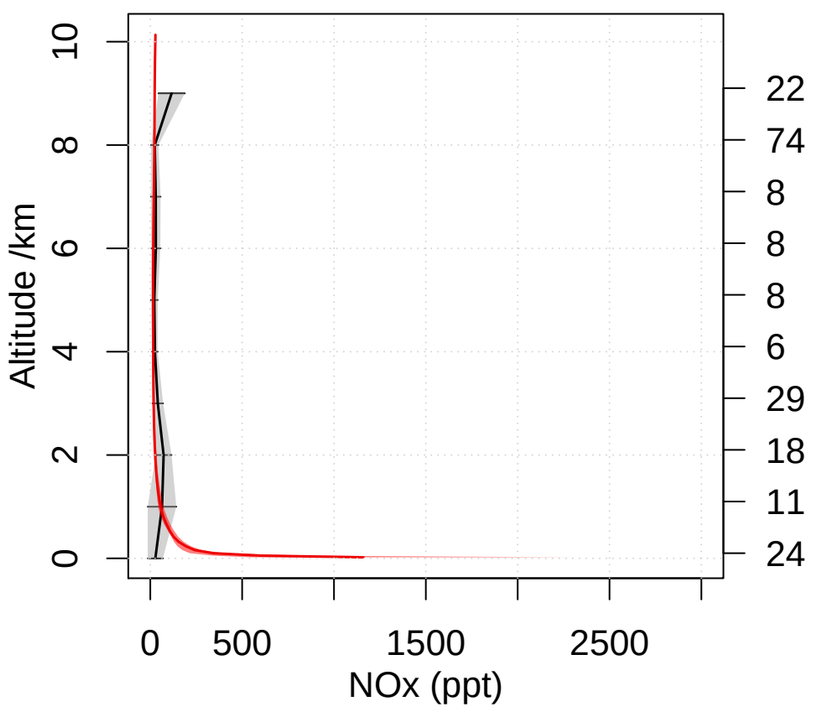


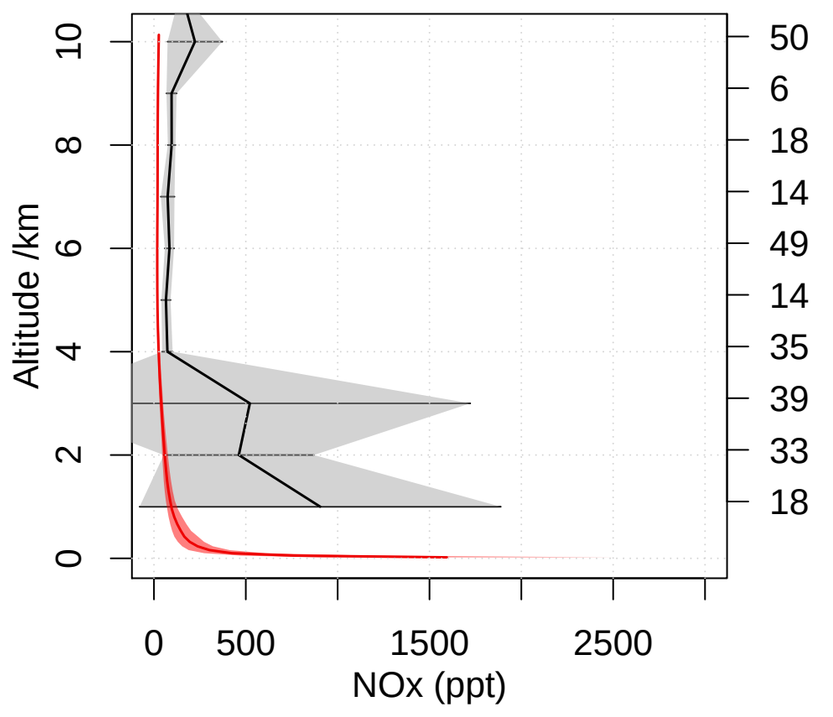


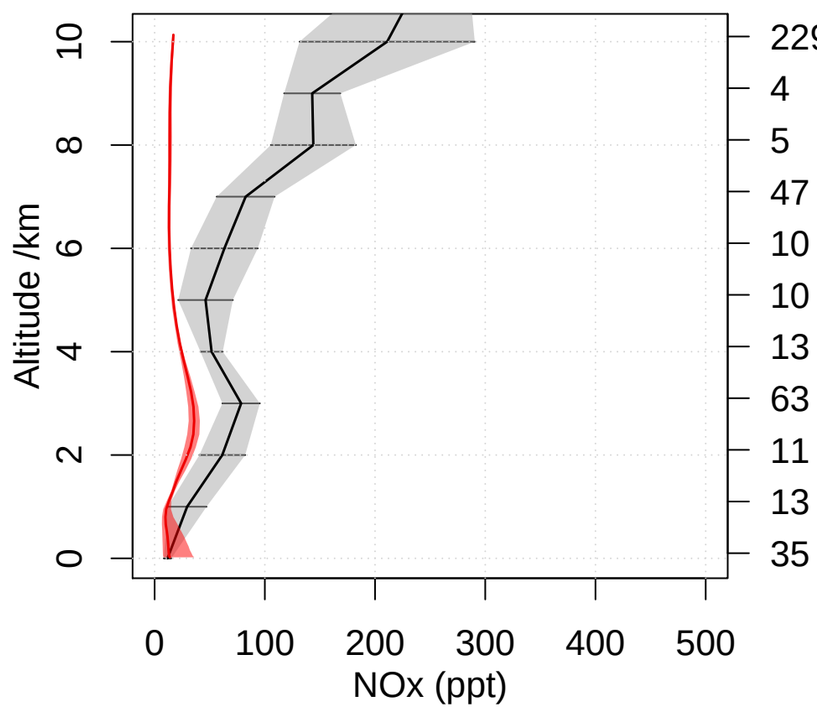




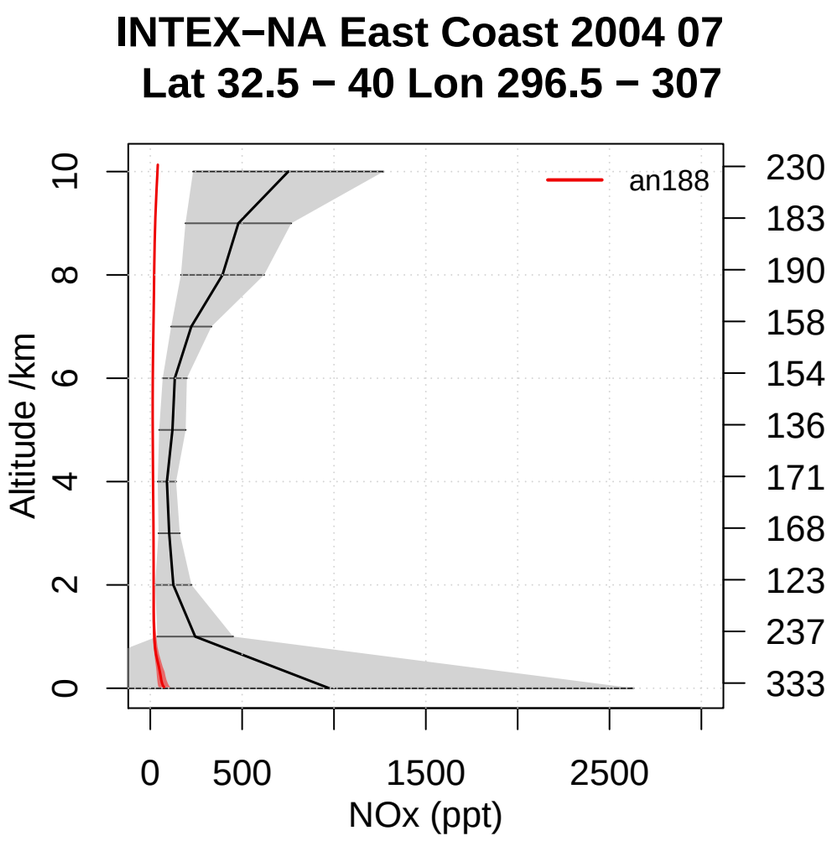


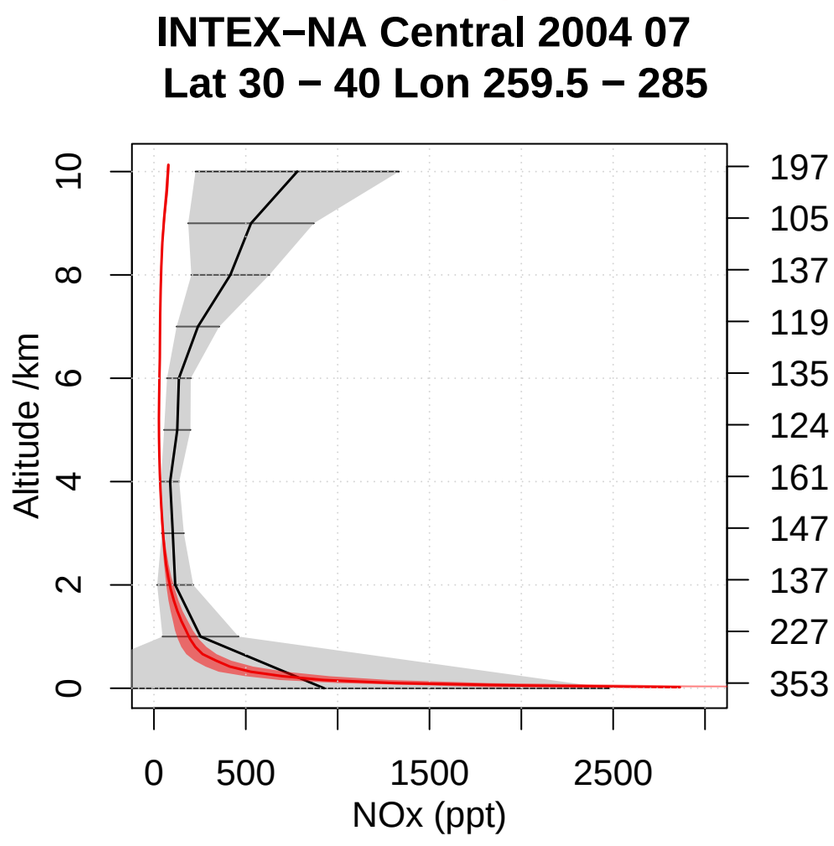


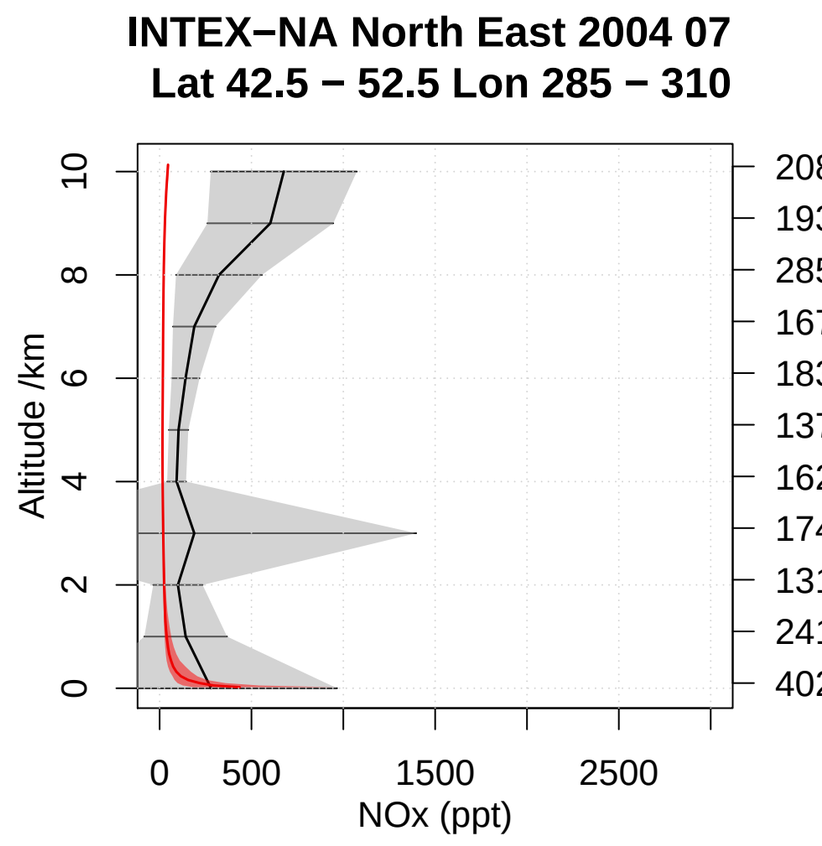


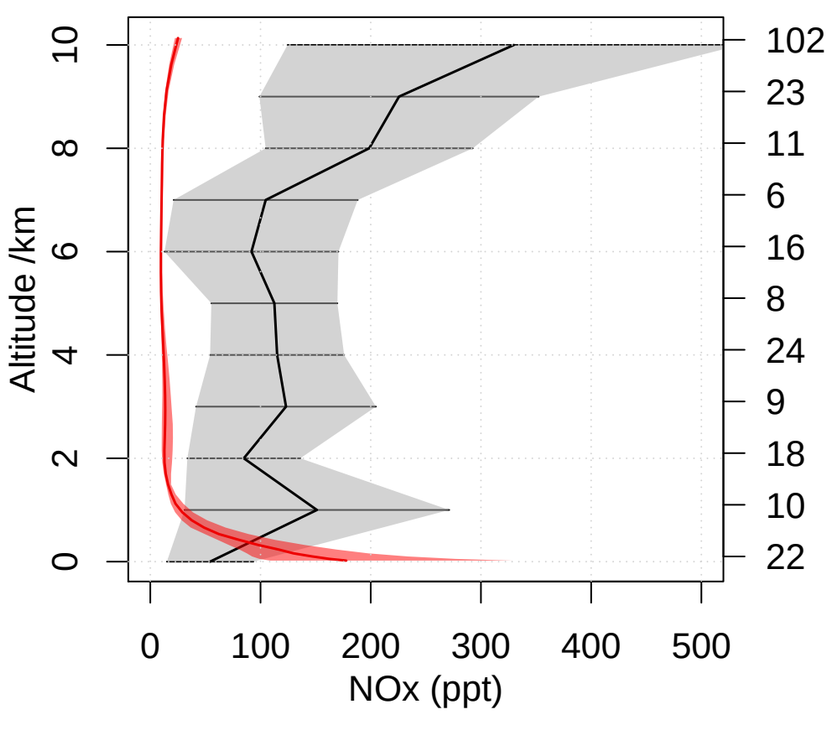


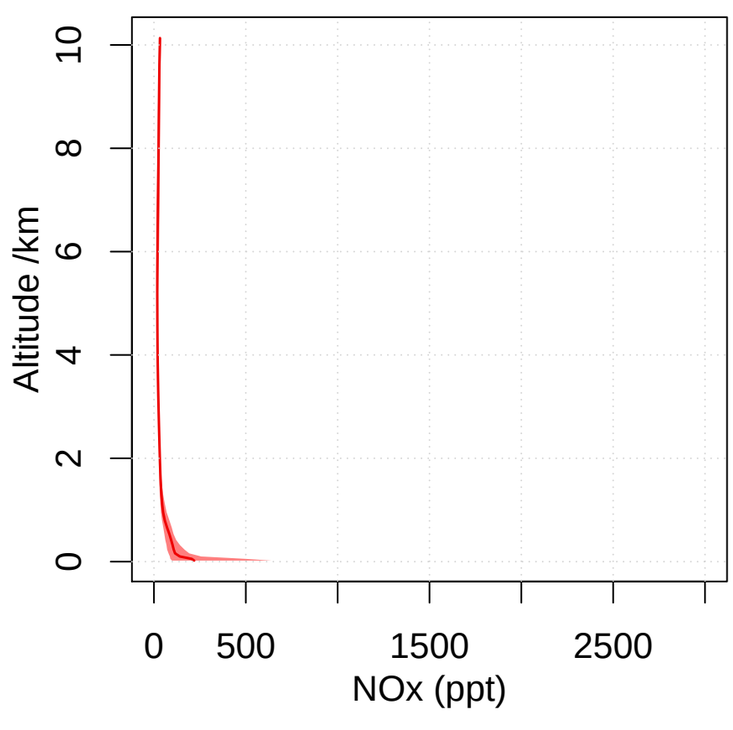
Emmons NOx comparison

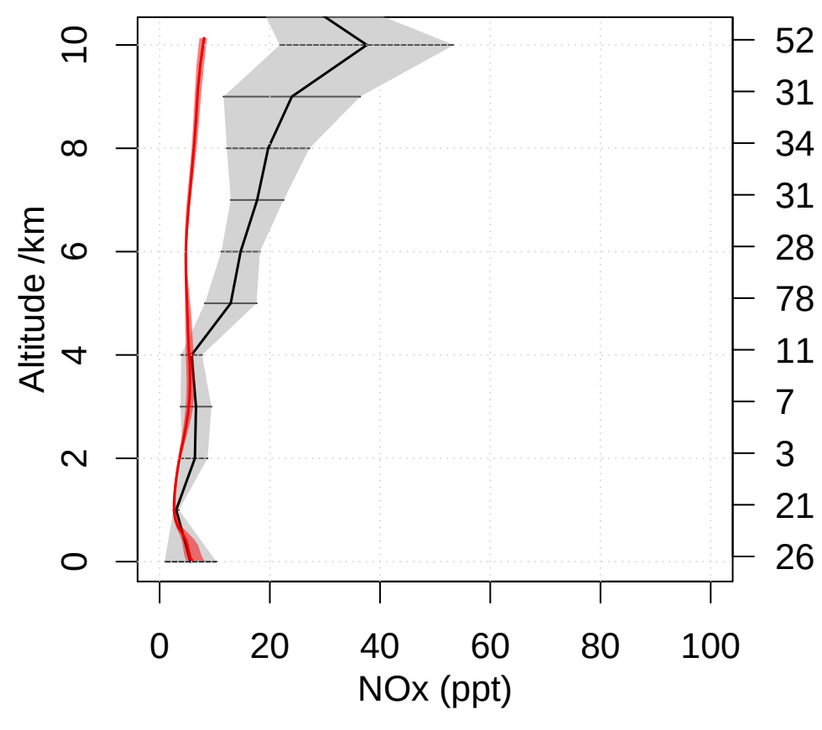


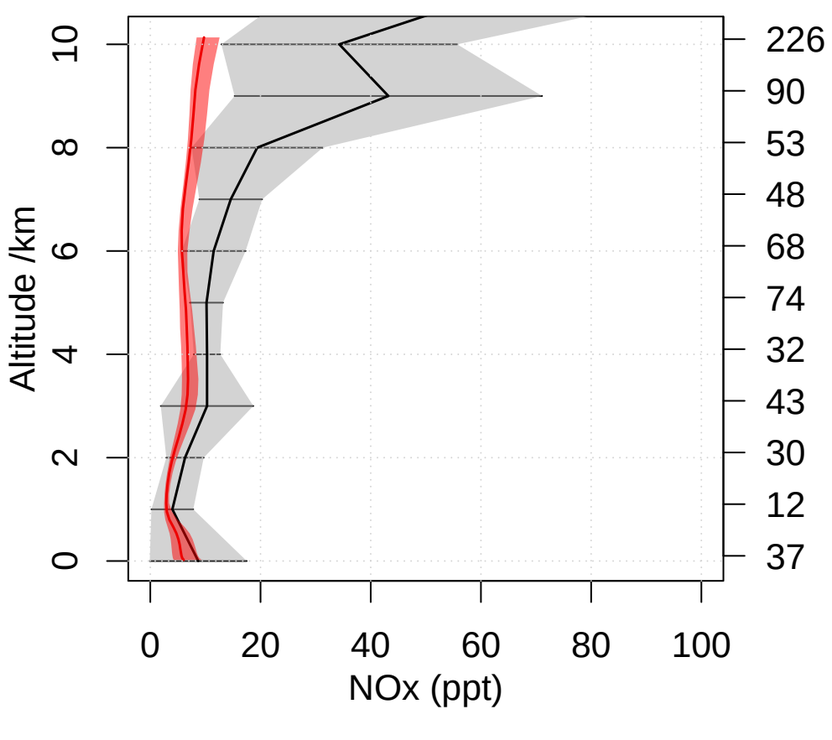


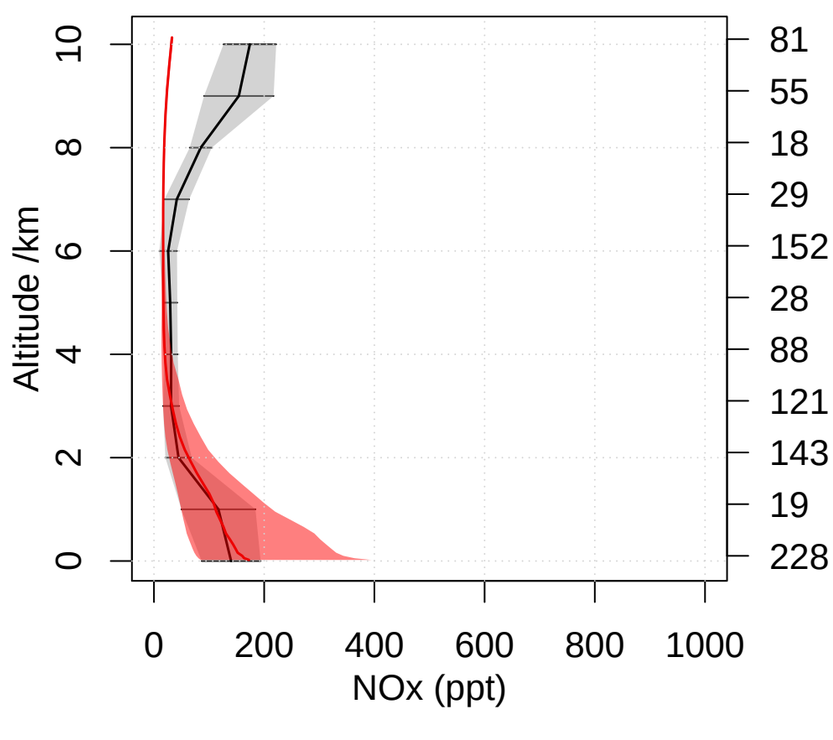


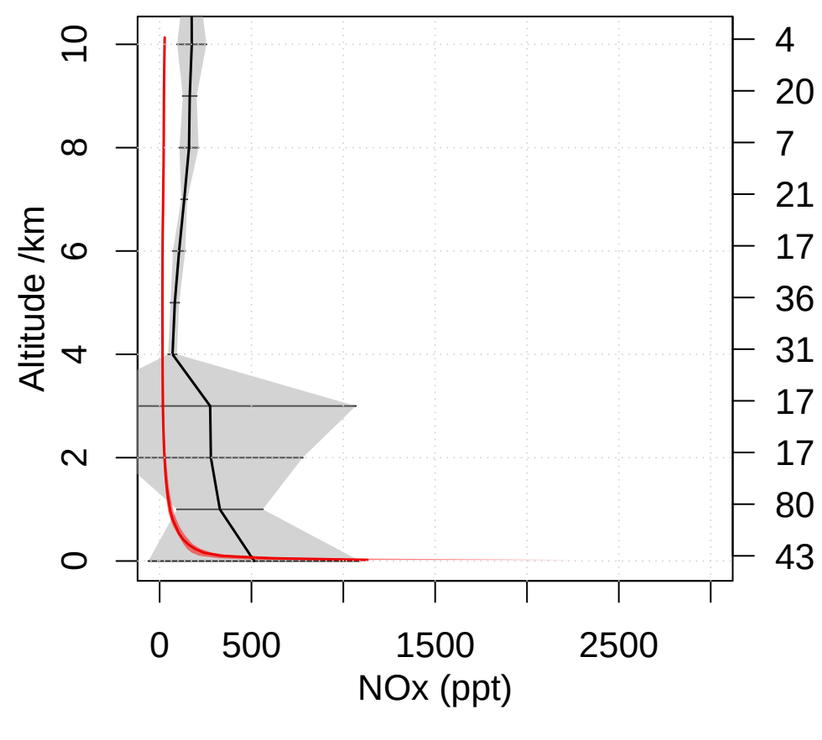


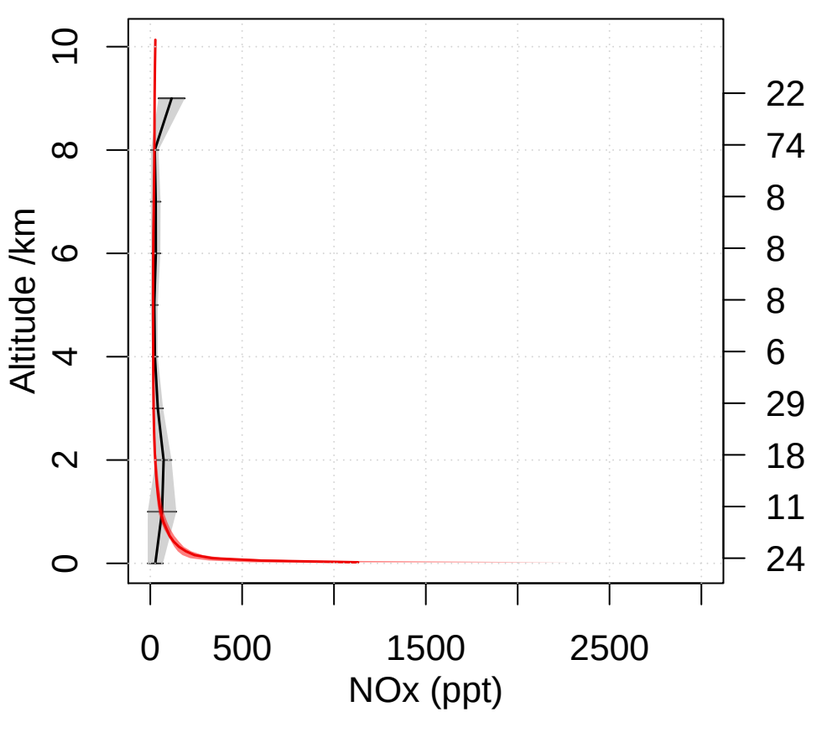


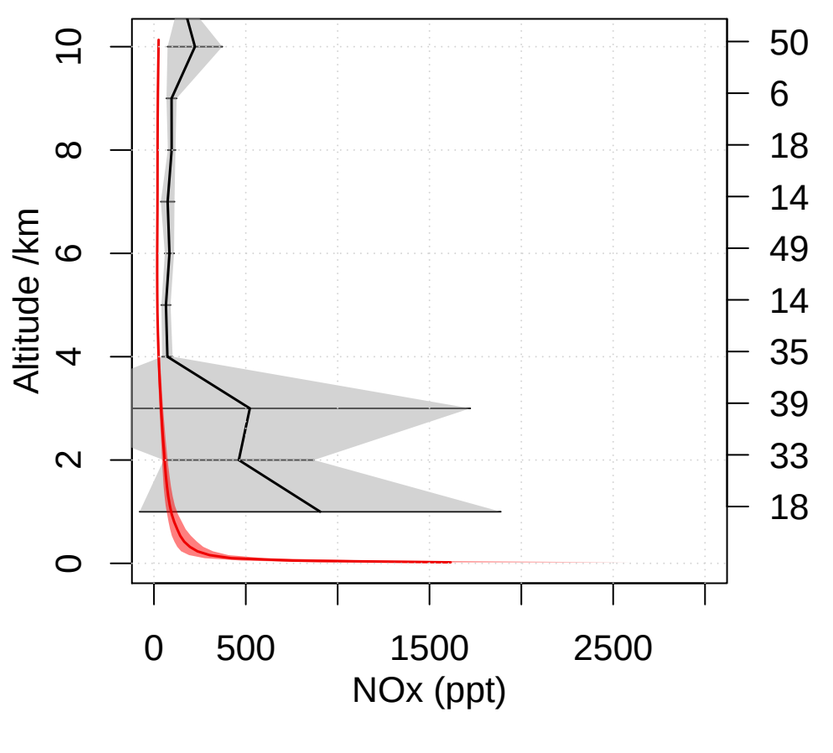


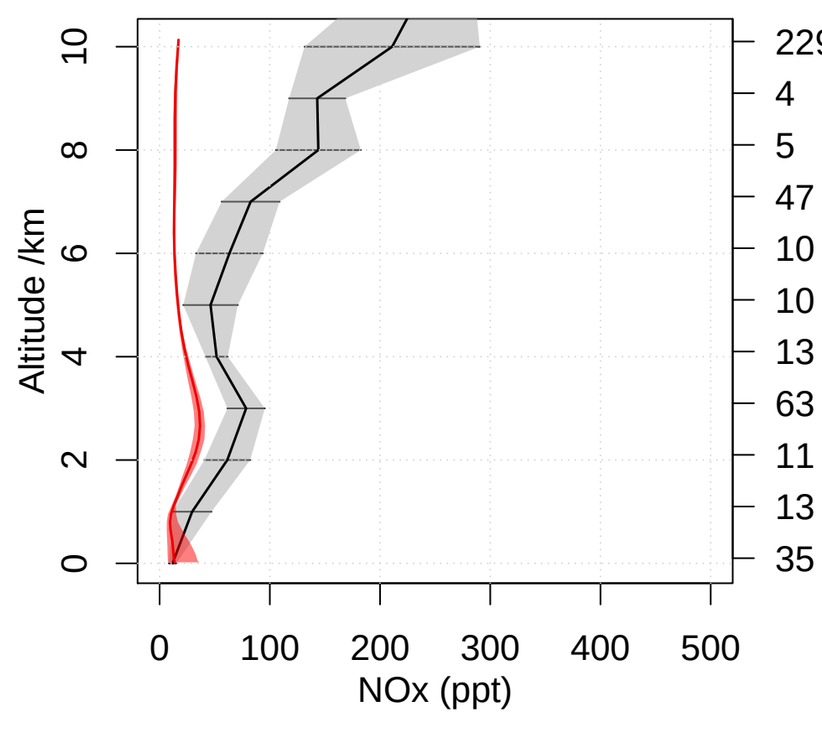


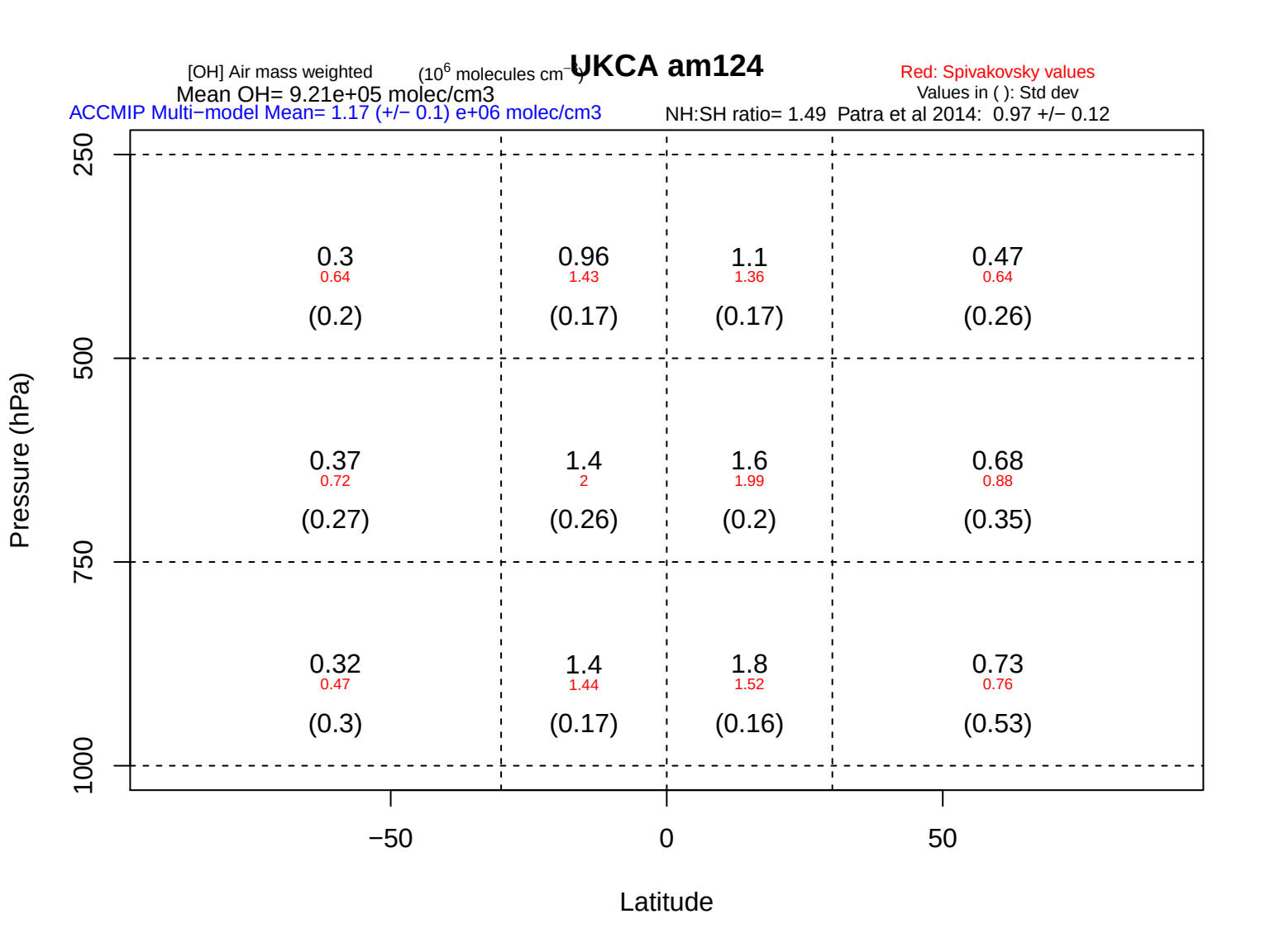


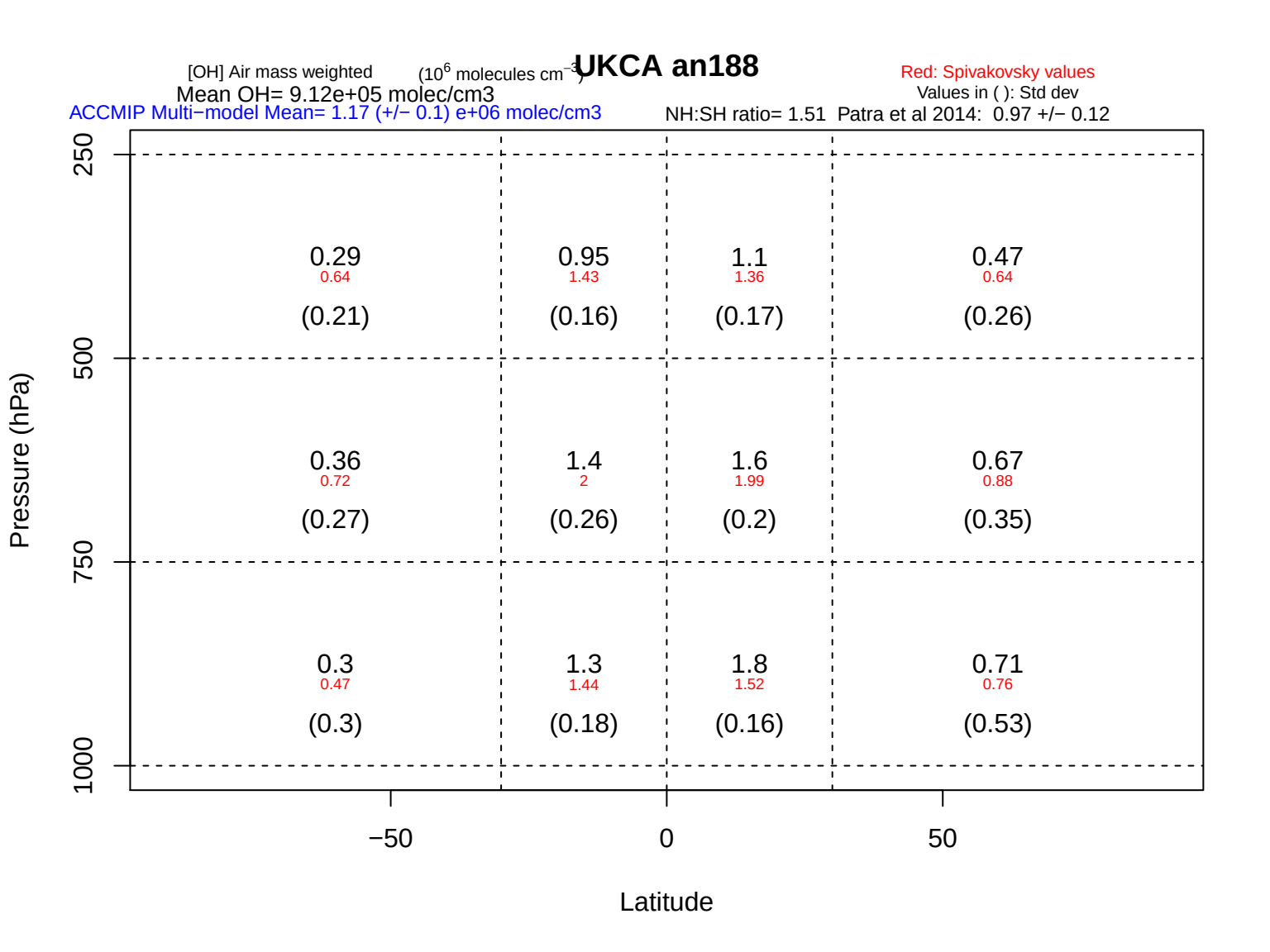


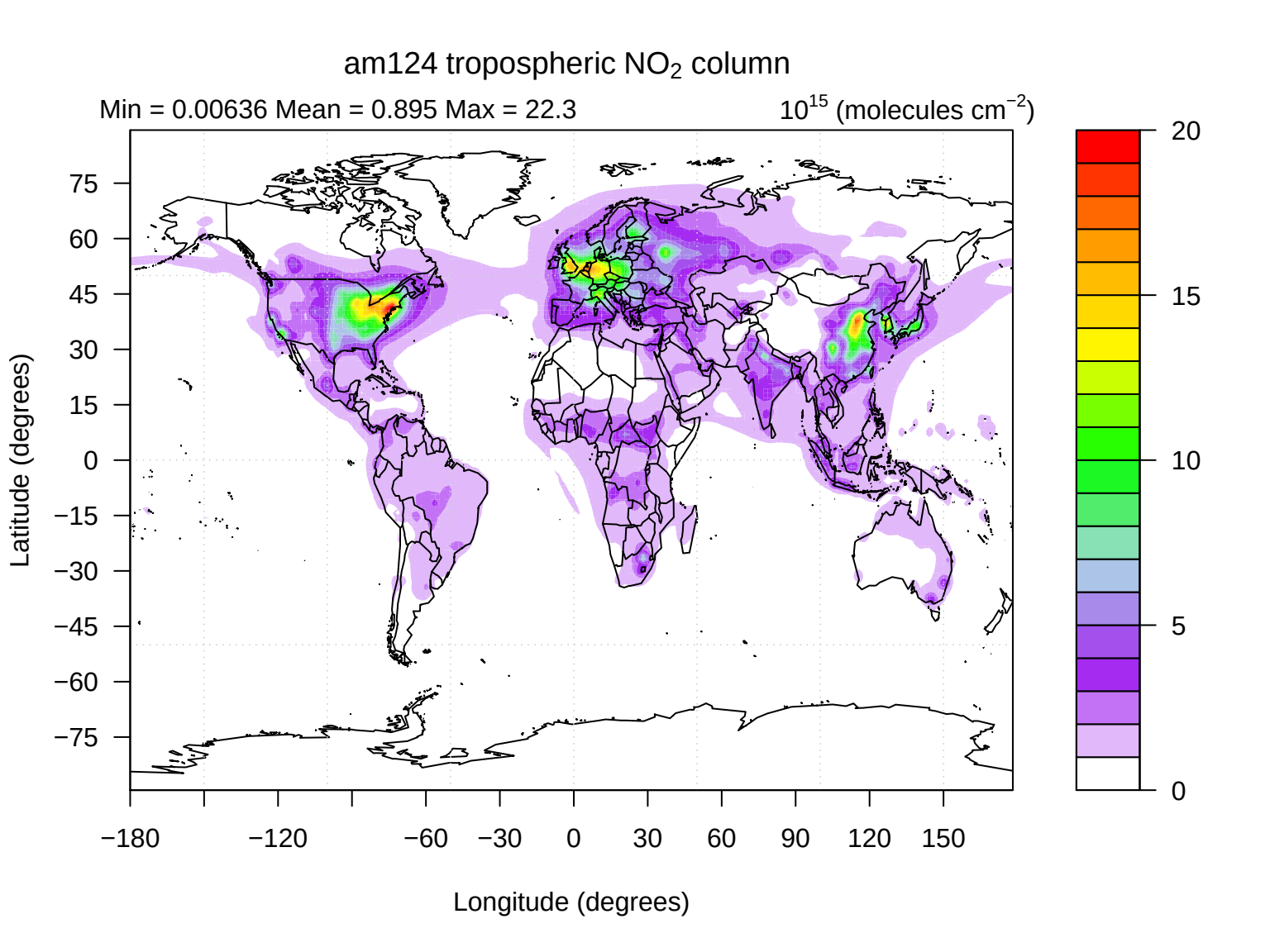


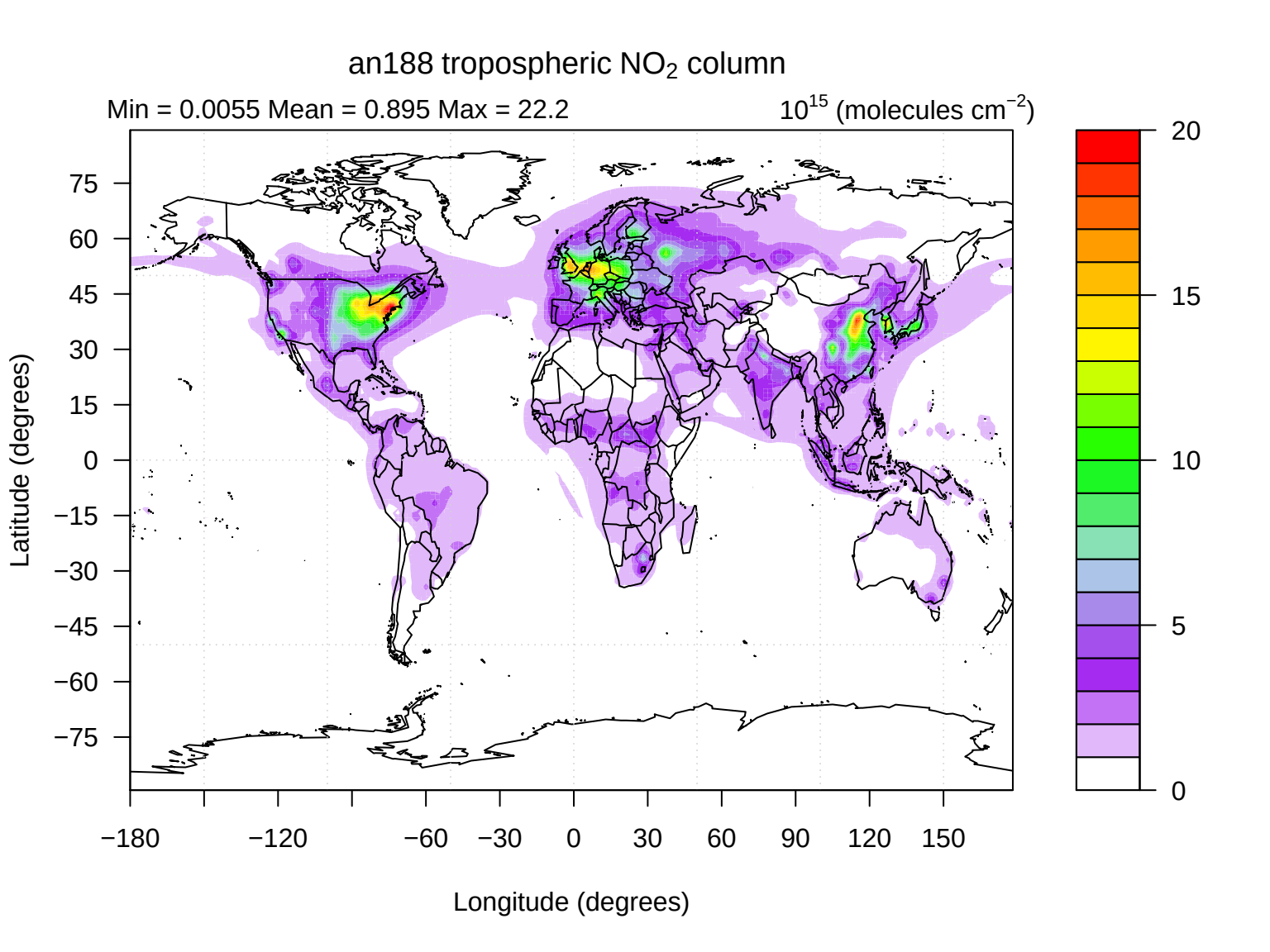





[OH] Air mass weighted (10^6 molecules cm^{-3})
UKCA am124
Red: Spivakovsky values
Values in ( ): Std dev
Mean OH= 9.21e+05 molec/cm3
ACCMIP Multi−model Mean= 1.17 (+/− 0.1) e+06 molec/cm3
NH:SH ratio= 1.49 Patra et al 2014: 0.97 +/− 0.12
0.3
0.64
(0.2)
0.96
1.43
(0.17)
1.1
1.36
(0.17)
0.47
0.64
(0.26)
0.37
0.72
(0.27)
1.4
2
(0.26)
1.6
1.99
(0.2)
0.68
0.88
(0.35)
0.32
0.47
(0.3)
1.4
1.44
(0.17)
1.8
1.52
(0.16)
0.73
0.76
(0.53)
250
500
750
1000
Pressure (hPa)
−50
0
50
Latitude


[OH] Air mass weighted (10^6 molecules cm^{-3})
UKCA an188
Red: Spivakovsky values
Values in ( ): Std dev
Mean OH= 9.12e+05 molec/cm3
ACCMIP Multi−model Mean= 1.17 (+/− 0.1) e+06 molec/cm3
NH:SH ratio= 1.51 Patra et al 2014: 0.97 +/− 0.12
0.29
0.64
(0.21)
0.95
1.43
(0.16)
1.1
1.36
(0.17)
0.47
0.64
(0.26)
0.36
0.72
(0.27)
1.4
2
(0.26)
1.6
1.99
(0.2)
0.67
0.88
(0.35)
0.3
0.47
(0.3)
1.3
1.44
(0.18)
1.8
1.52
(0.16)
0.71
0.76
(0.53)
250
500
750
1000
Pressure (hPa)
−50
0
50
Latitude


am124 tropospheric NO2 column
Min = 0.00636 Mean = 0.895 Max = 22.3
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


an188 tropospheric NO2 column
Min = 0.0055 Mean = 0.895 Max = 22.2
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