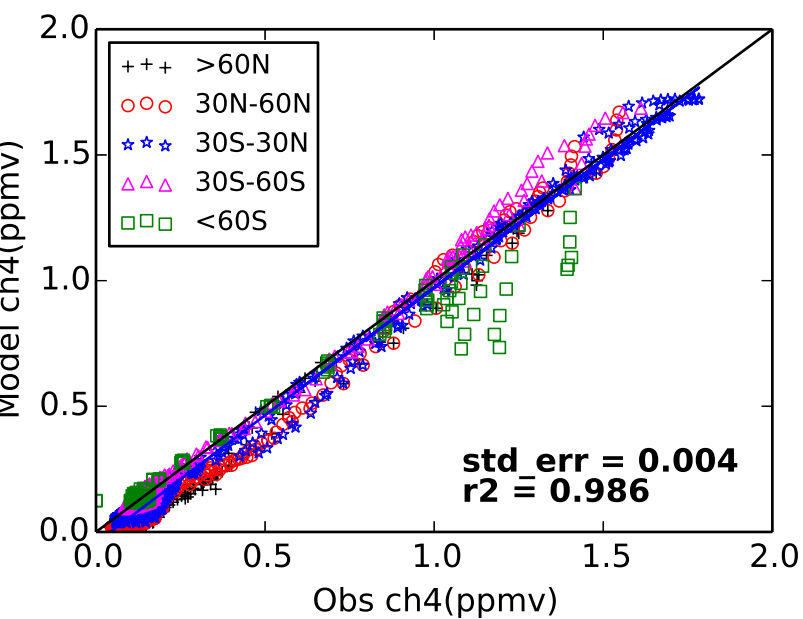
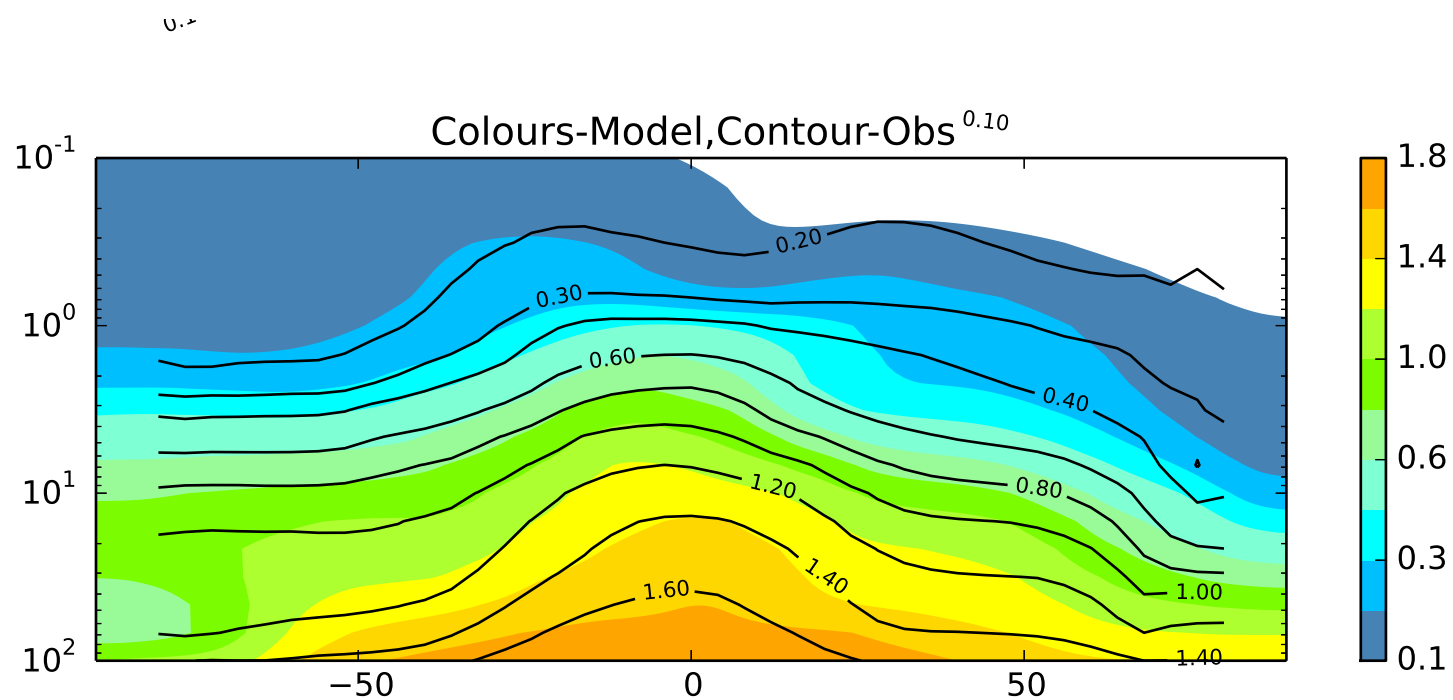
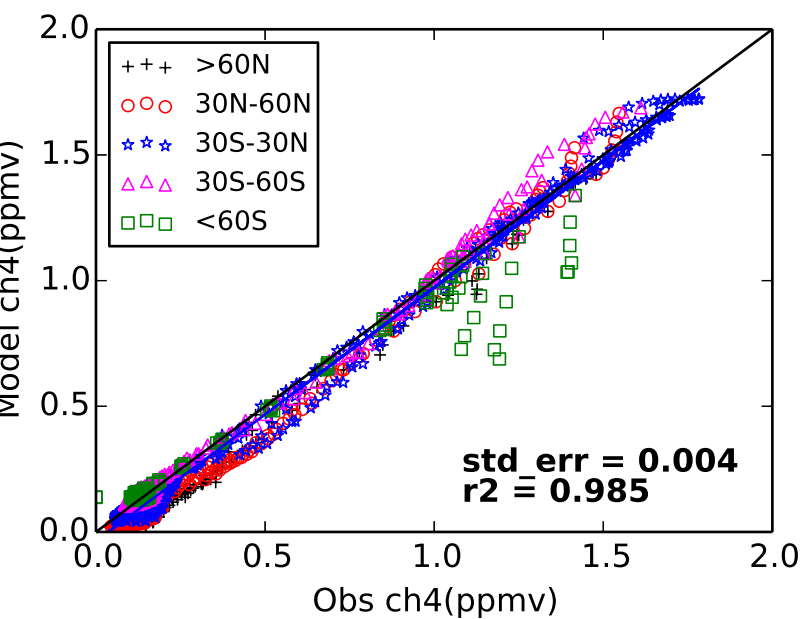
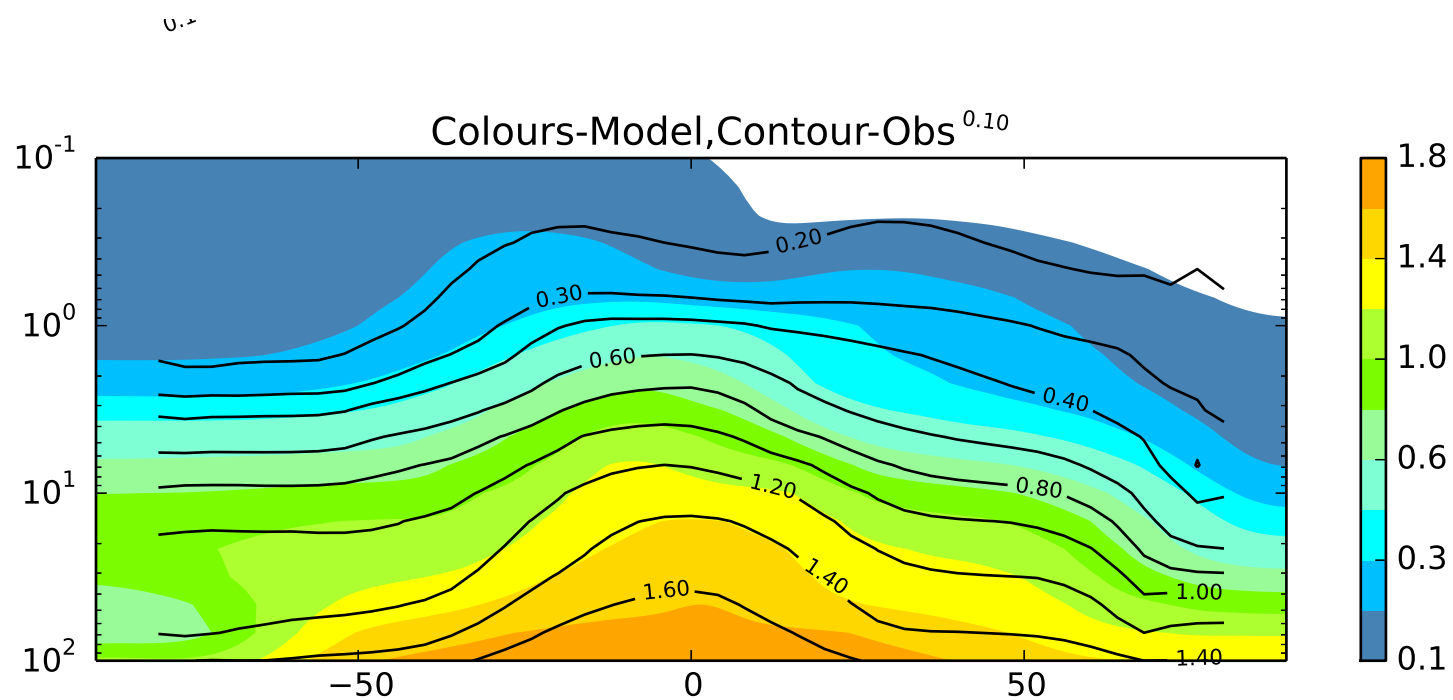
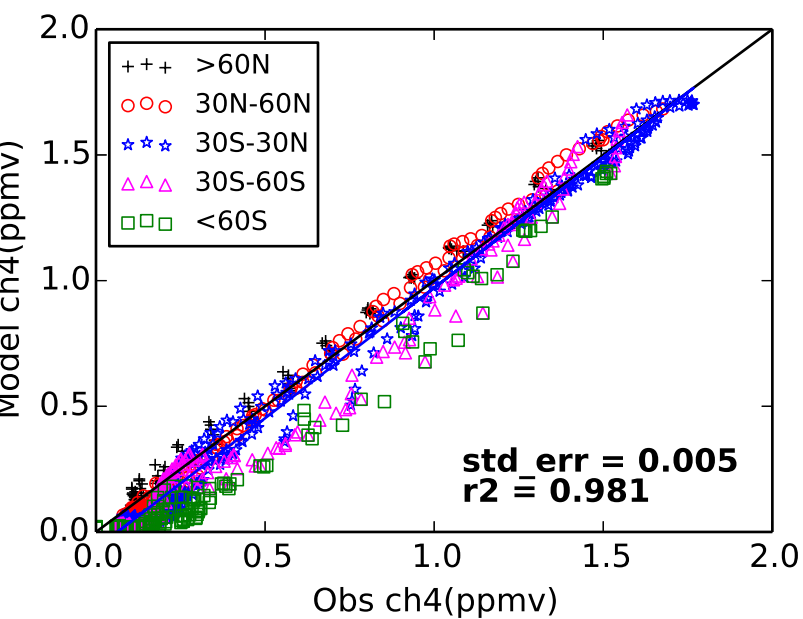
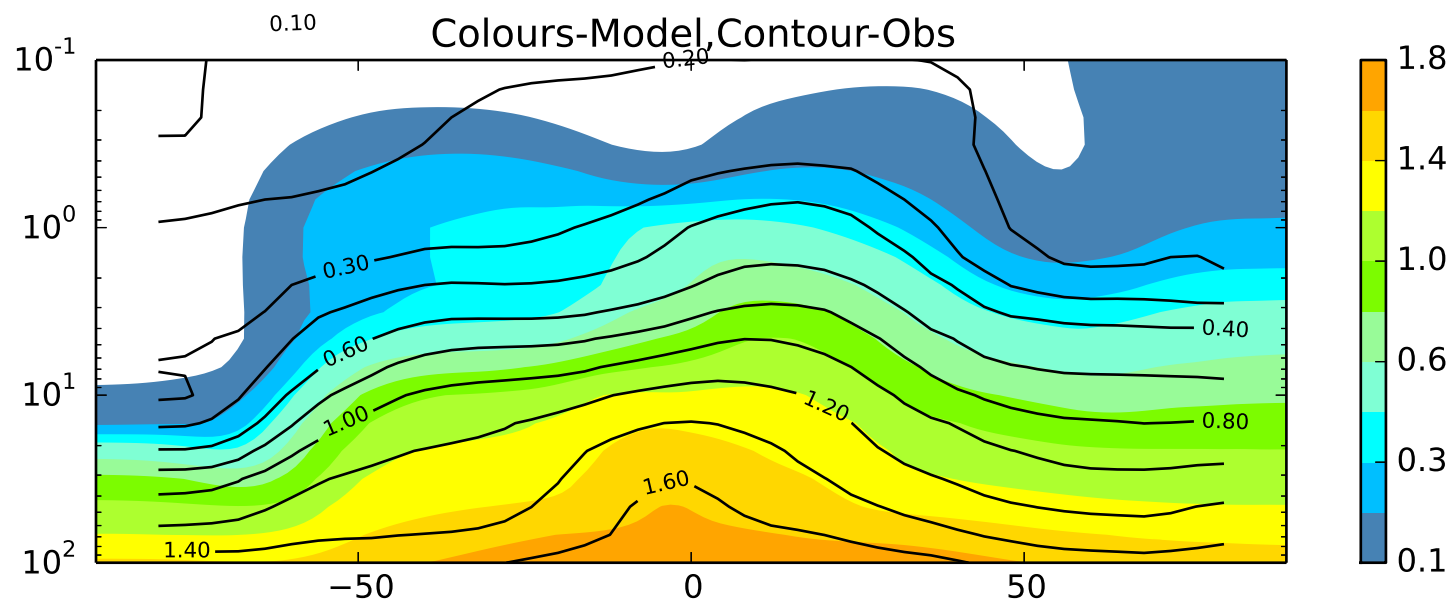




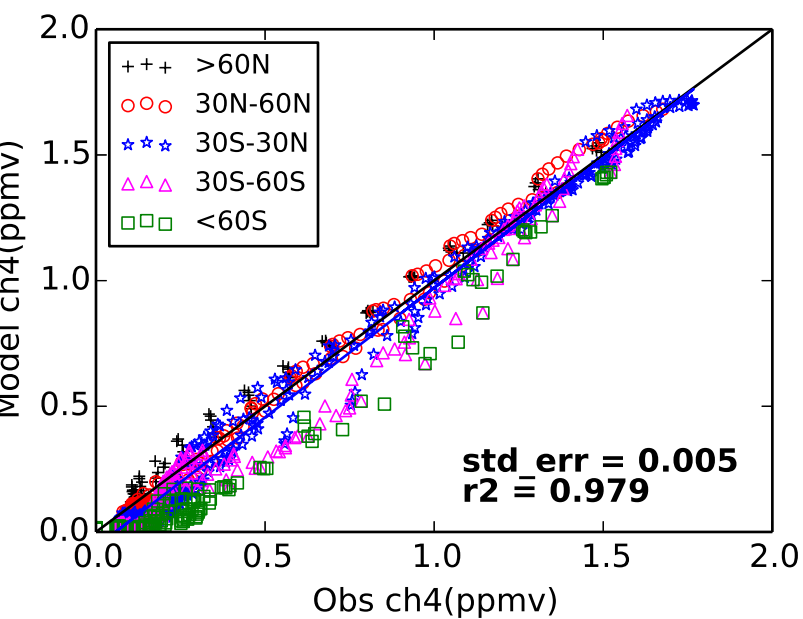
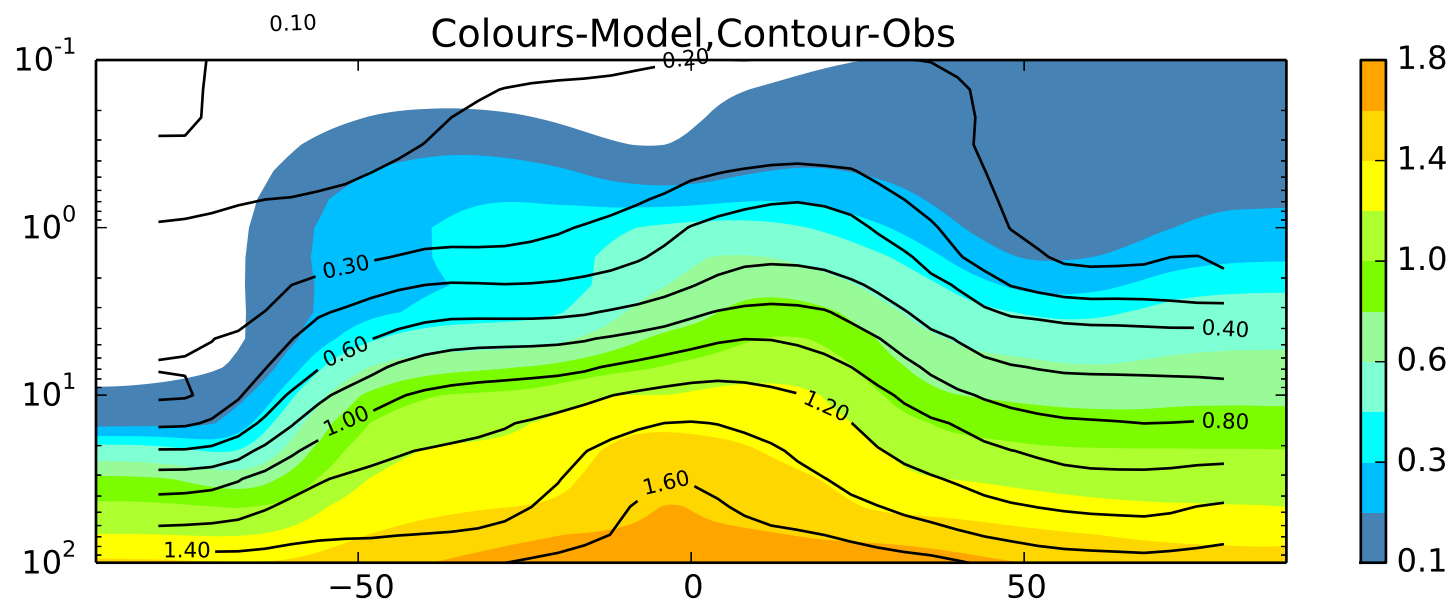
UKCA am124 vs HALOE:
CH4 (ppmv) Jan



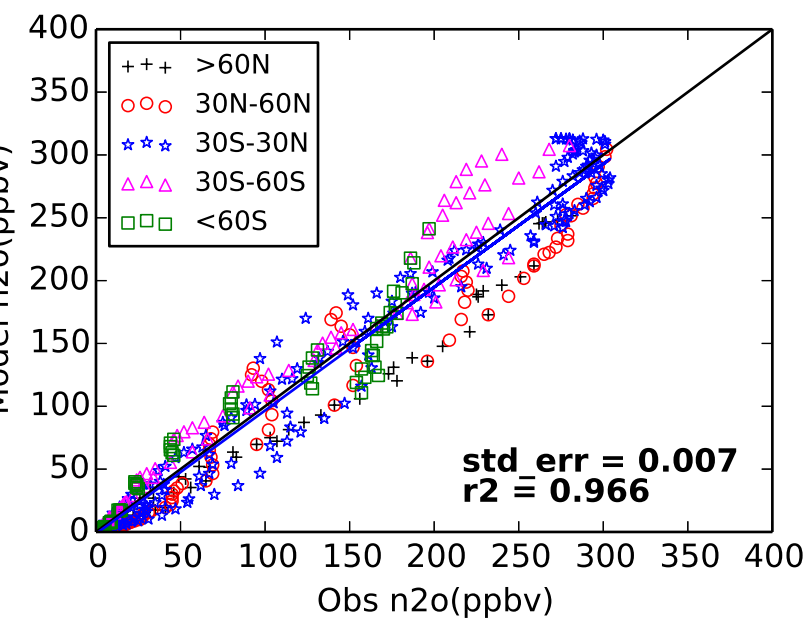
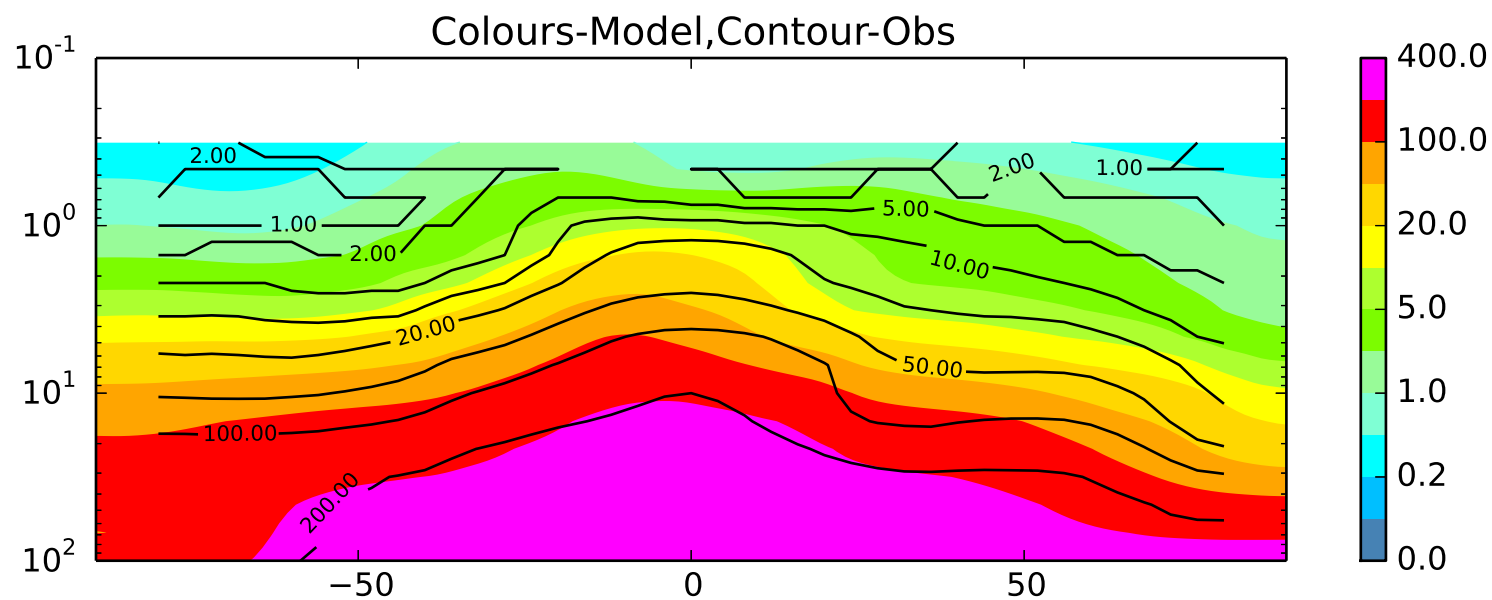
UKCA an114 vs HALOE:
CH₄ (ppmv) Jan



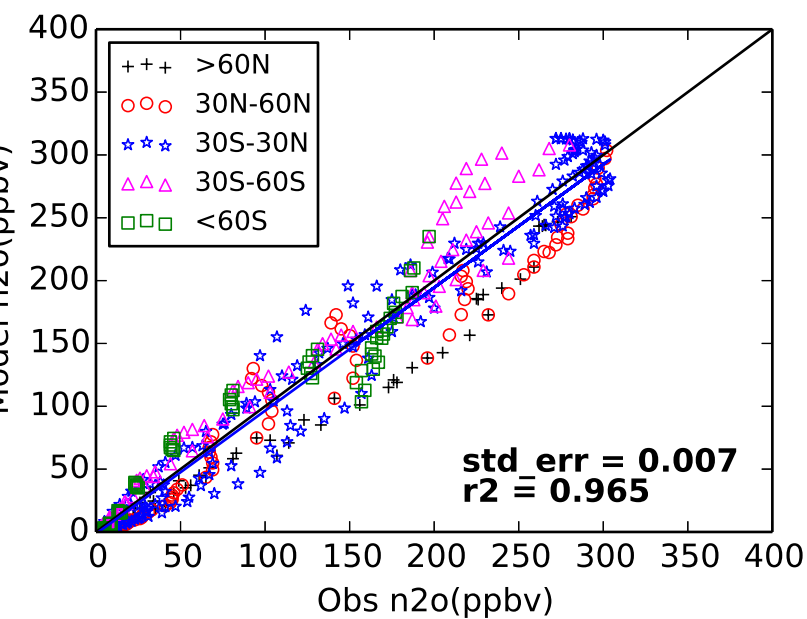
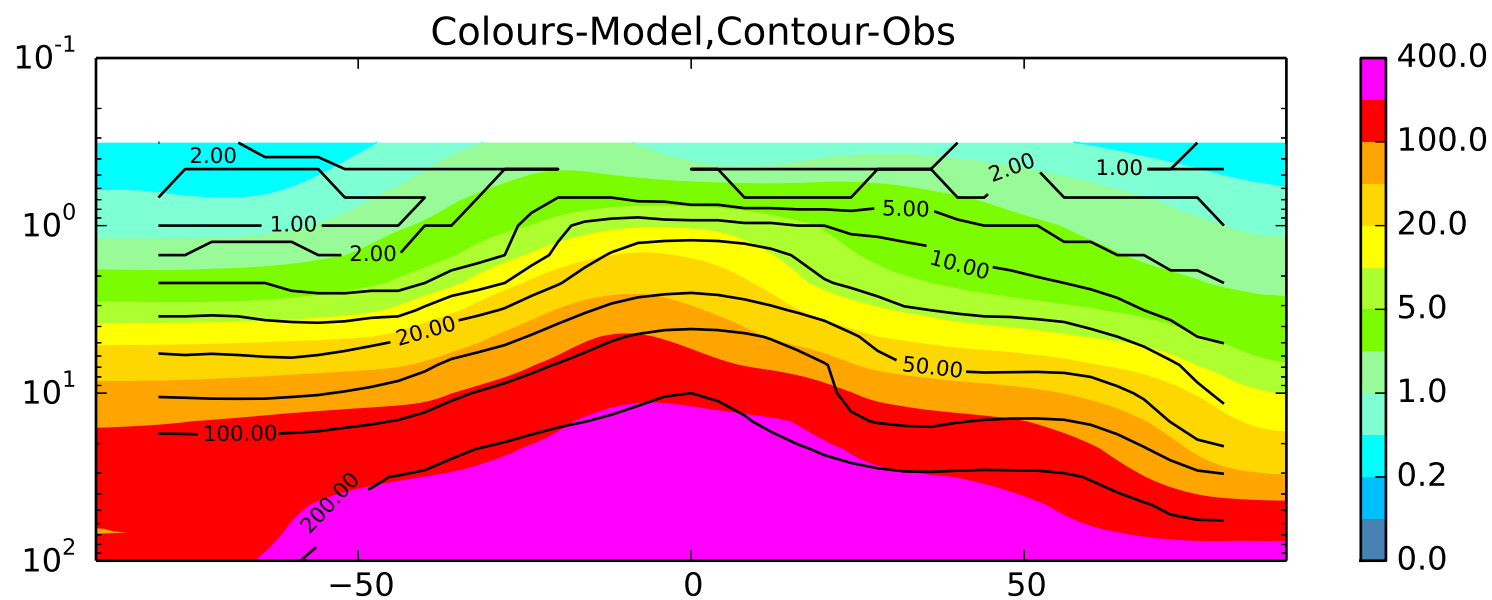
UKCA am124 vs HALOE:
CH4 (ppmv) Jul



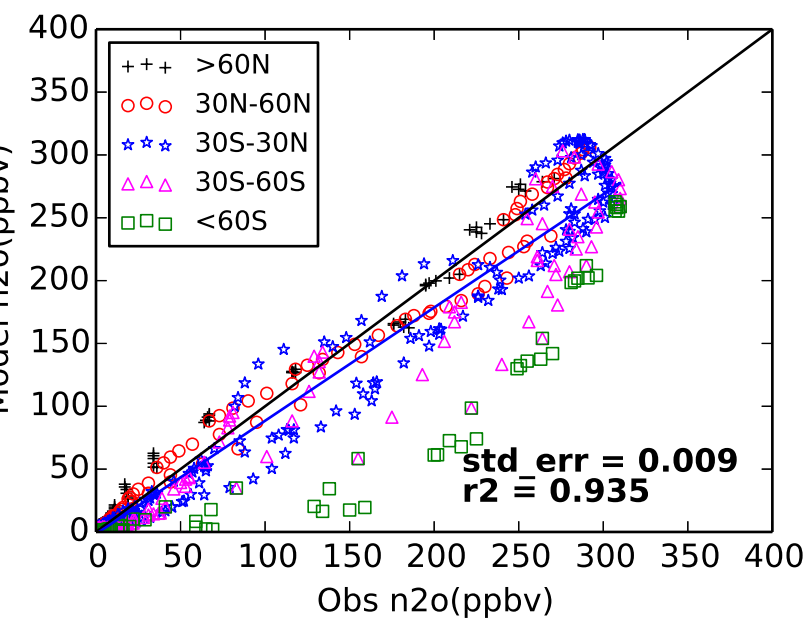
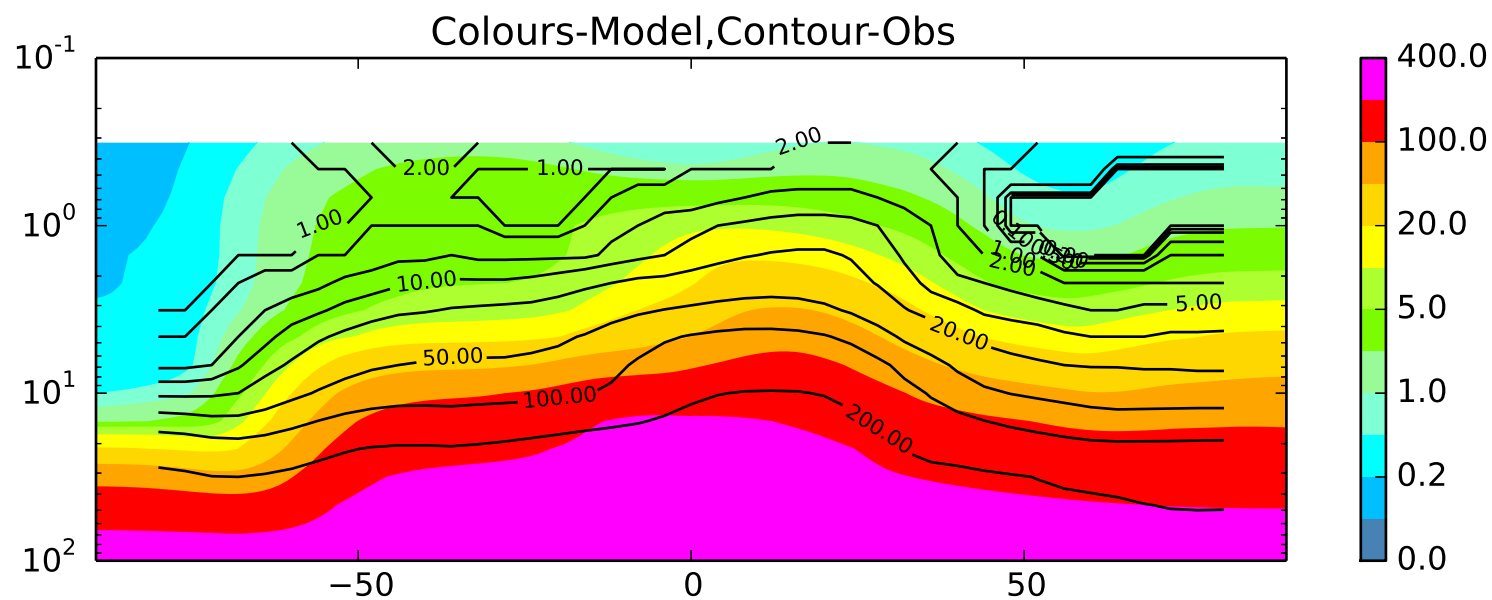
UKCA an114 vs HALOE:
CH4 (ppmv) Jul



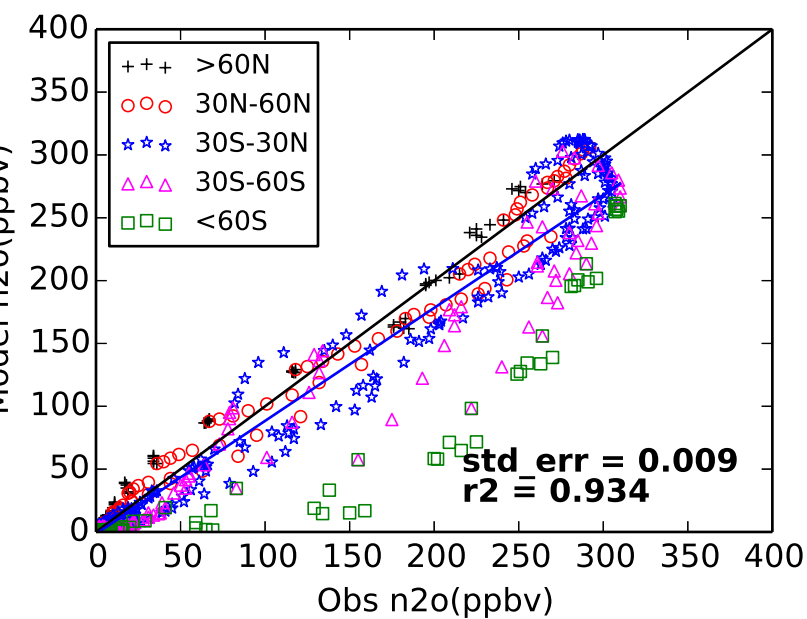
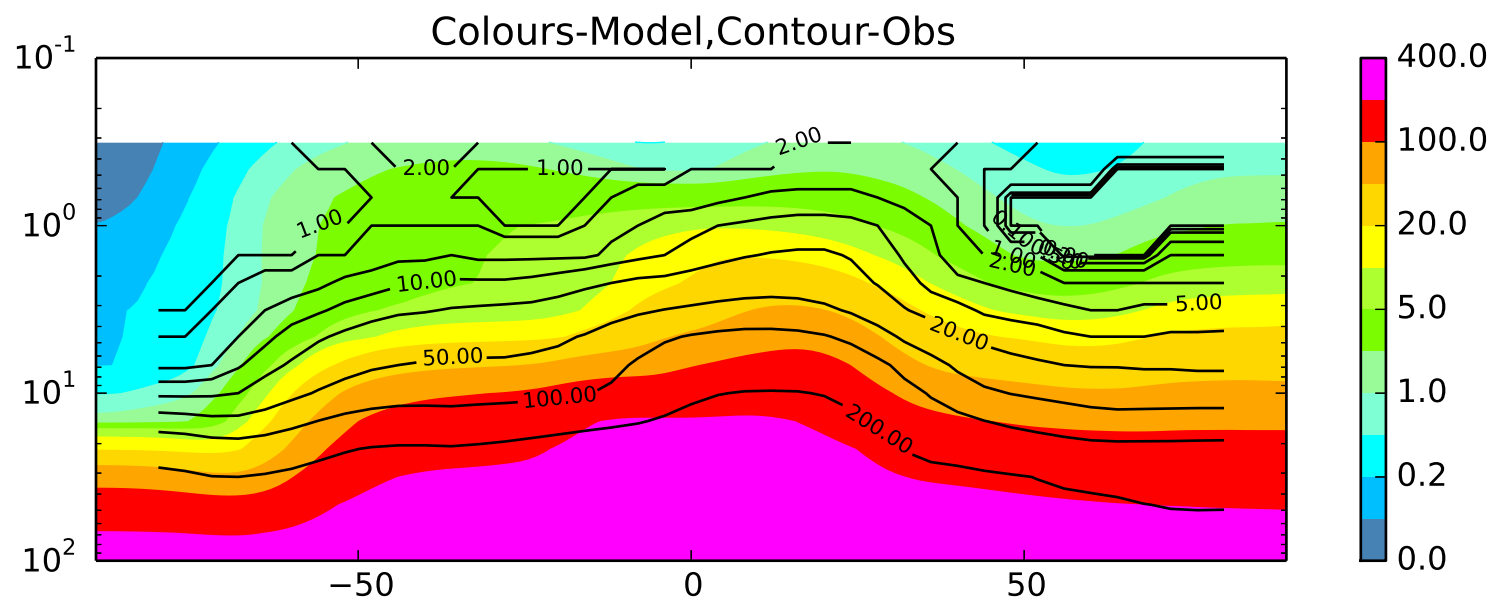
UKCA am124 vs HALOE:
N2O (ppmv) Jan



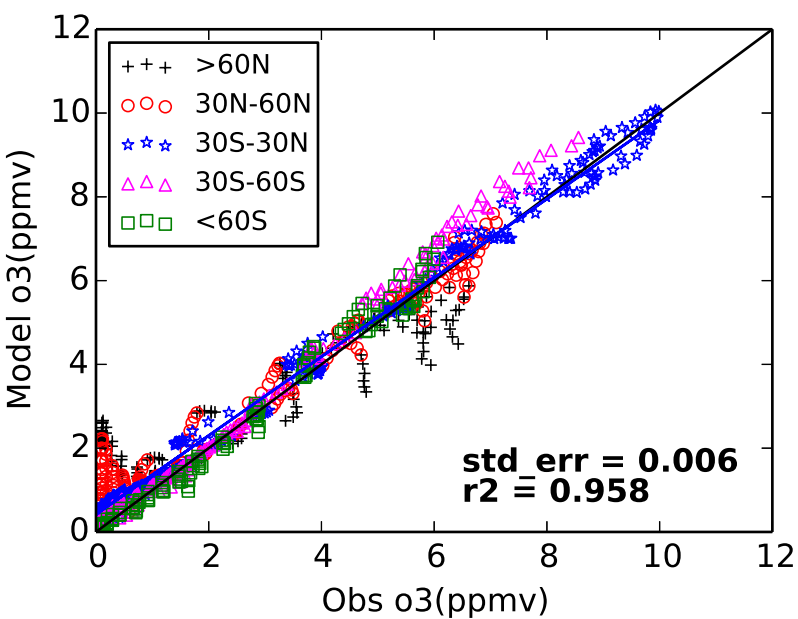
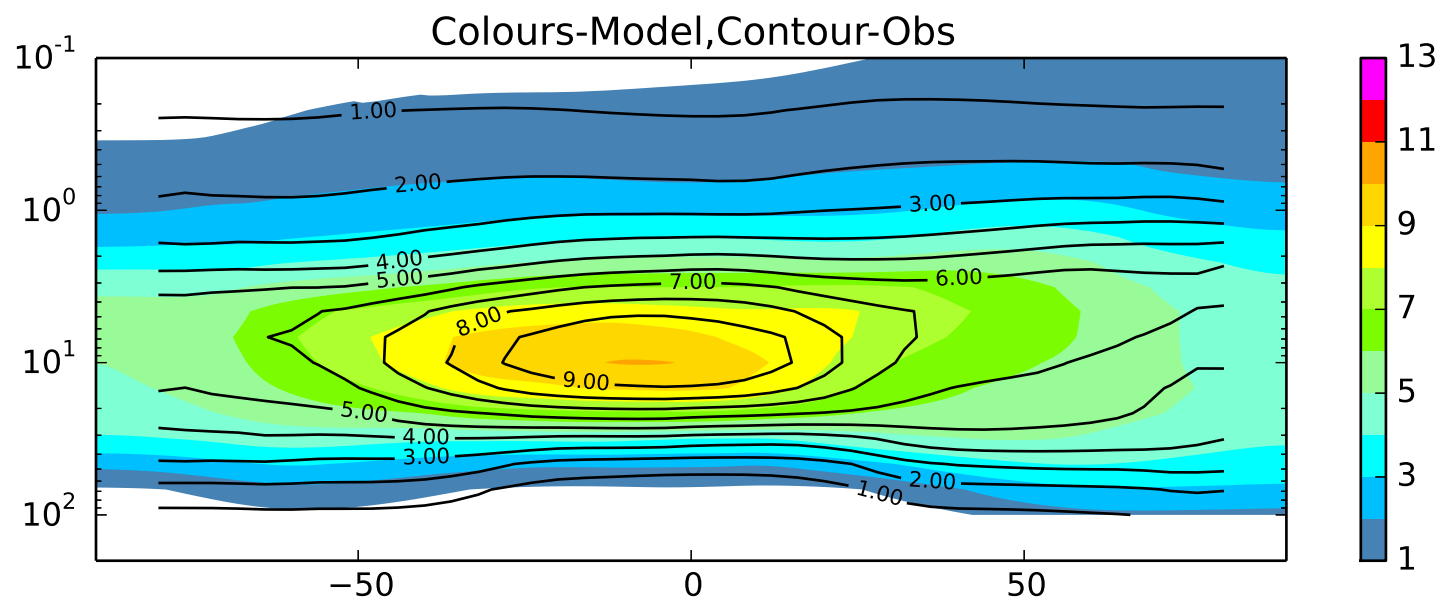
UKCA an114 vs HALOE:
N2O (ppmv) Jan



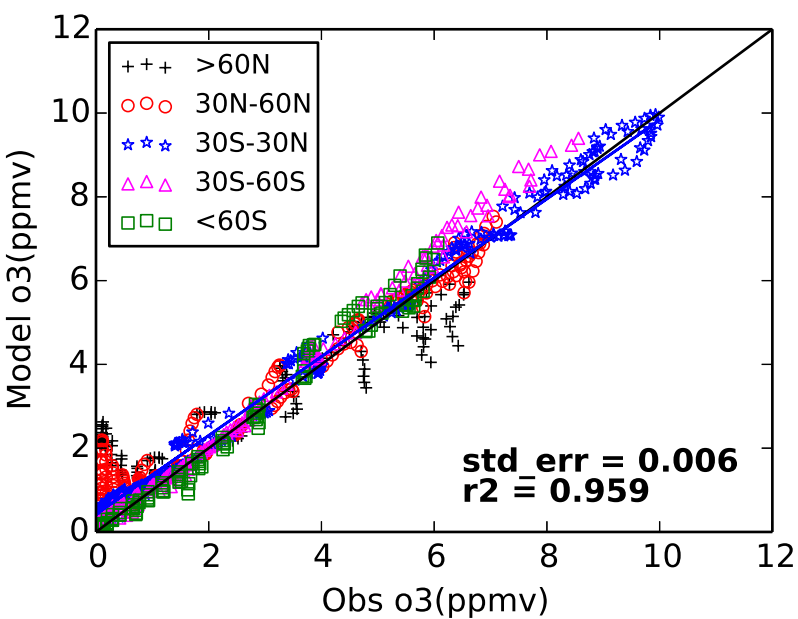
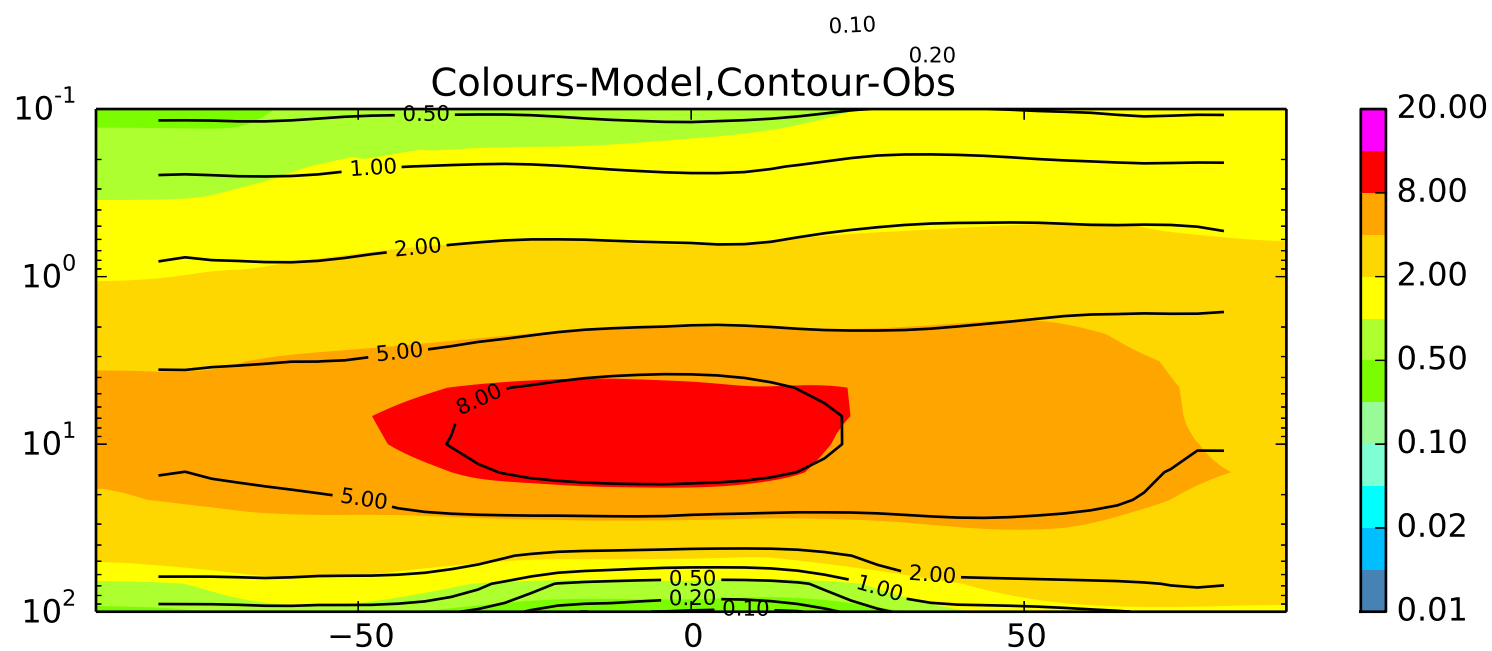
UKCA am124 vs HALOE:
N2O (ppmv) Jul



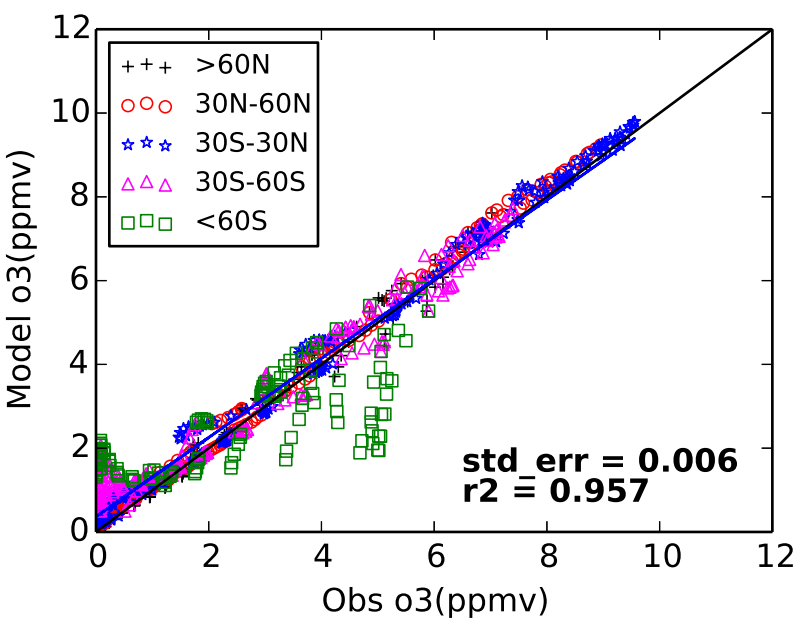
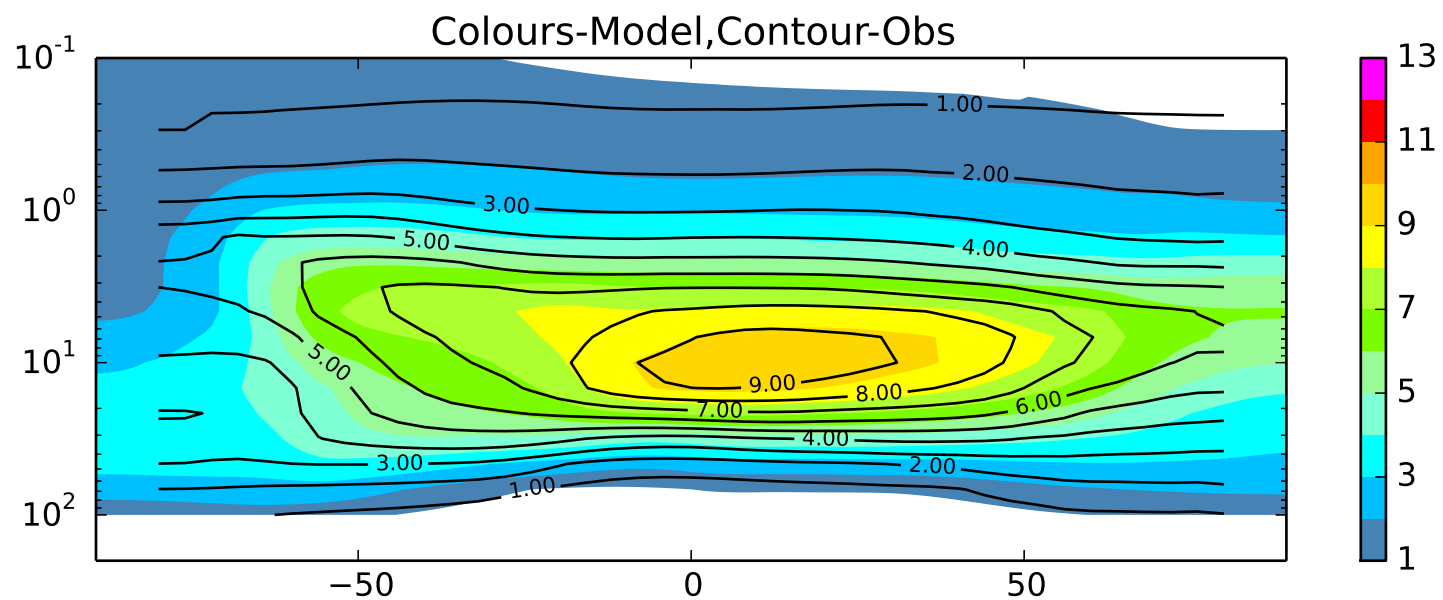
UKCA an114 vs HALOE:
N2O (ppmv) Jul



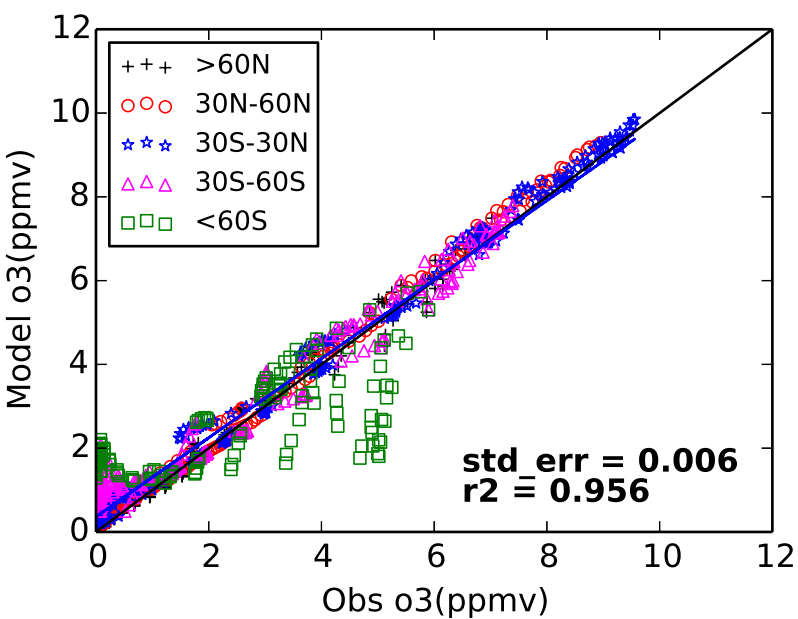
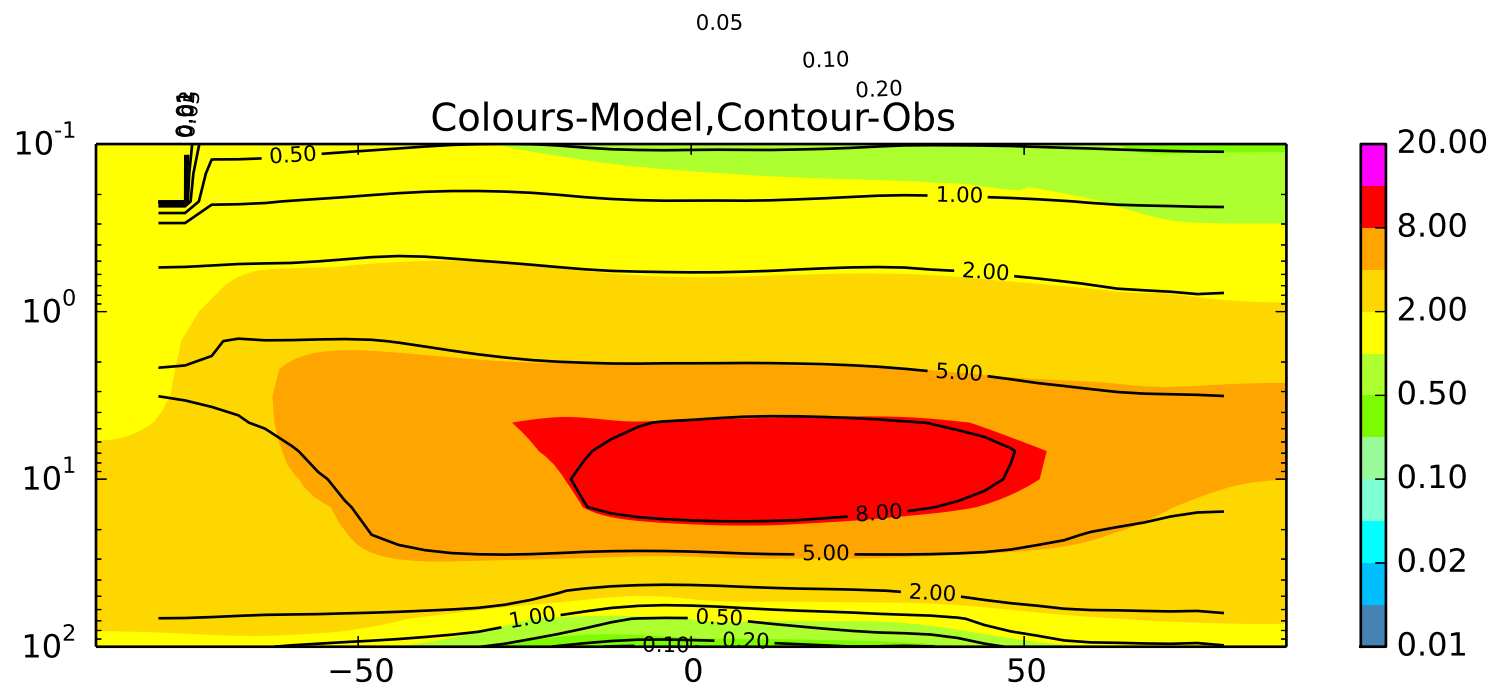
UKCA am124 vs HALOE:
O3 (ppmv) Jan



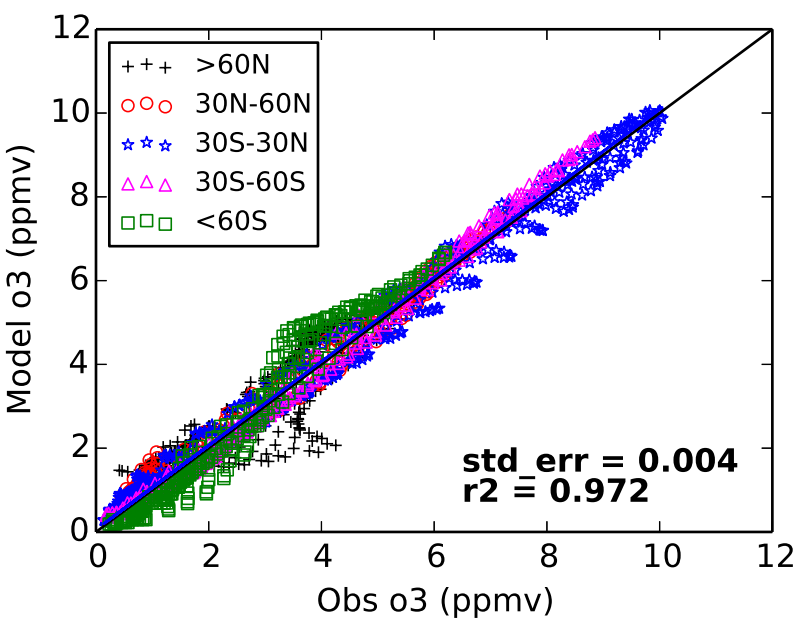
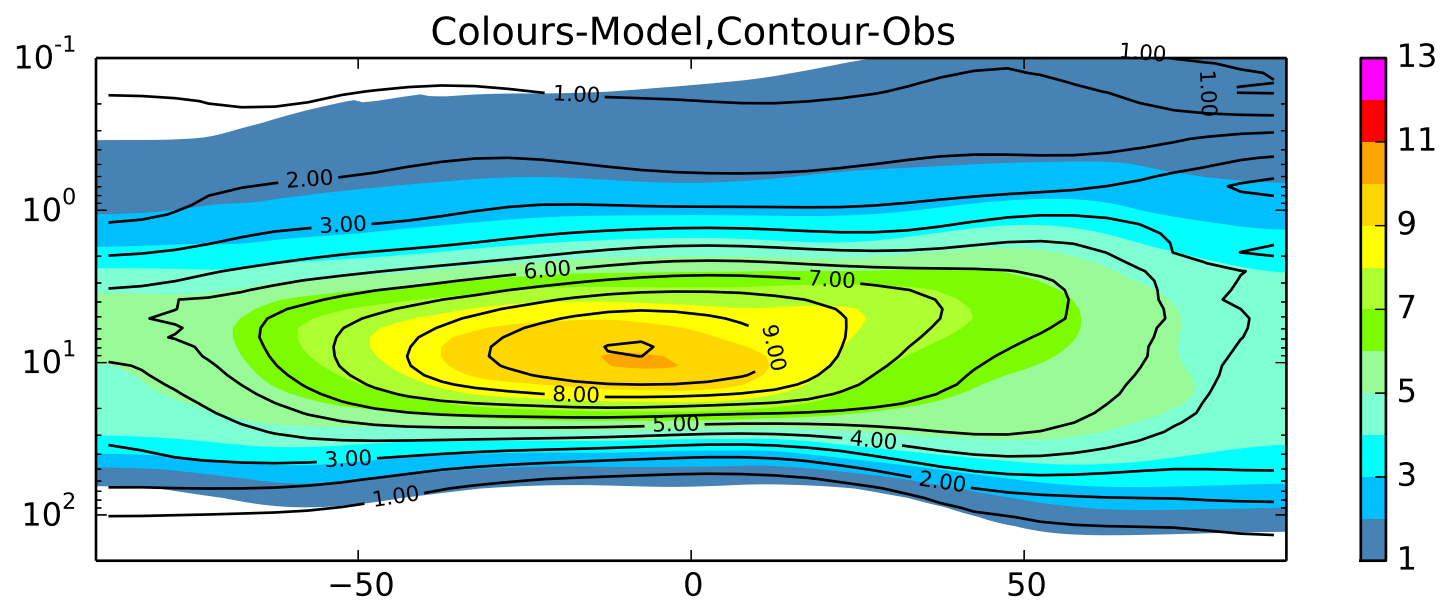
UKCA an114 vs HALOE:
 O3 (ppmv) Jan



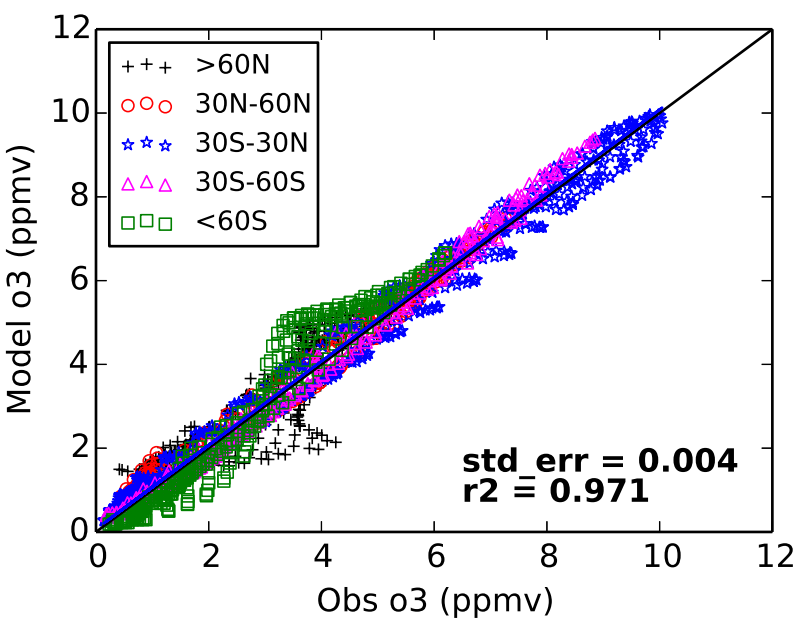
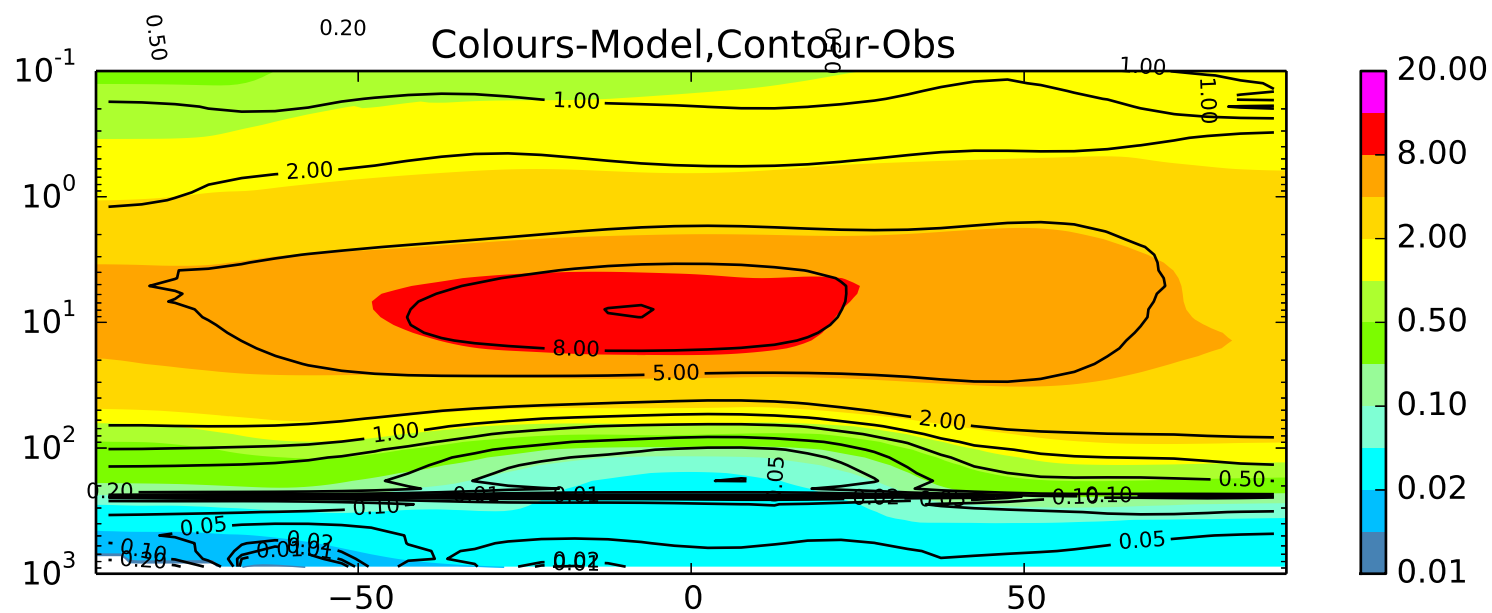
UKCA am124 vs HALOE:
O₃ (ppmv) Jul



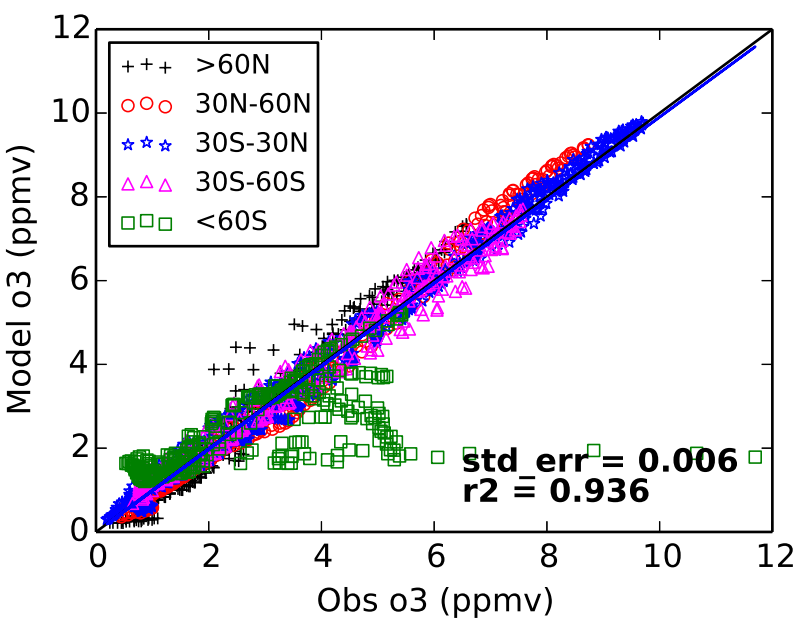
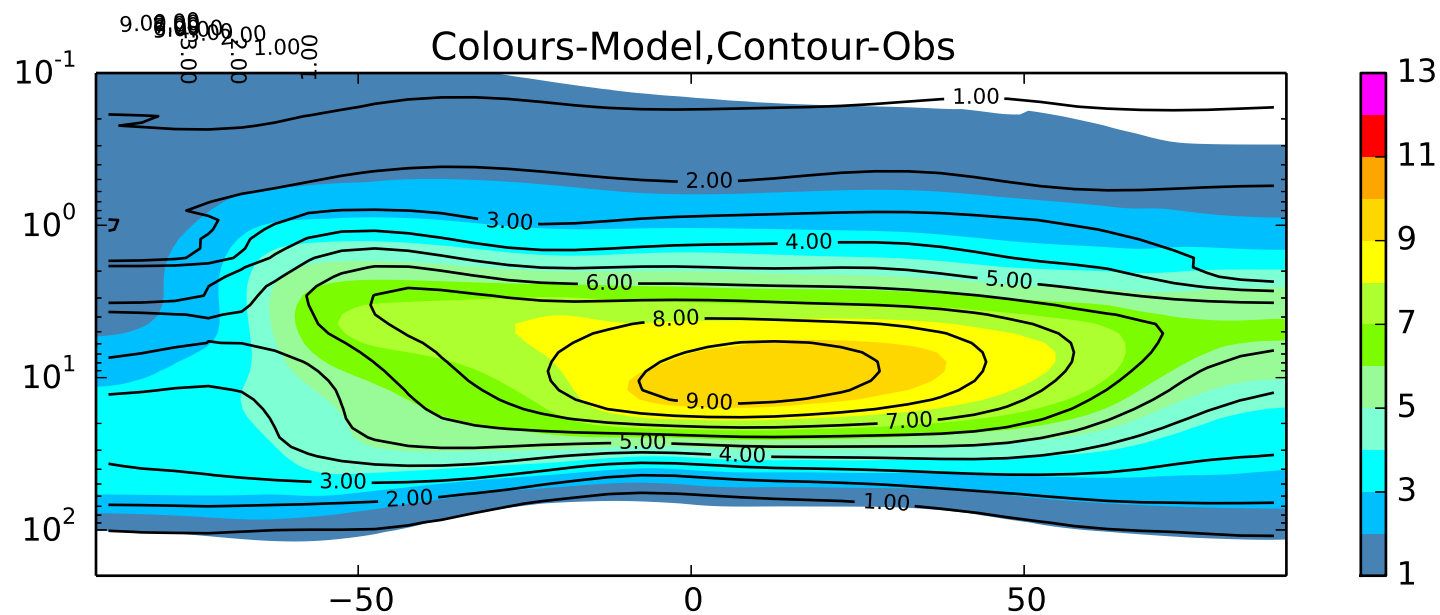
UKCA an114 vs HALOE:
O3 (ppmv) Jul



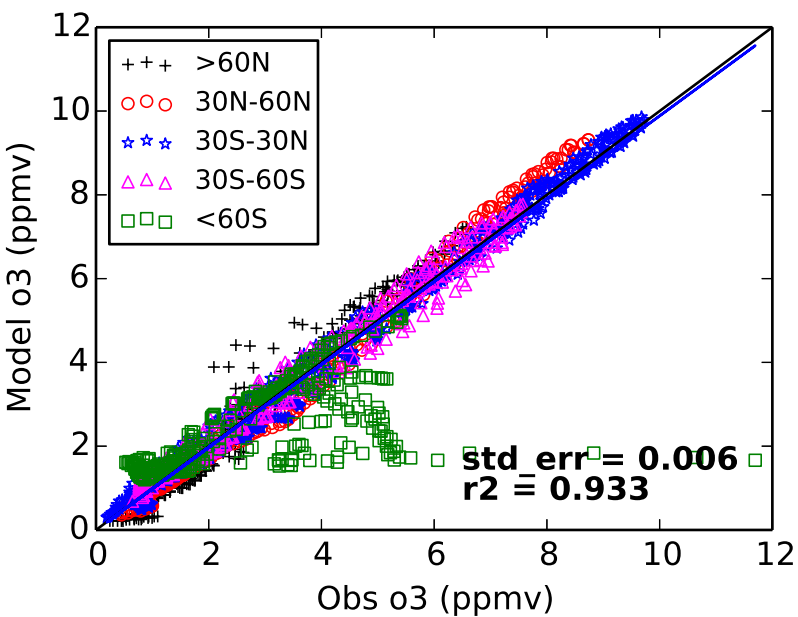
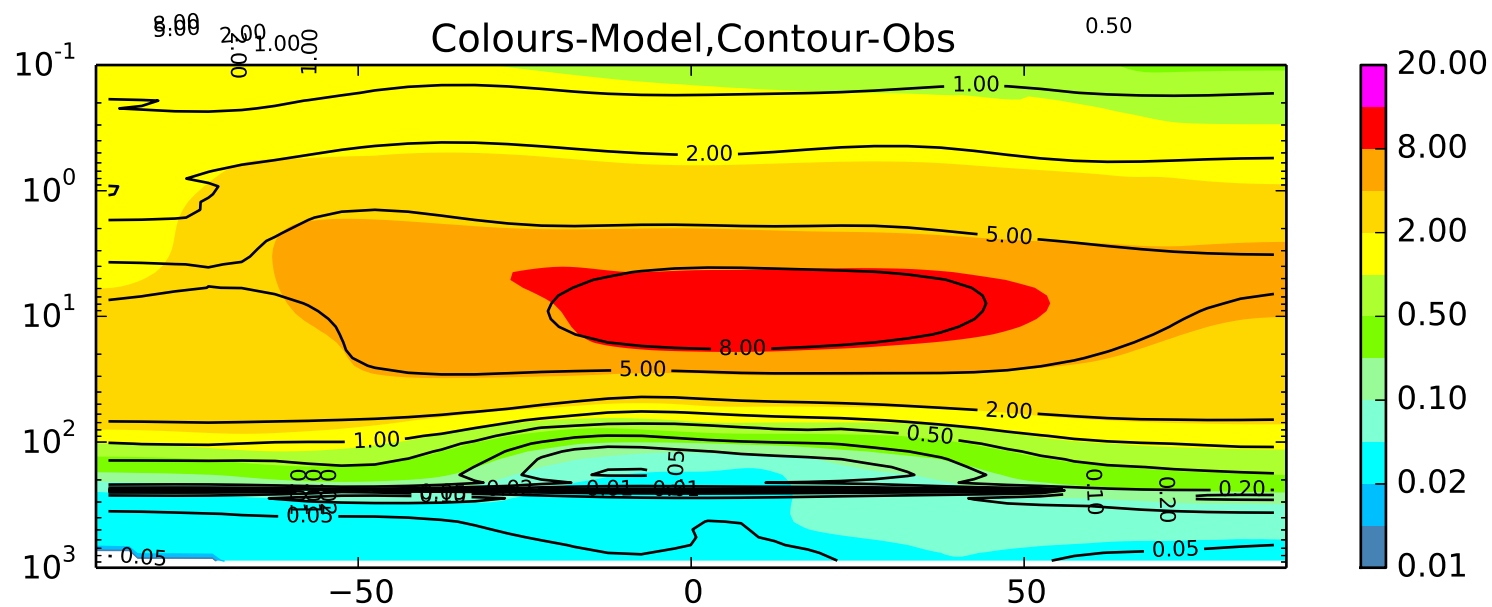
UKCA am124 vs NIWA-CCMVal:
O₃ (ppmv) Jan



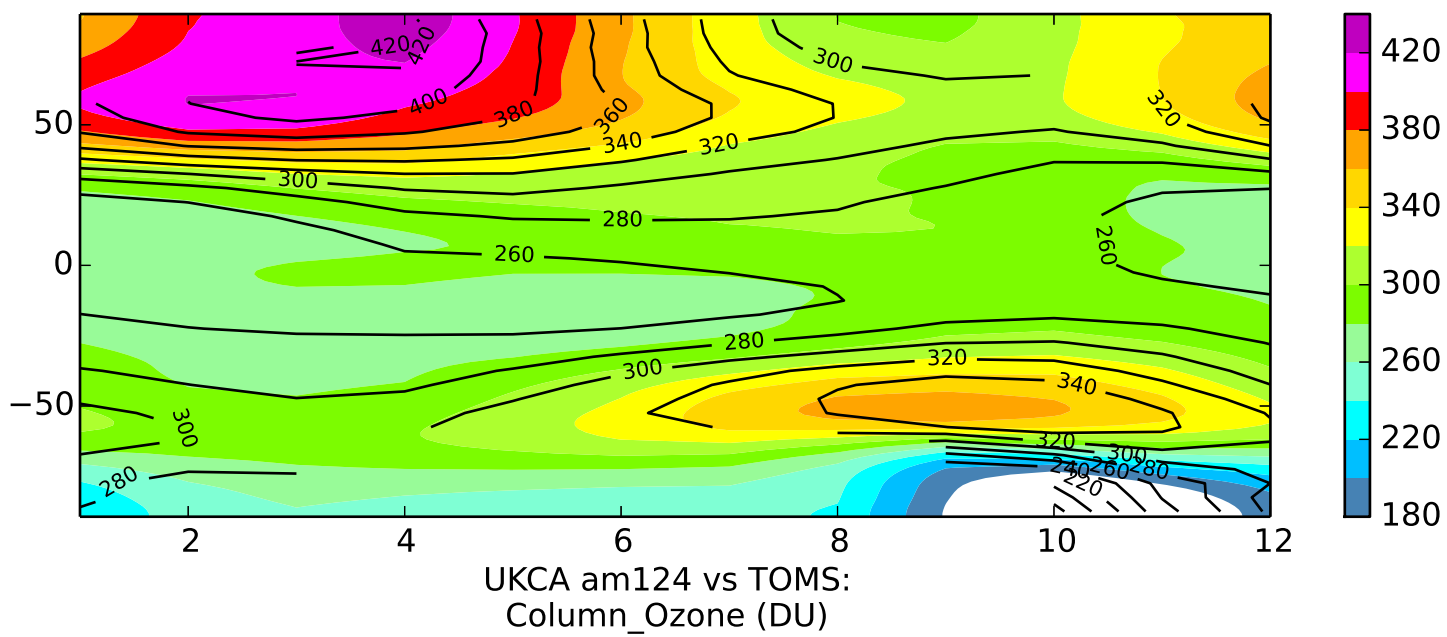
UKCA an114 vs NIWA-CCMVal:
O3 (ppmv) Jan

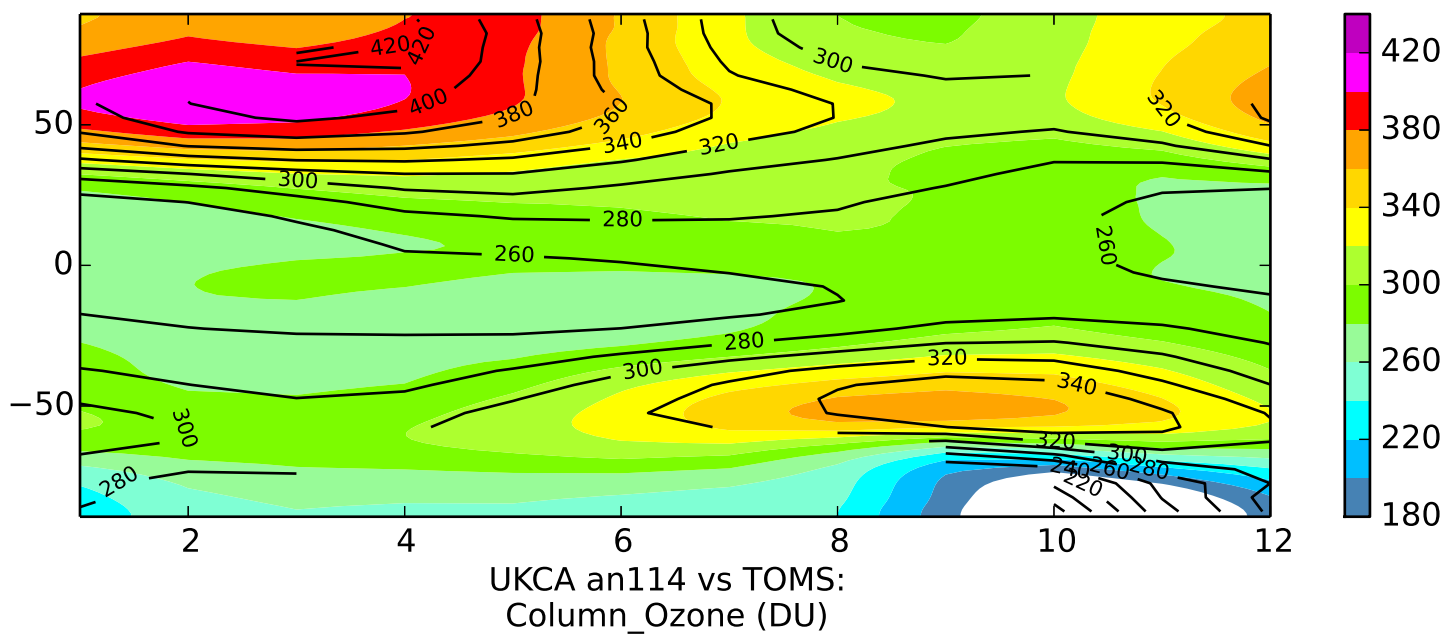


UKCA am124 vs NIWA-CCMVal:
O₃ (ppmv) Jul

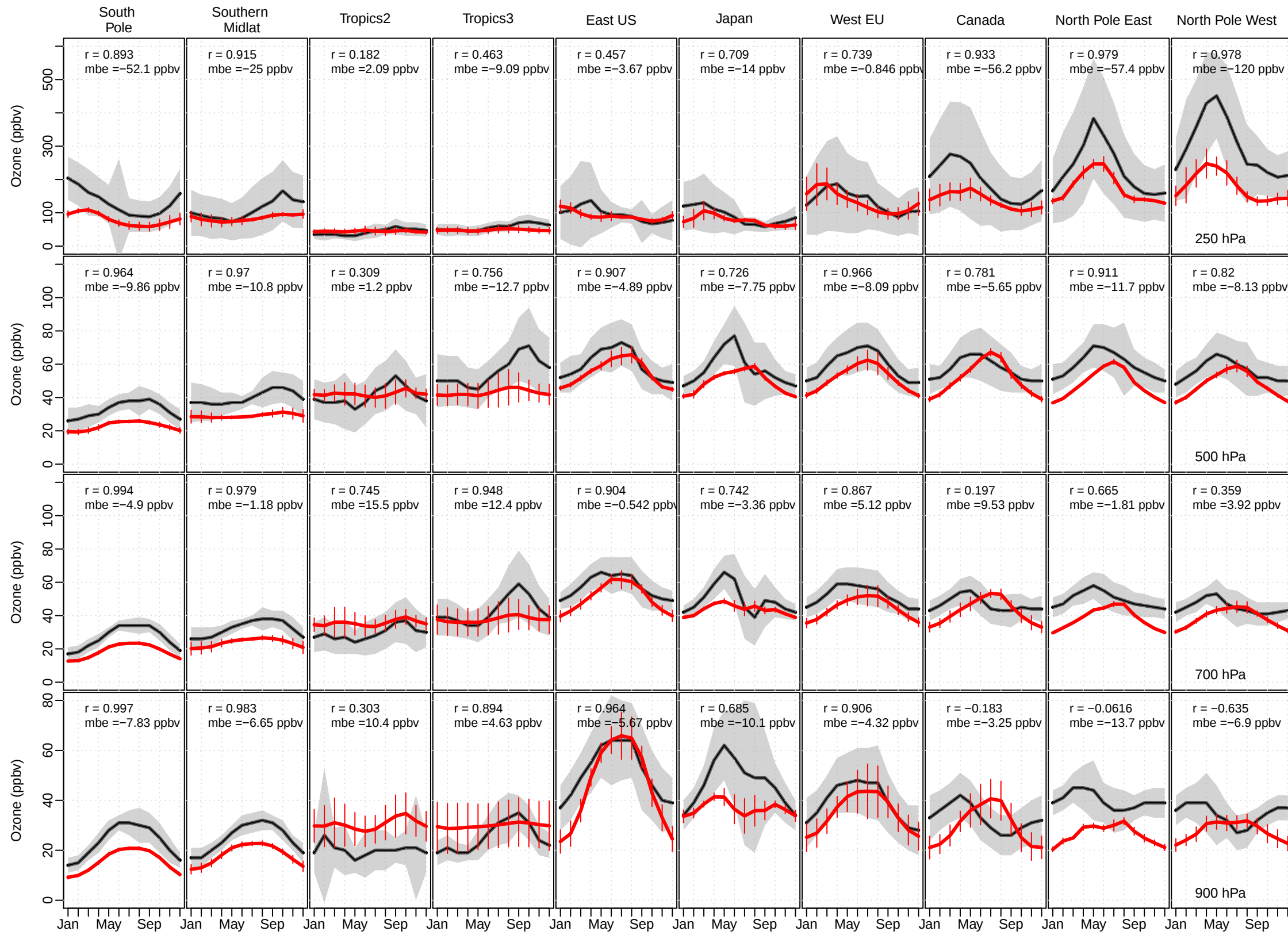


UKCA an114 vs NIWA-CCMVal:
O3 (ppmv) Jul

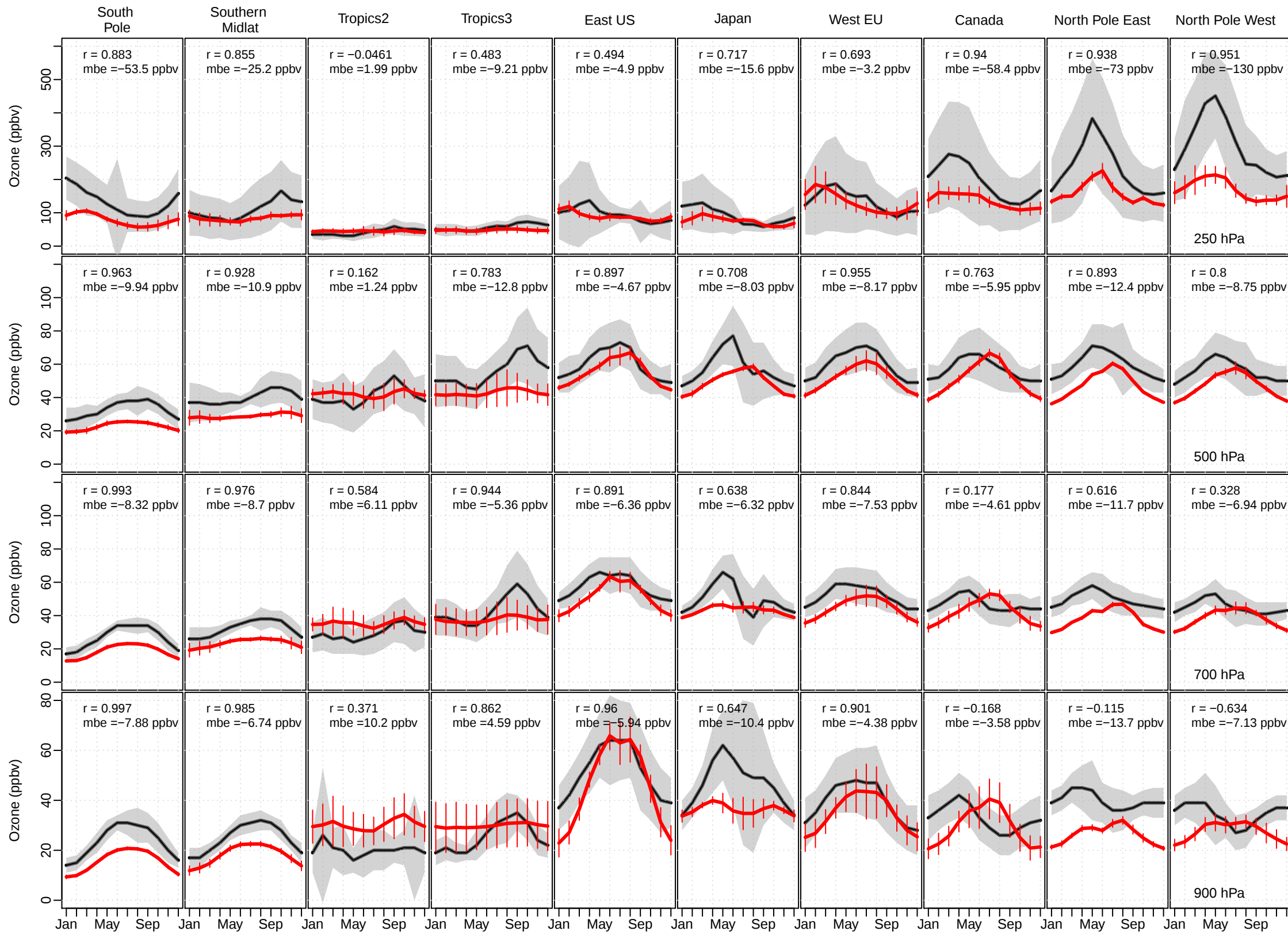




am124 Tilmes ozone sonde comparison

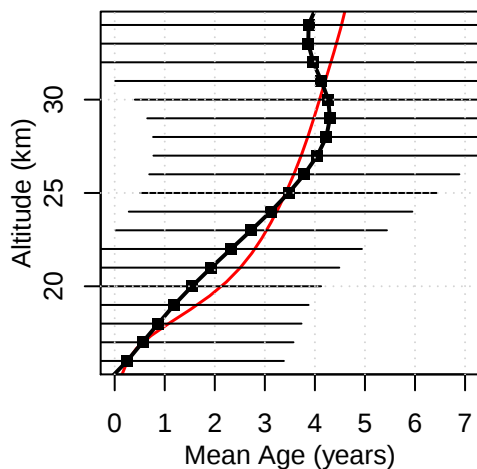


an114 Tilmes ozone sonde comparison

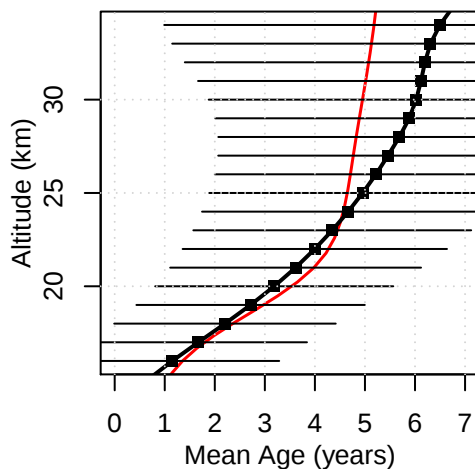


UKCA am124 Mean Age of Air

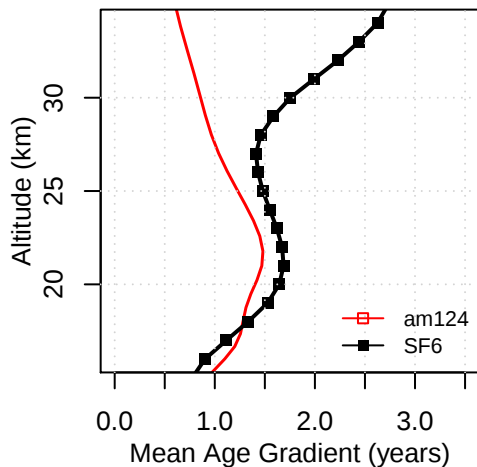
Tropical Mean Age Profile



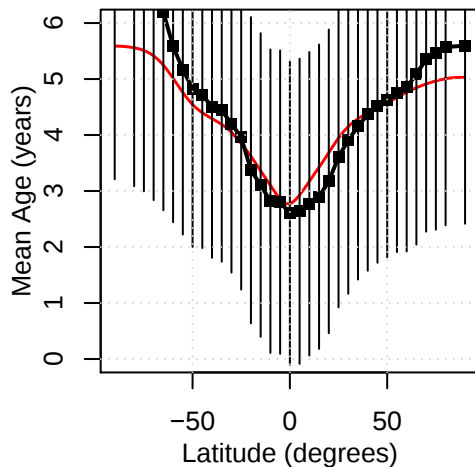
Midlatitude Mean Age Profile



Trop-Midlat Mean Age Gradient Prof

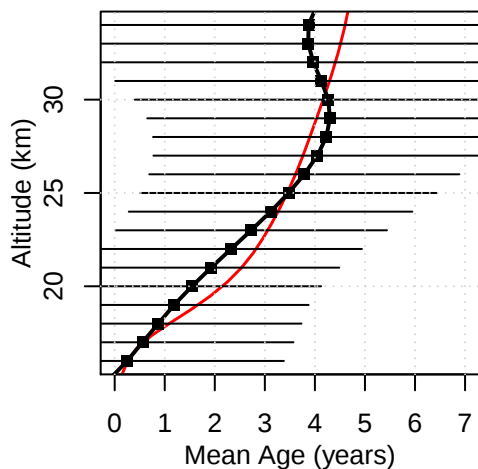


Mean Age, 23km (~50hPa)

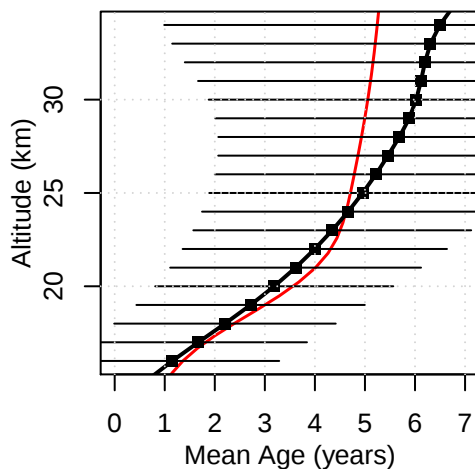


UKCA an114 Mean Age of Air

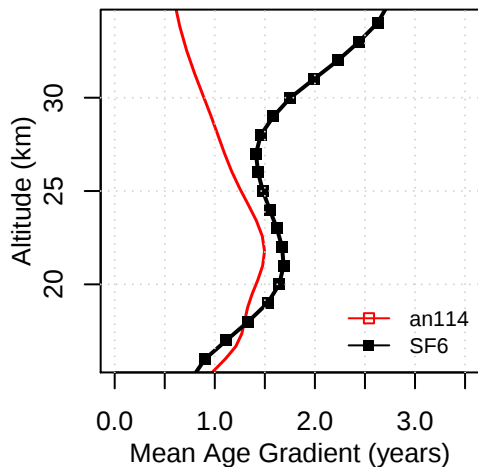
Tropical Mean Age Profile



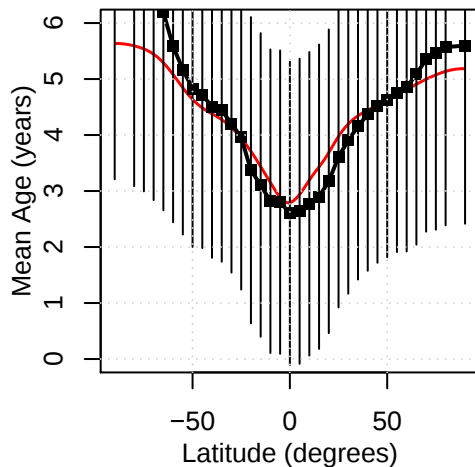
Midlatitude Mean Age Profile



Trop-Midlat Mean Age Gradient Prof

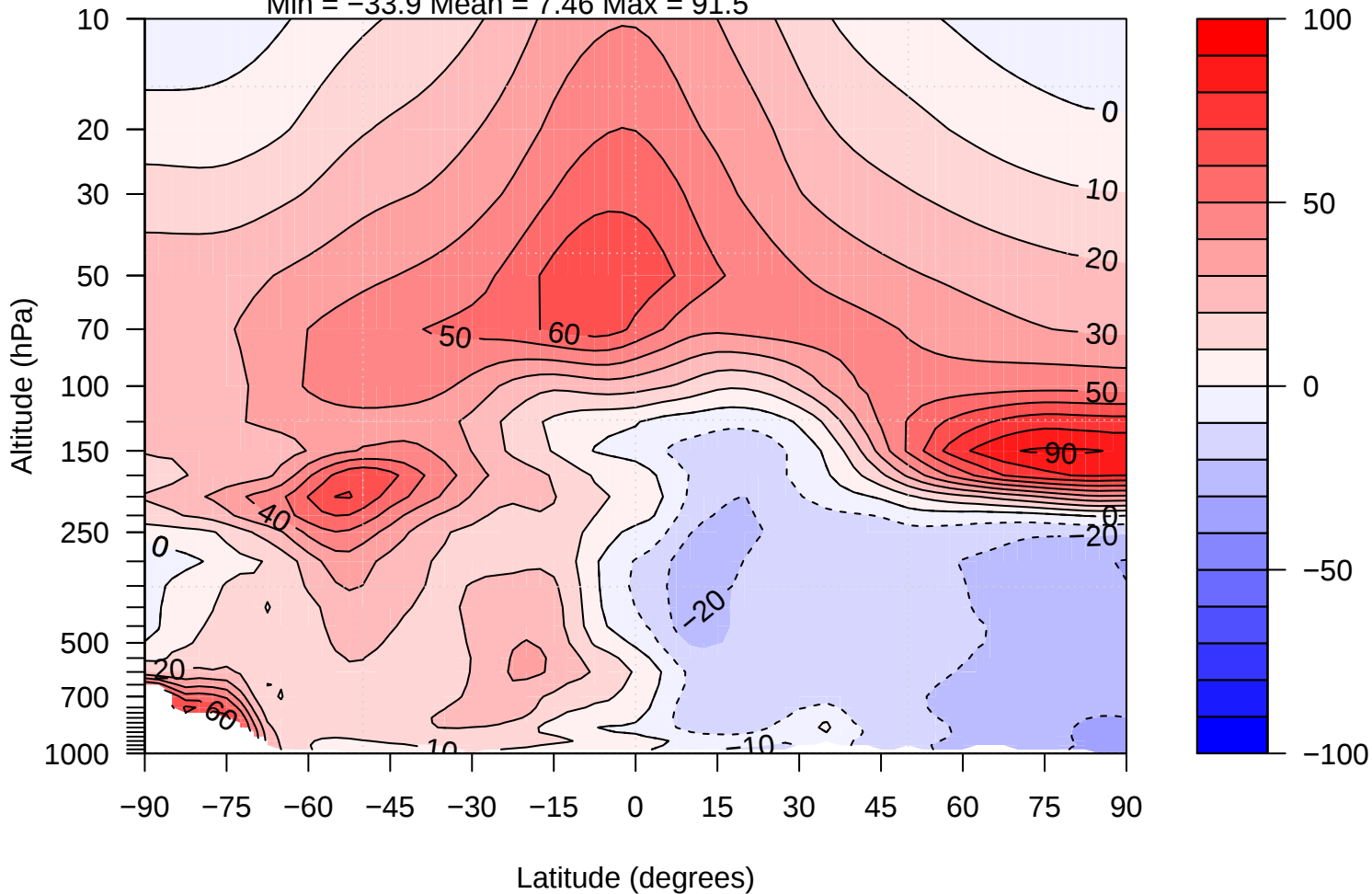


Mean Age, 23km (~50hPa)



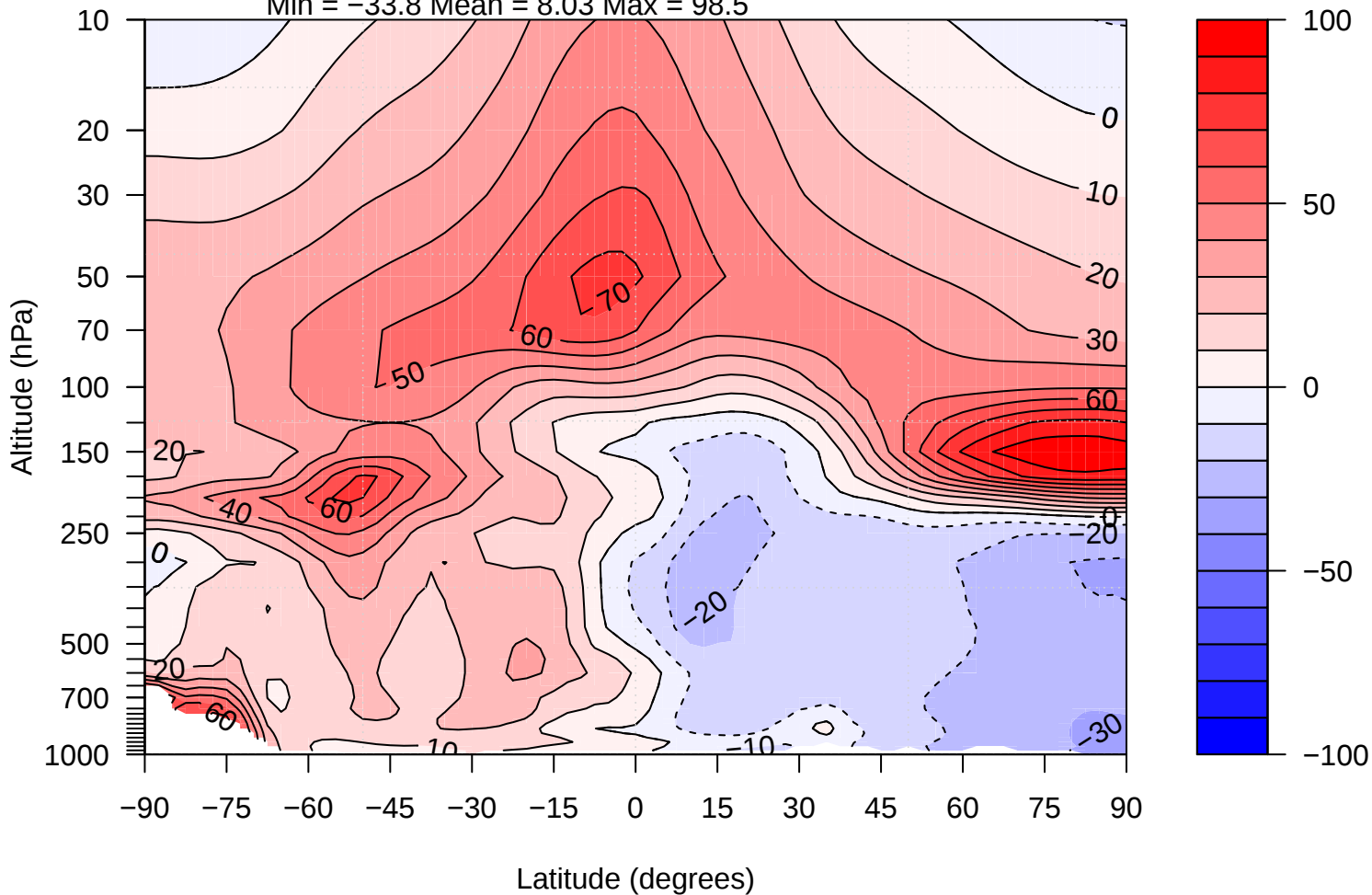
am124 – ERA Q bias

Min = -33.9 Mean = 7.46 Max = 91.5

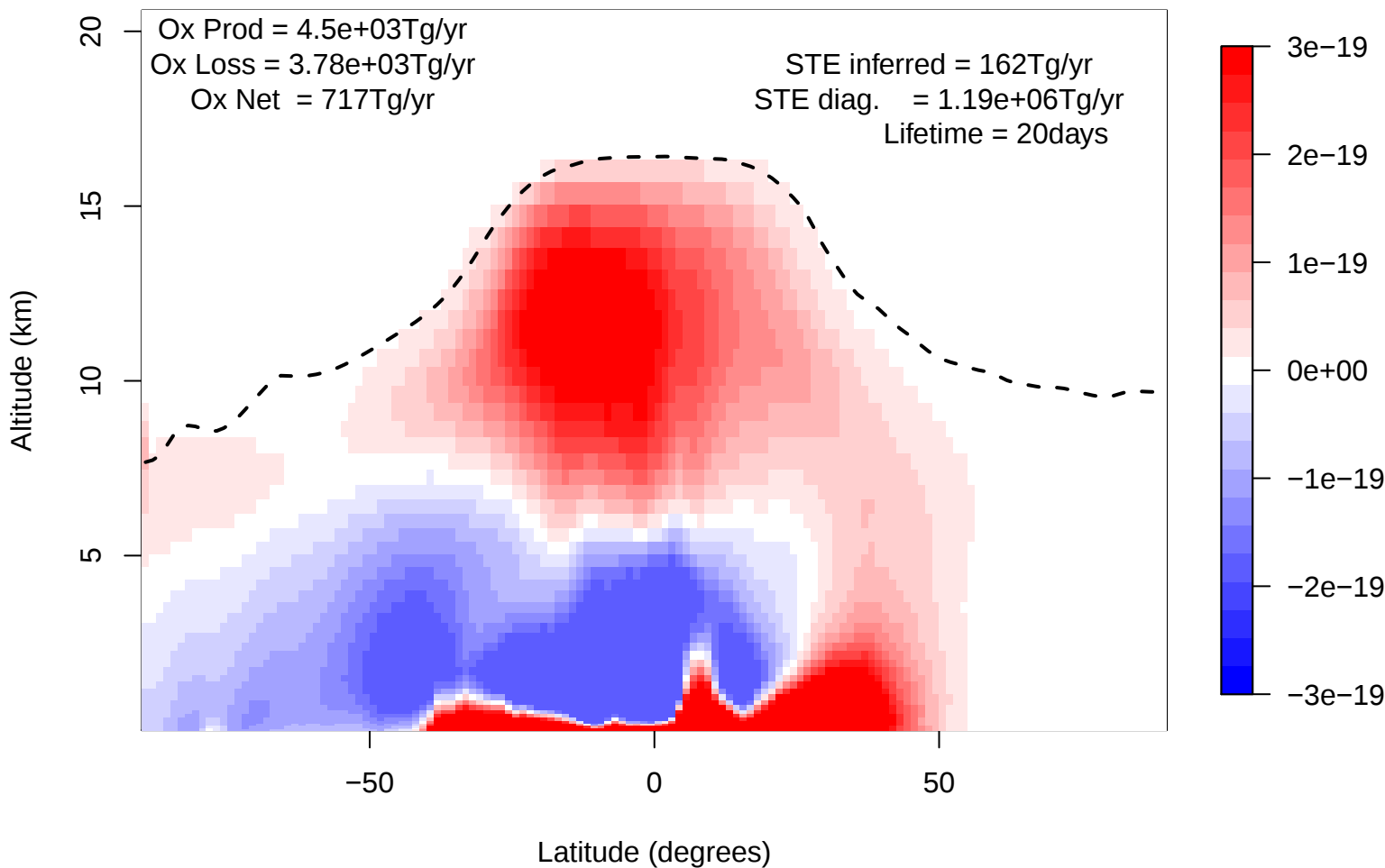


an114 - ERA Q bias

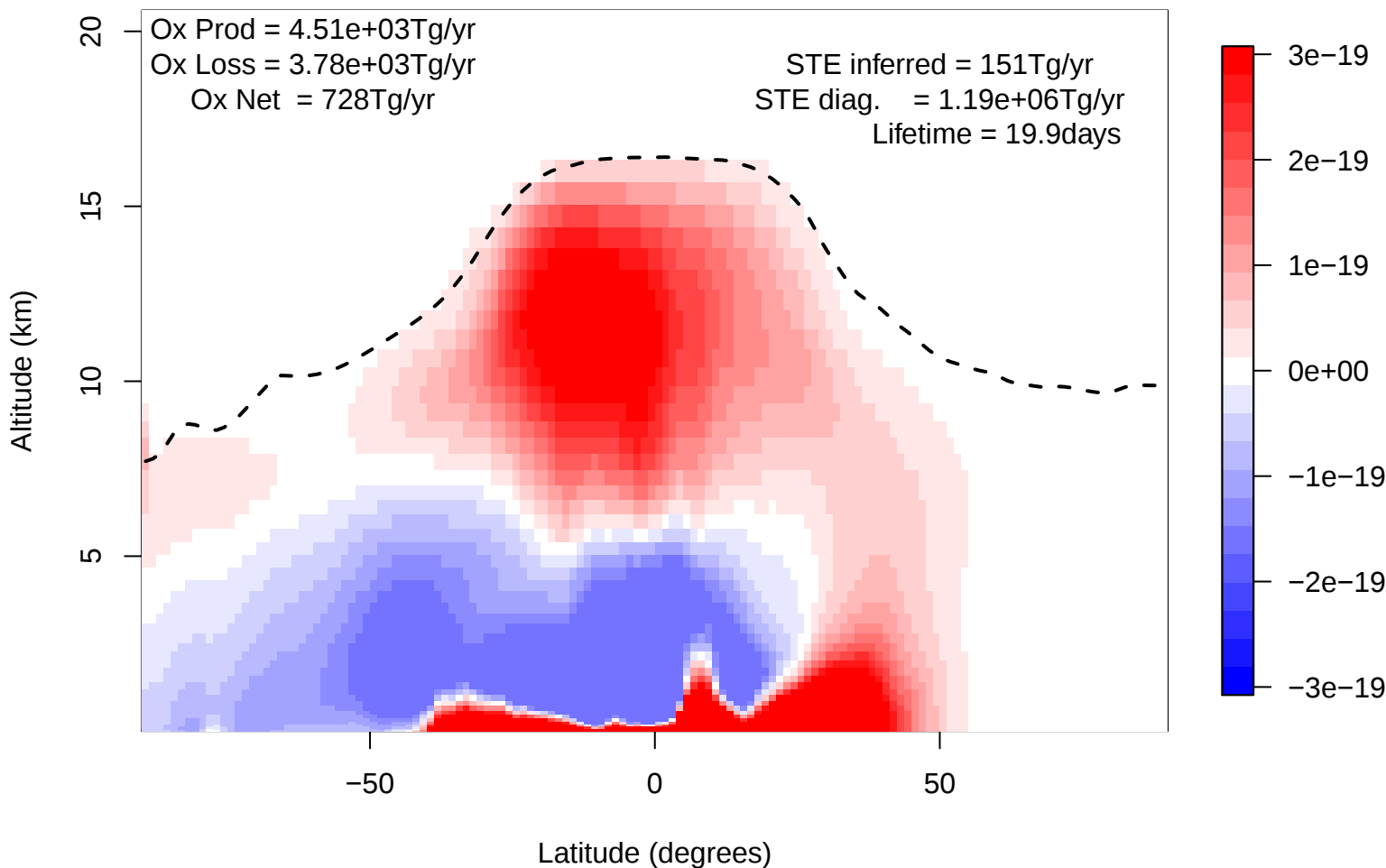
Min = -33.8 Mean = 8.03 Max = 98.5

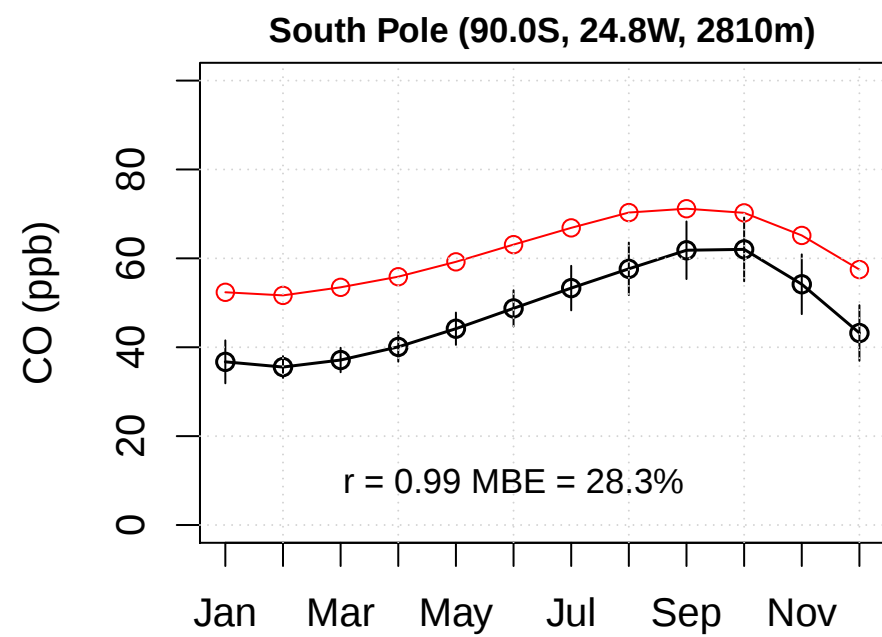
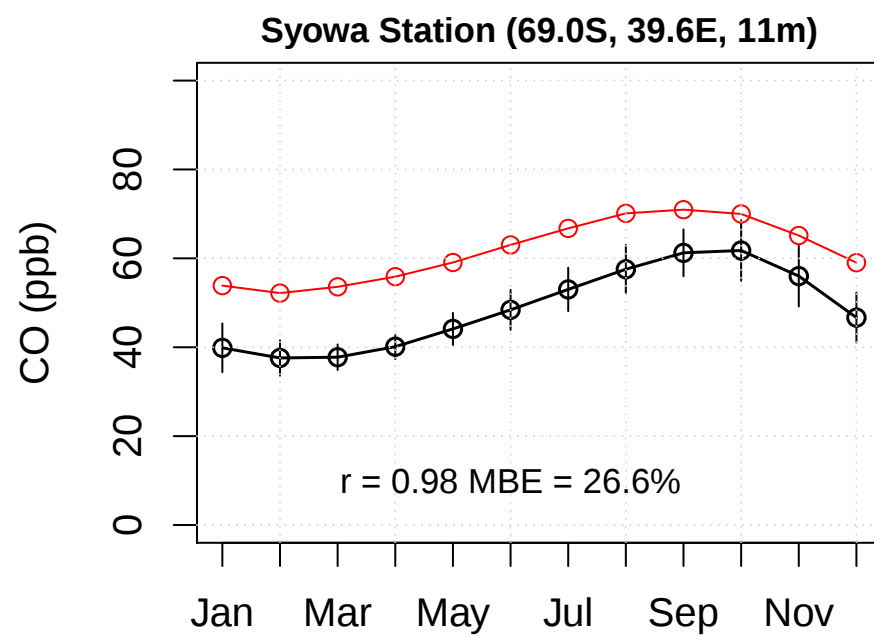
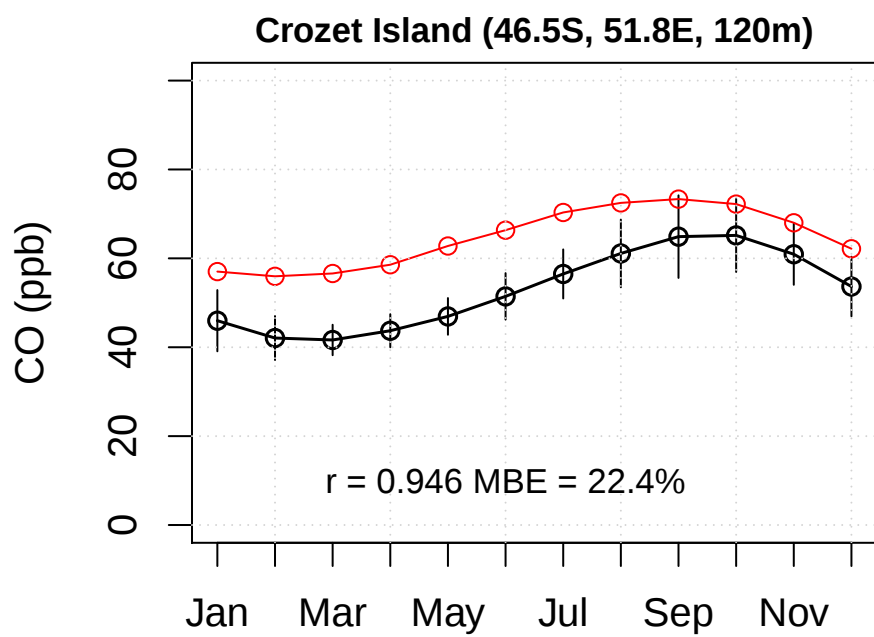
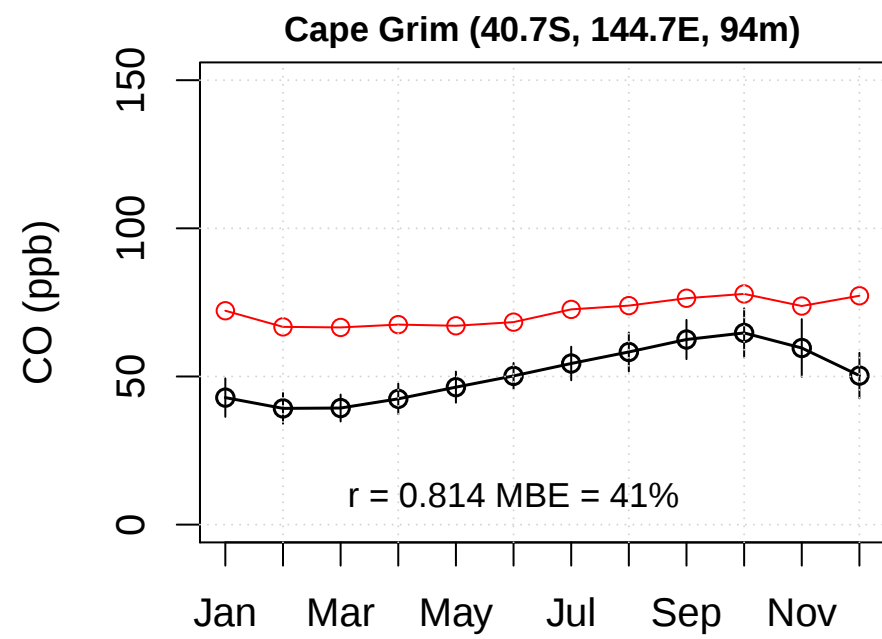
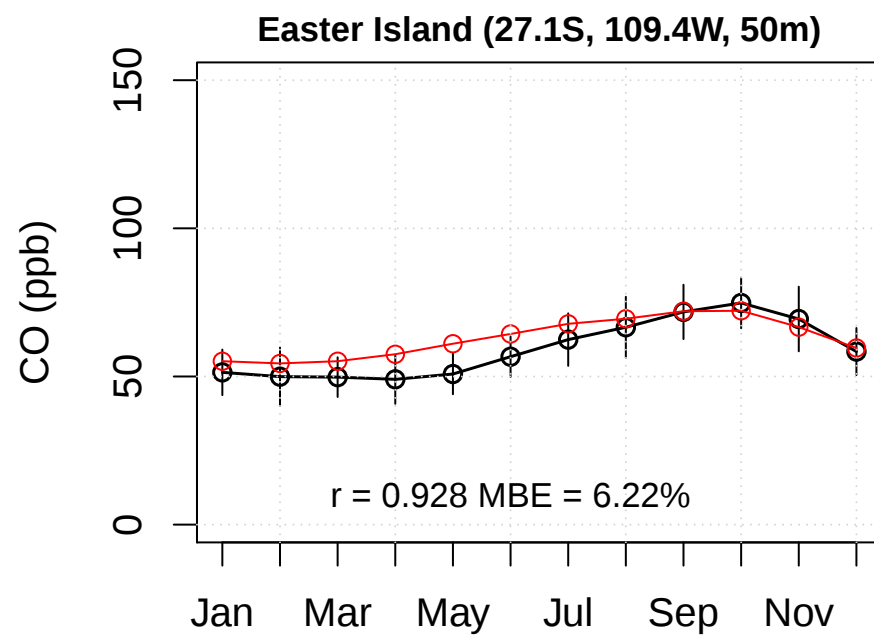
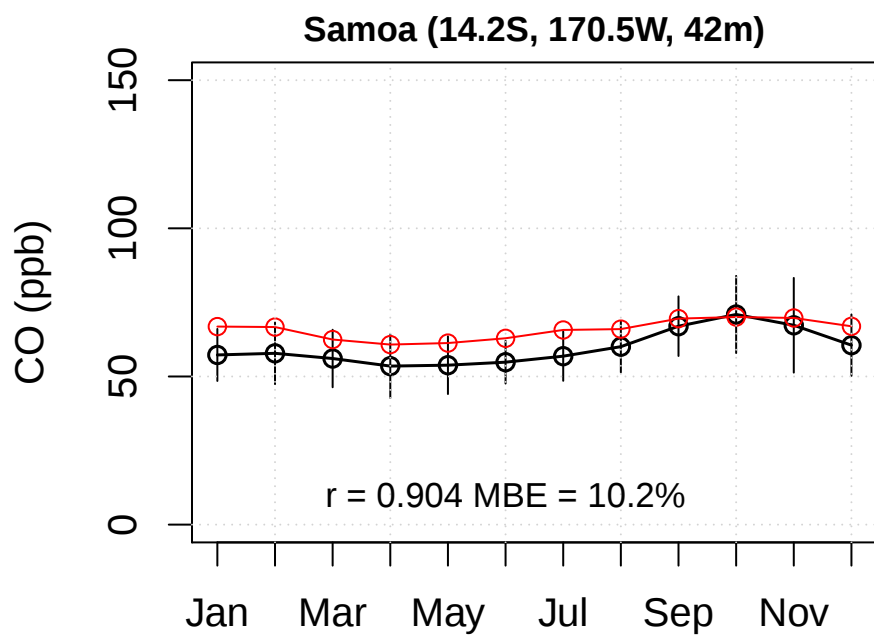
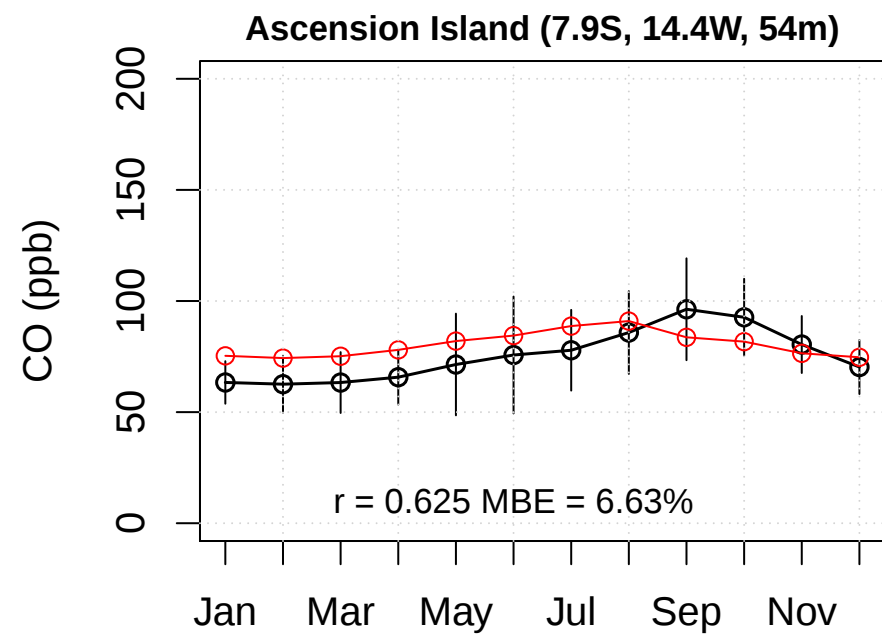
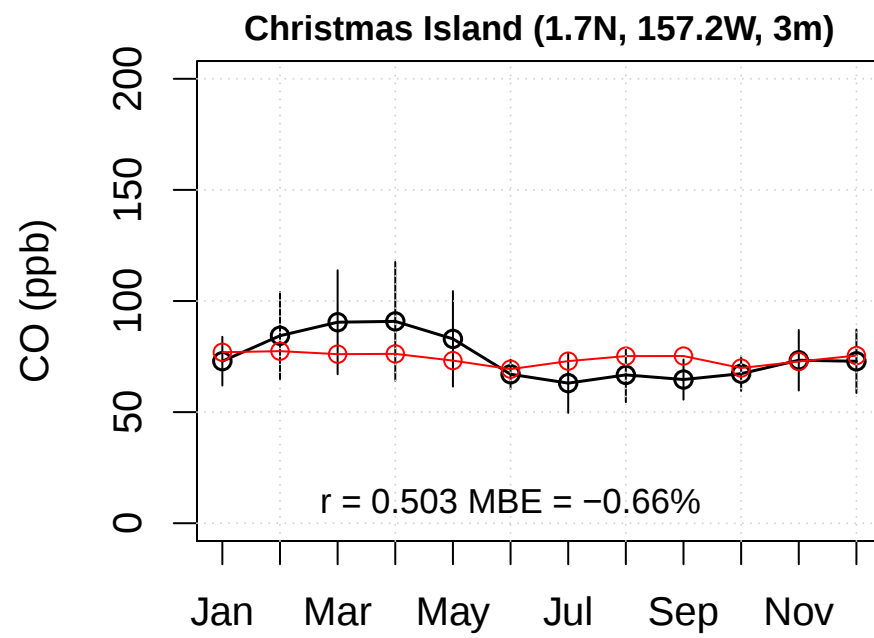
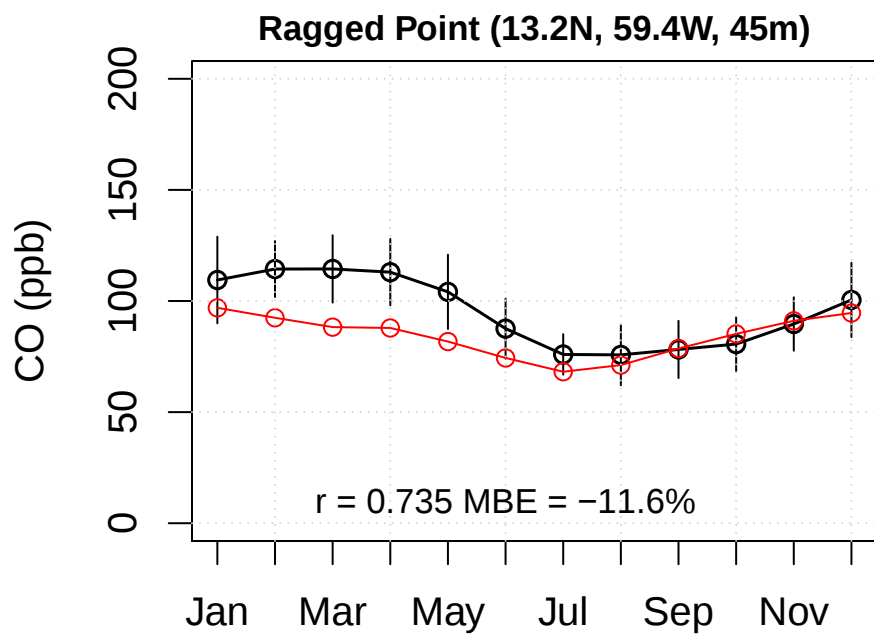
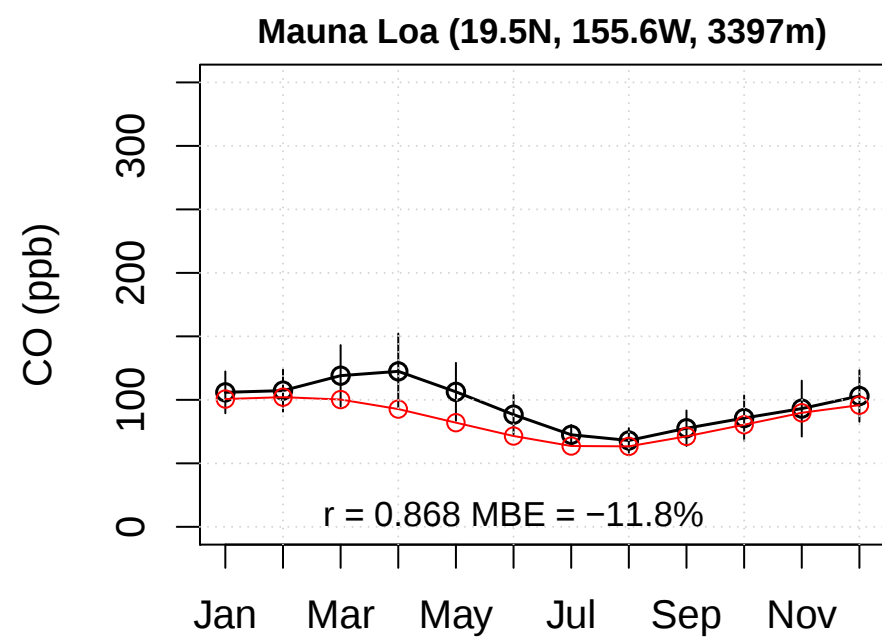
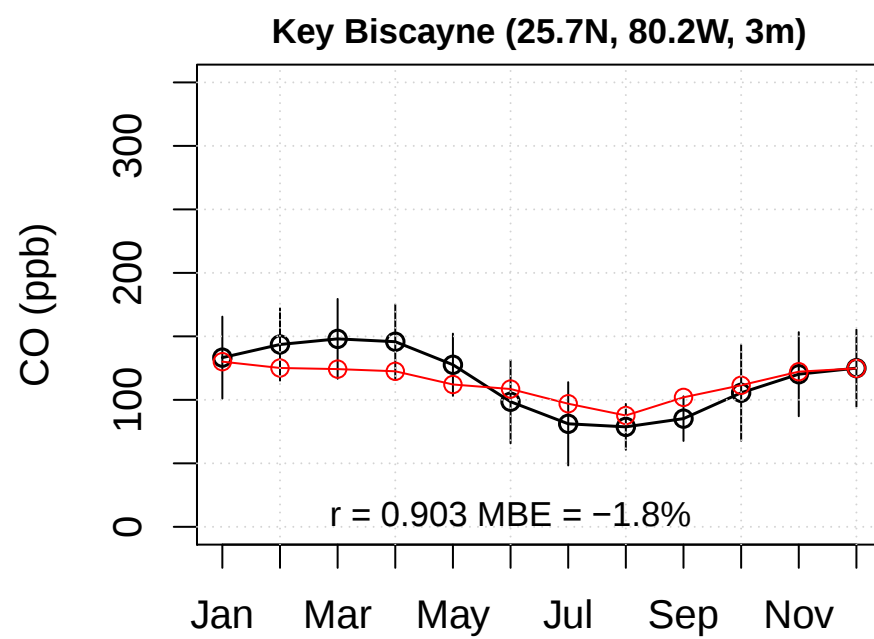
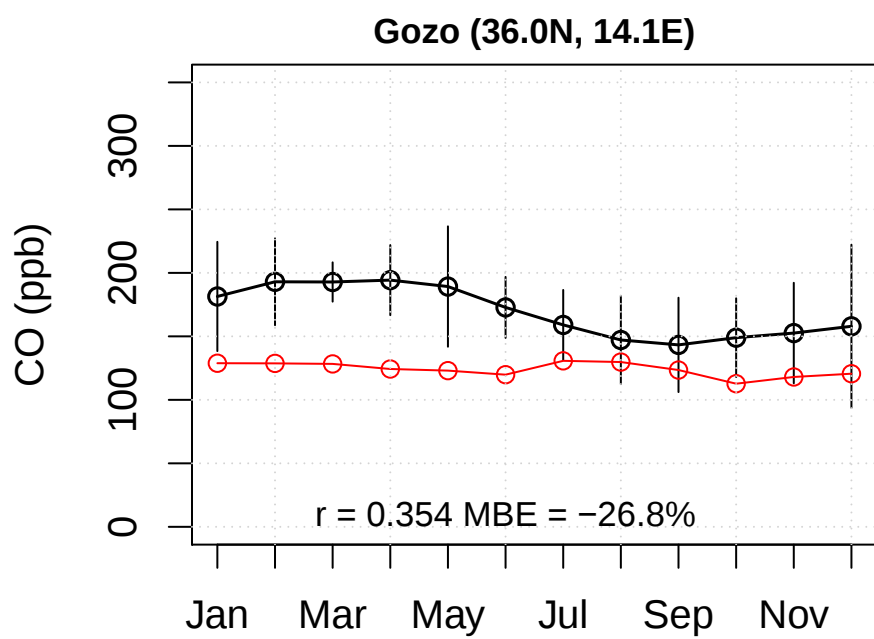
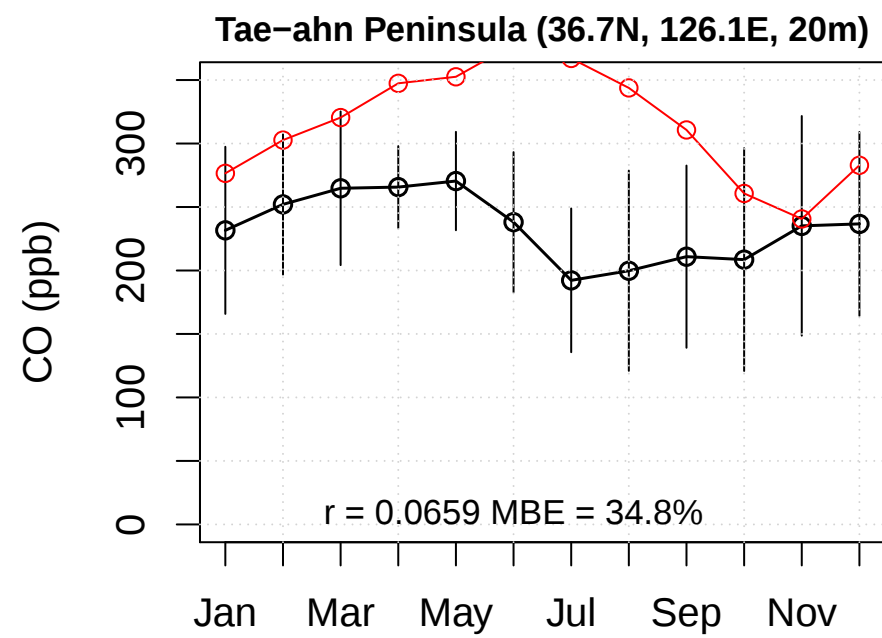
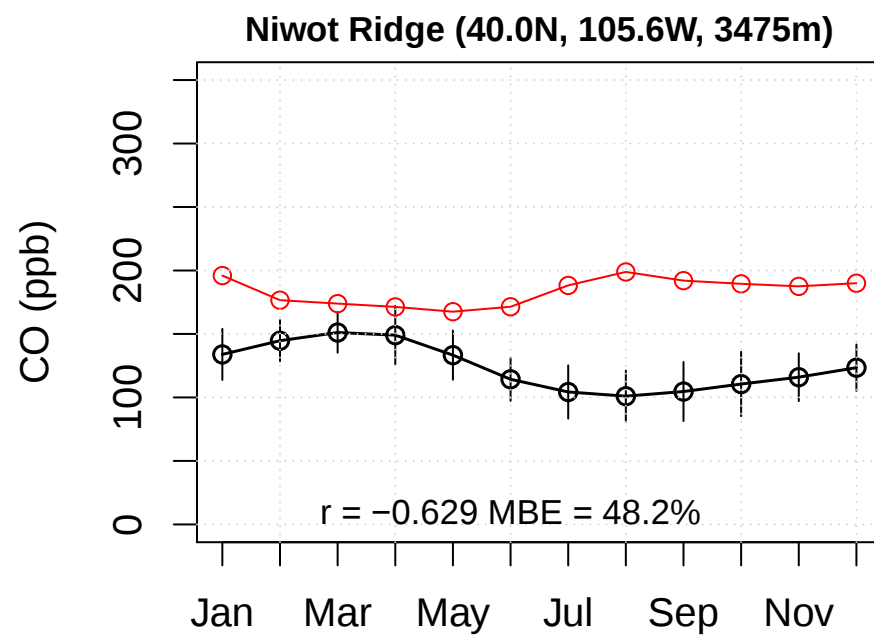
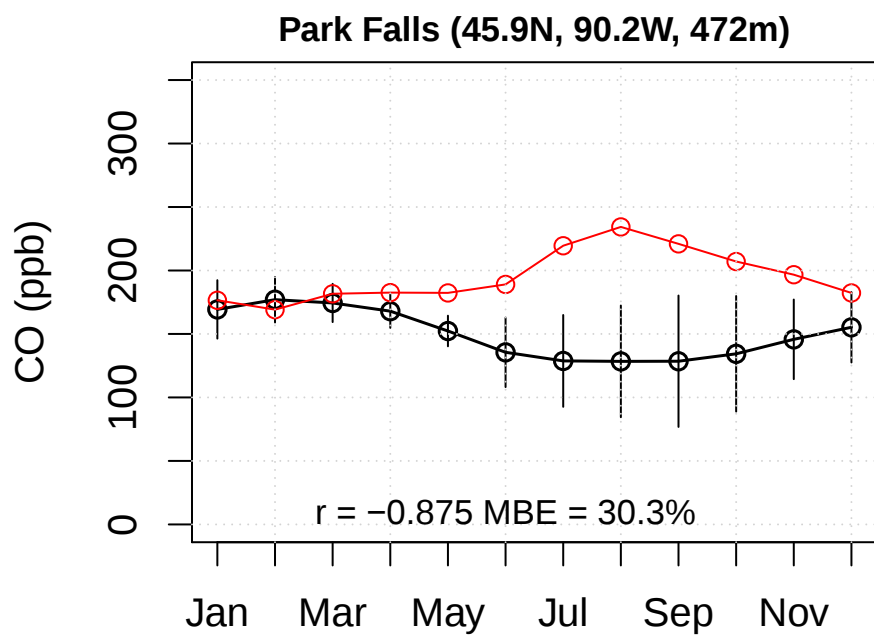
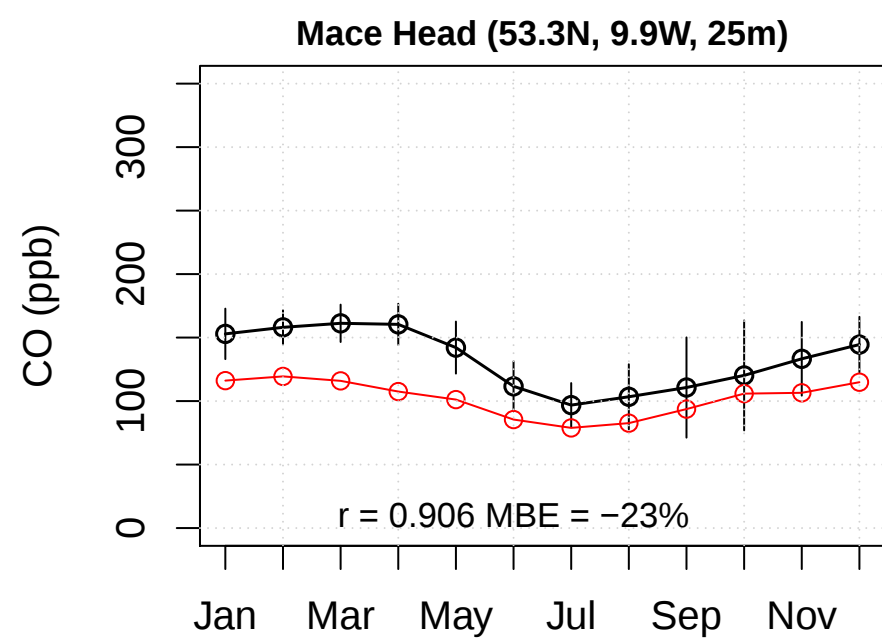
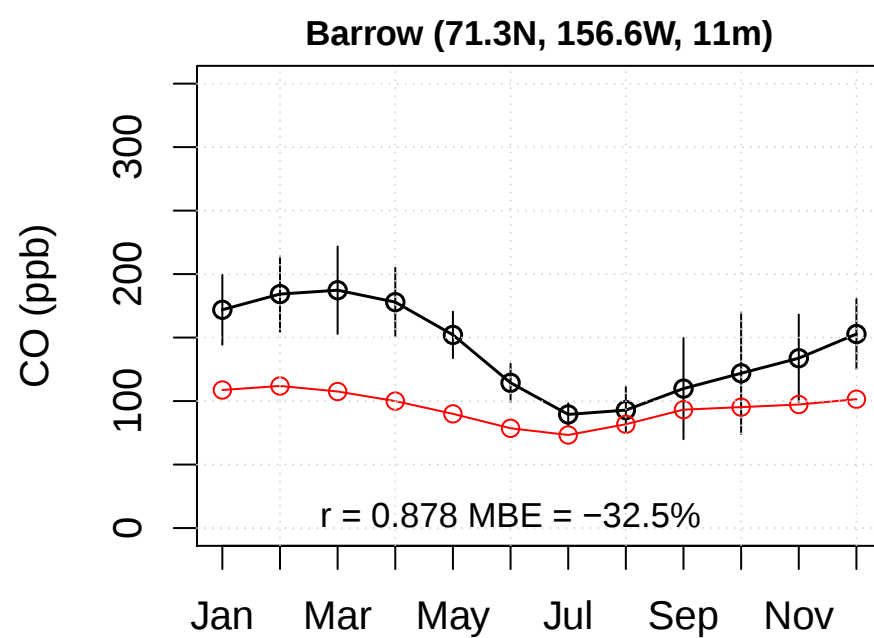
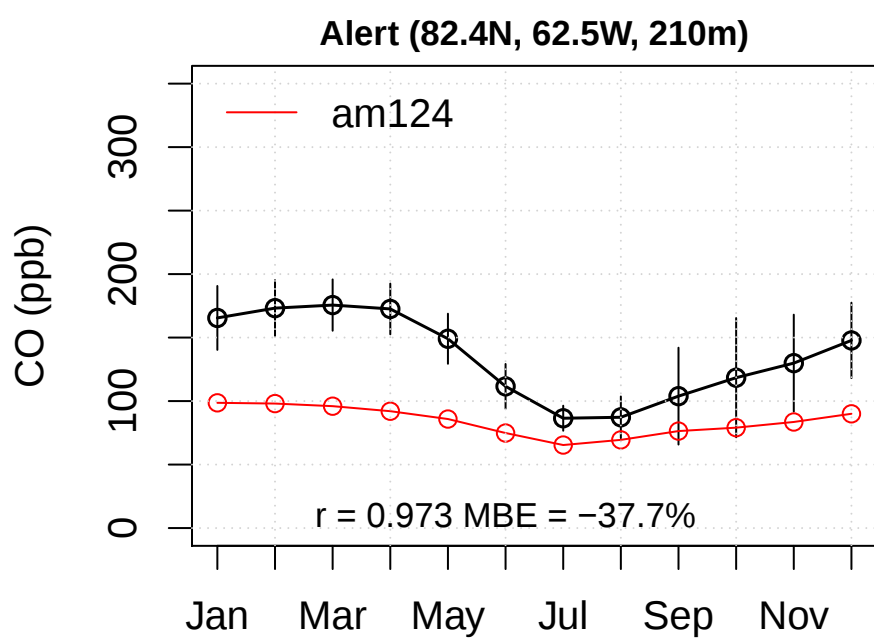


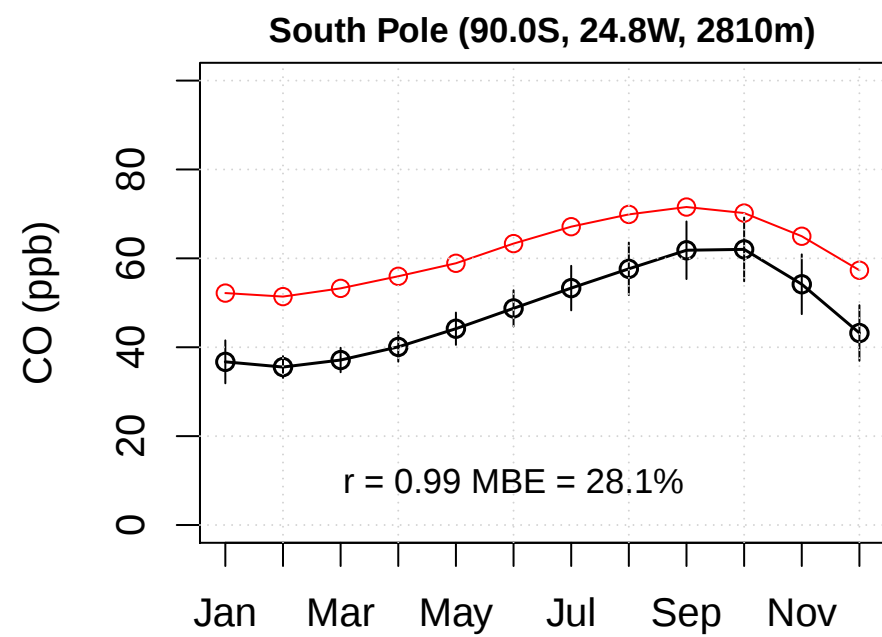
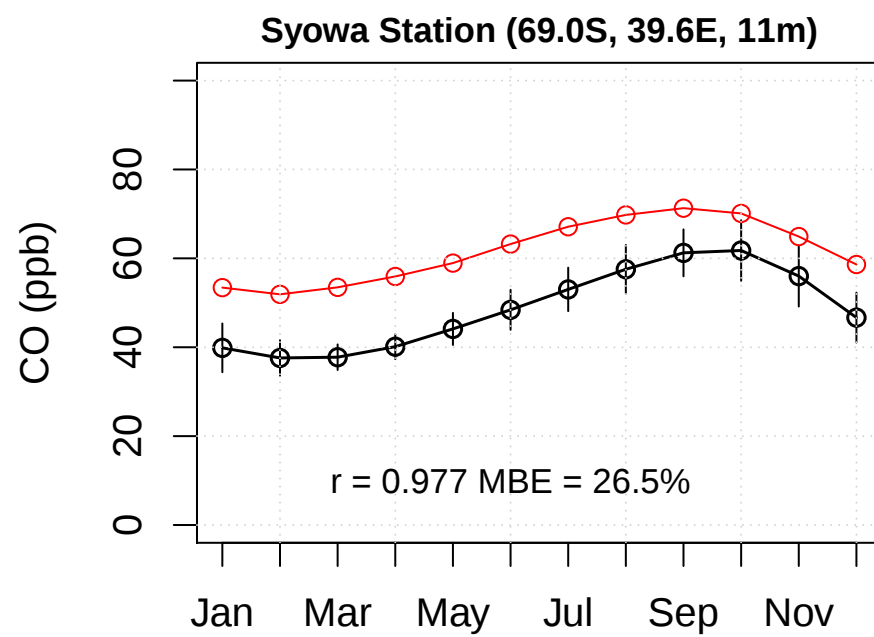
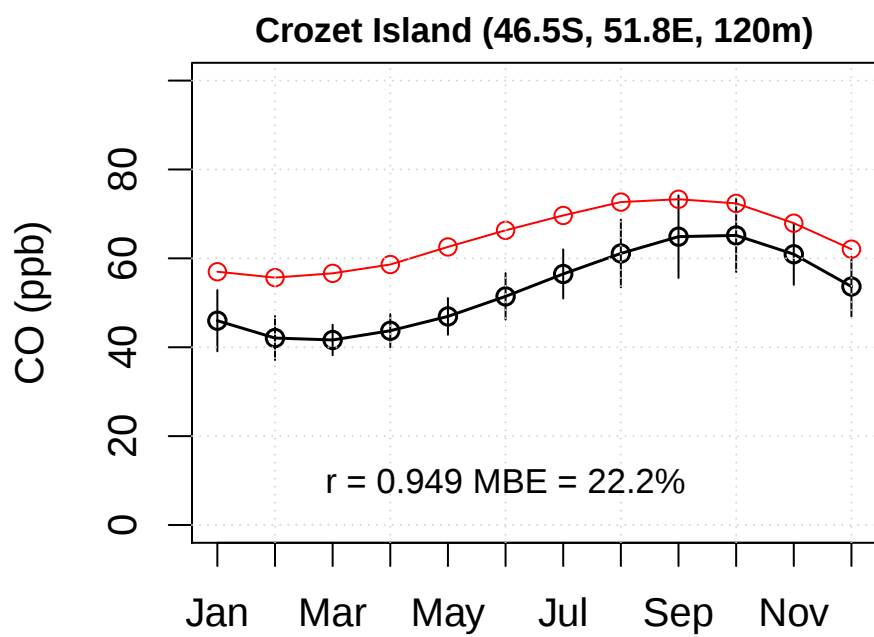
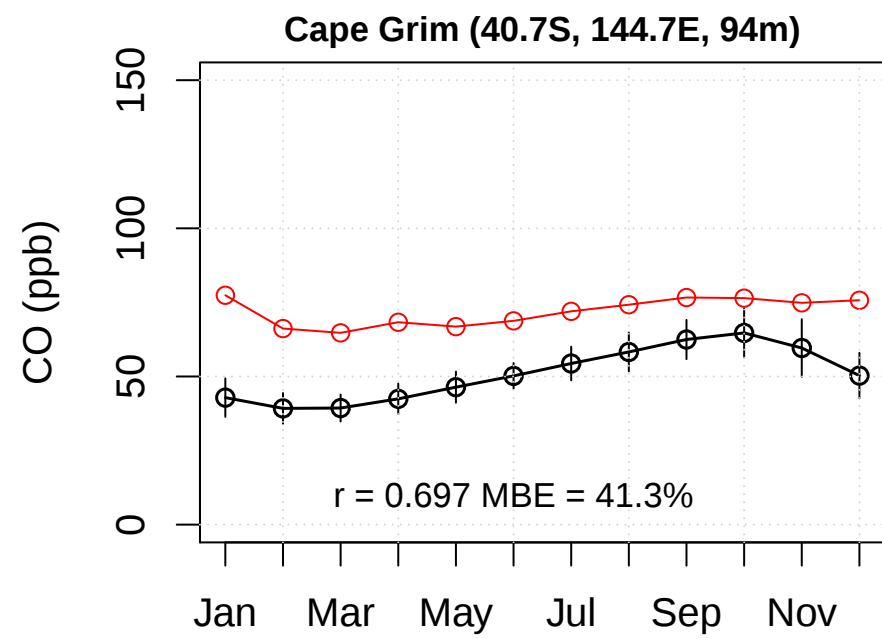
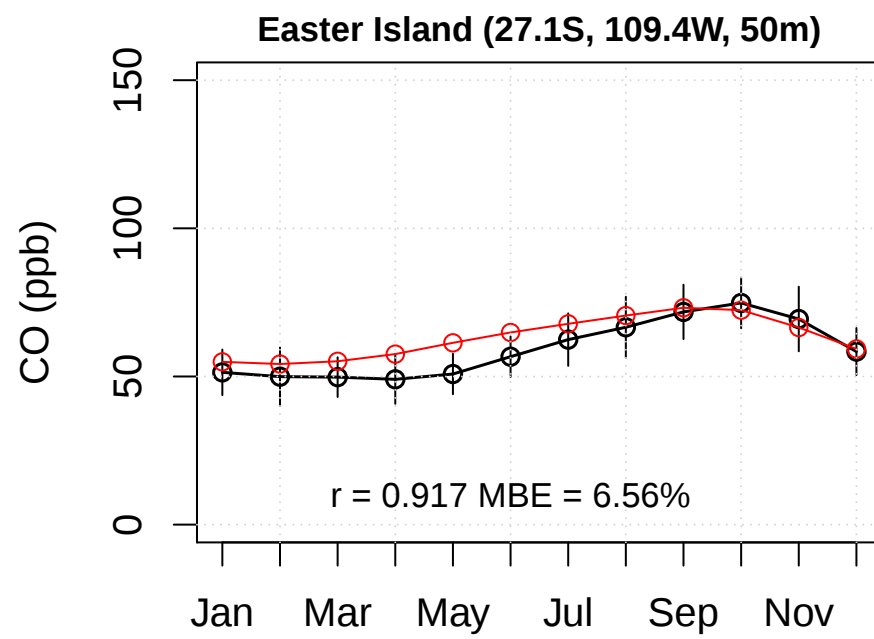
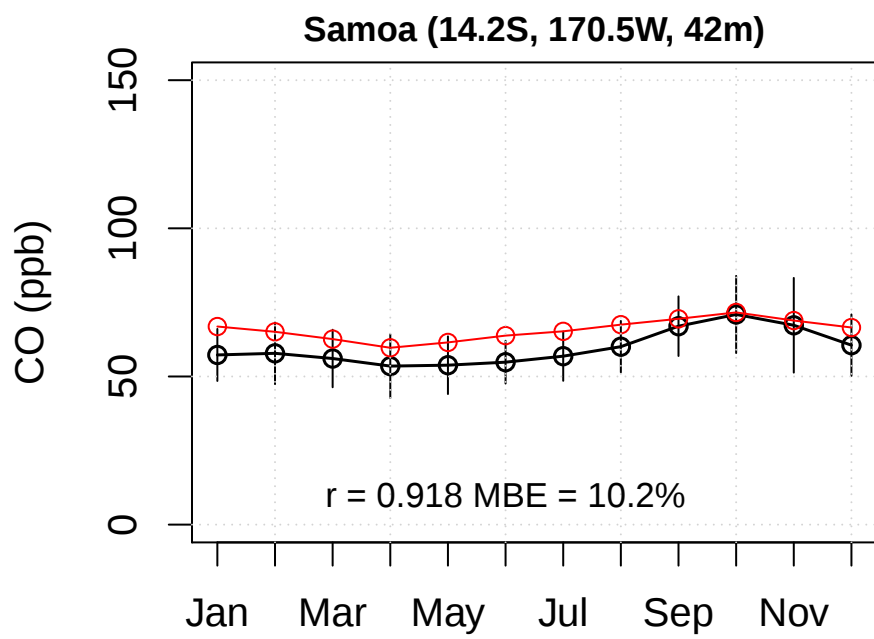
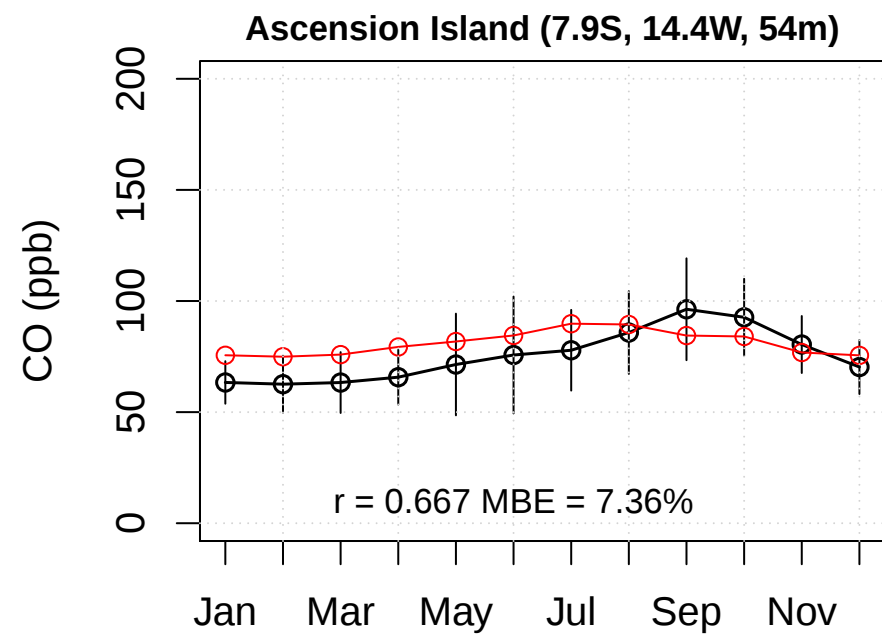
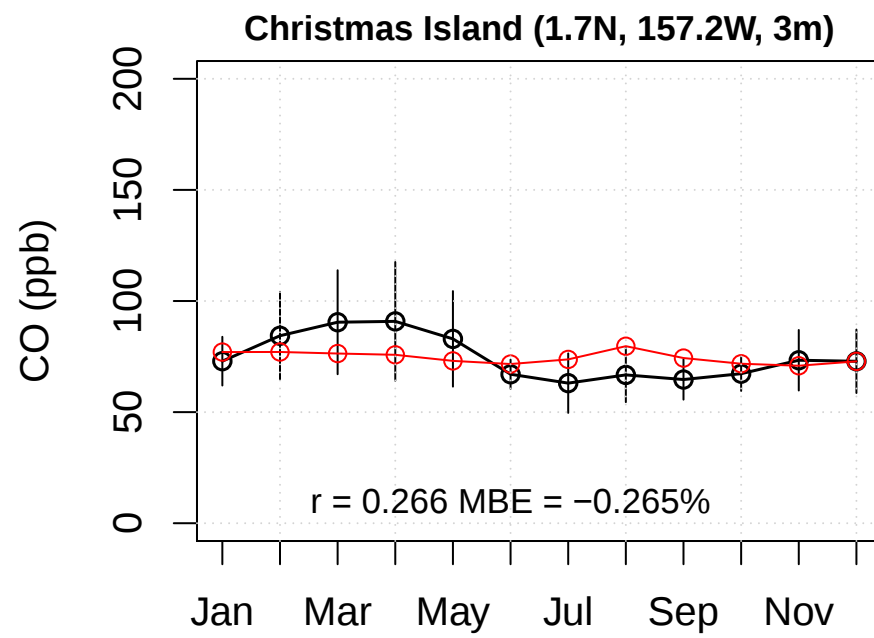
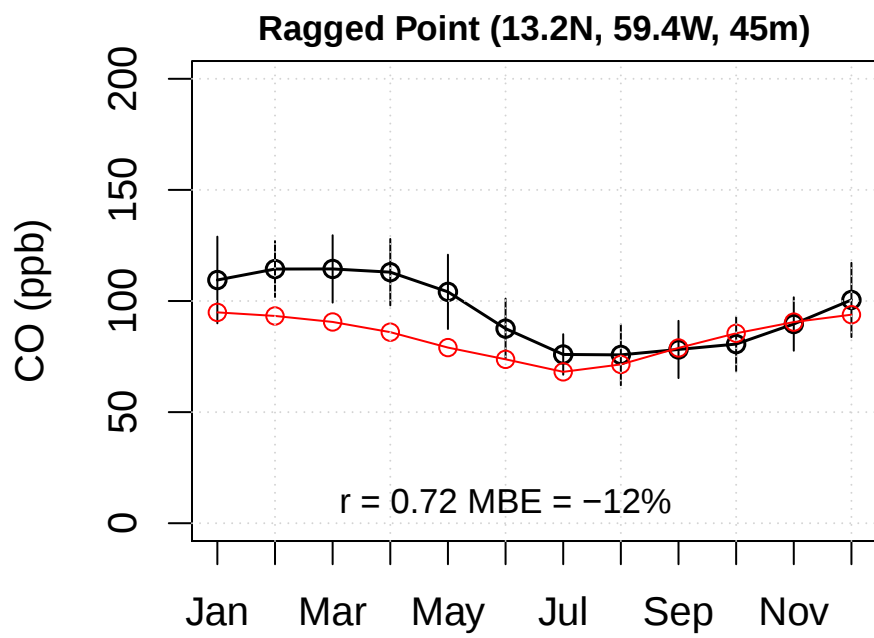
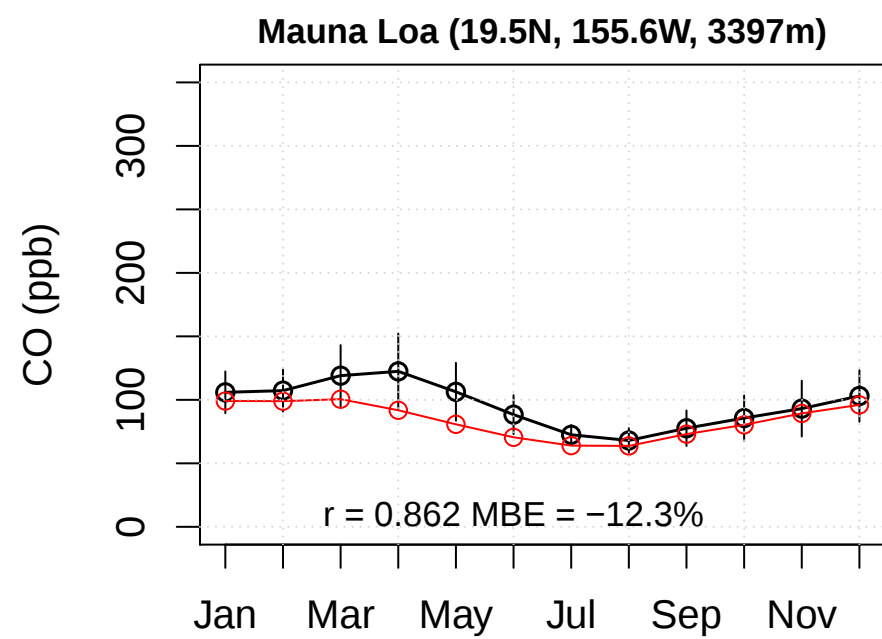
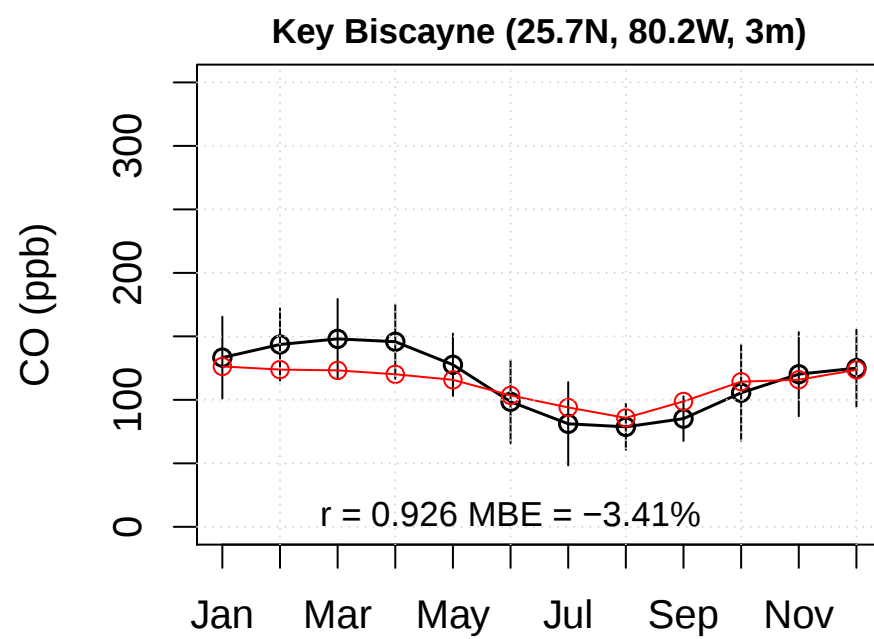
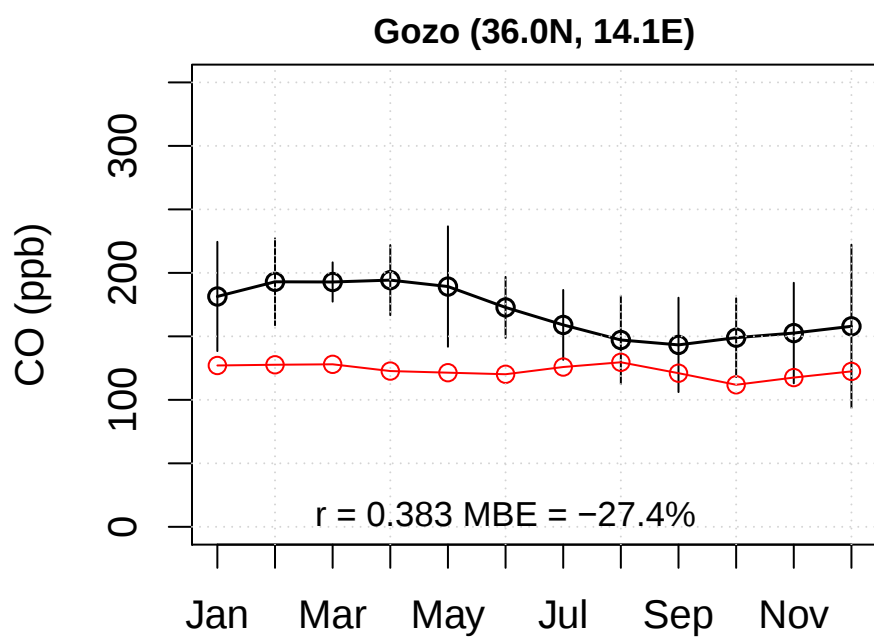
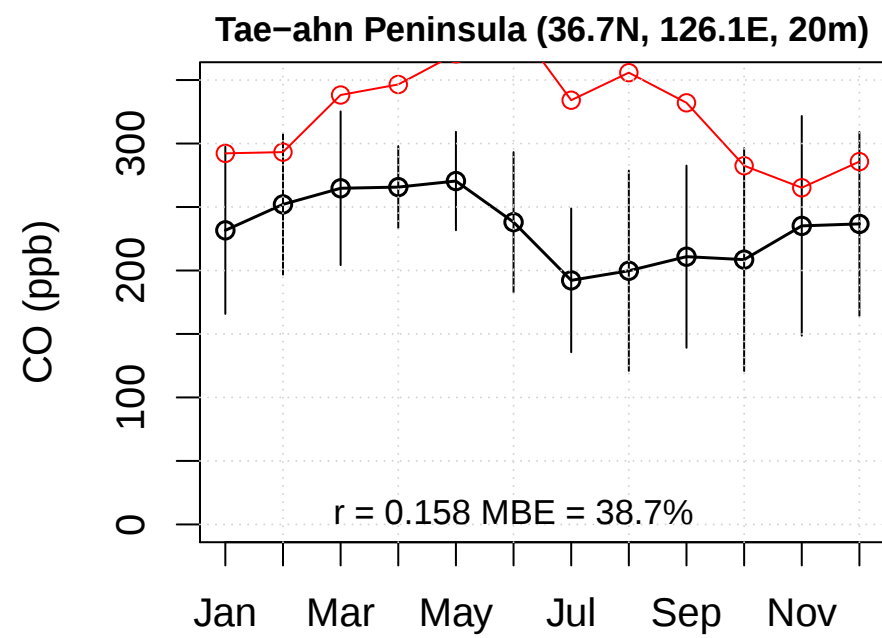
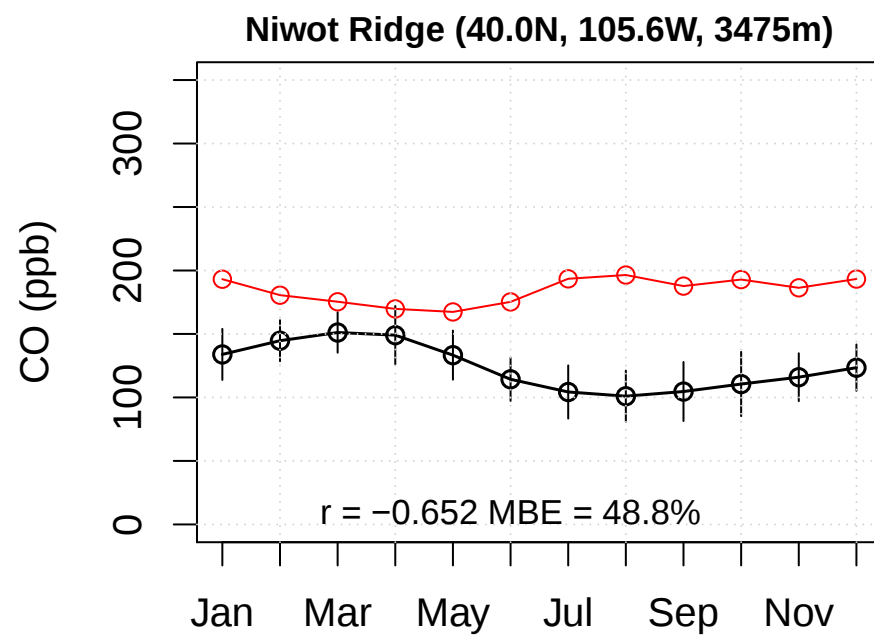
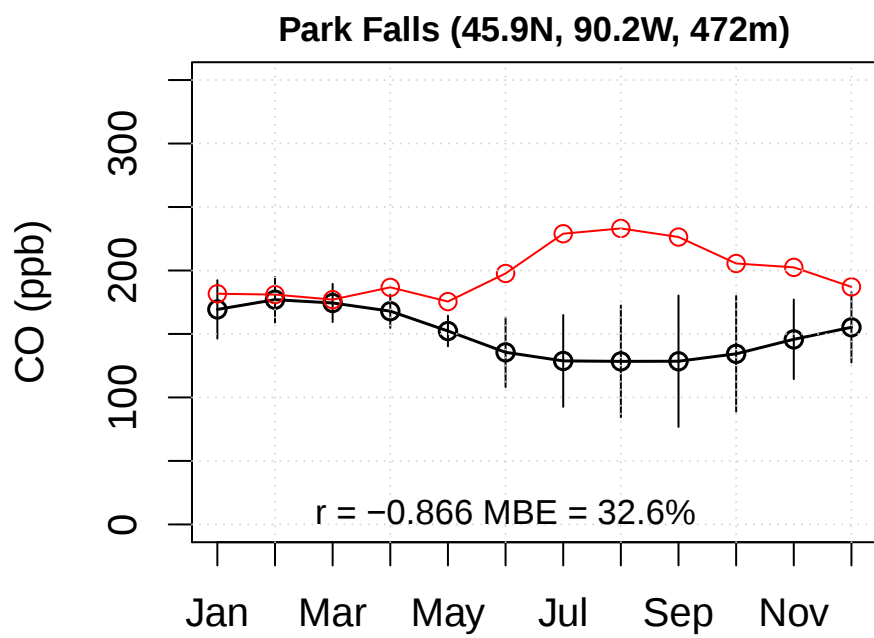
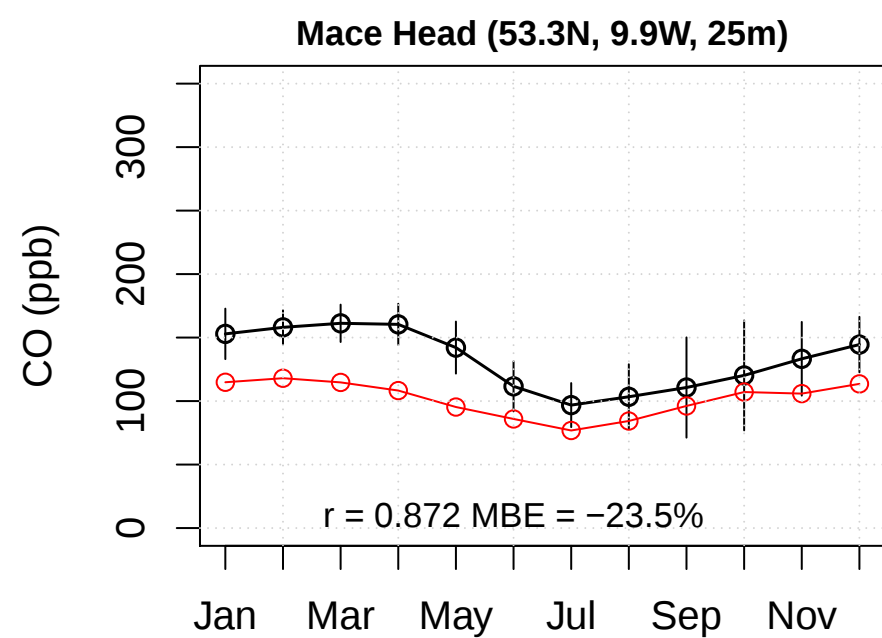
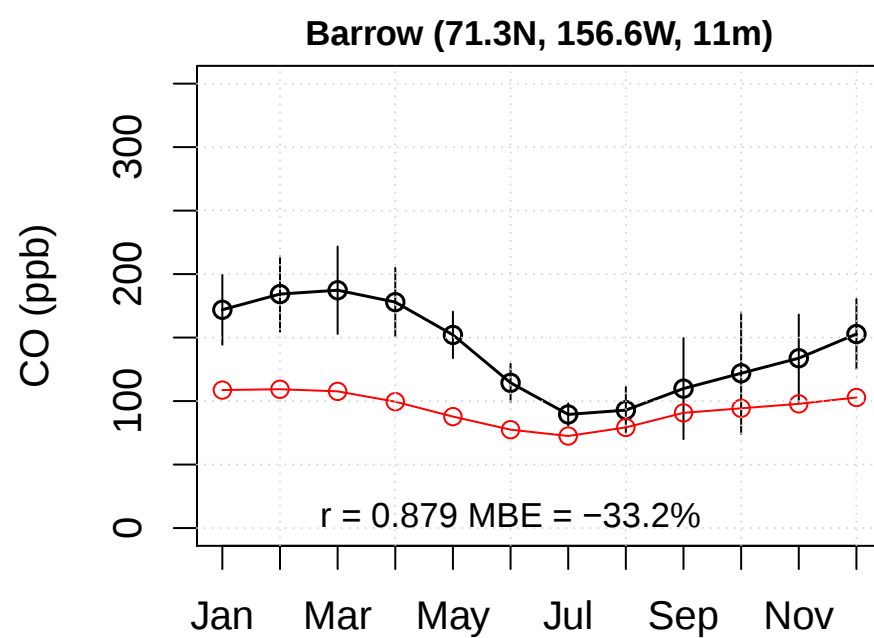
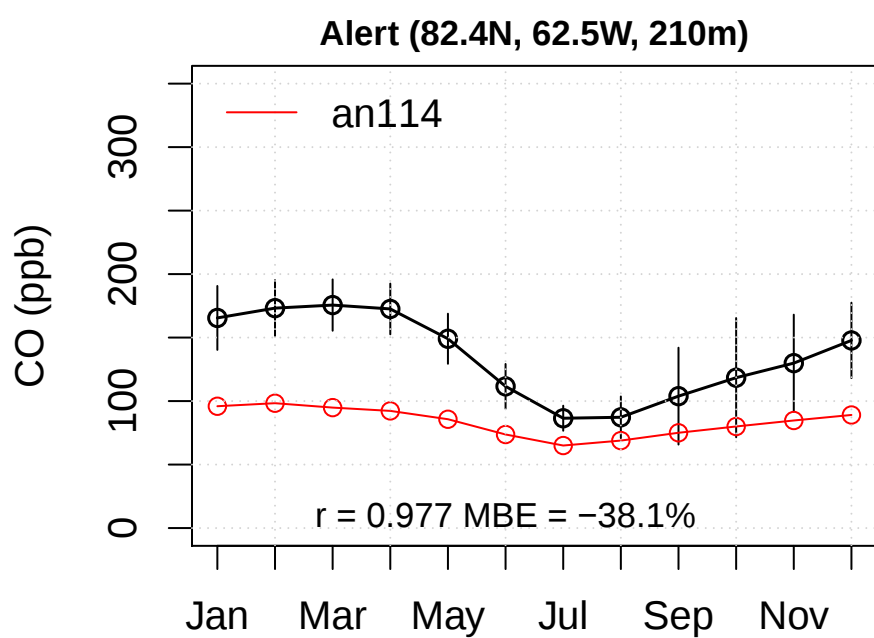
UKCA am124 Ox Net Chemical Production



UKCA an114 Ox Net Chemical Production



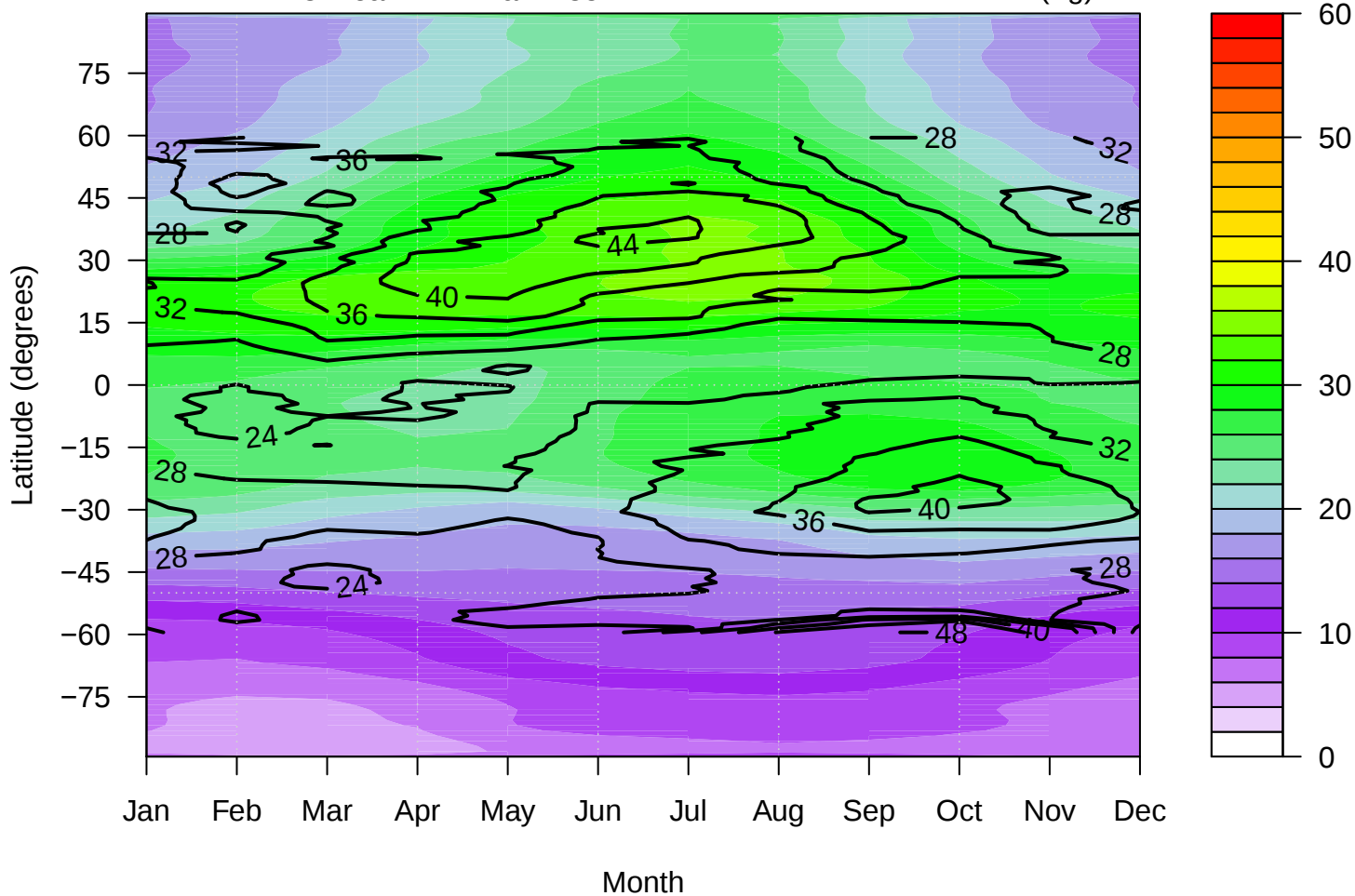




am124 tropospheric O₃ column

Min = 4.3 Mean = 21 Max = 35

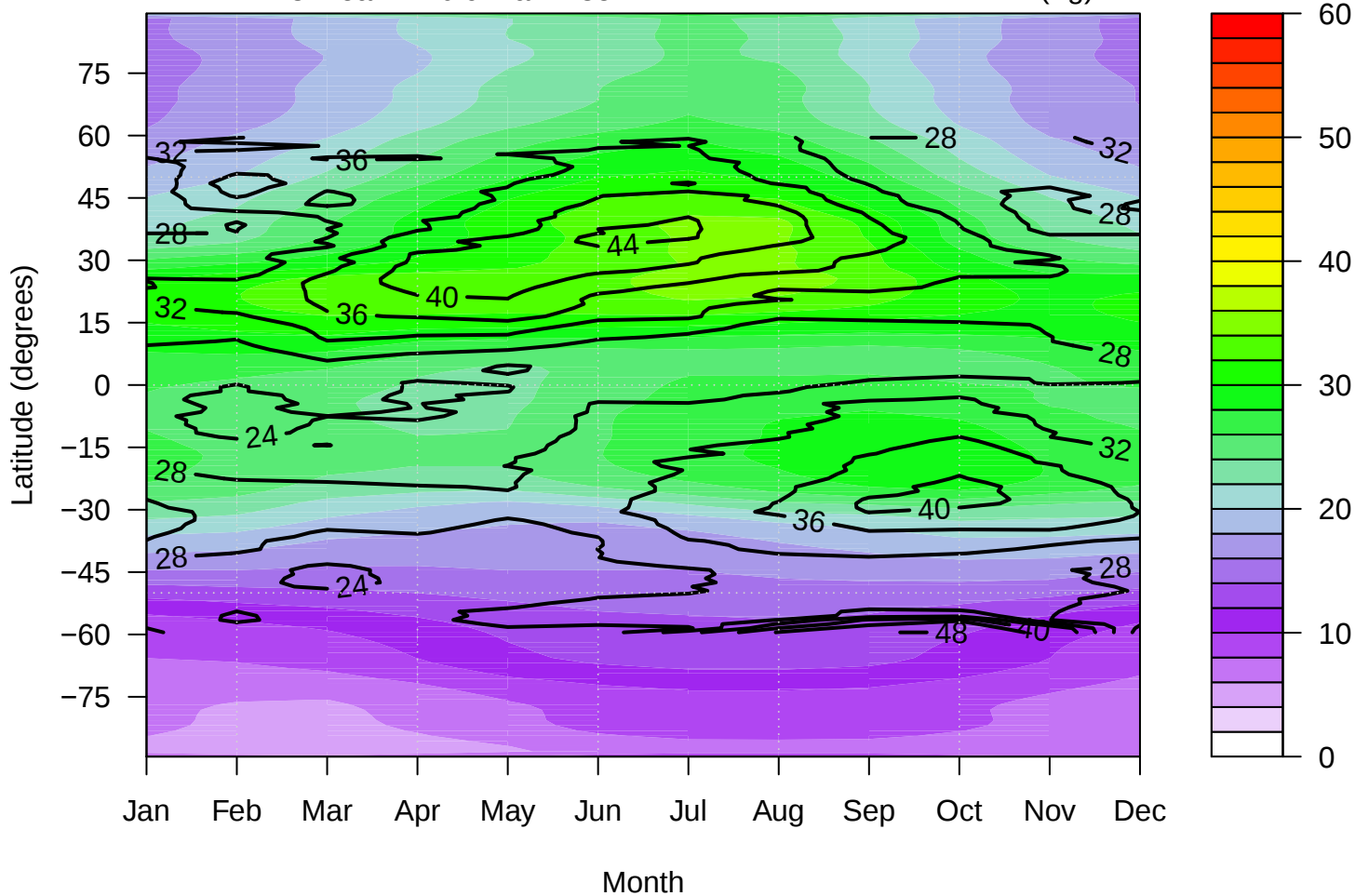
Burden (Tg) = 258



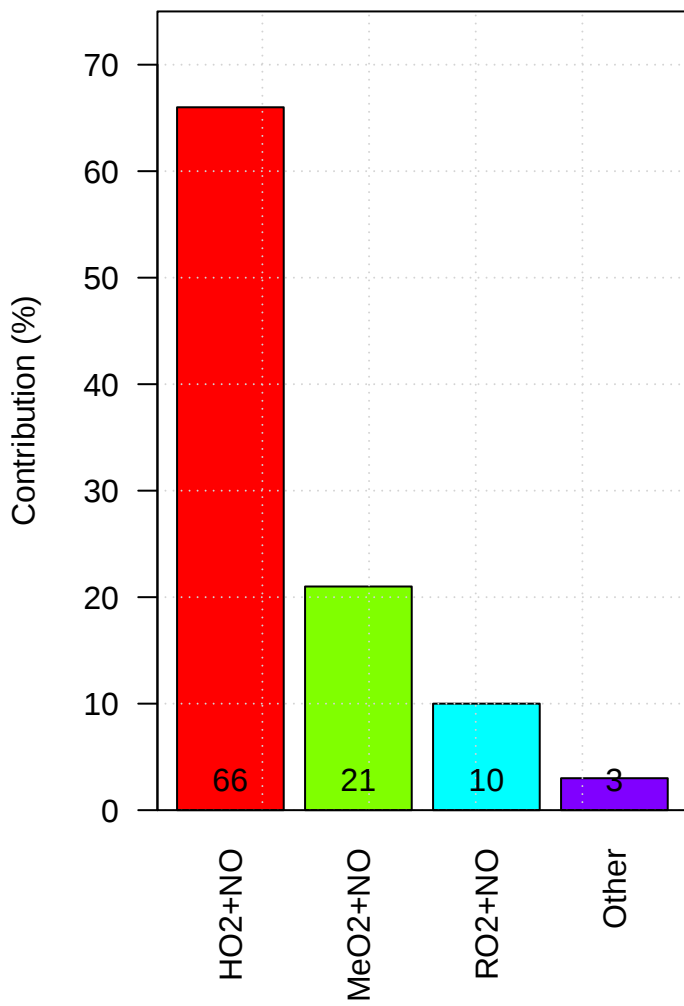
an114 tropospheric O₃ column

Min = 4.3 Mean = 20.9 Max = 35

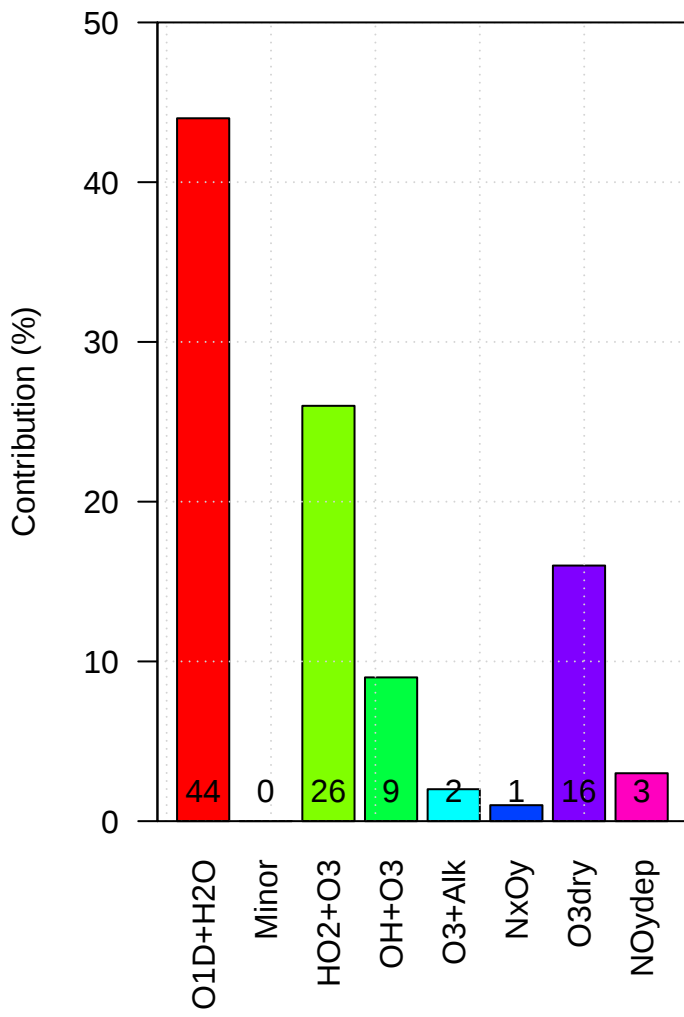
Burden (Tg) = 257



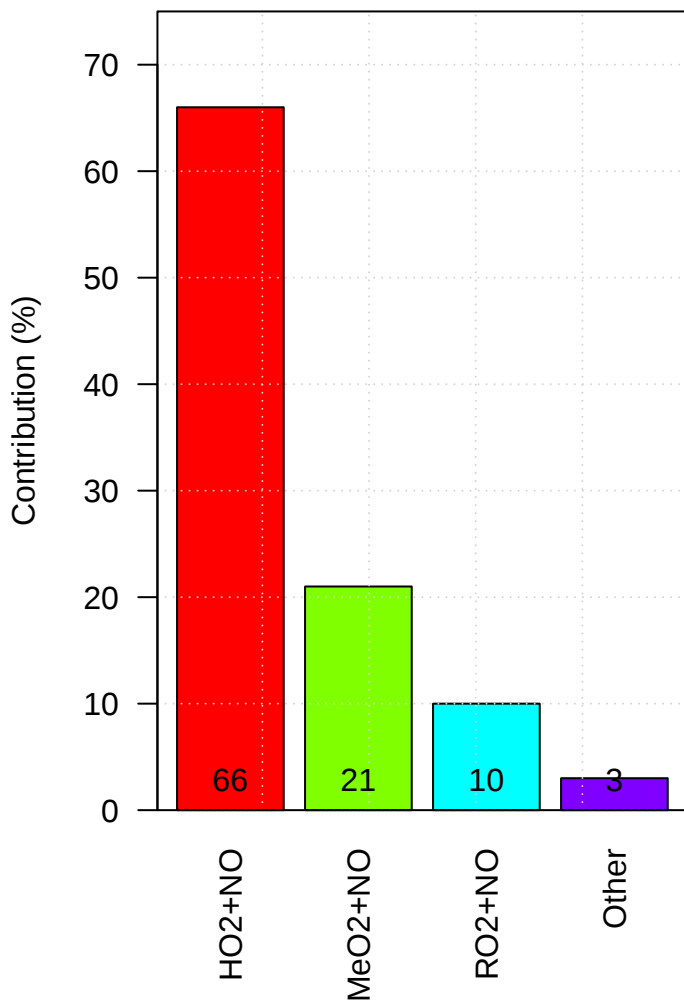
am124 Production of Tropospheric Ox



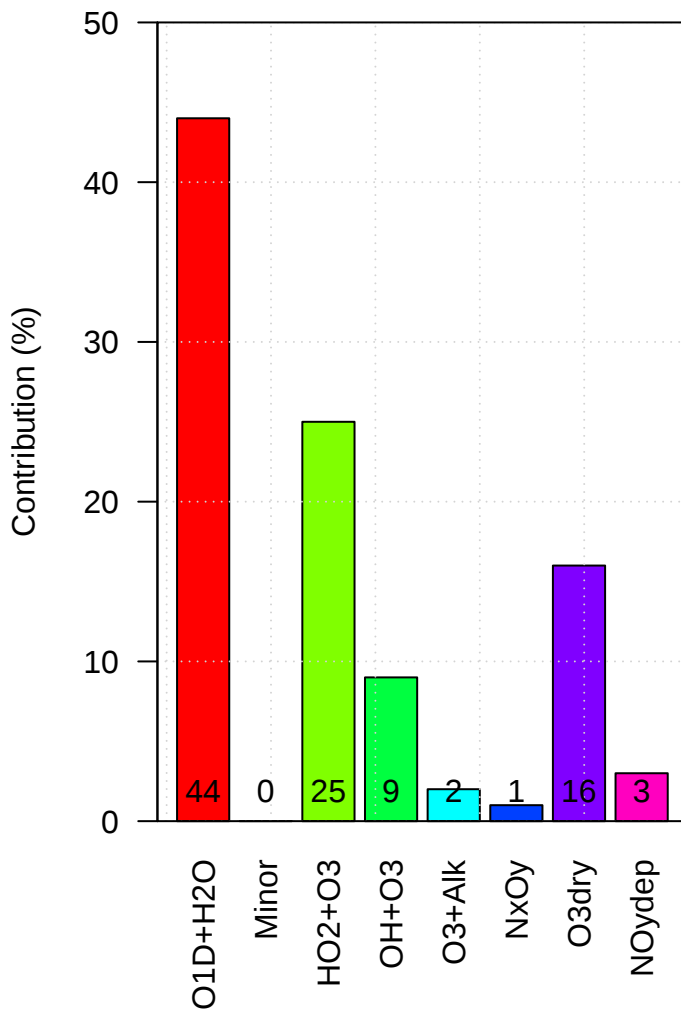
am124 Loss of Tropospheric Ox



an114 Production of Tropospheric Ox

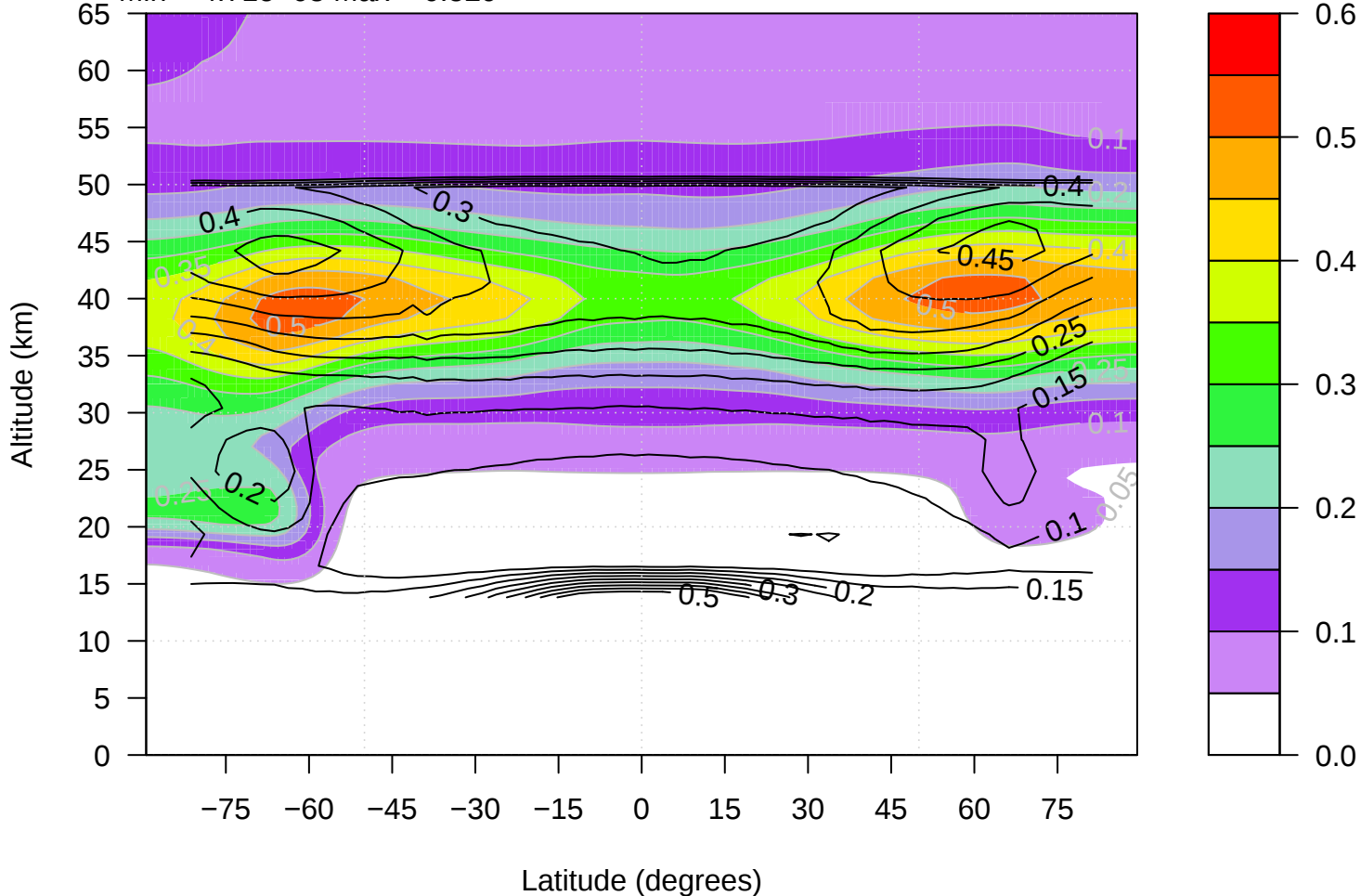


an114 Loss of Tropospheric Ox



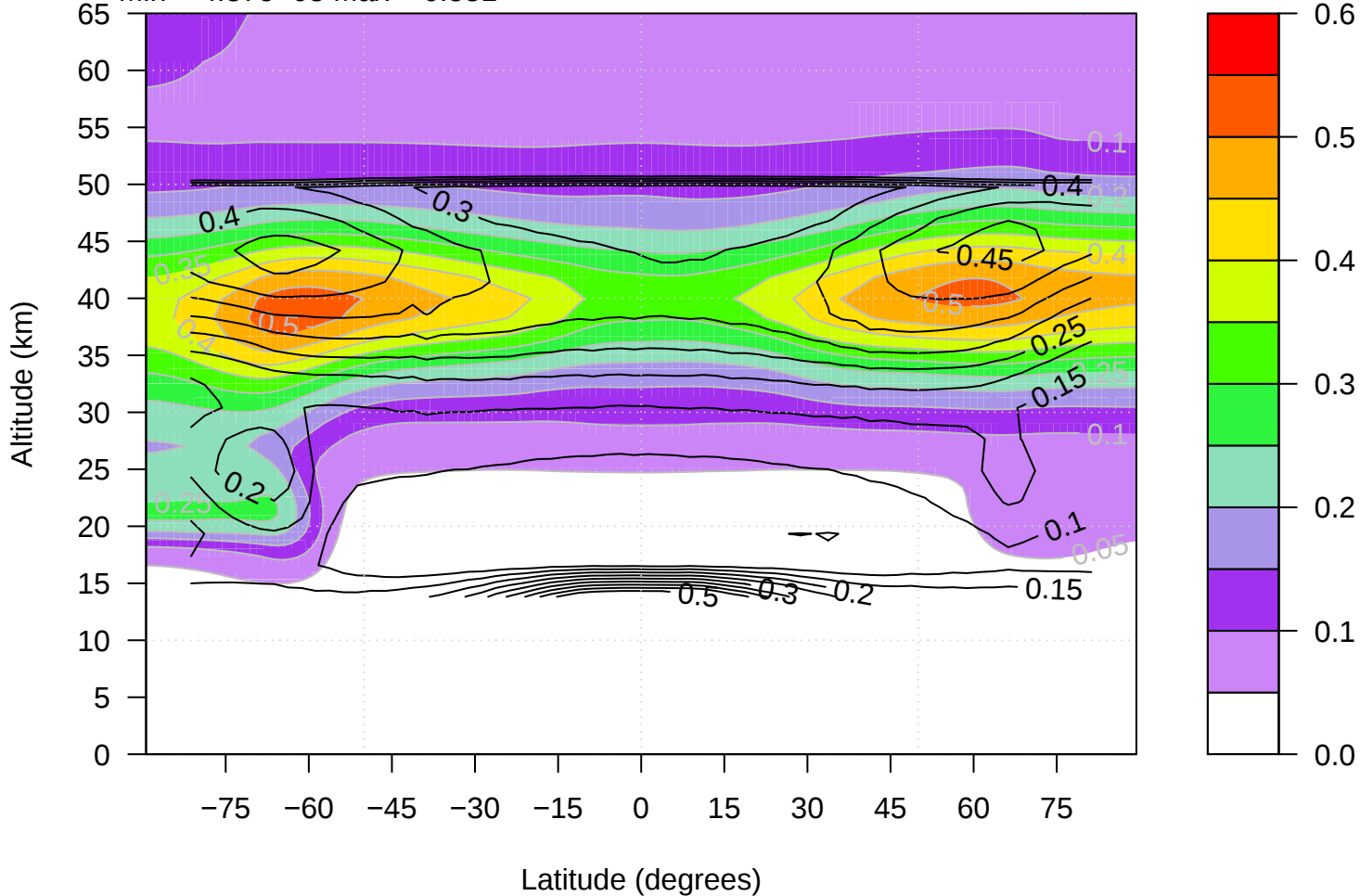
MLS – UKCA am124 ClO comparison

Min = 4.71e-08 Max = 0.529



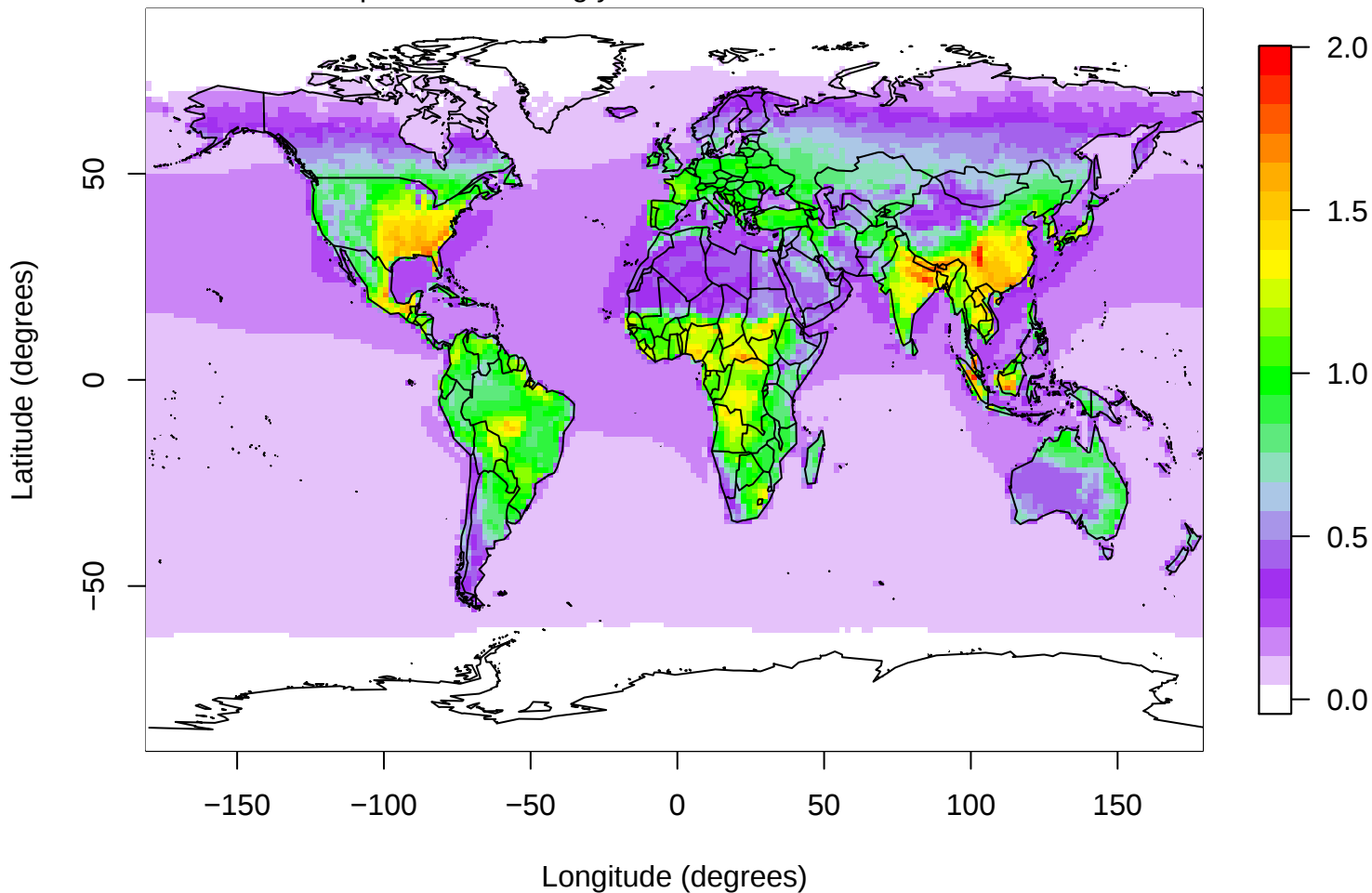
MLS – UKCA an114 ClO comparison

Min = 4.87e-08 Max = 0.531



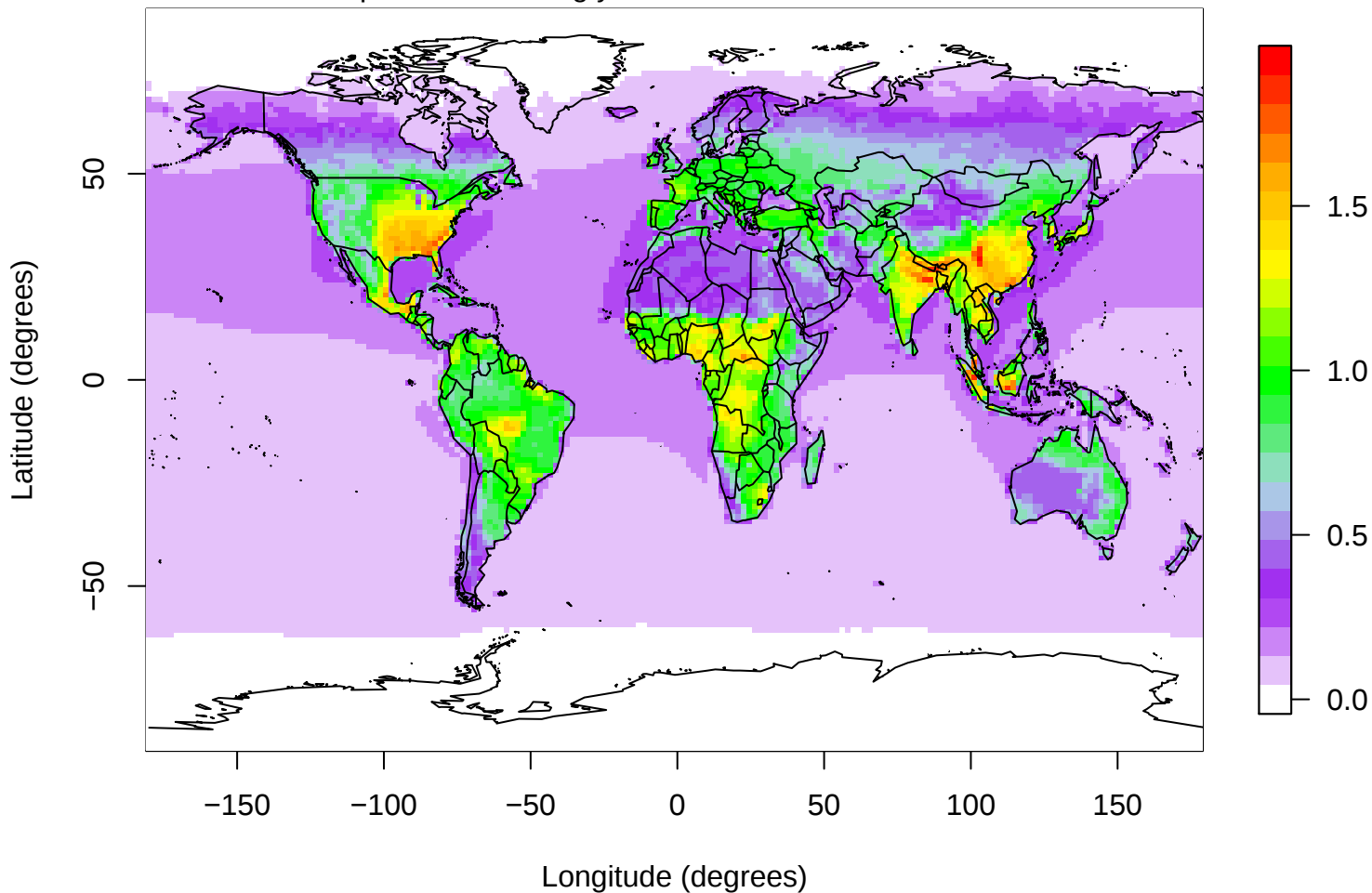
UKCA Ox deposition am124

Total Ox Deposition = 879 Tg/yr



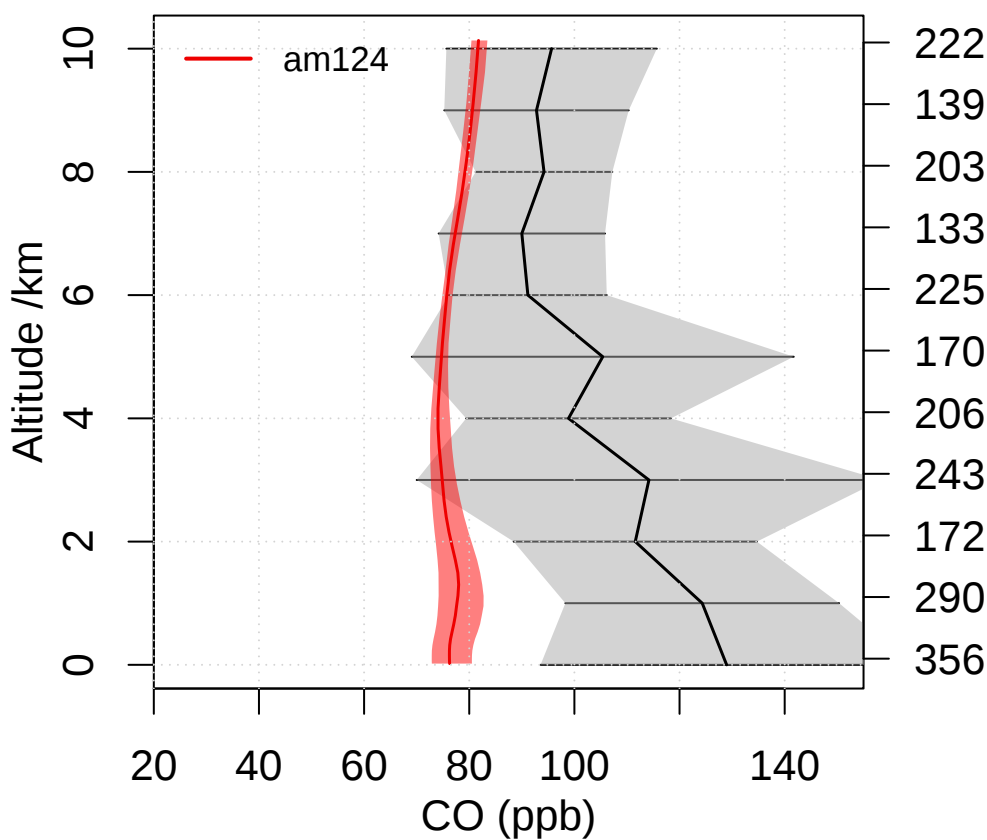
UKCA Ox deposition an114

Total Ox Deposition = 879 Tg/yr

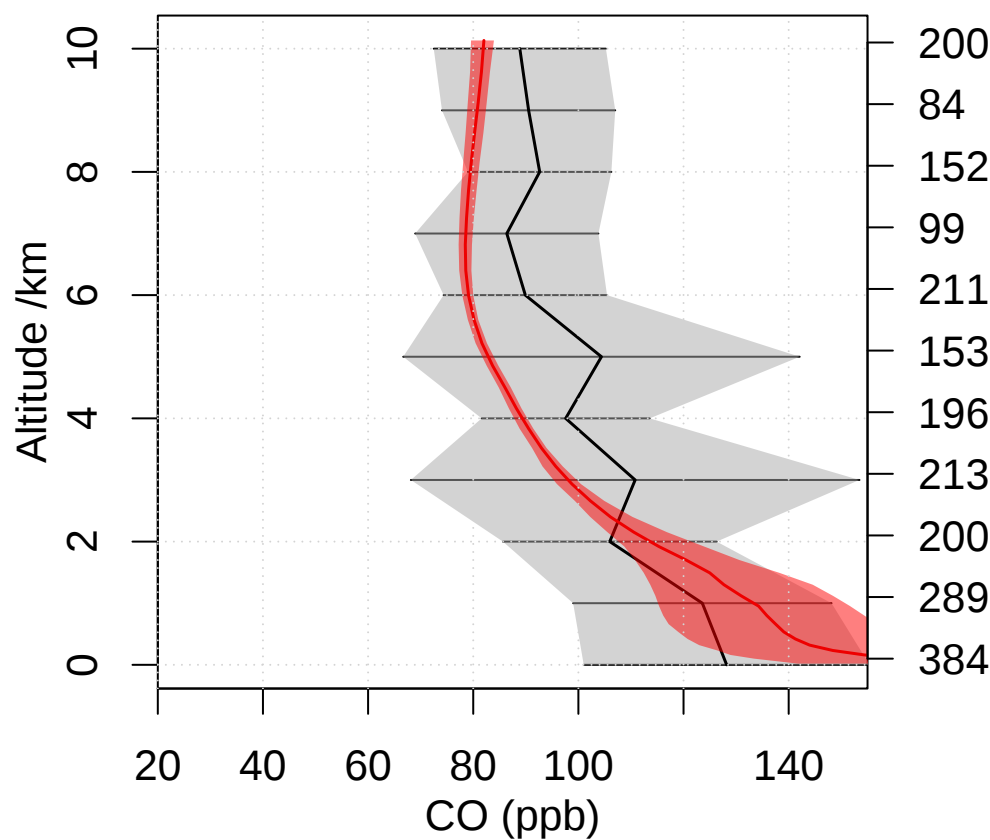


Emmons CO comparison

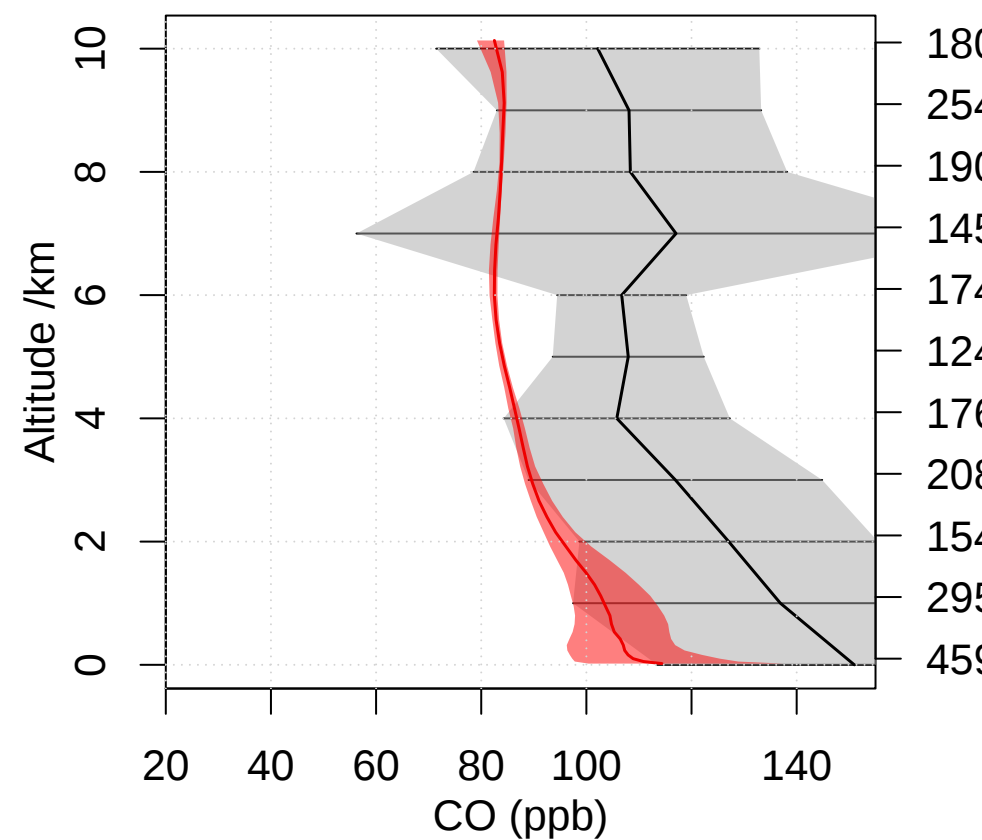
INTEX-NA East Coast 2004 07
Lat 32.5 – 40 Lon 296.5 – 307



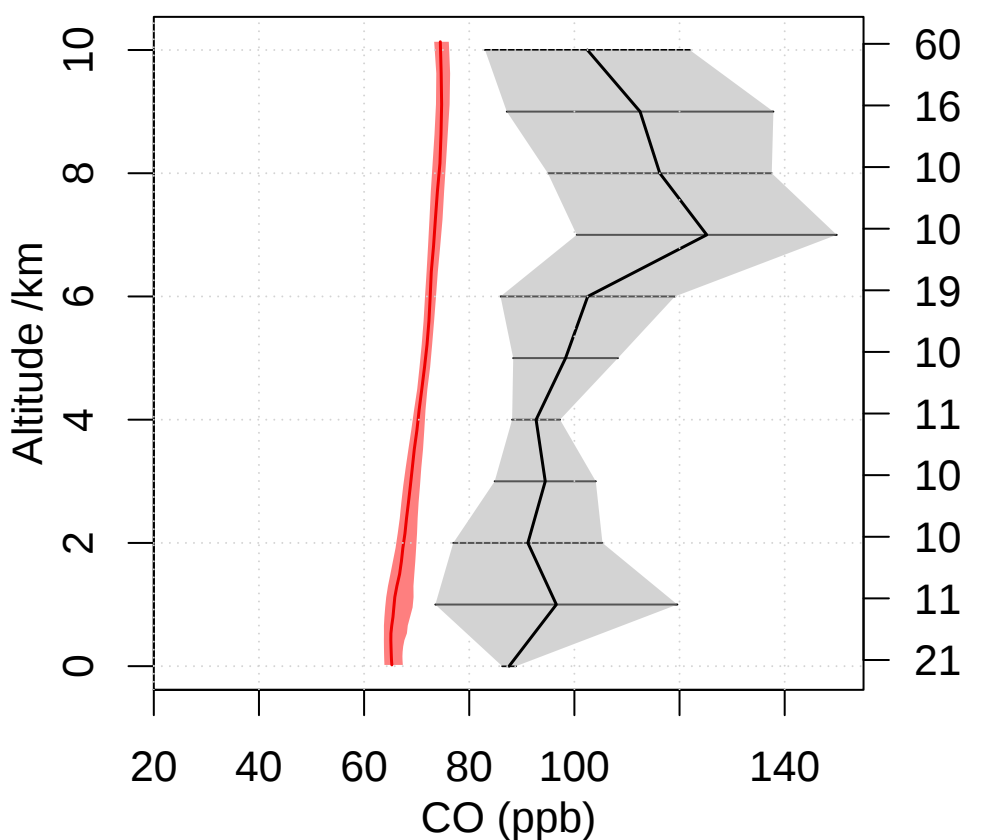
INTEX-NA Central 2004 07
Lat 30 – 40 Lon 259.5 – 285



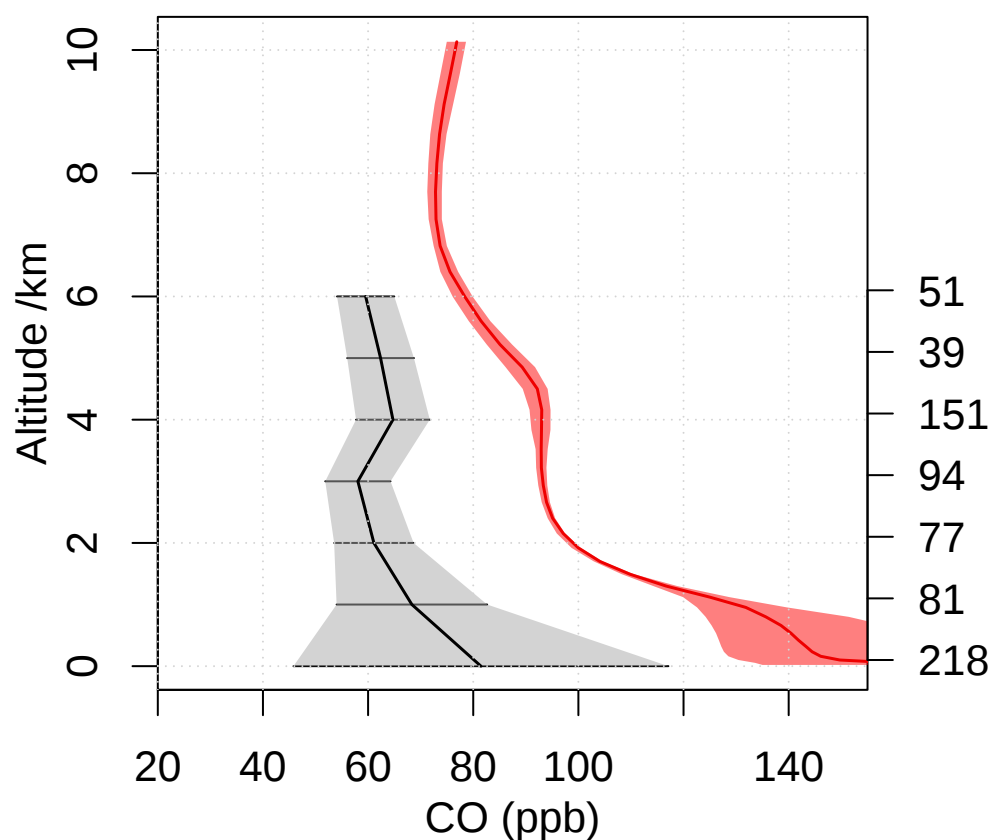
INTEX-NA North East 2004 07
Lat 42.5 – 52.5 Lon 285 – 310



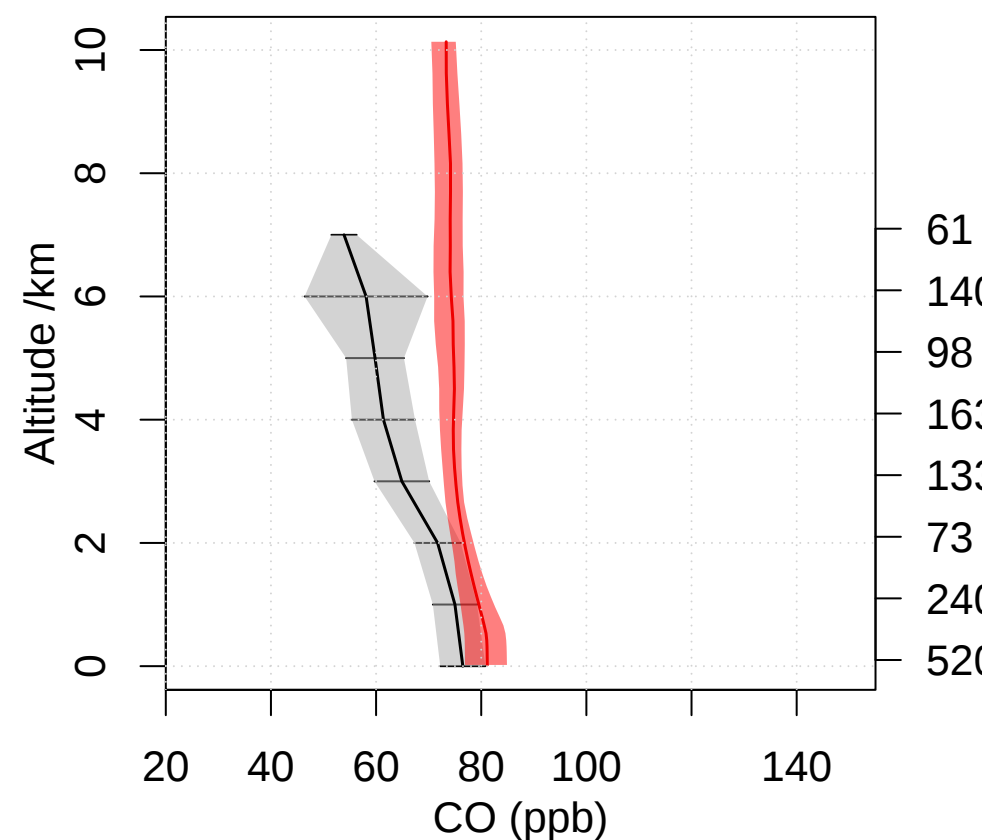
INTEX-NA West Coast 2004 07
Lat 32.5 – 45 Lon 217 – 240



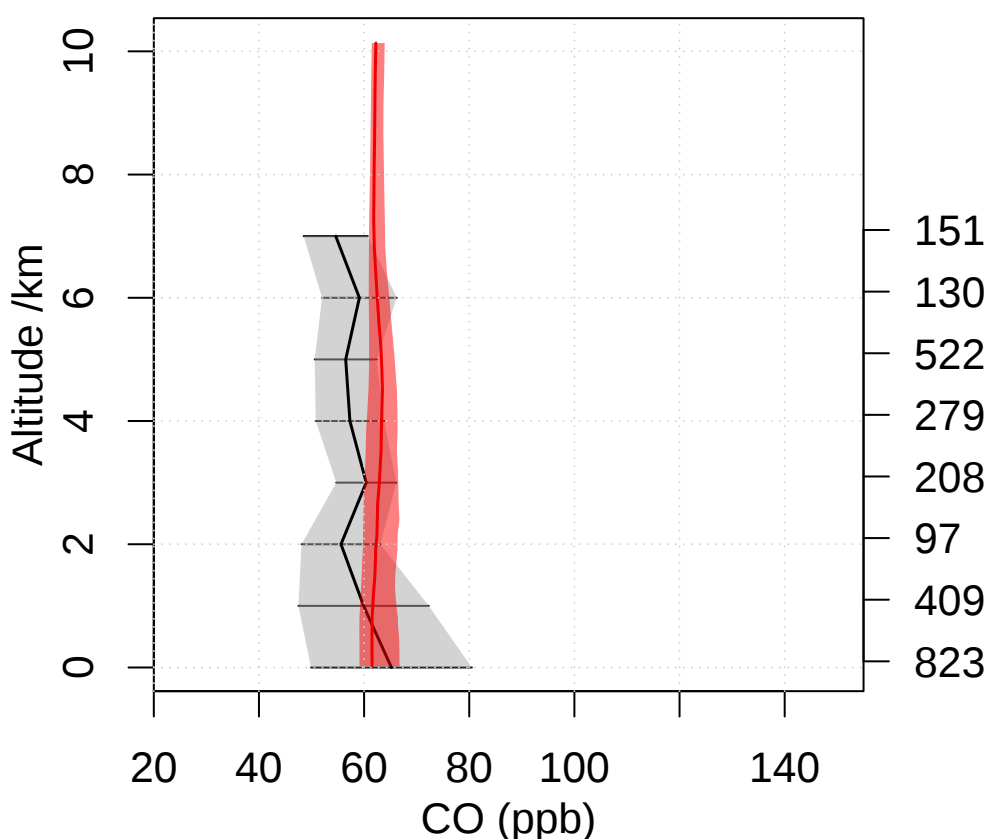
OP3 2008 07
Lat 2.5 – 7.5 Lon 112.5 – 120



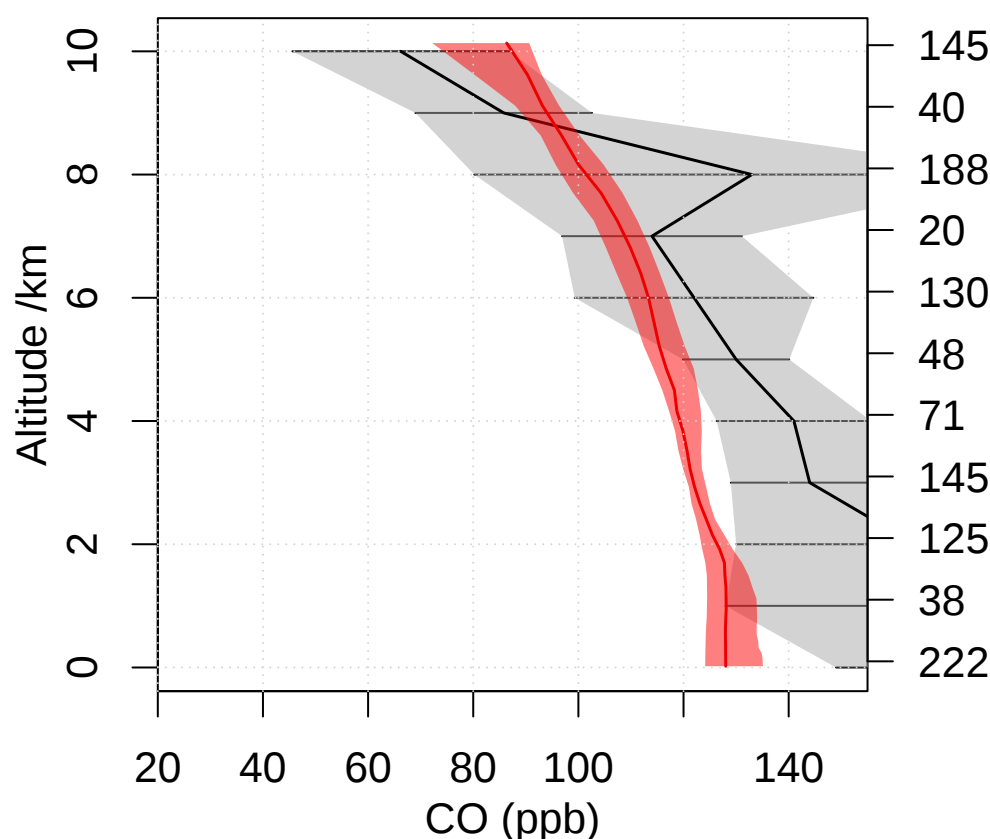
PEM-Tropics-B Christmas-Island 1999 0
Lat 0 – 10 Lon 200 – 220



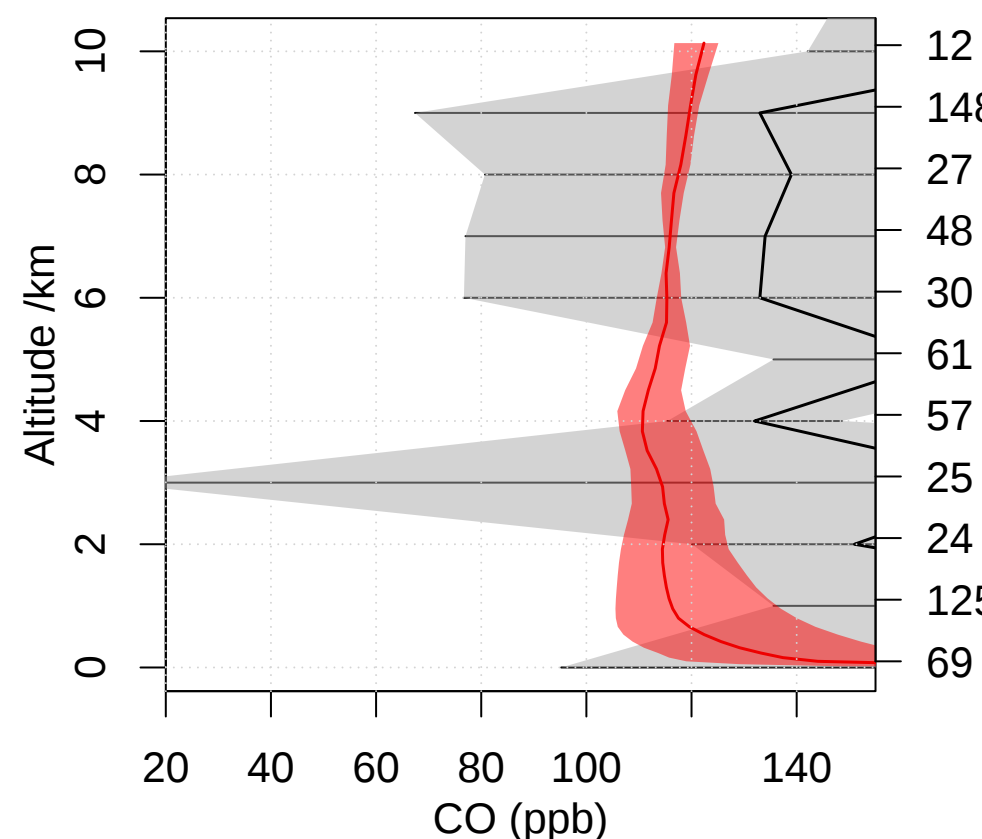
PEM-Tropics-B Tahiti 1999 03
Lat -20 – 0 Lon 200 – 230



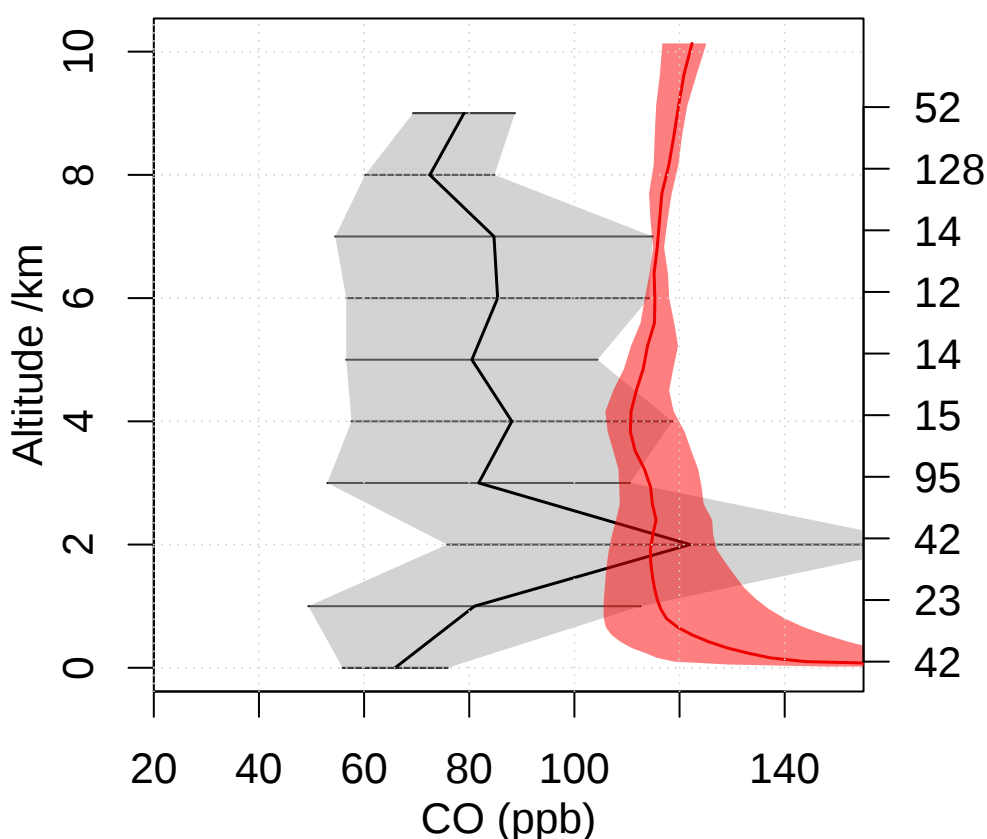
PEM-West-B Japan 1994 02
Lat 25 – 40 Lon 135 – 150



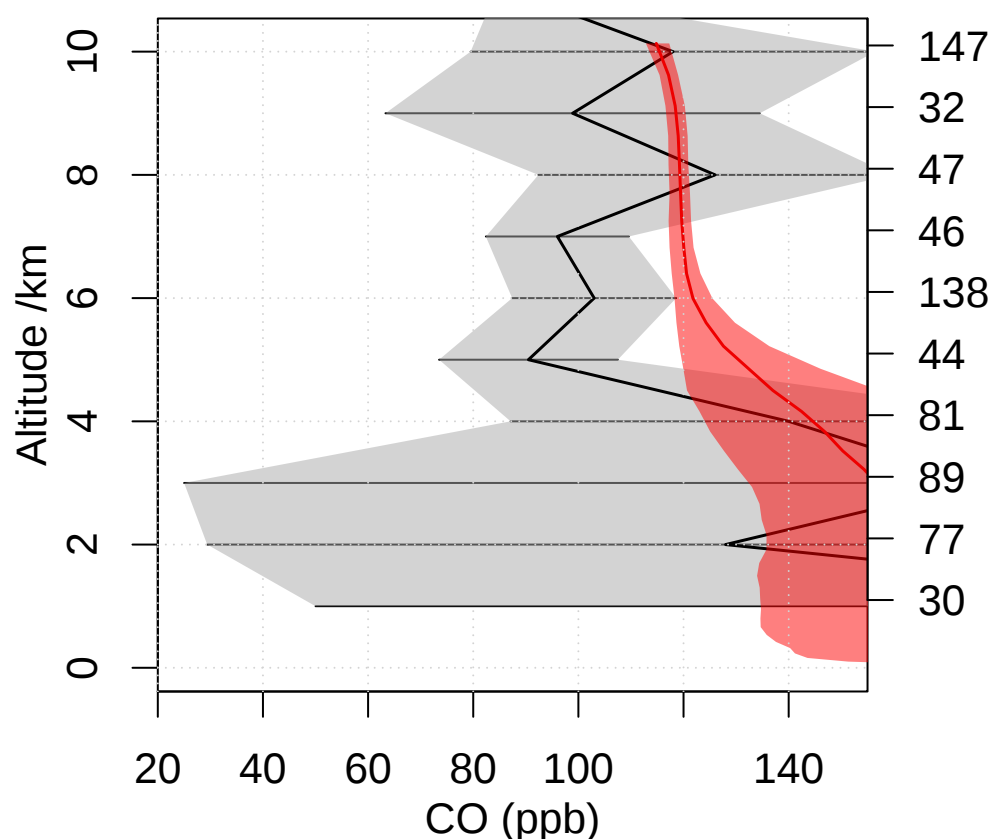
TRACE-A E-Brazil 1992 09
Lat -15 – -5 Lon 310 – 320



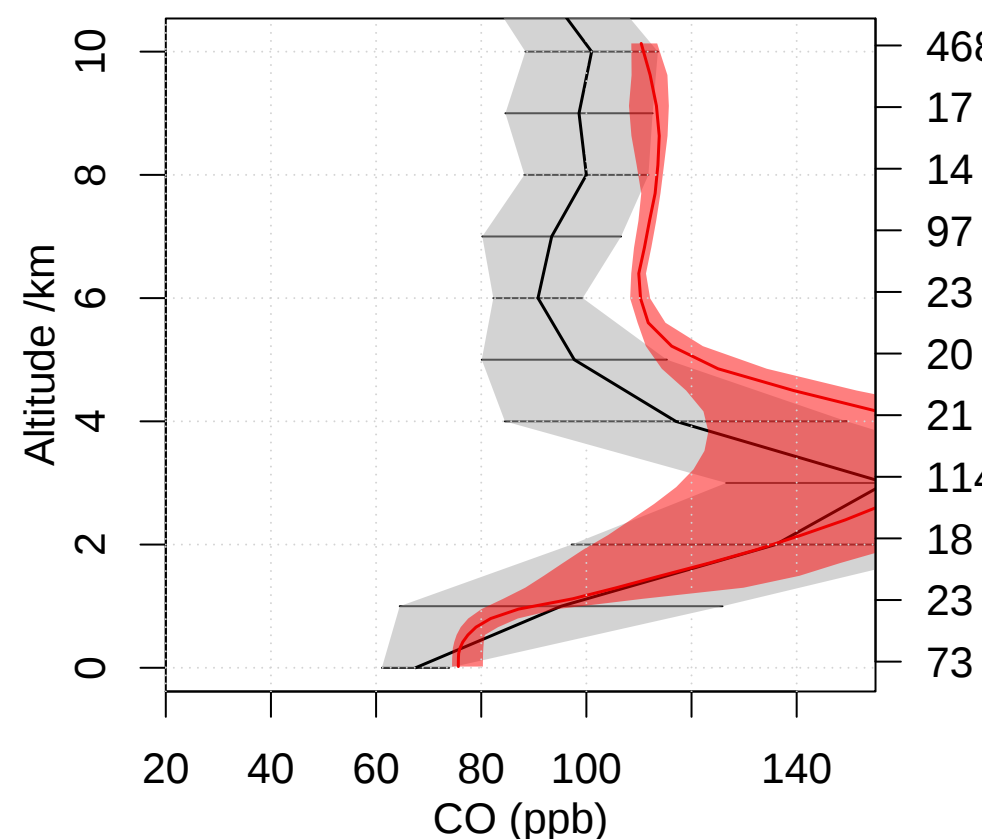
TRACE-A E-Brazil Coast 1992 09
Lat -35 – -25 Lon 310 – 320



TRACE-A S-Africa 1992 09
Lat -25 – -5 Lon 15 – 35

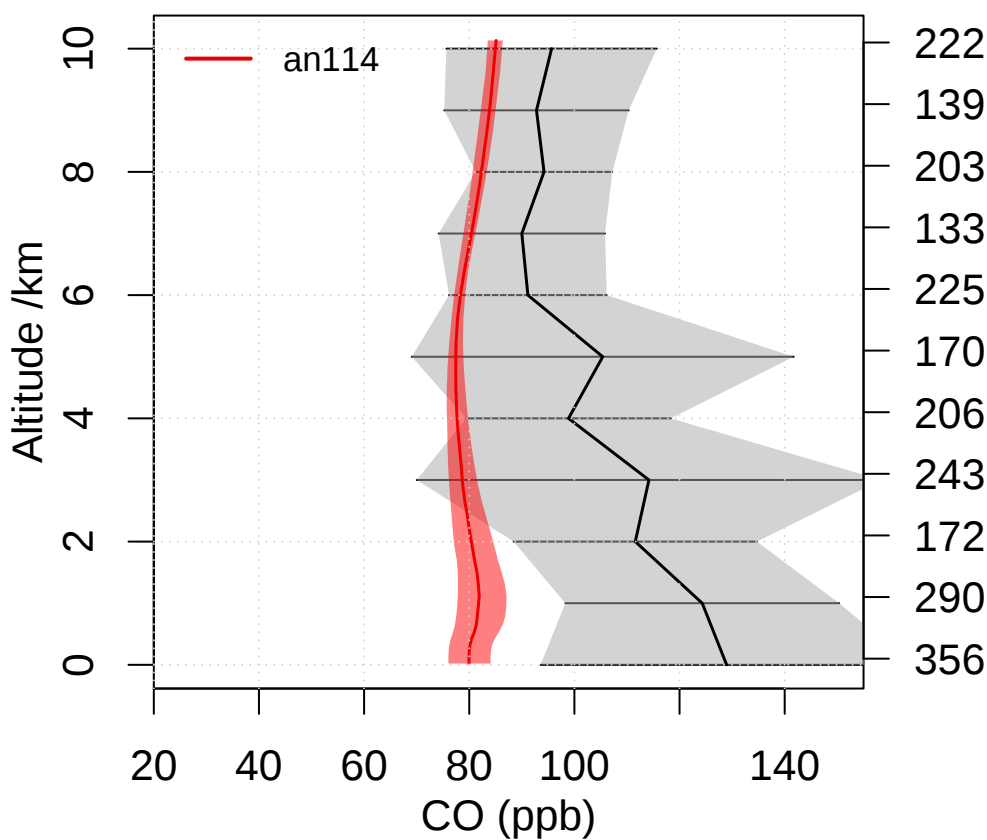


TRACE-A W-Africa Coast 1992 09
Lat -25 – -5 Lon 0 – 10

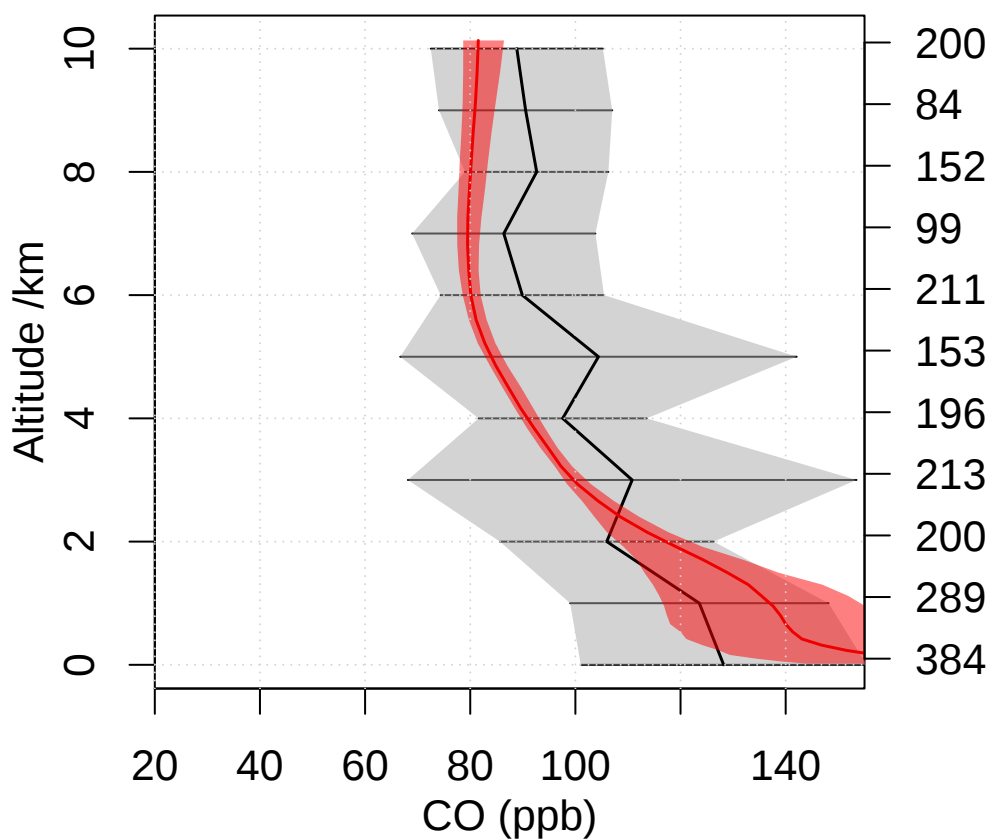


Emmons CO comparison

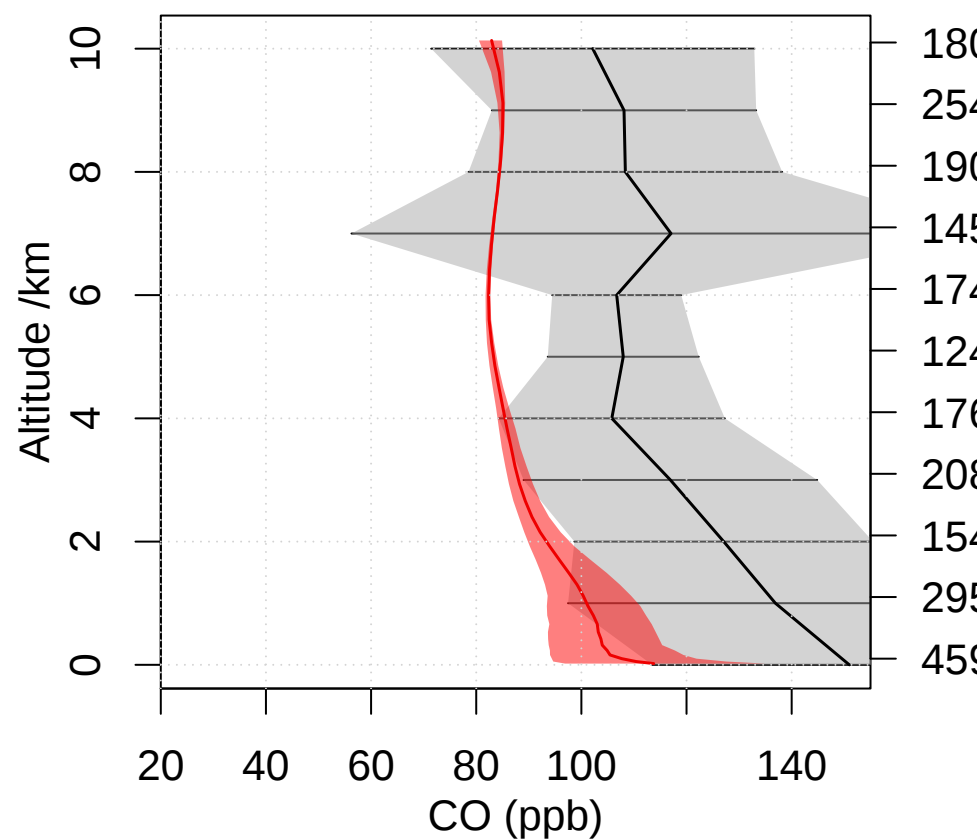
INTEX-NA East Coast 2004 07
Lat 32.5 – 40 Lon 296.5 – 307



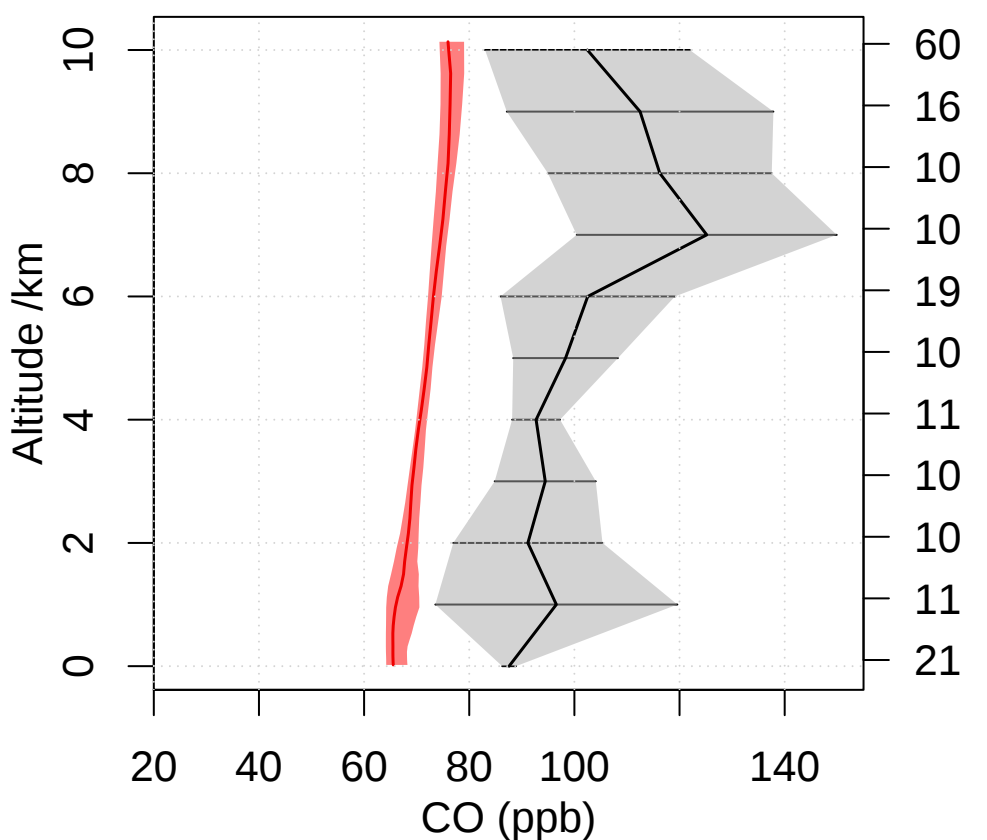
INTEX-NA Central 2004 07
Lat 30 – 40 Lon 259.5 – 285



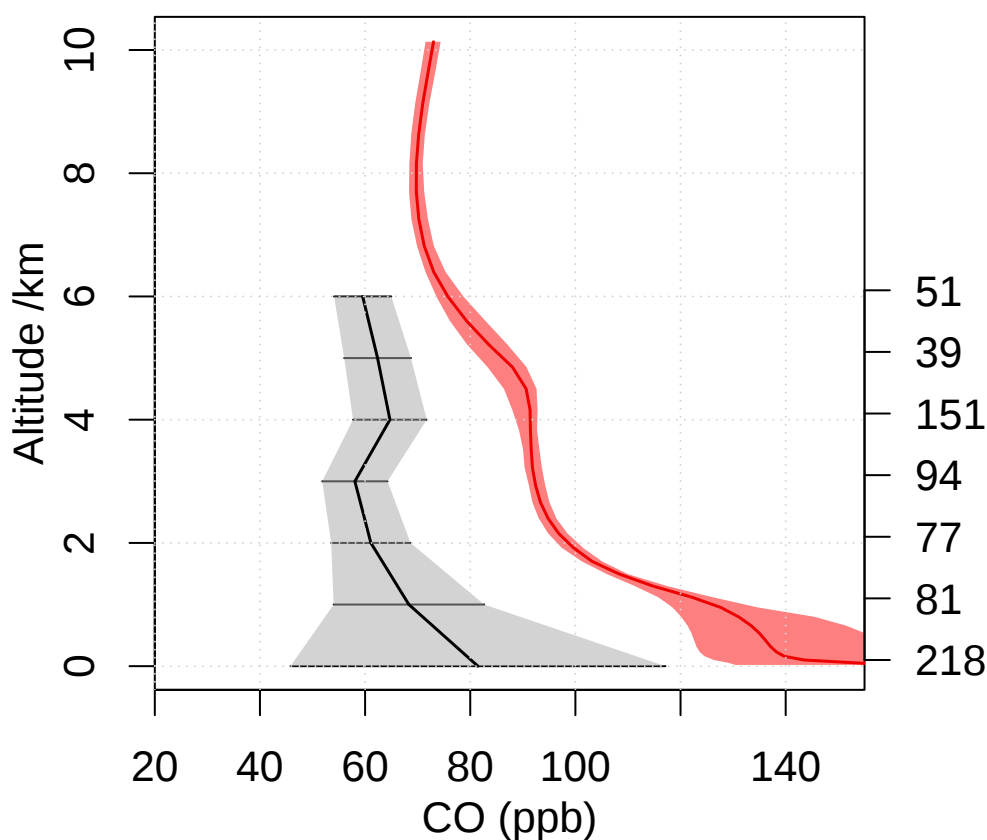
INTEX-NA North East 2004 07
Lat 42.5 – 52.5 Lon 285 – 310



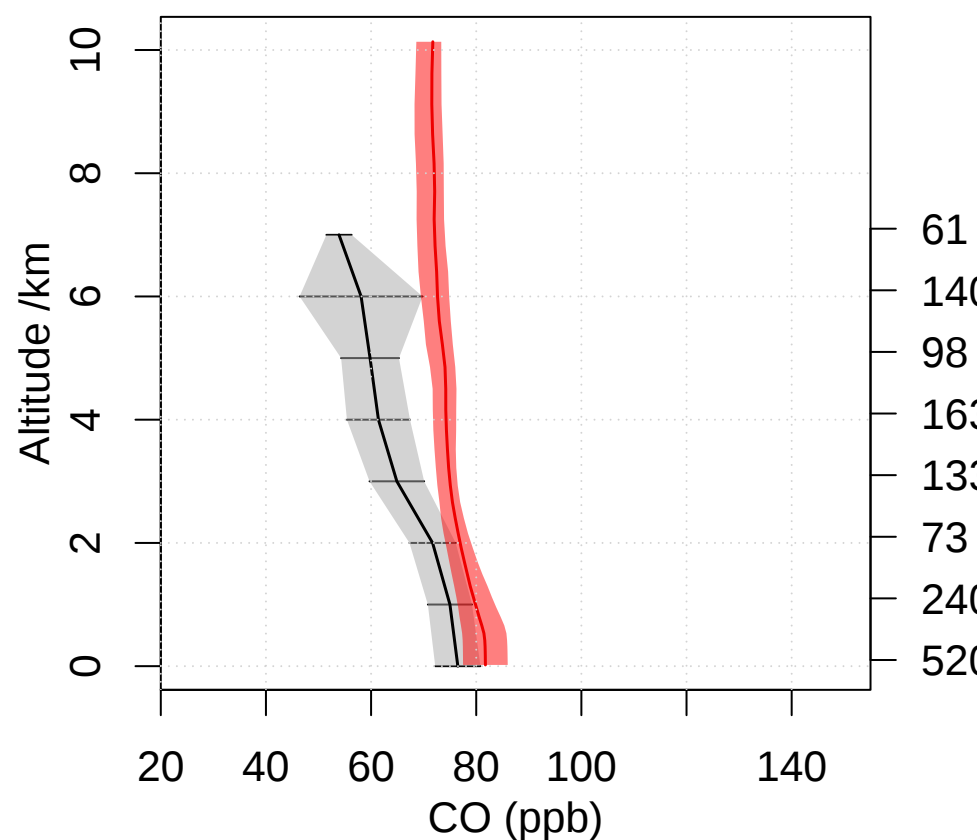
INTEX-NA West Coast 2004 07
Lat 32.5 – 45 Lon 217 – 240



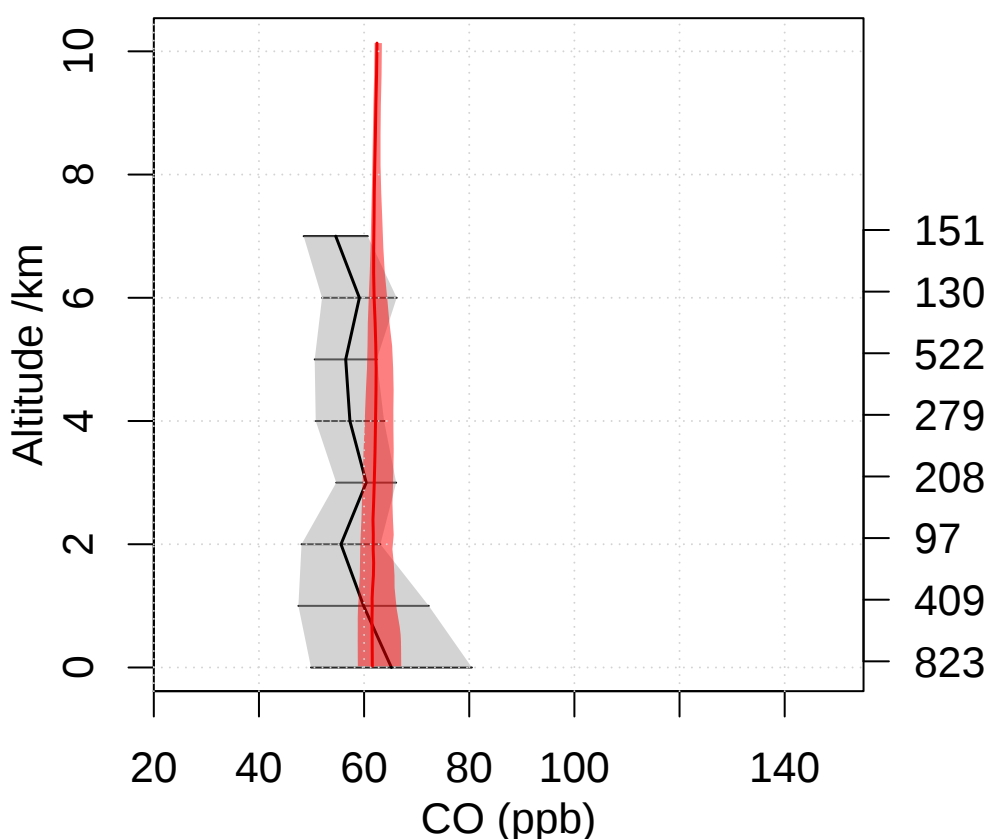
OP3 2008 07
Lat 2.5 – 7.5 Lon 112.5 – 120



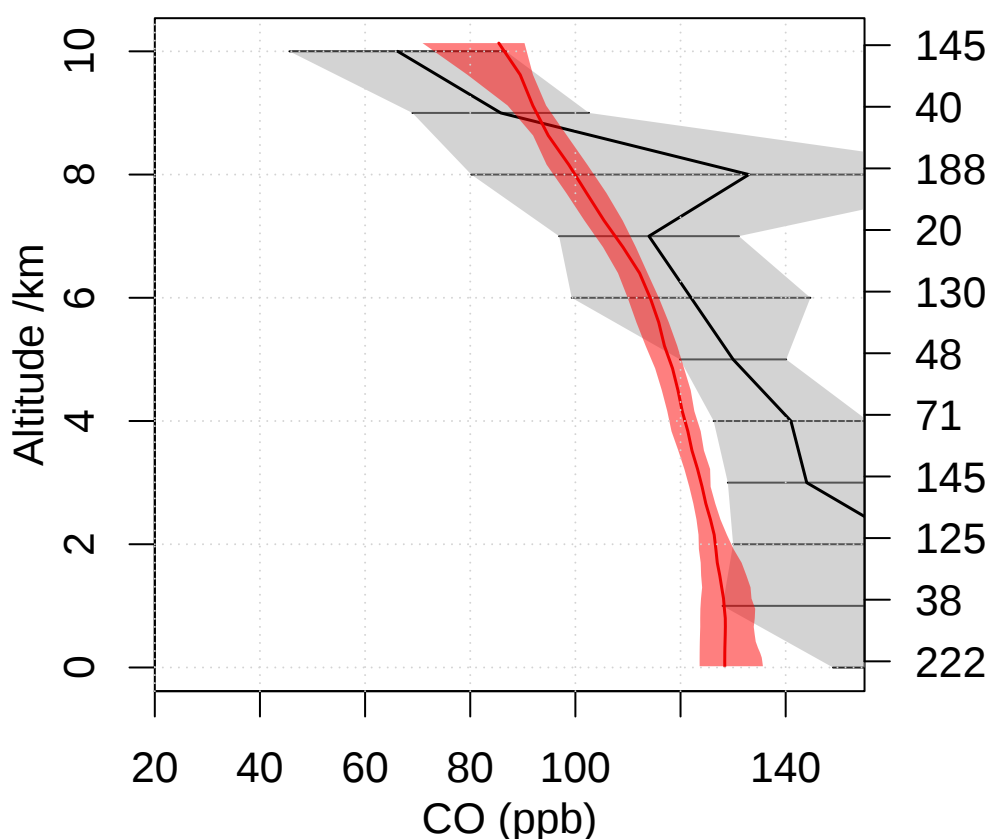
PEM-Tropics-B Christmas-Island 1999 0
Lat 0 – 10 Lon 200 – 220



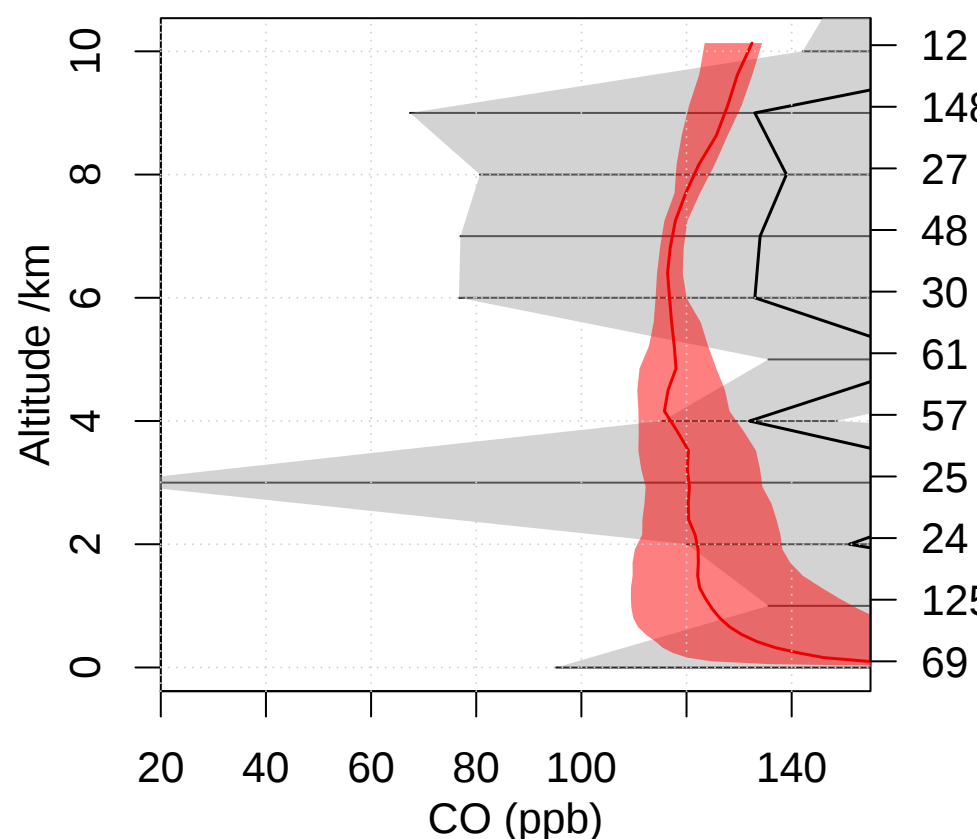
PEM-Tropics-B Tahiti 1999 03
Lat -20 – 0 Lon 200 – 230



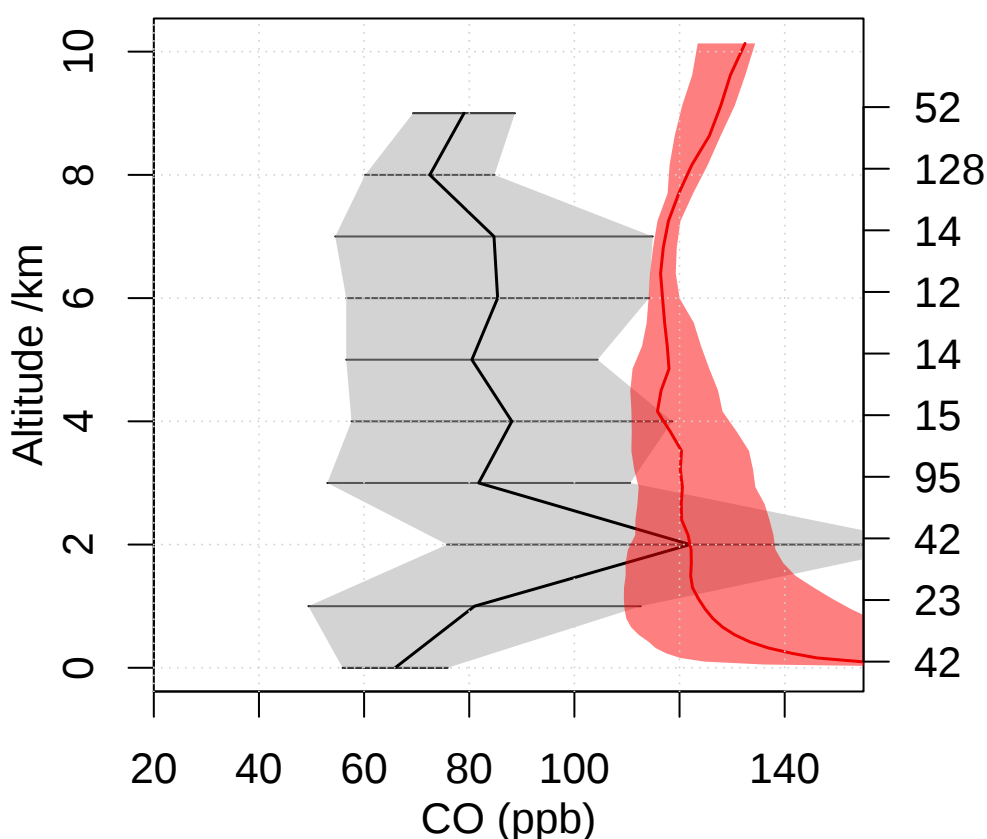
PEM-West-B Japan 1994 02
Lat 25 – 40 Lon 135 – 150



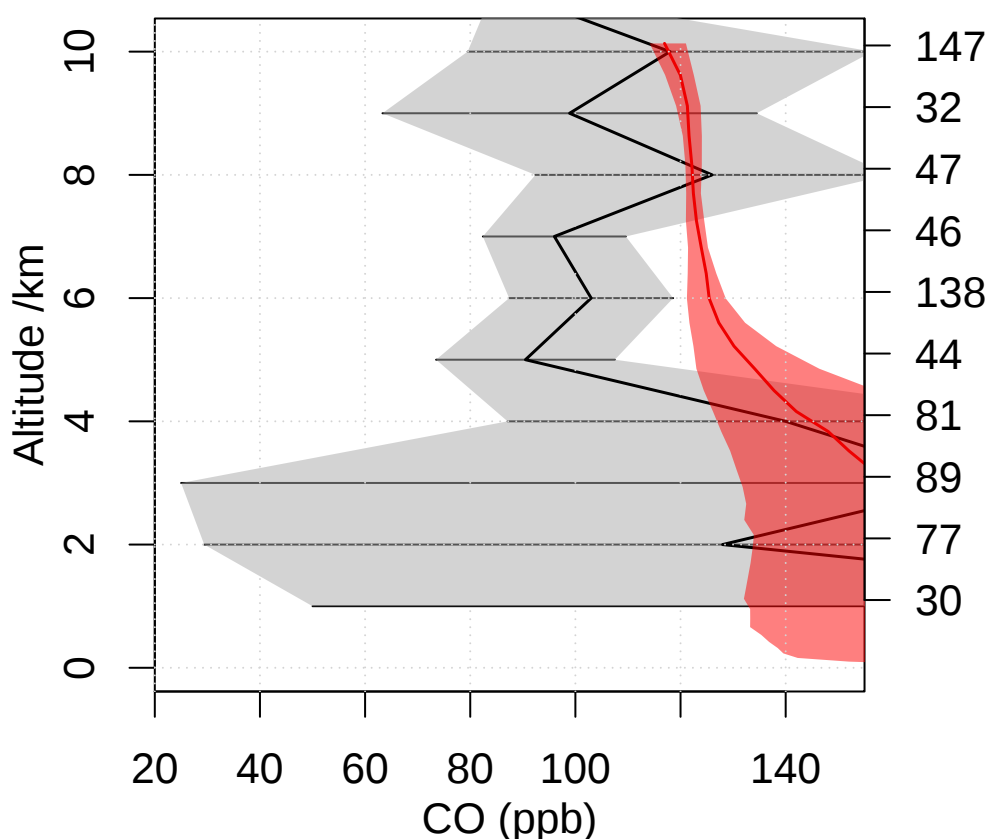
TRACE-A E-Brazil 1992 09
Lat -15 – -5 Lon 310 – 320



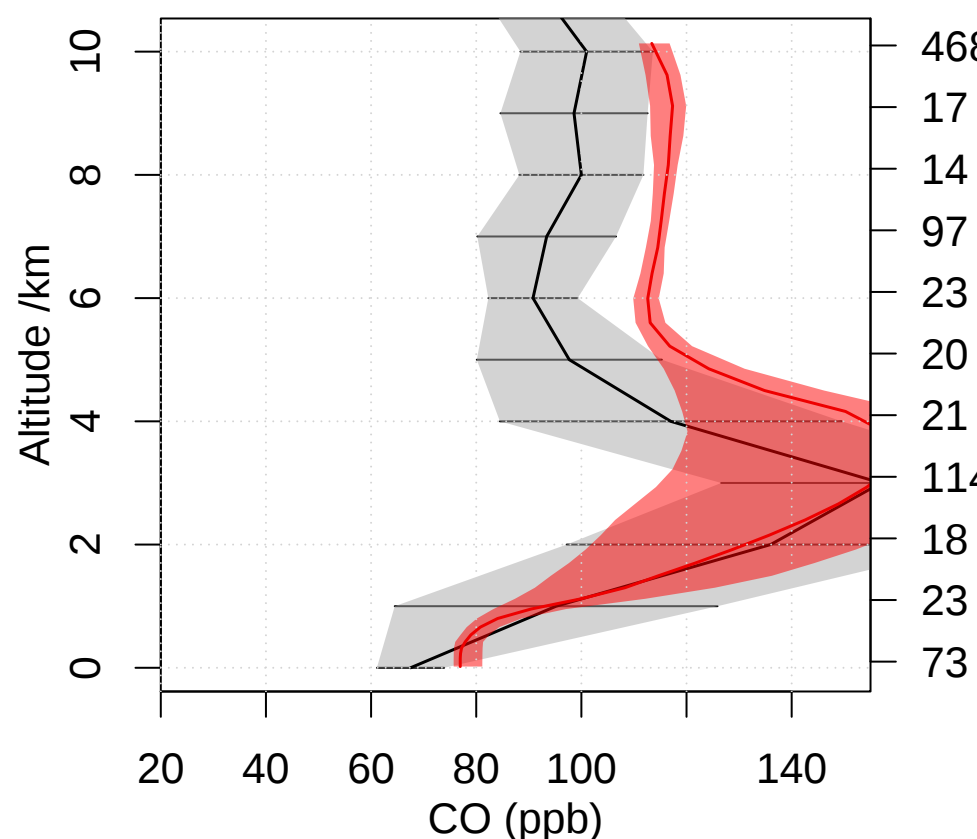
TRACE-A E-Brazil Coast 1992 09
Lat -35 – -25 Lon 310 – 320

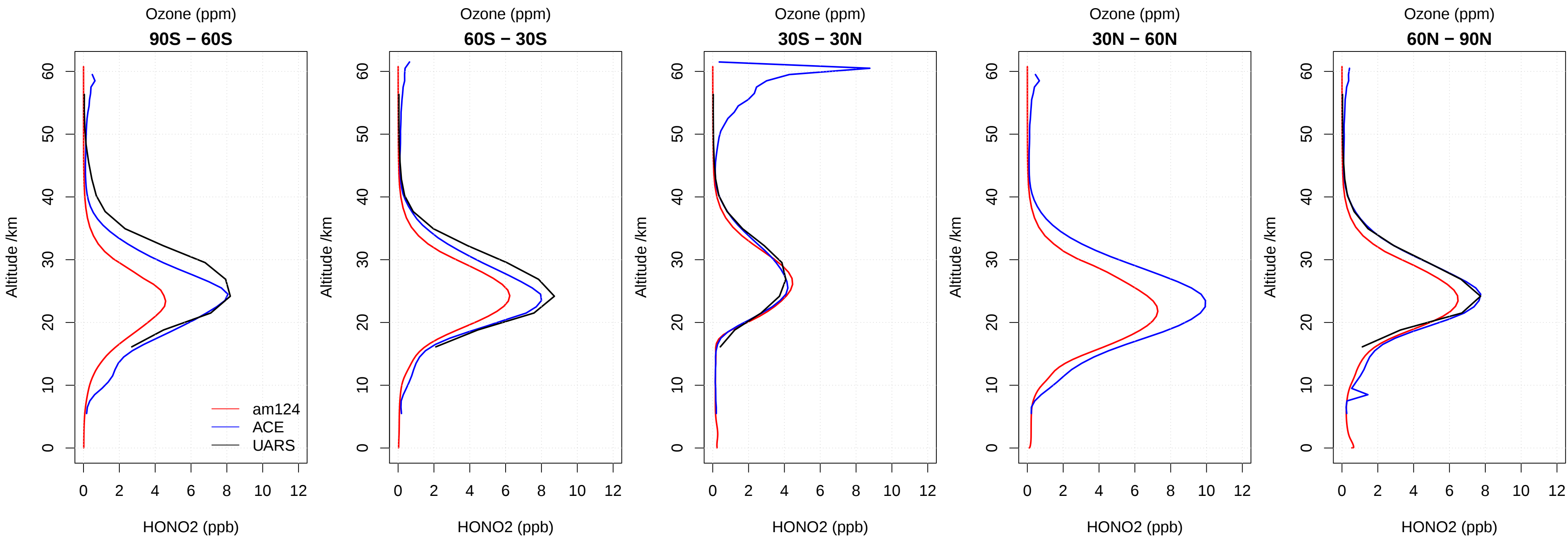
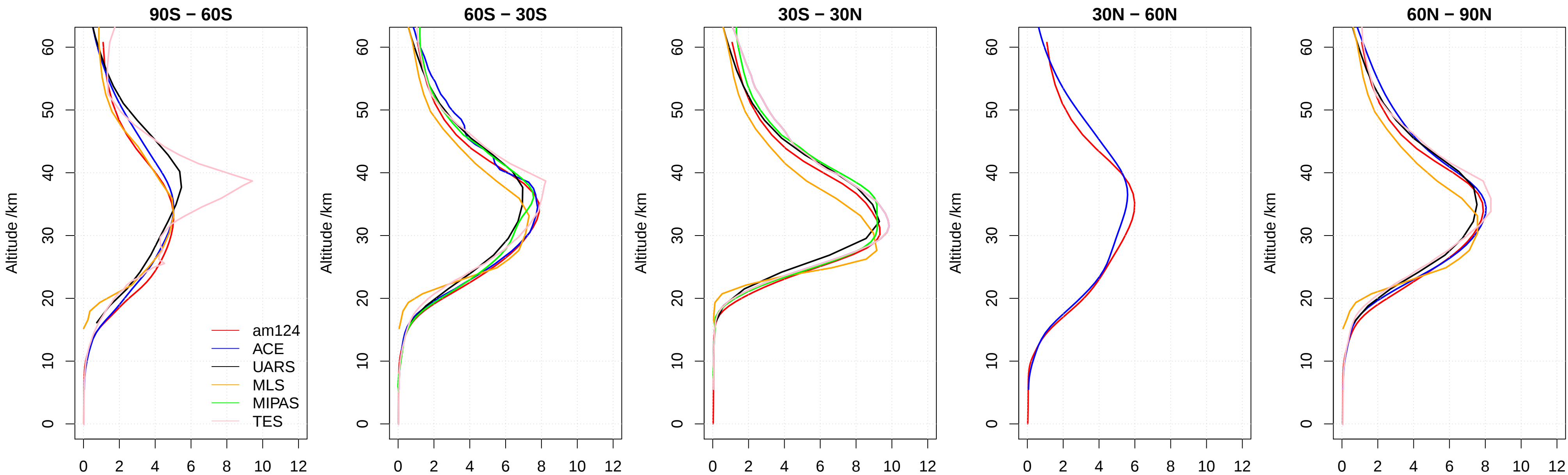


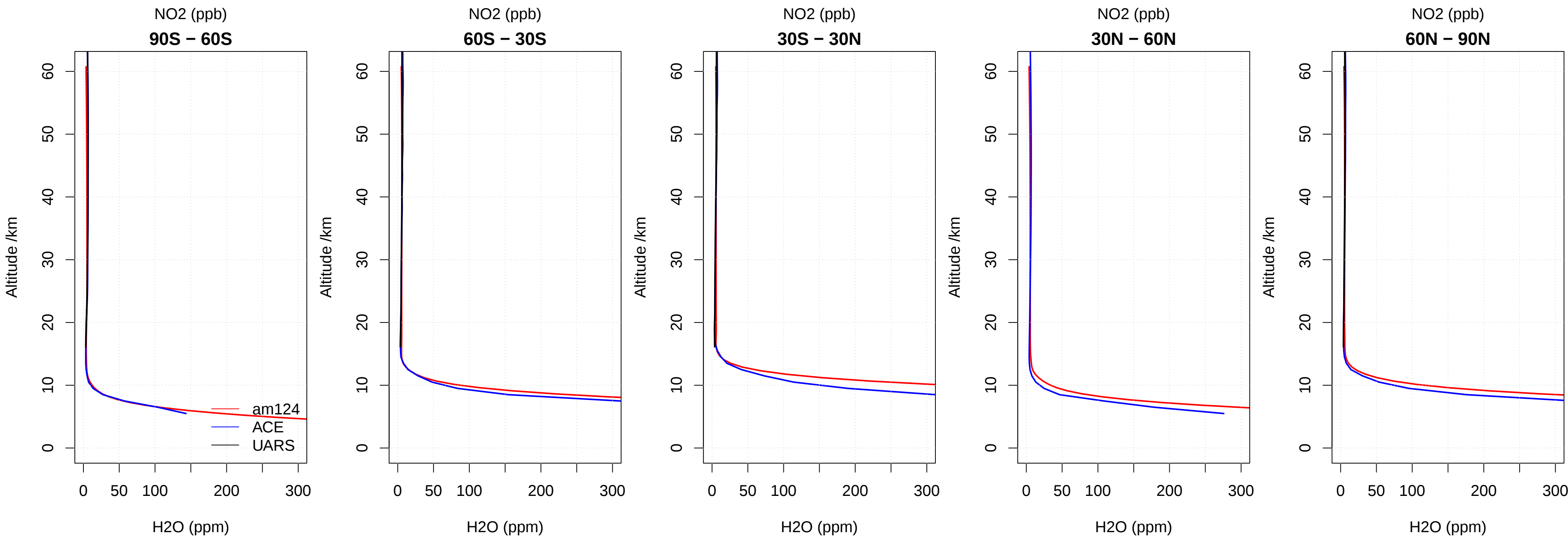
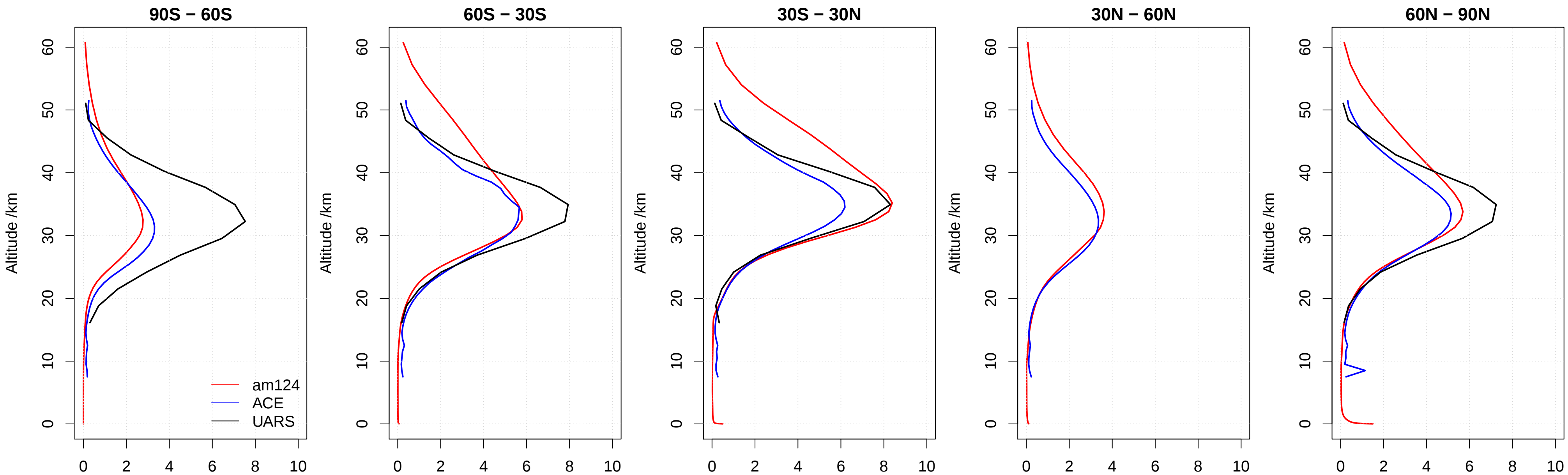
TRACE-A S-Africa 1992 09
Lat -25 – -5 Lon 15 – 35

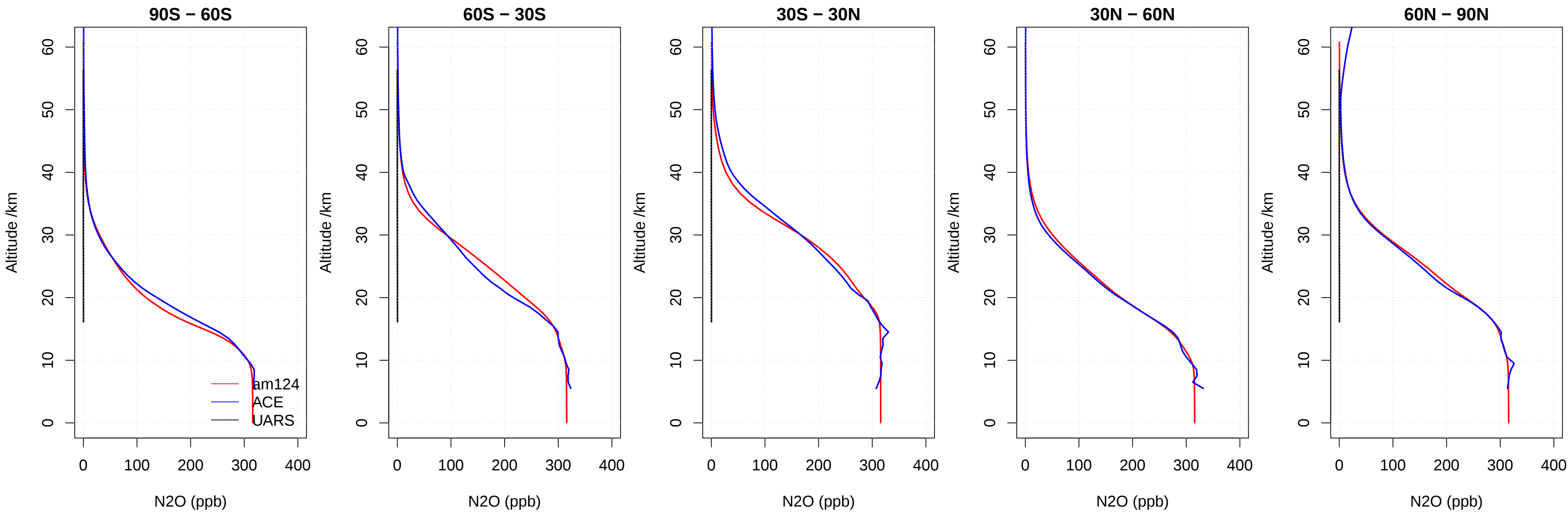


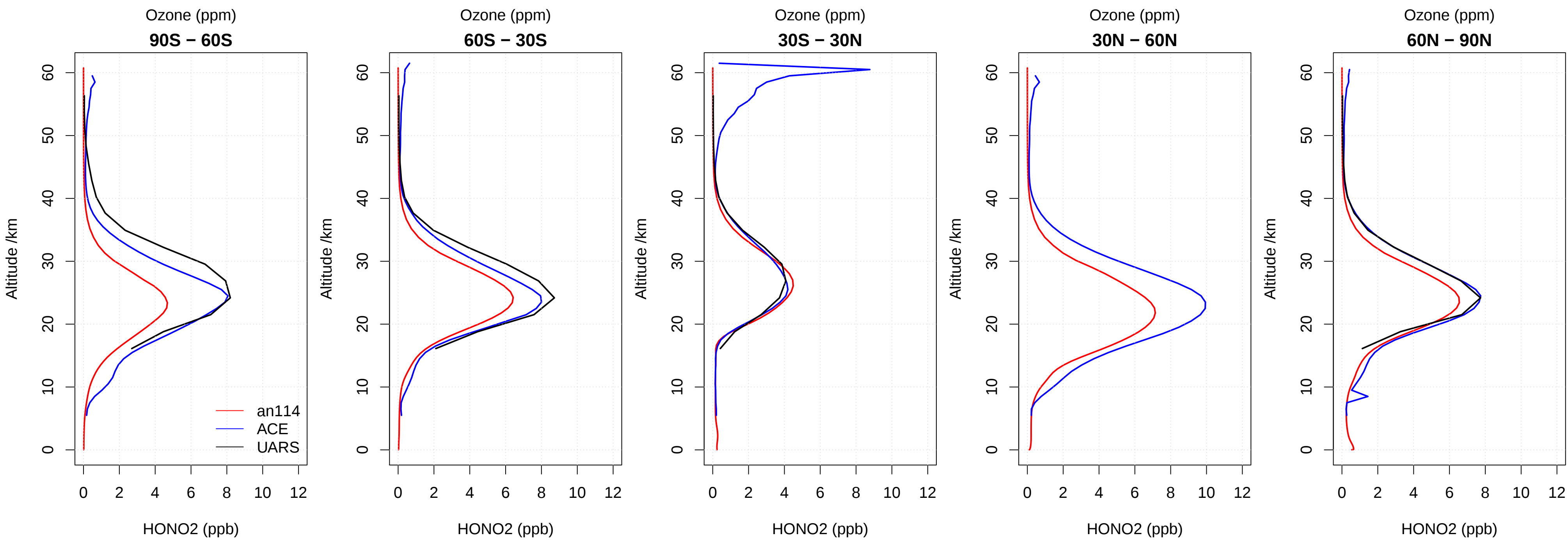
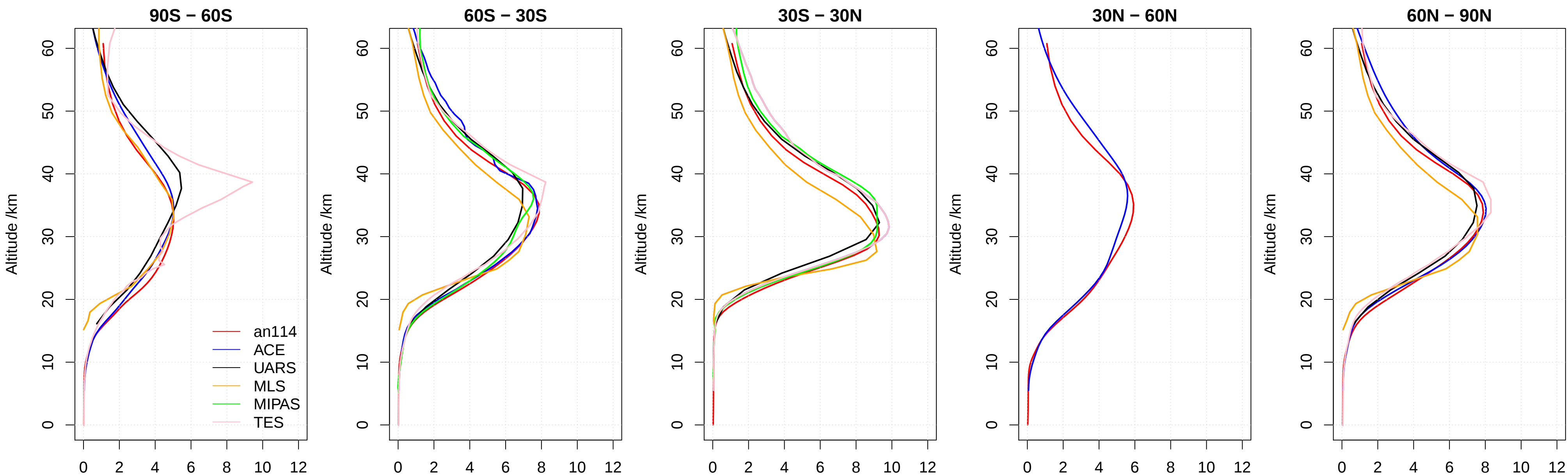
TRACE-A W-Africa Coast 1992 09
Lat -25 – -5 Lon 0 – 10

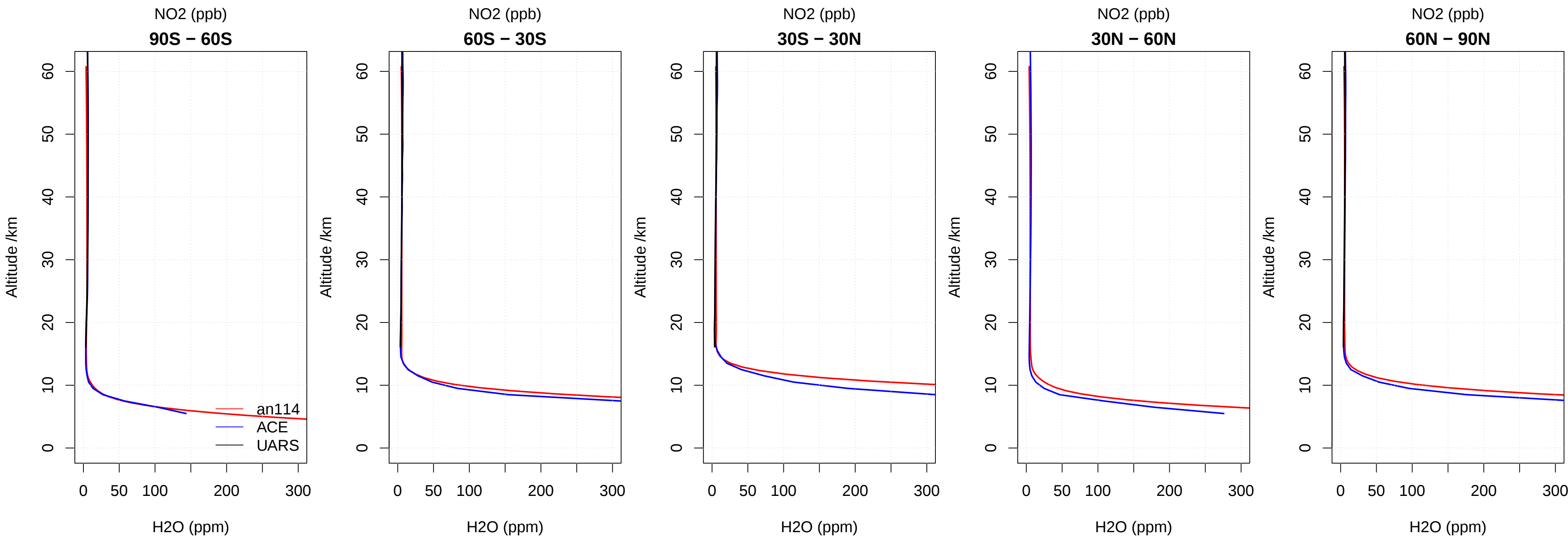
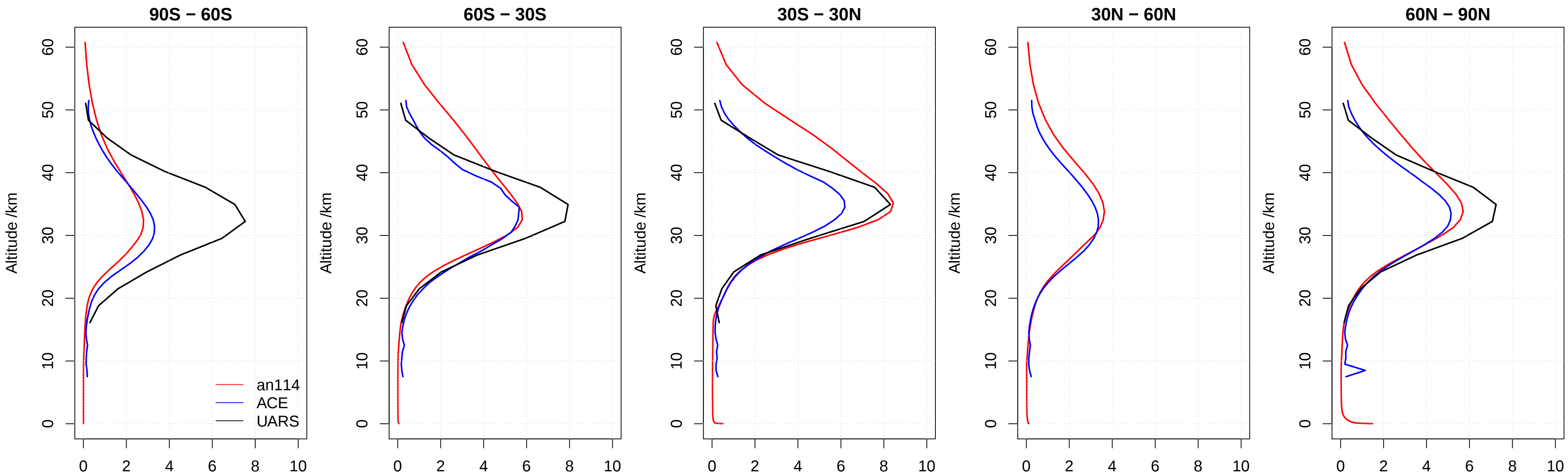


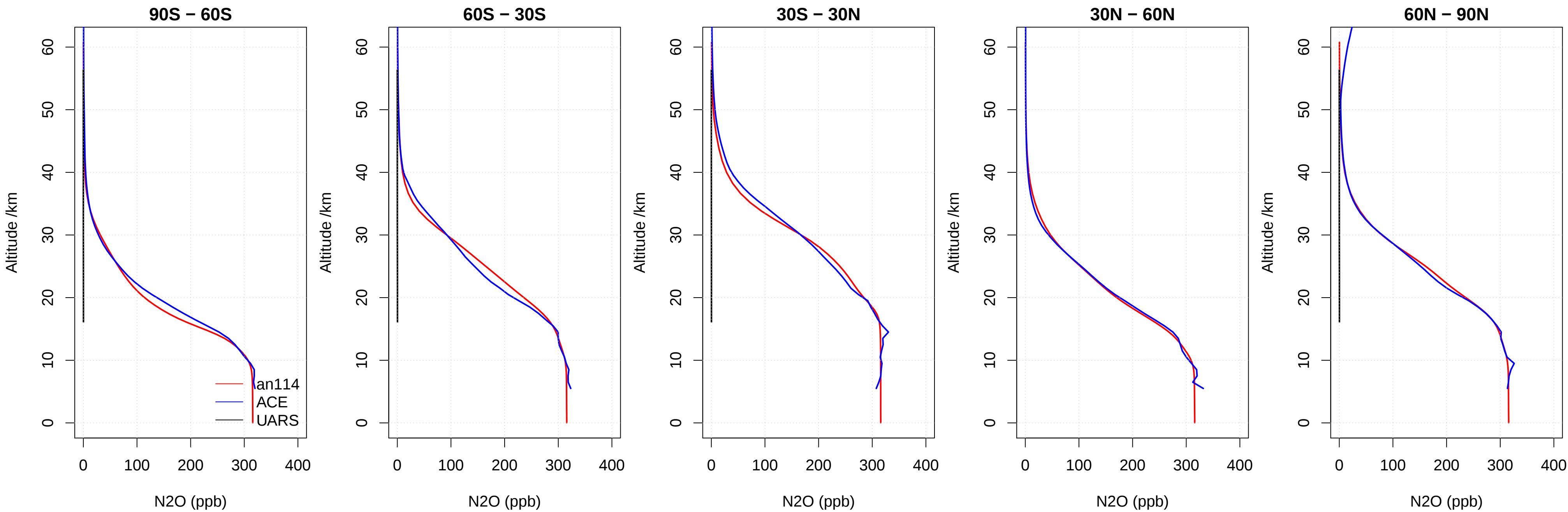






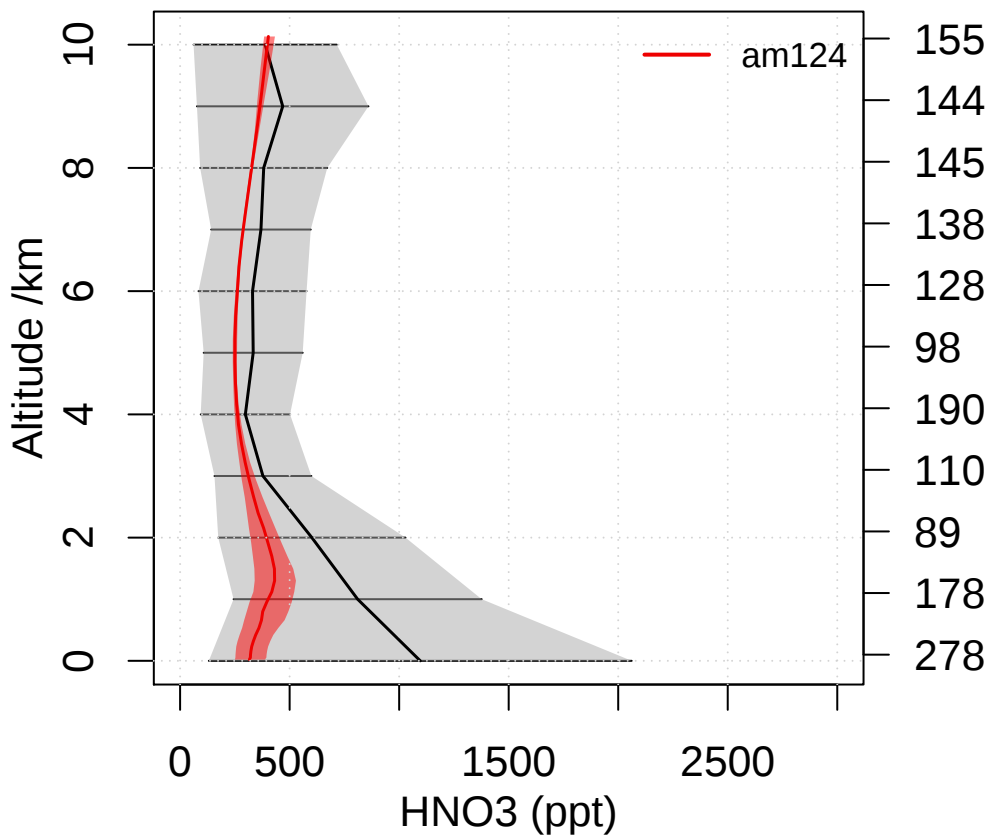




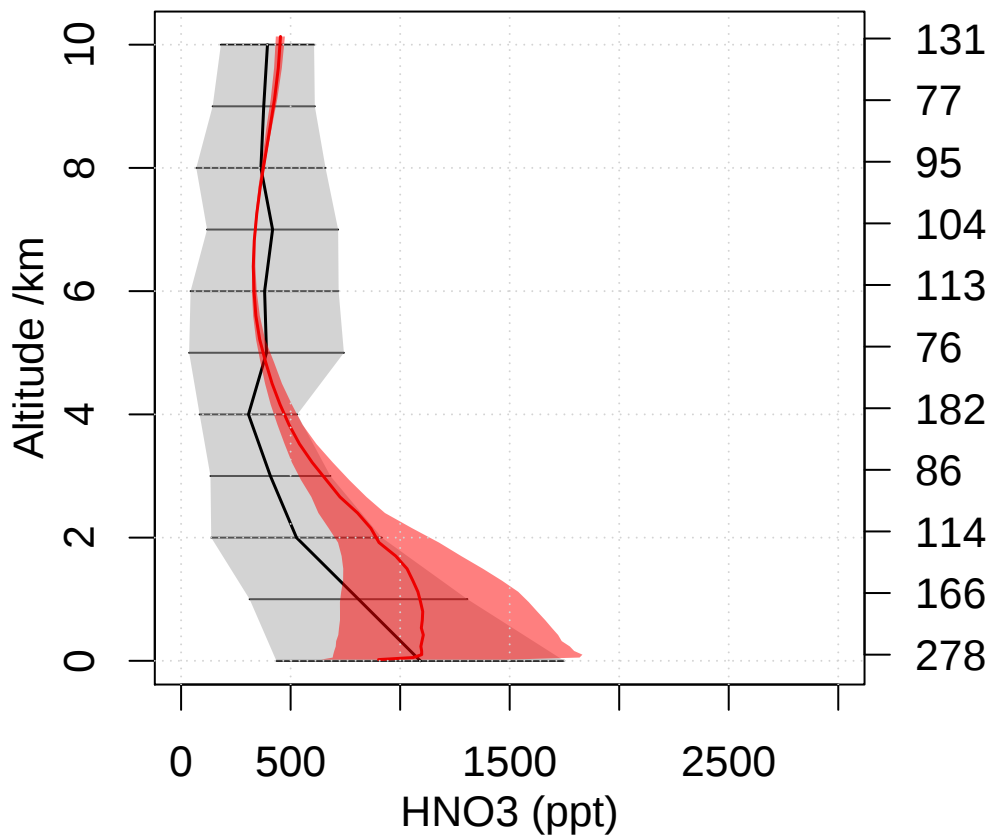


Emmons HNO3 comparison

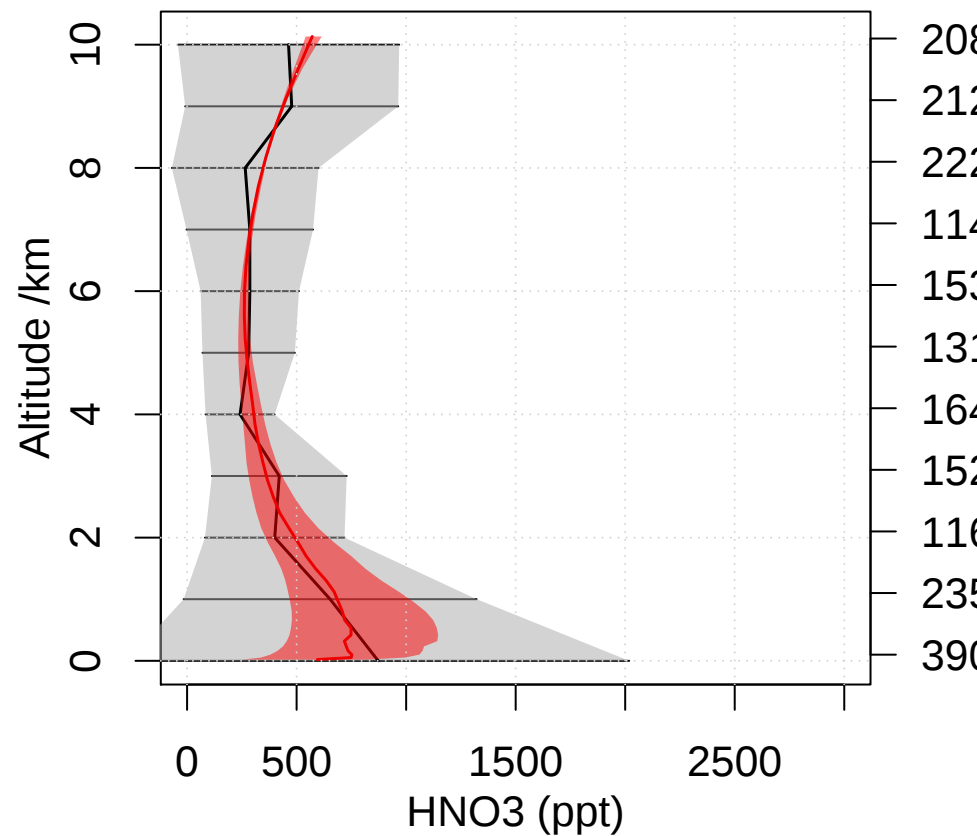
INTEX-NA East Coast 2004 07
Lat 32.5 – 40 Lon 296.5 – 307



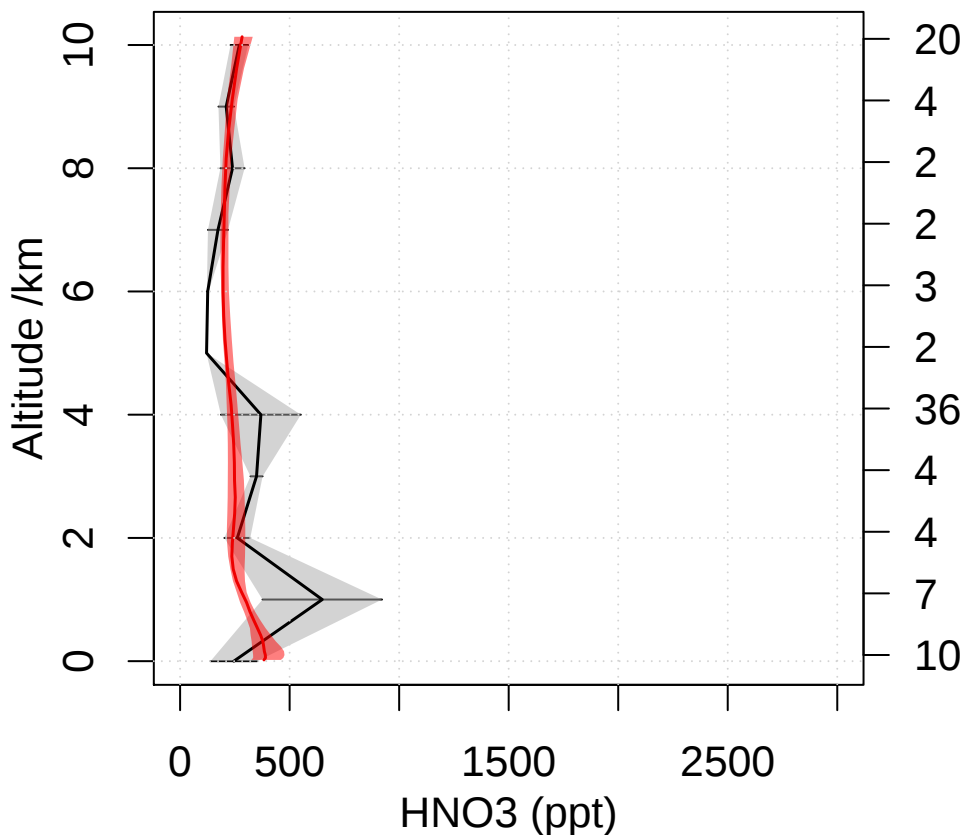
INTEX-NA Central 2004 07
Lat 30 – 40 Lon 259.5 – 285



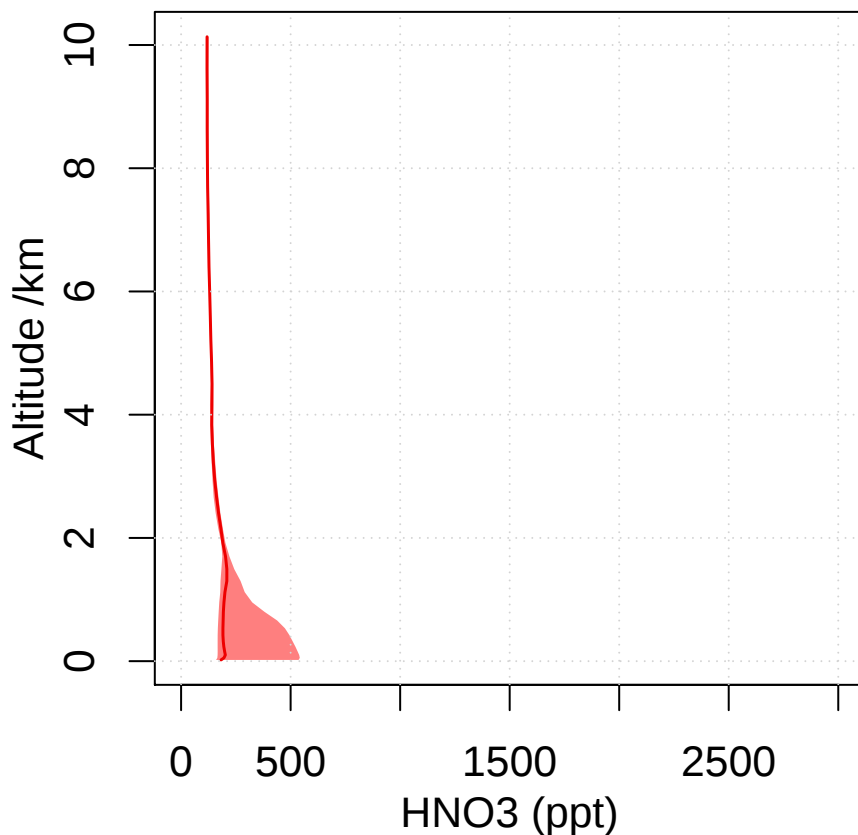
INTEX-NA North East 2004 07
Lat 42.5 – 52.5 Lon 285 – 310



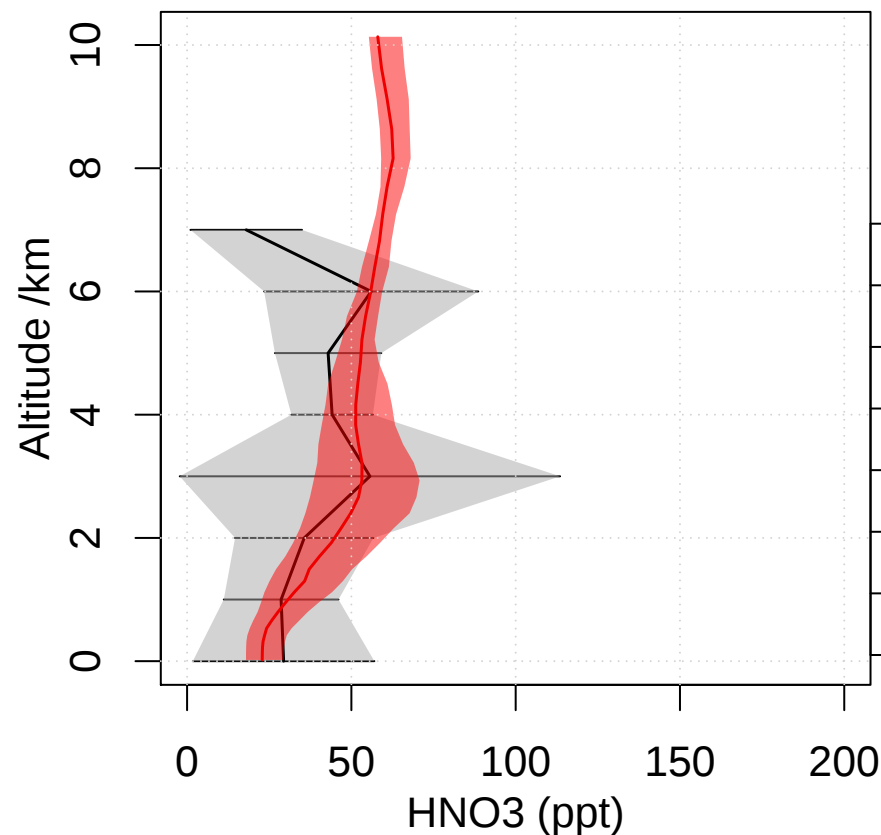
INTEX-NA West Coast 2004 07
Lat 32.5 – 45 Lon 217 – 240



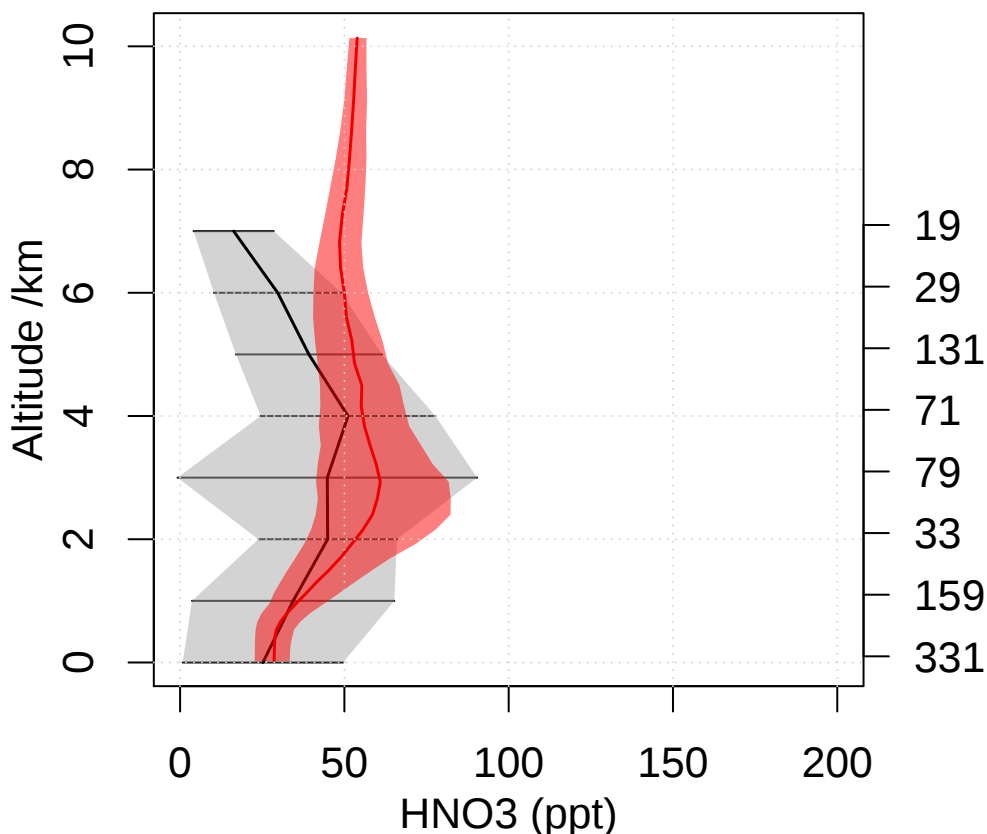
OP3 2008 07
Lat 2.5 – 7.5 Lon 112.5 – 120



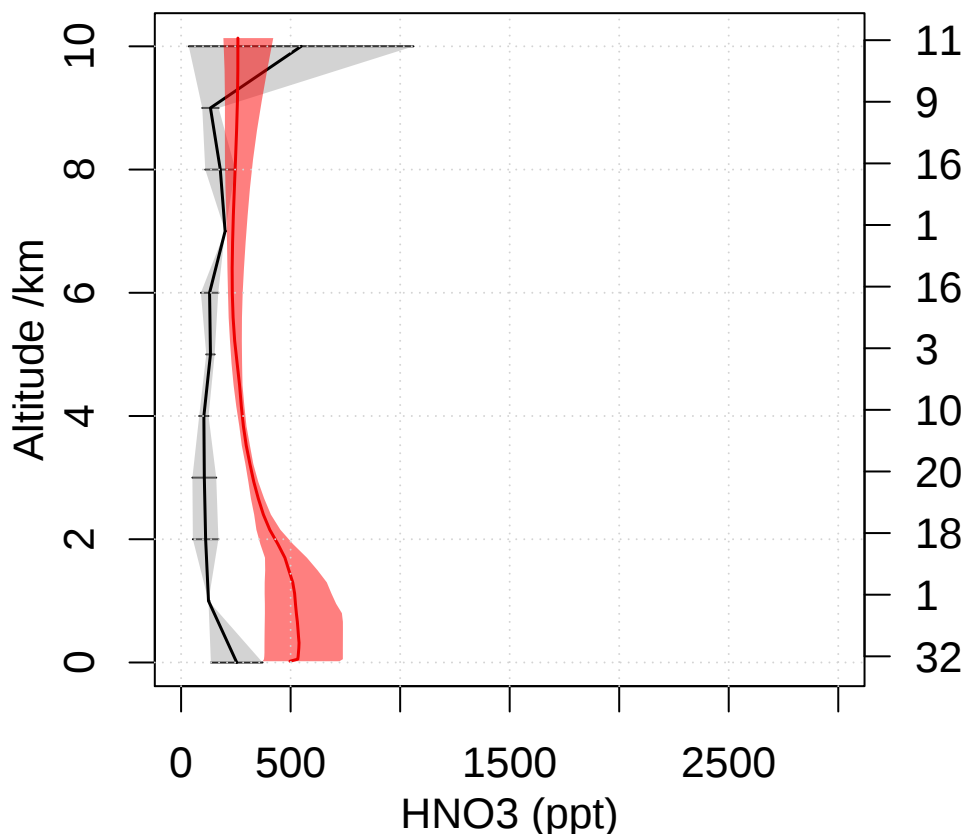
PEM-Tropics-B Christmas-Island 1999 07
Lat 0 – 10 Lon 200 – 220



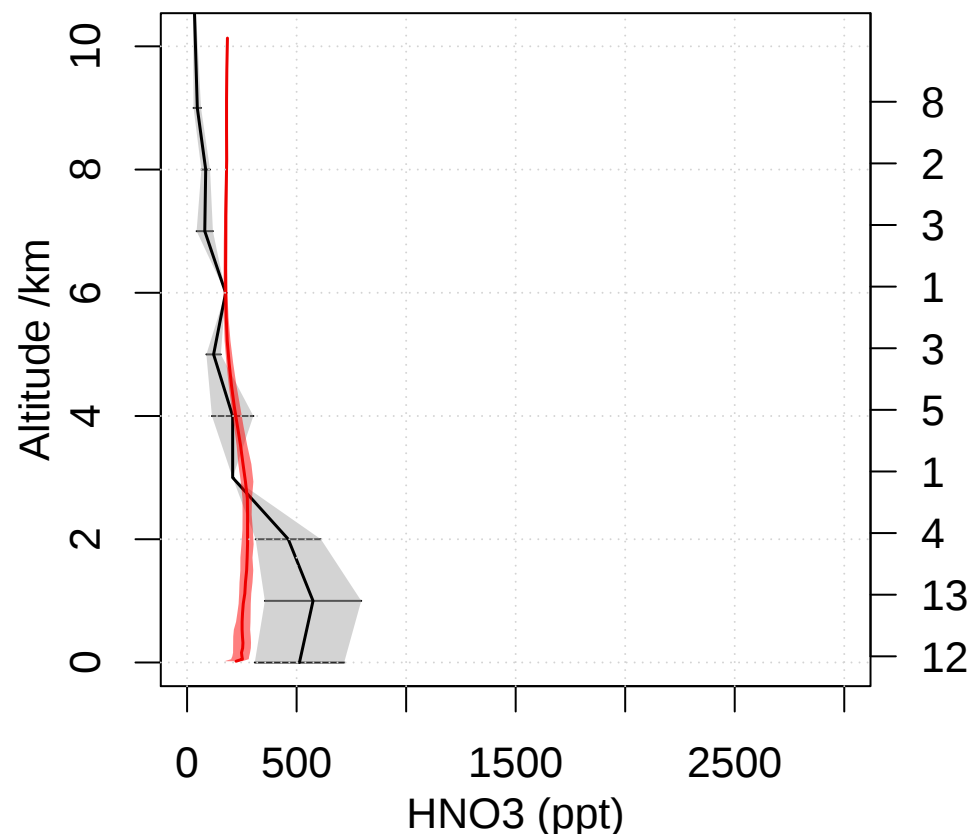
PEM-Tropics-B Tahiti 1999 03
Lat -20 – 0 Lon 200 – 230



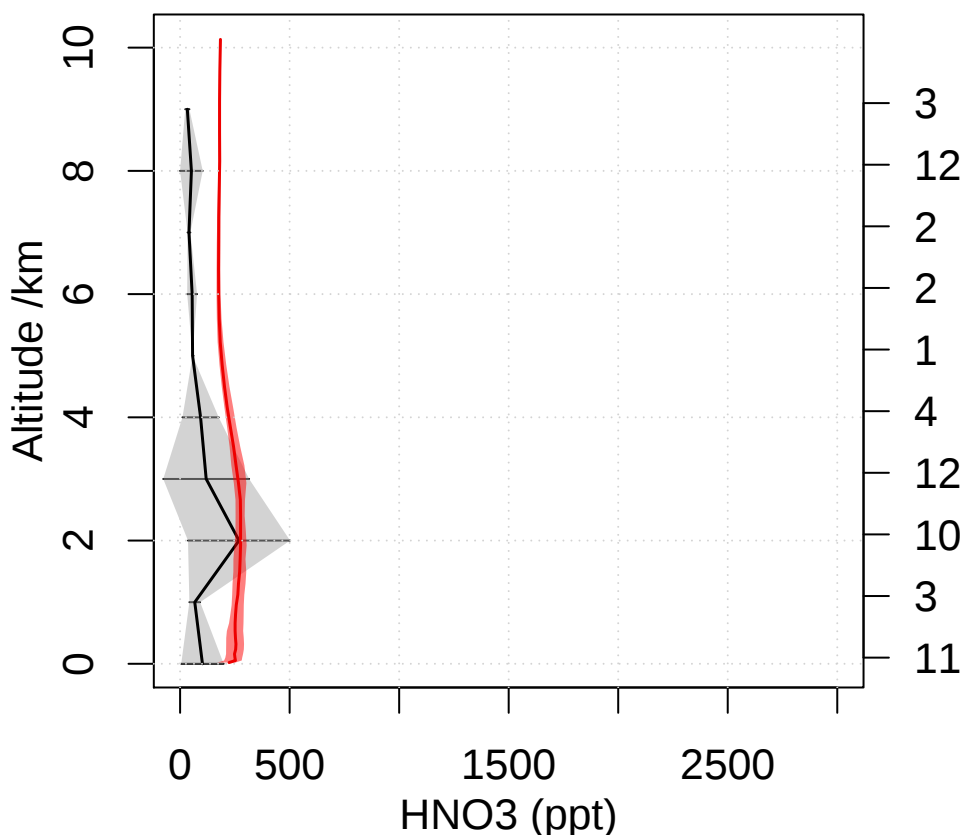
PEM-West-B Japan 1994 02
Lat 25 – 40 Lon 135 – 150



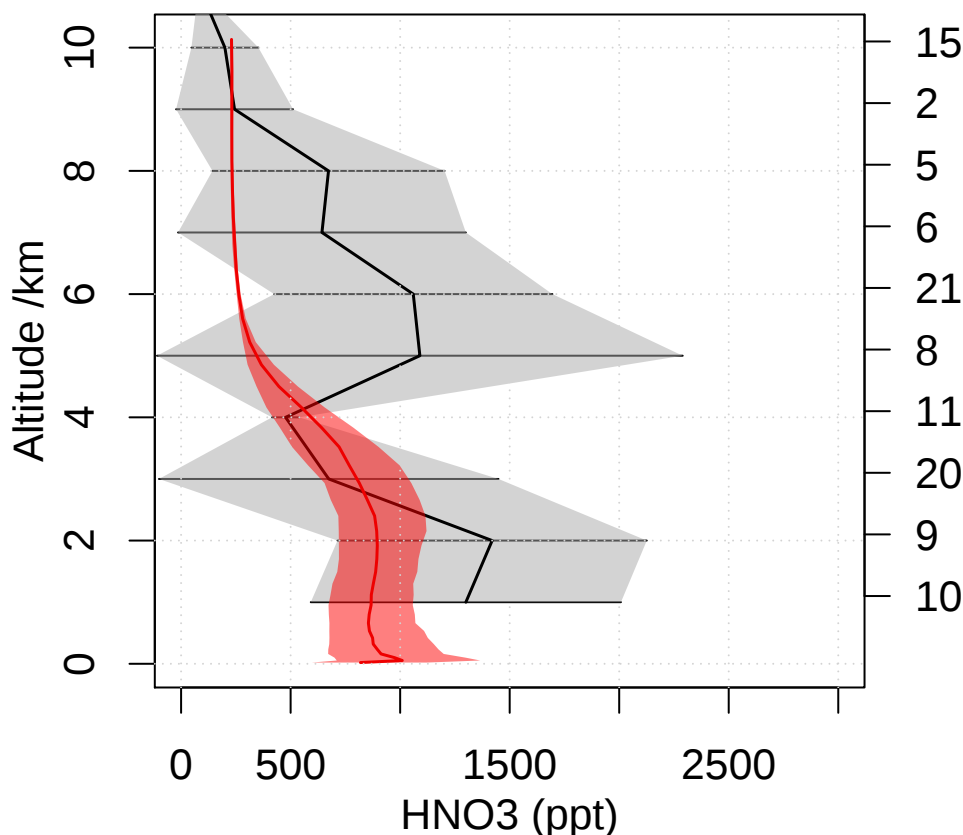
TRACE-A E-Brazil 1992 09
Lat -15 – -5 Lon 310 – 320



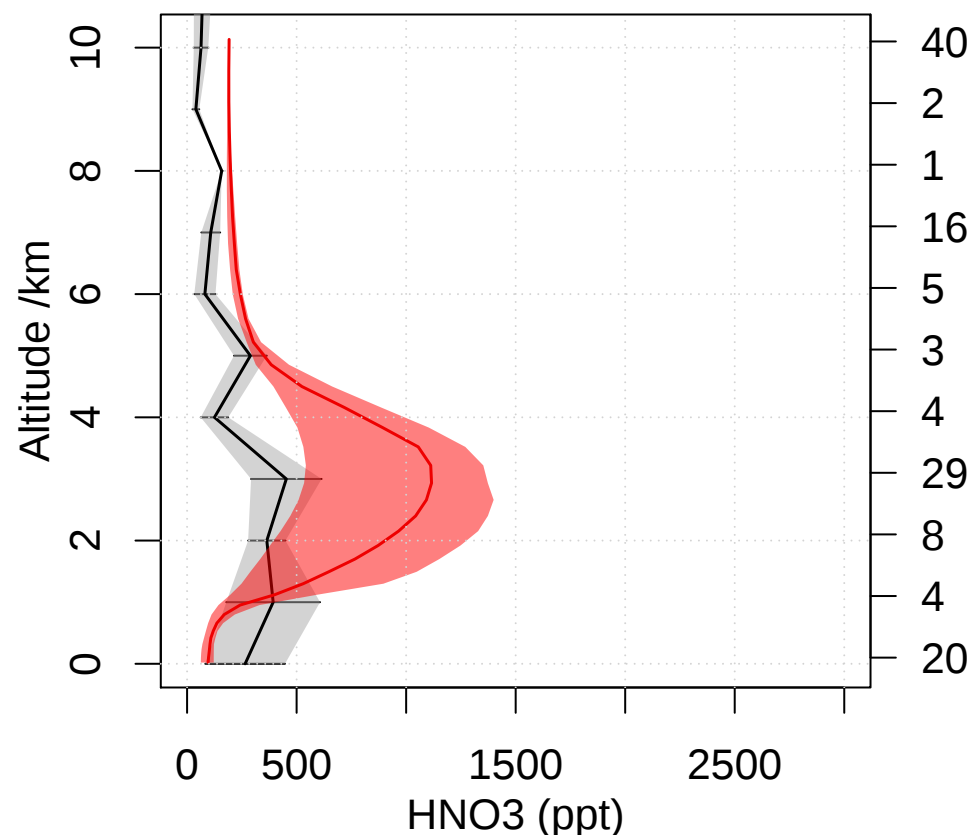
TRACE-A E-Brazil Coast 1992 09
Lat -35 – -25 Lon 310 – 320



TRACE-A S-Africa 1992 09
Lat -25 – -5 Lon 15 – 35

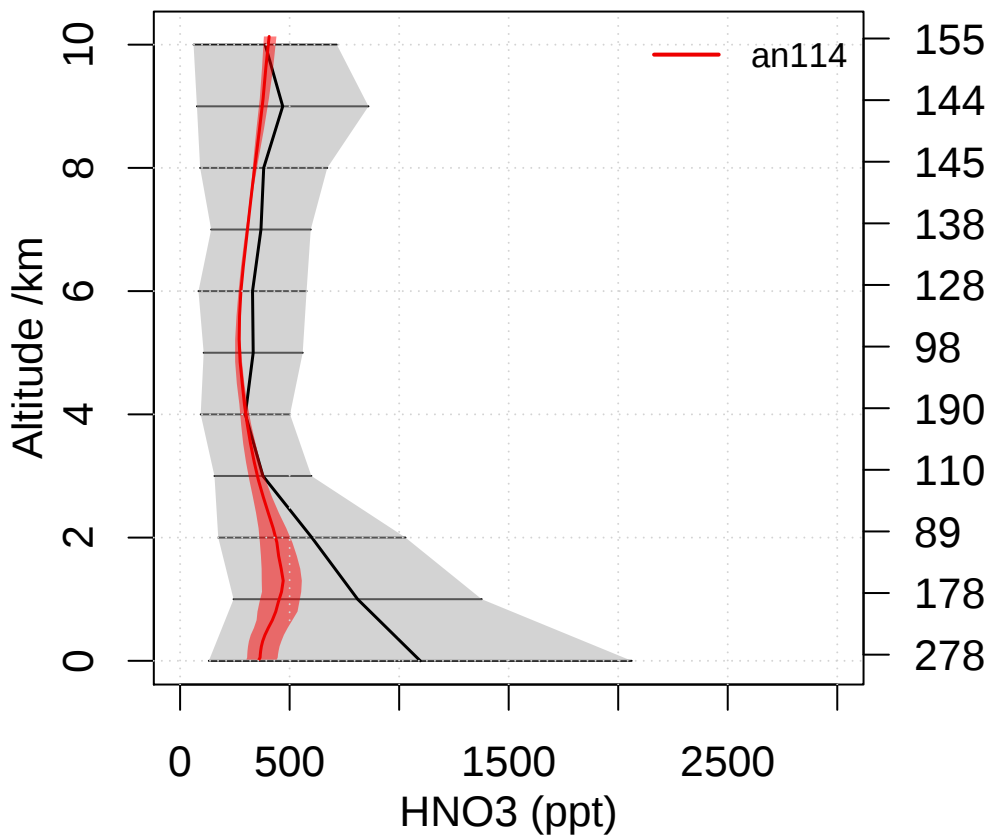


TRACE-A W-Africa Coast 1992 09
Lat -25 – -5 Lon 0 – 10

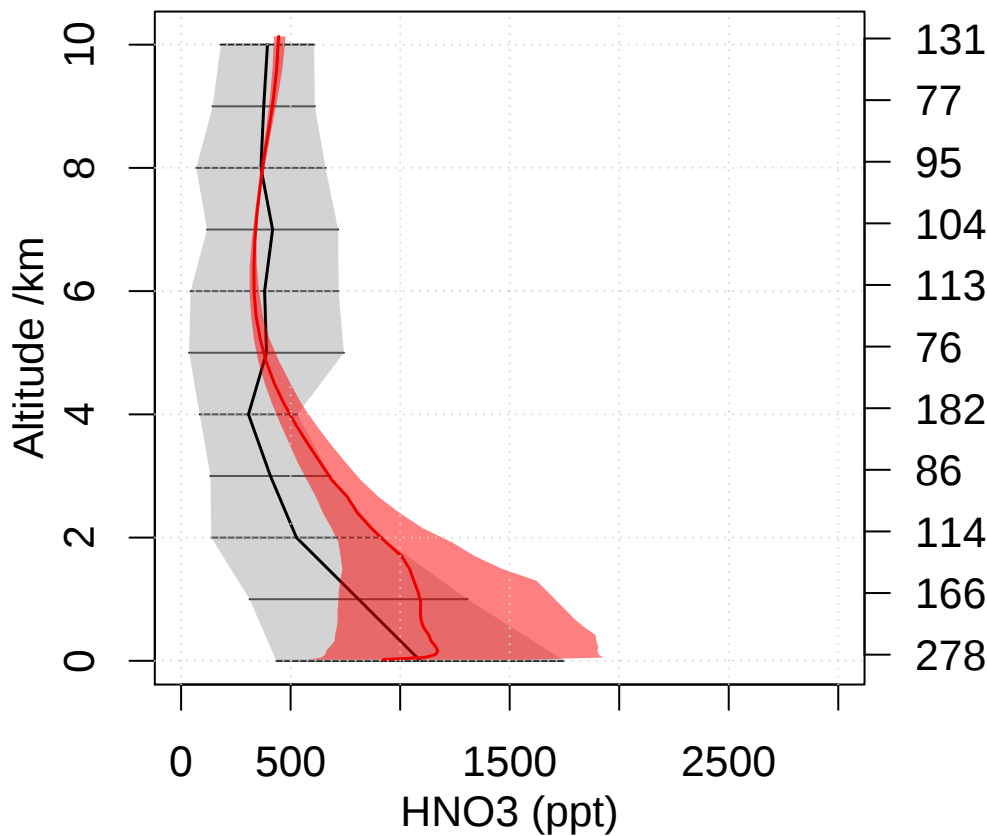


Emmons HNO3 comparison

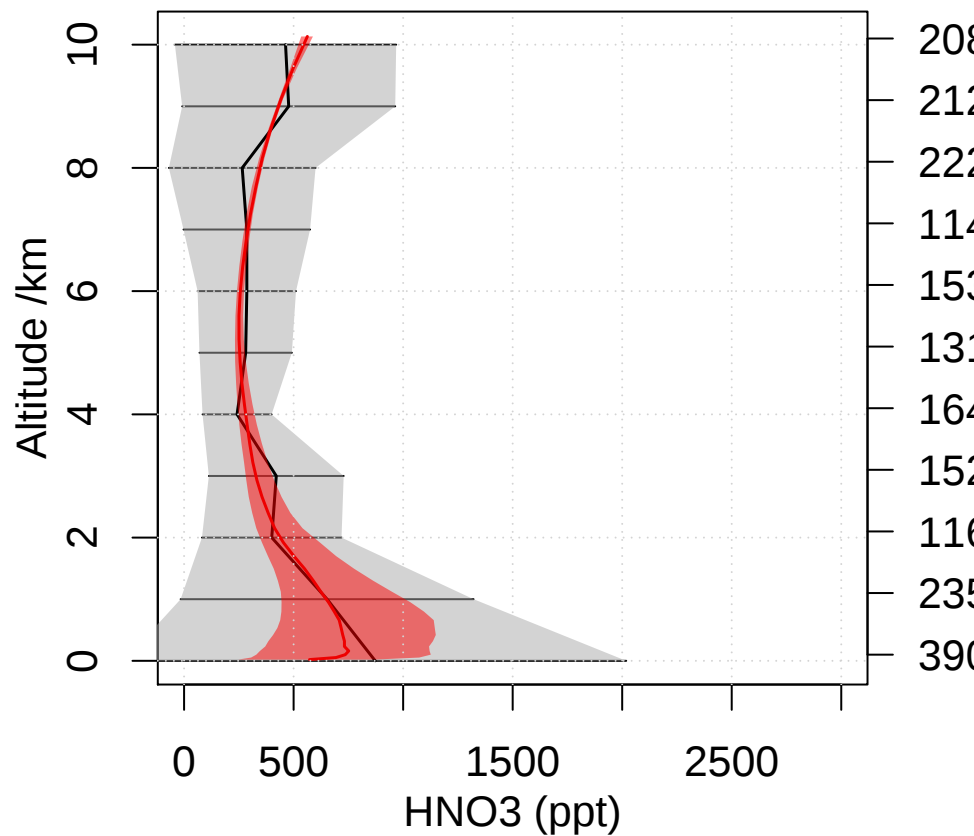
INTEX-NA East Coast 2004 07
Lat 32.5 – 40 Lon 296.5 – 307



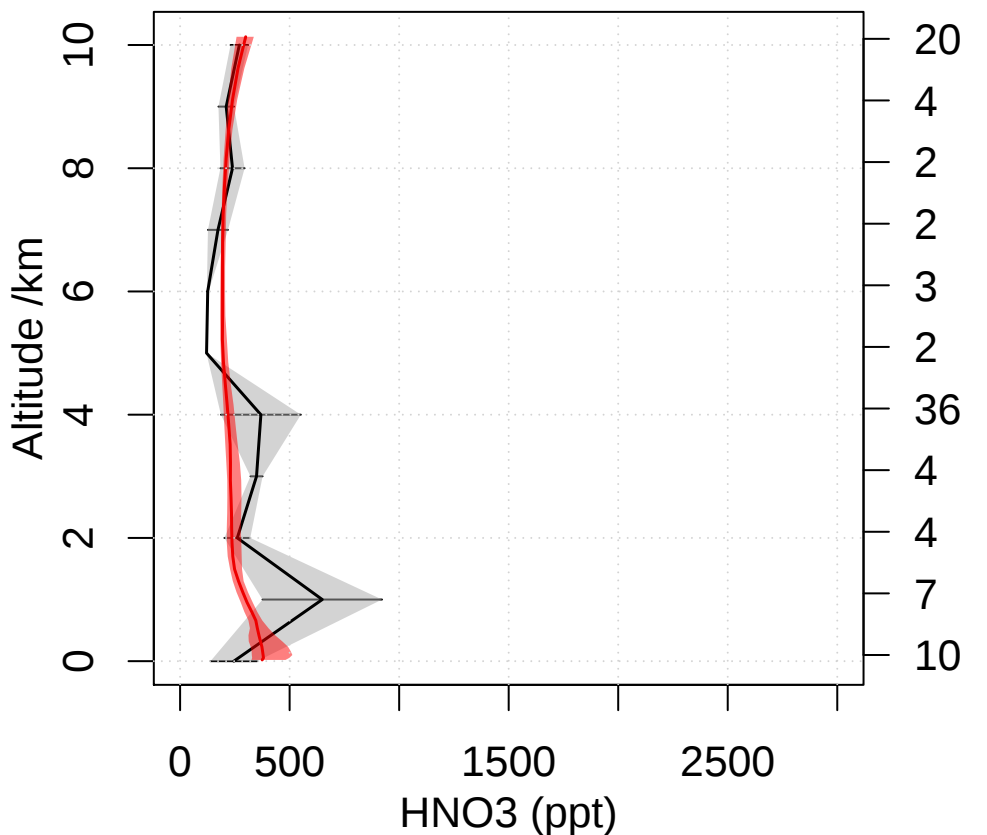
INTEX-NA Central 2004 07
Lat 30 – 40 Lon 259.5 – 285



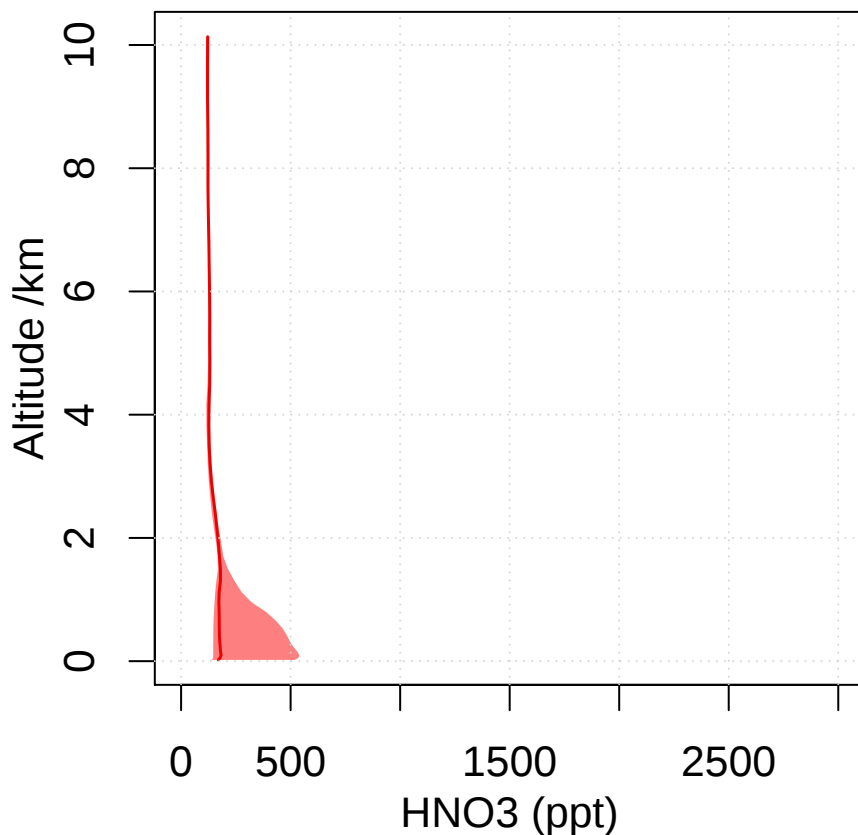
INTEX-NA North East 2004 07
Lat 42.5 – 52.5 Lon 285 – 310



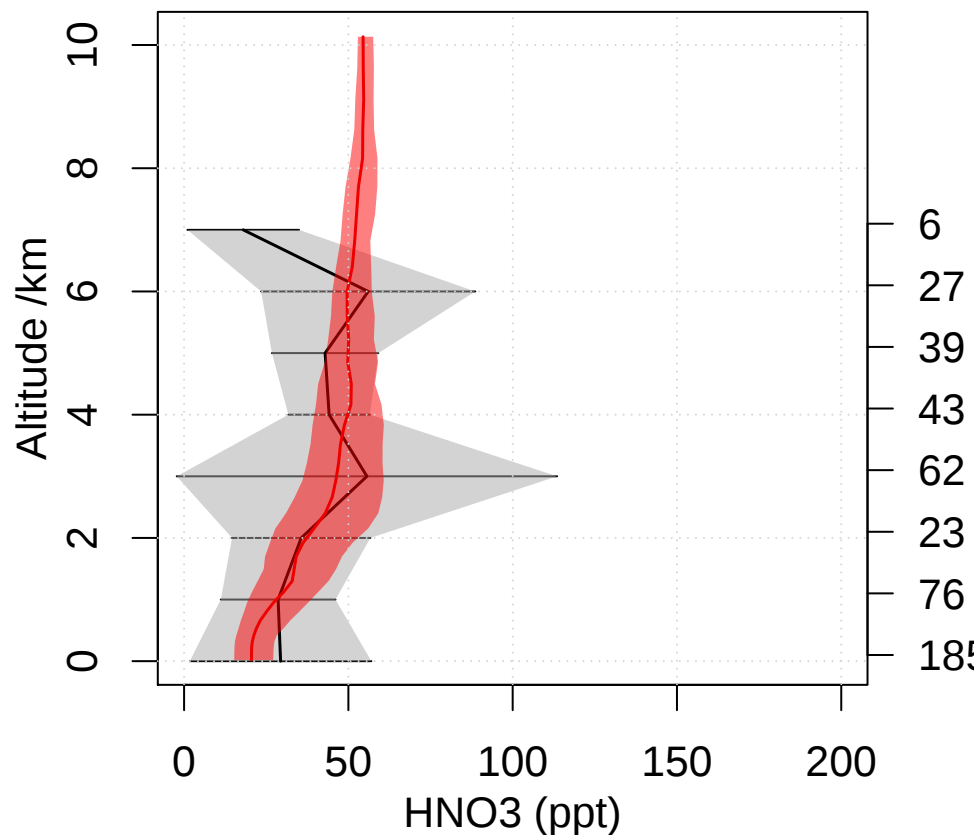
INTEX-NA West Coast 2004 07
Lat 32.5 – 45 Lon 217 – 240



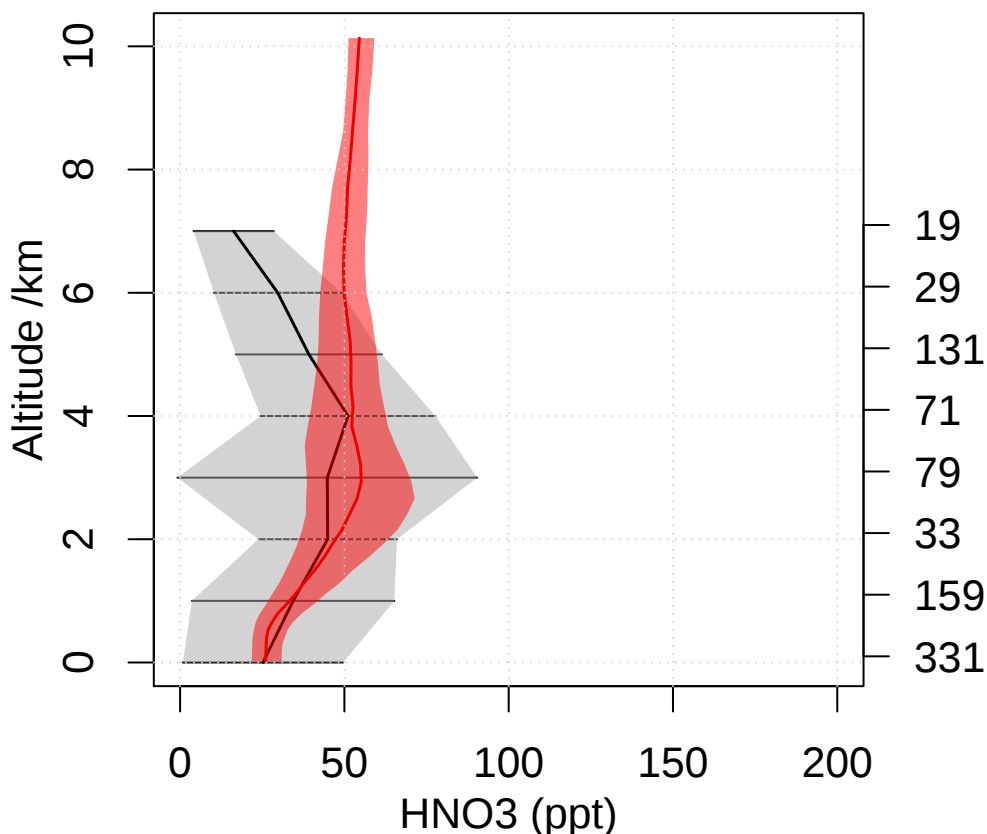
OP3 2008 07
Lat 2.5 – 7.5 Lon 112.5 – 120



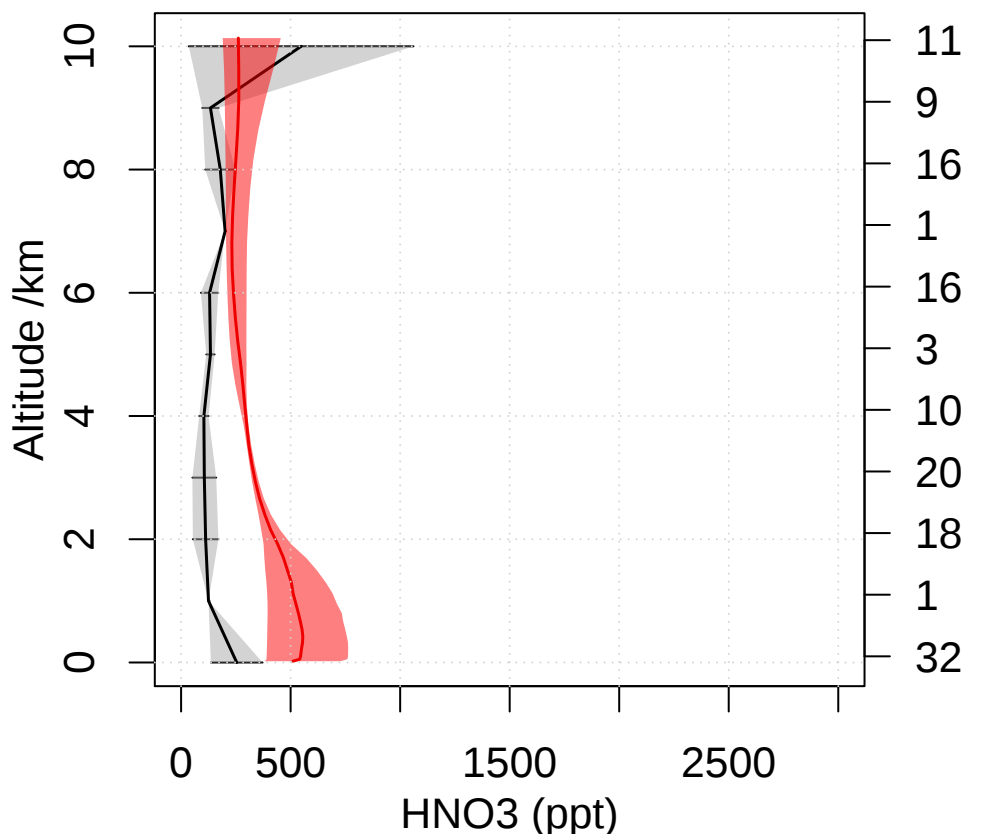
PEM-Tropics-B Christmas-Island 1999 07
Lat 0 – 10 Lon 200 – 220



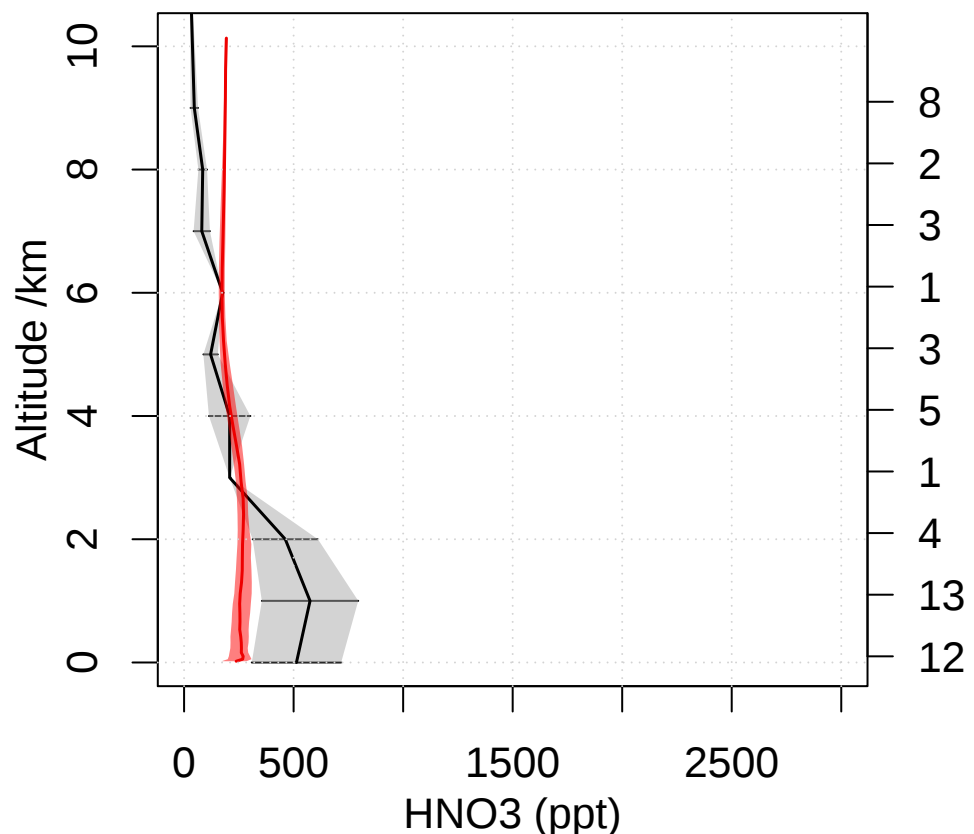
PEM-Tropics-B Tahiti 1999 03
Lat -20 – 0 Lon 200 – 230



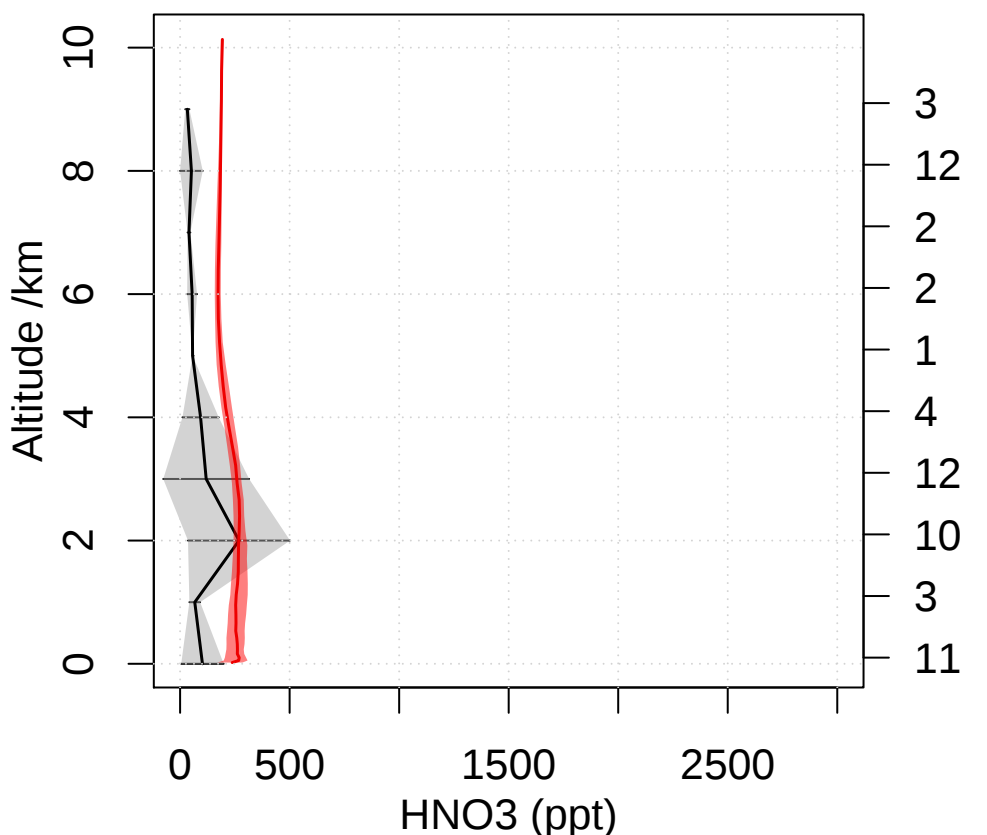
PEM-West-B Japan 1994 02
Lat 25 – 40 Lon 135 – 150



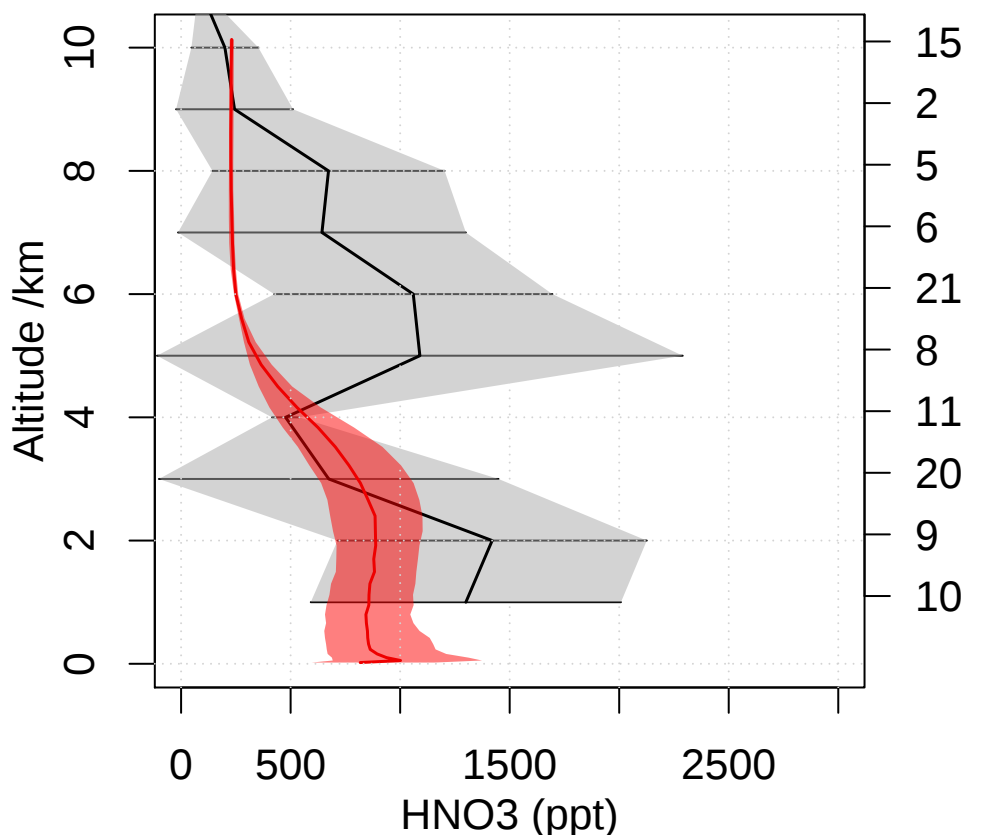
TRACE-A E-Brazil 1992 09
Lat -15 – -5 Lon 310 – 320



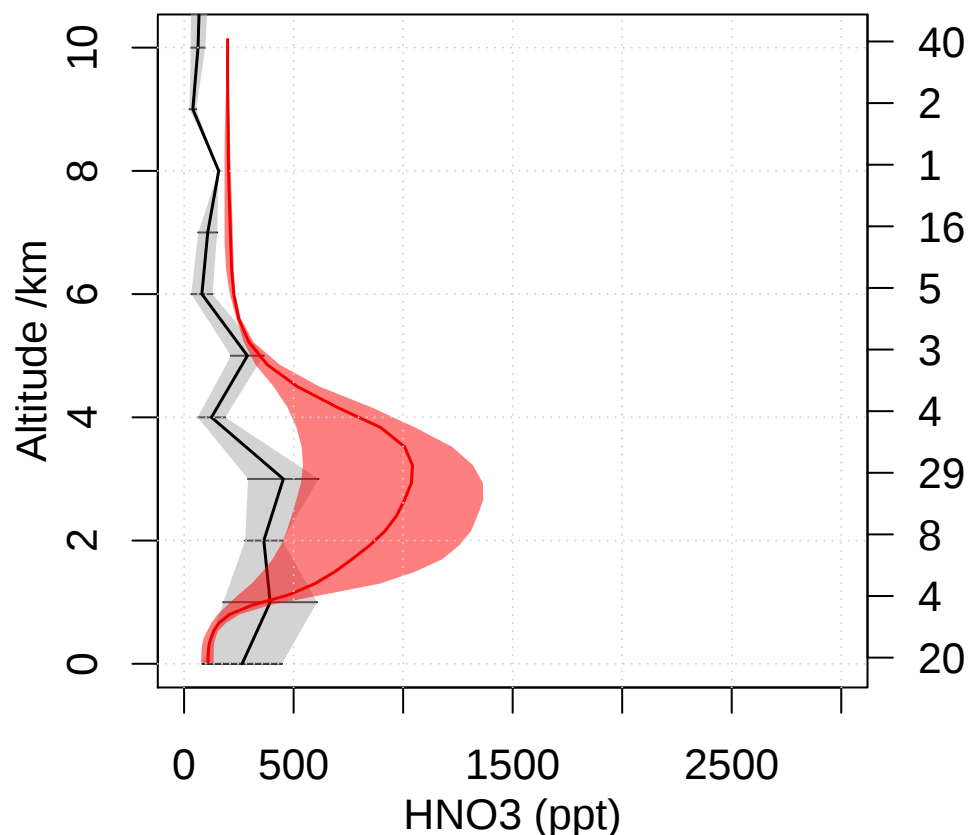
TRACE-A E-Brazil Coast 1992 09
Lat -35 – -25 Lon 310 – 320



TRACE-A S-Africa 1992 09
Lat -25 – -5 Lon 15 – 35

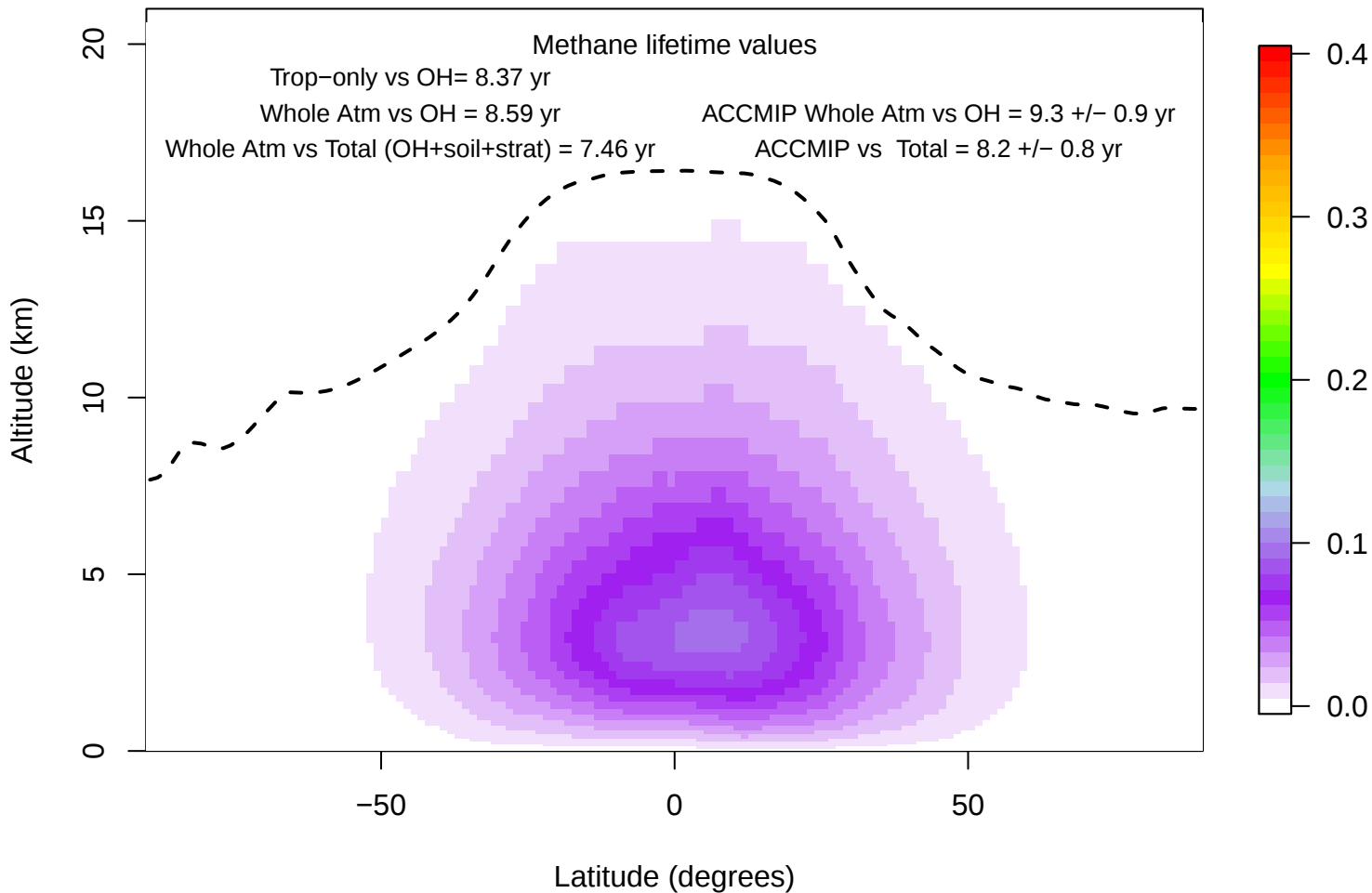


TRACE-A W-Africa Coast 1992 09
Lat -25 – -5 Lon 0 – 10



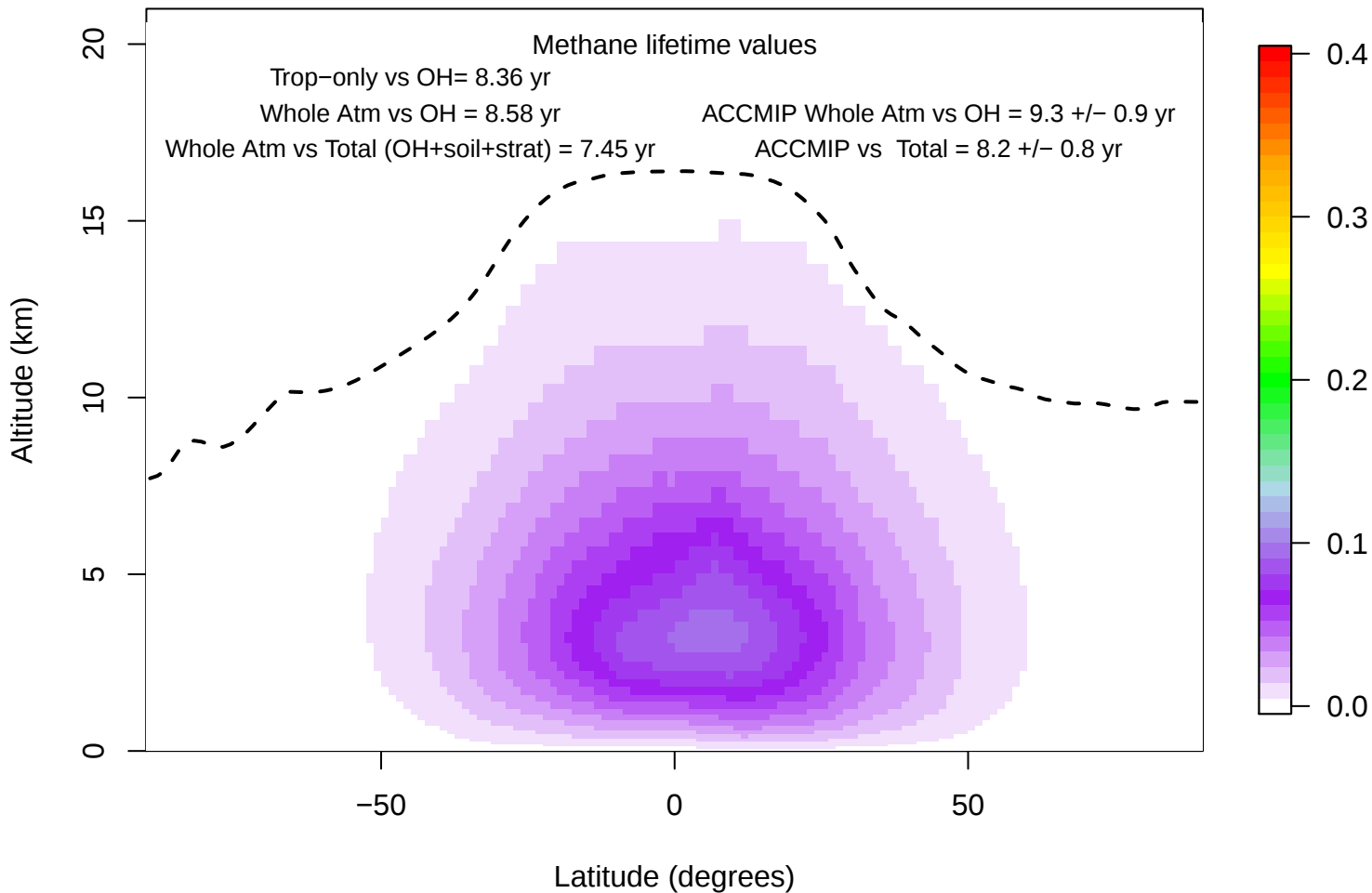
UKCA am124

% CH₄ + OH flux (moles cm⁻³ s⁻¹)



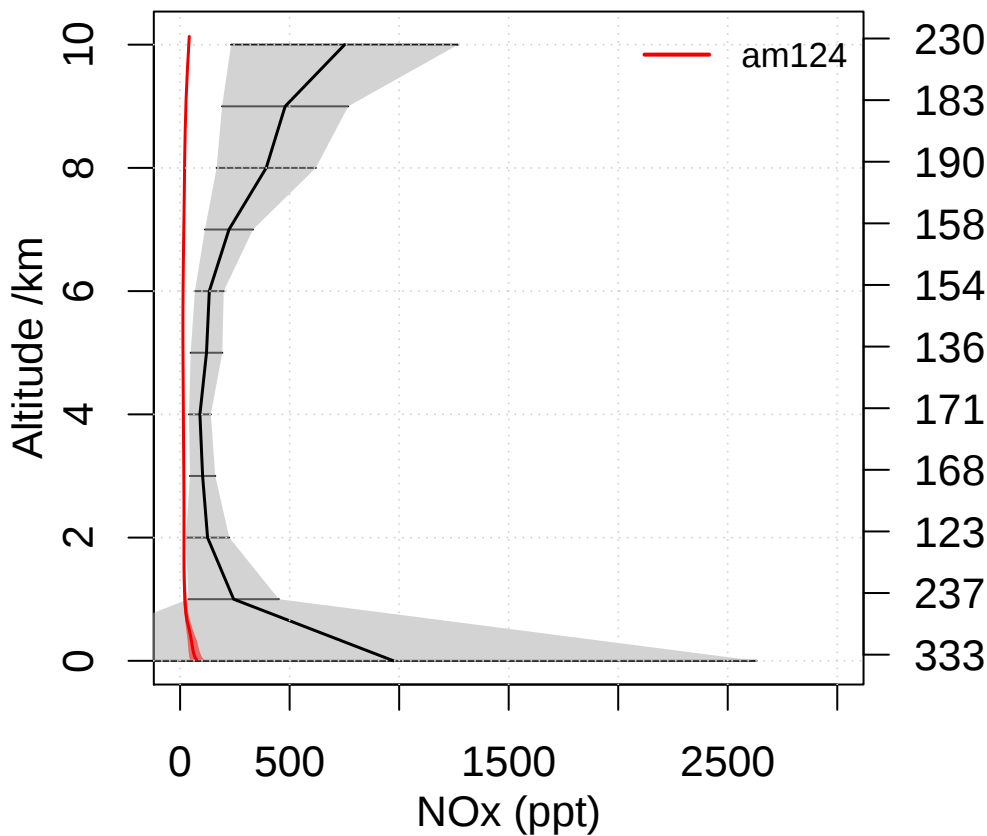
UKCA an114

% CH₄ + OH flux (moles cm⁻³ s⁻¹)

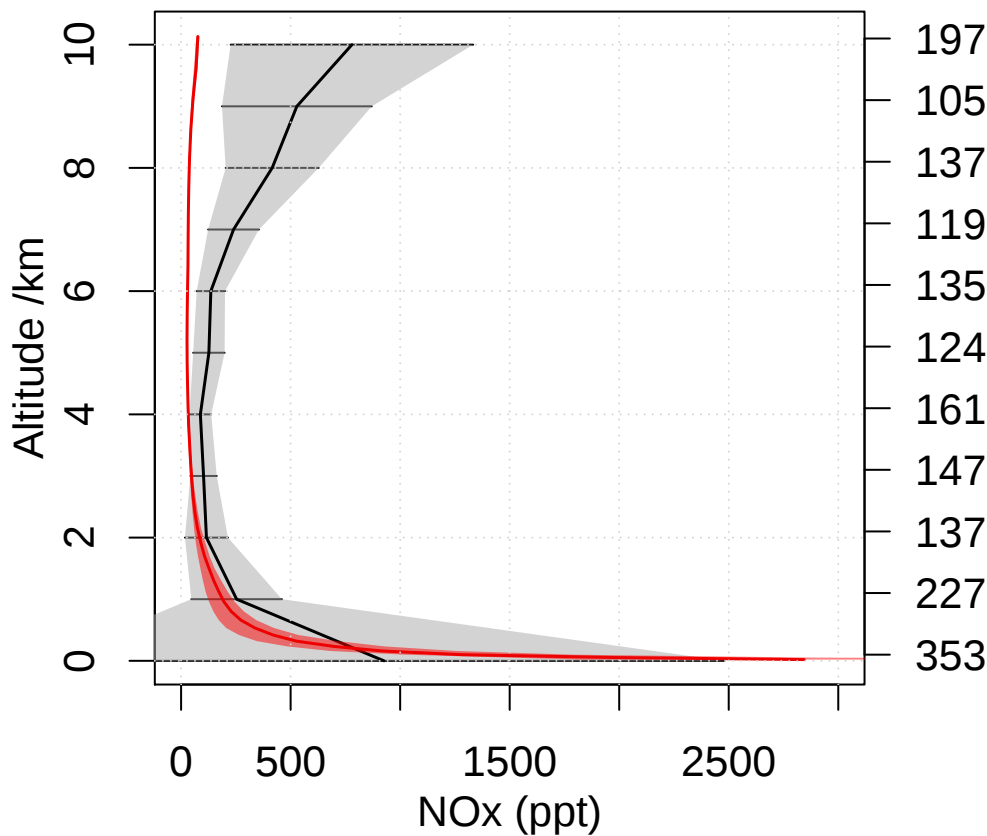


Emmons NOx comparison

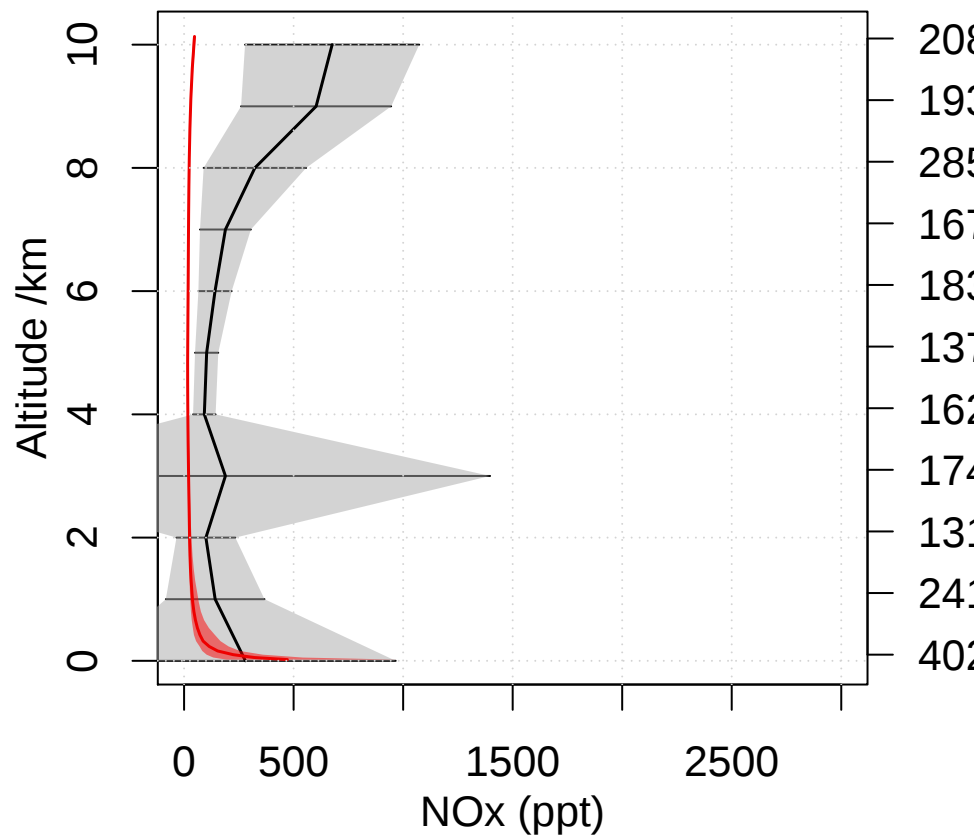
INTEX-NA East Coast 2004 07
Lat 32.5 – 40 Lon 296.5 – 307



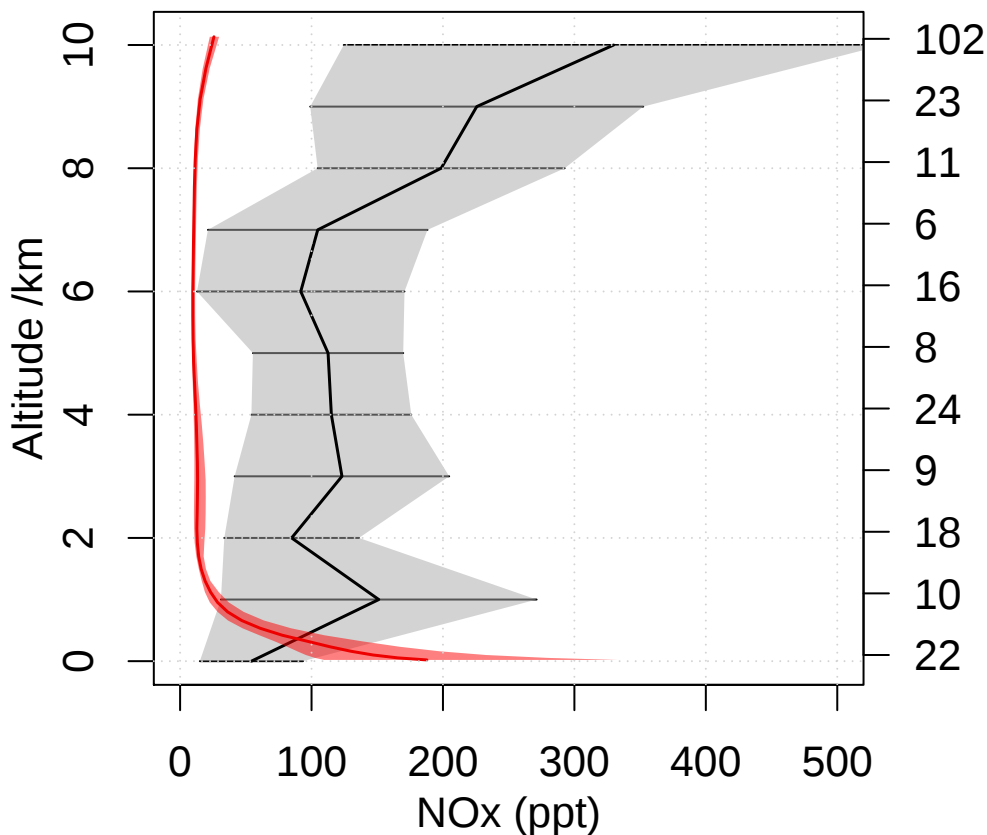
INTEX-NA Central 2004 07
Lat 30 – 40 Lon 259.5 – 285



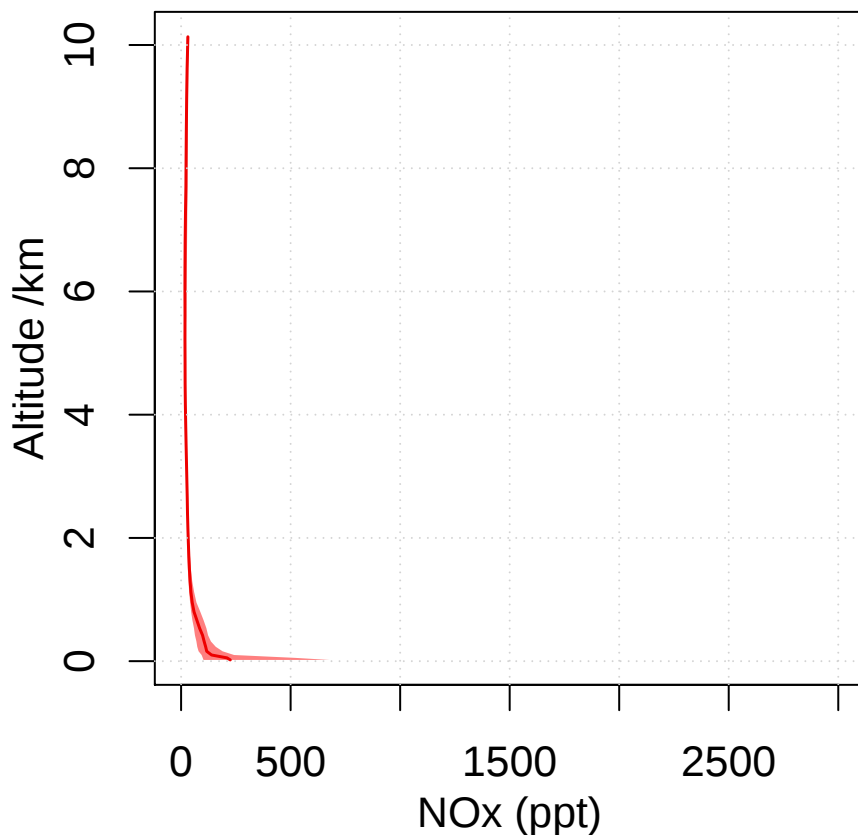
INTEX-NA North East 2004 07
Lat 42.5 – 52.5 Lon 285 – 310



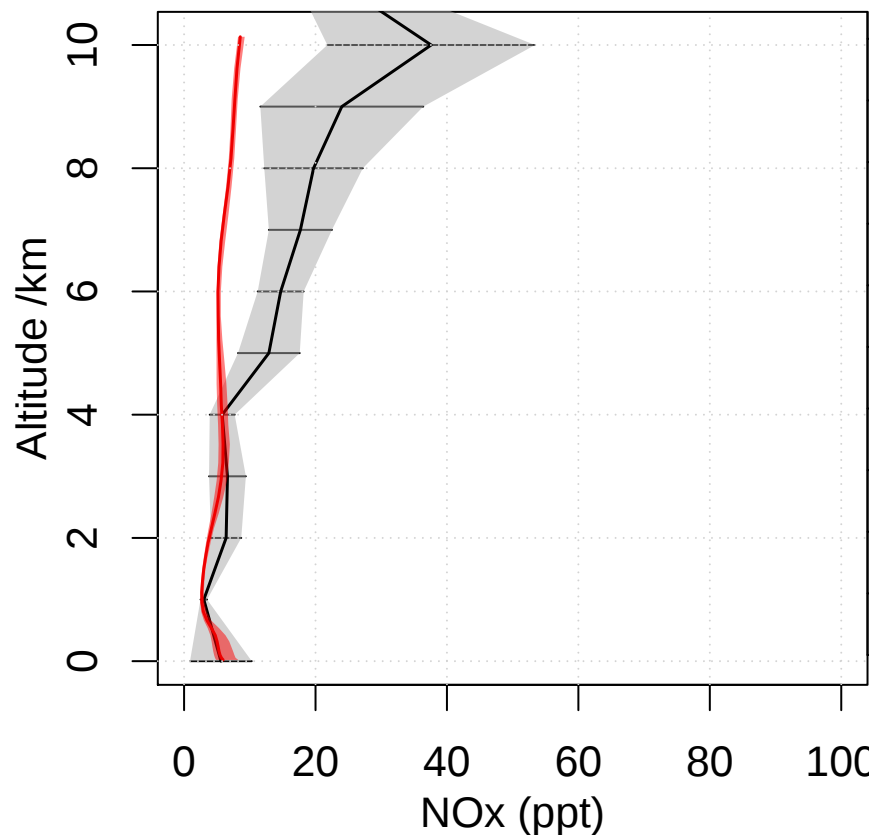
INTEX-NA West Coast 2004 07
Lat 32.5 – 45 Lon 217 – 240



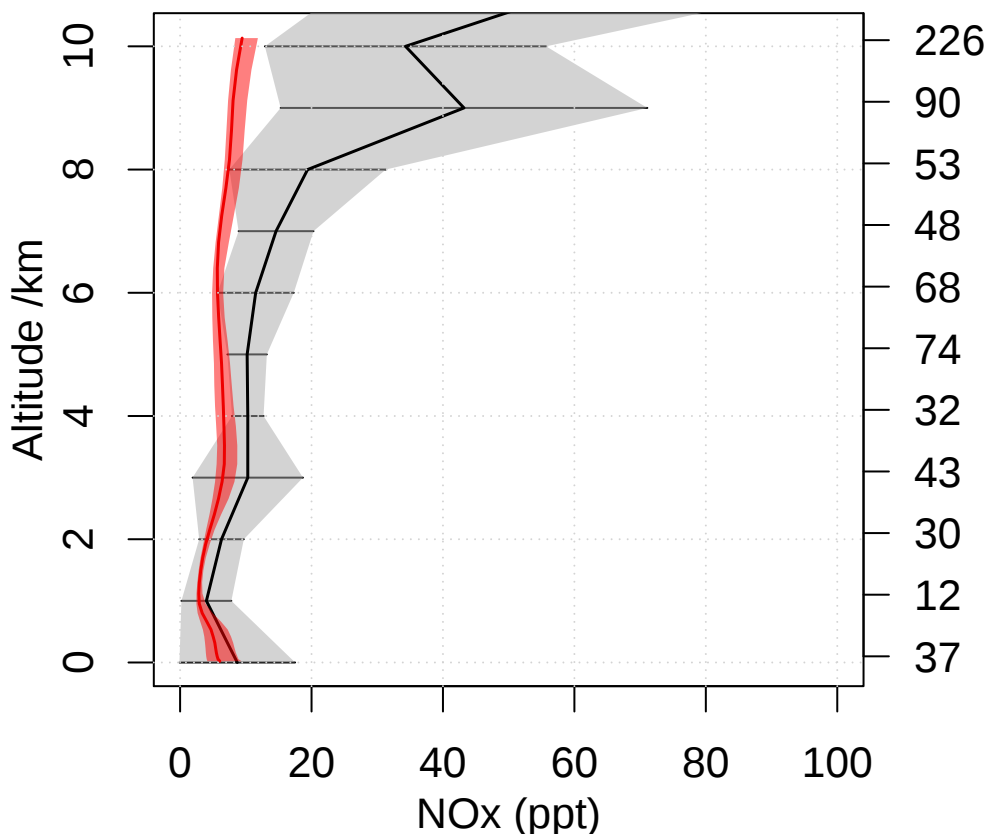
OP3 2008 07
Lat 2.5 – 7.5 Lon 112.5 – 120



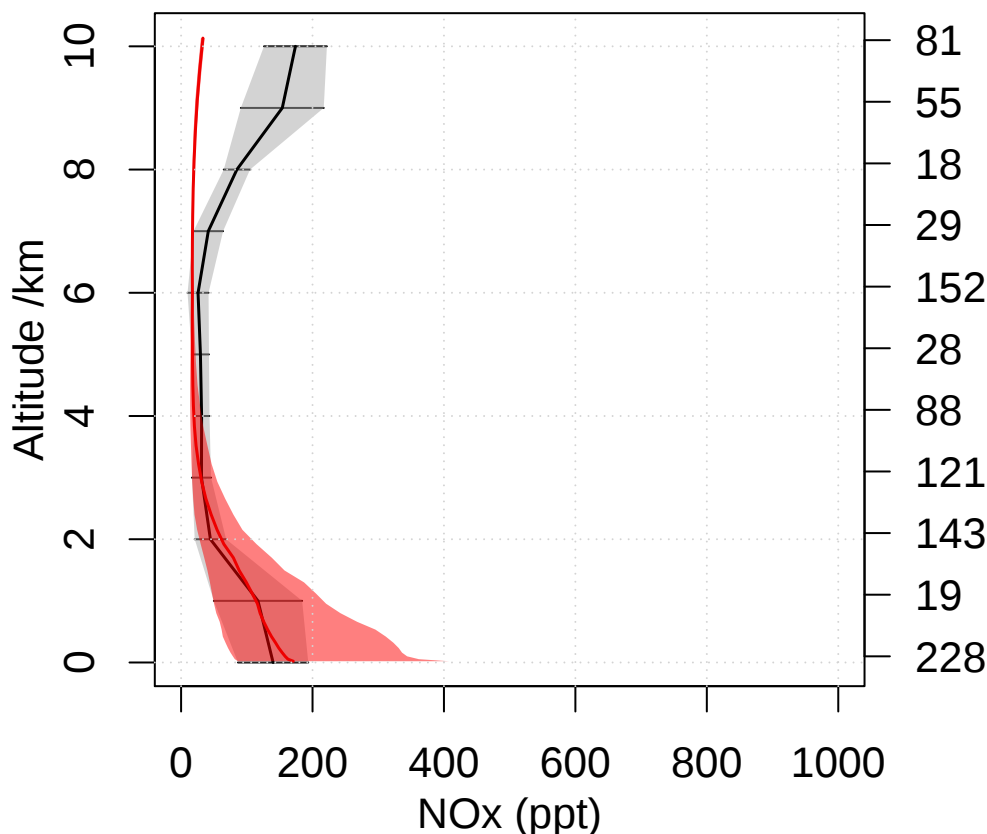
PEM-Tropics-B Christmas-Island 1999 07
Lat 0 – 10 Lon 200 – 220



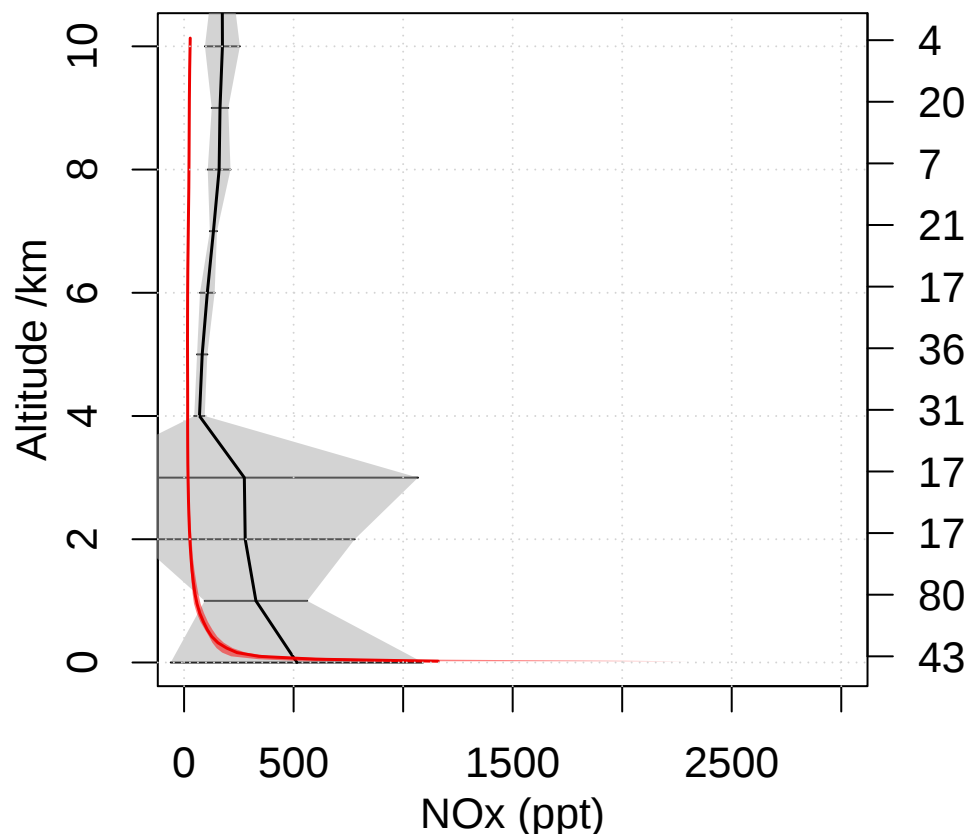
PEM-Tropics-B Tahiti 1999 03
Lat -20 – 0 Lon 200 – 230



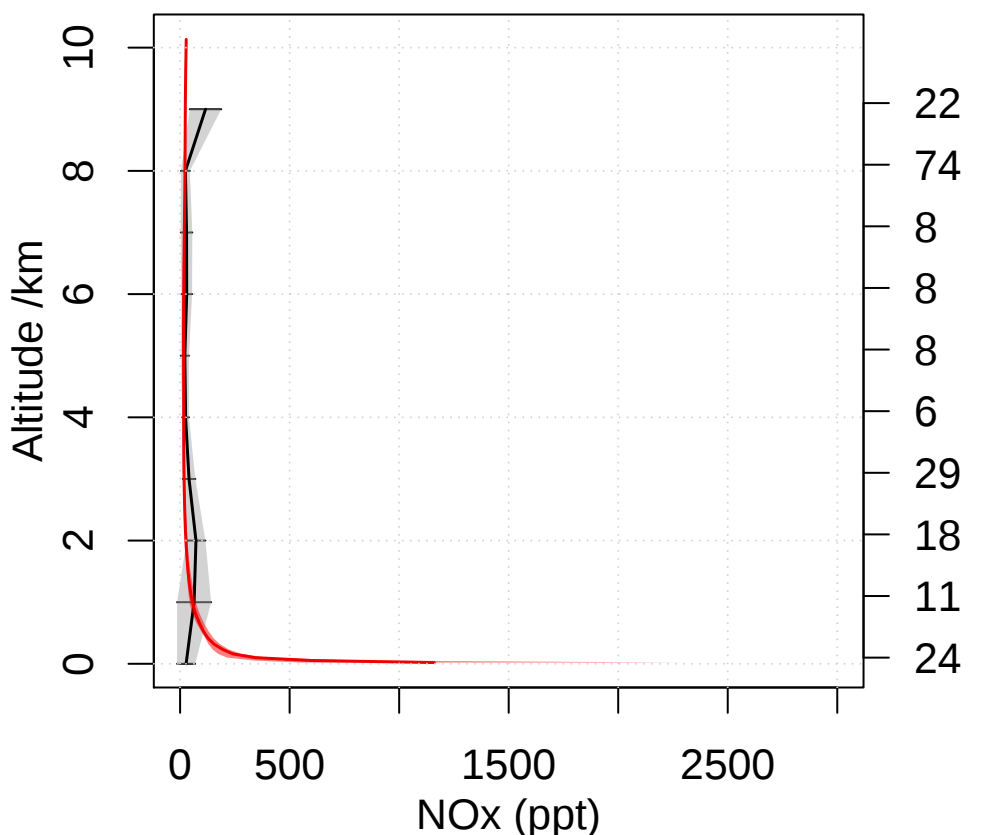
PEM-West-B Japan 1994 02
Lat 25 – 40 Lon 135 – 150



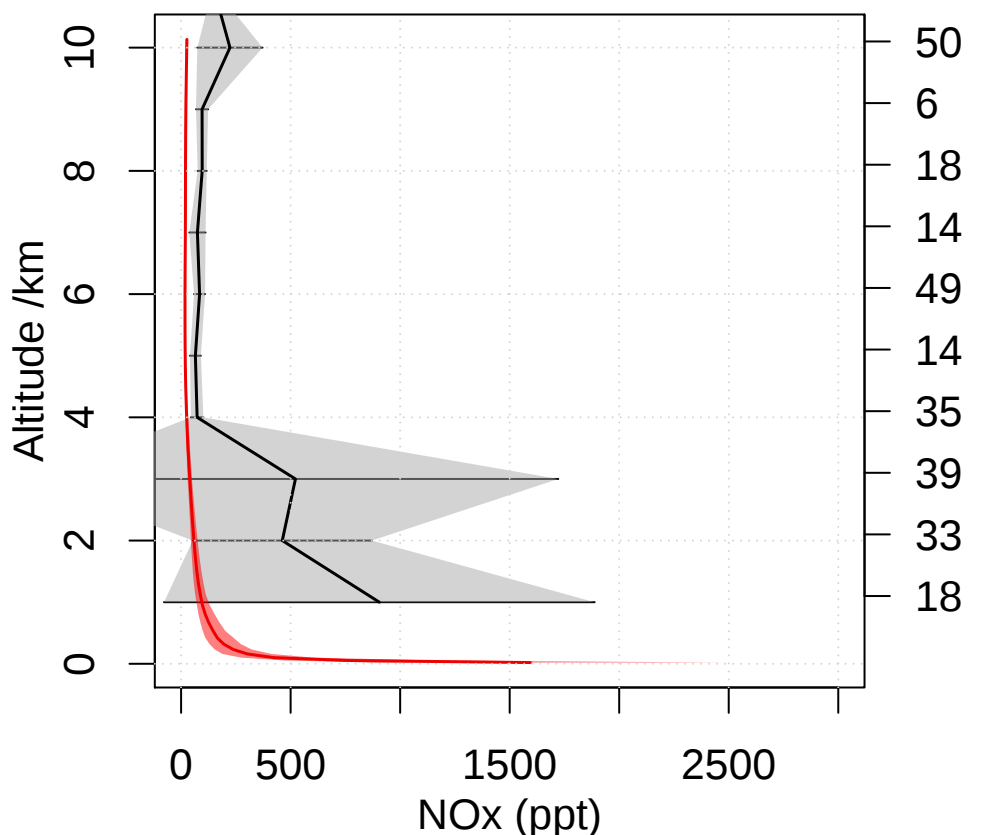
TRACE-A E-Brazil 1992 09
Lat -15 – -5 Lon 310 – 320



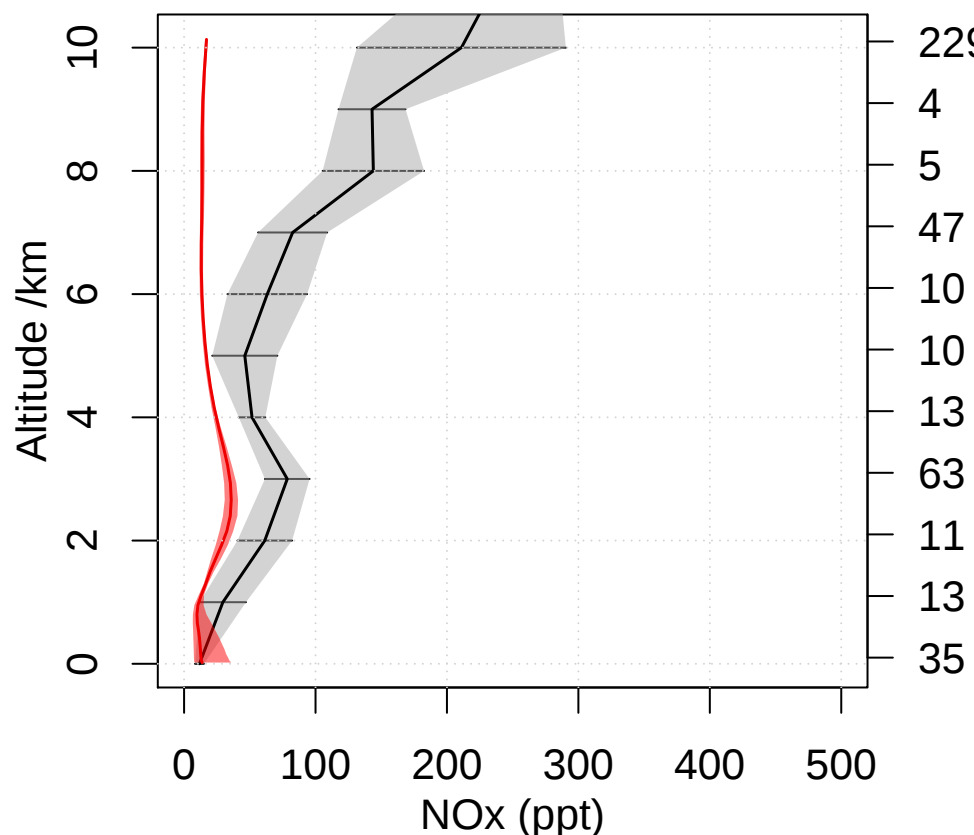
TRACE-A E-Brazil Coast 1992 09
Lat -35 – -25 Lon 310 – 320



TRACE-A S-Africa 1992 09
Lat -25 – -5 Lon 15 – 35

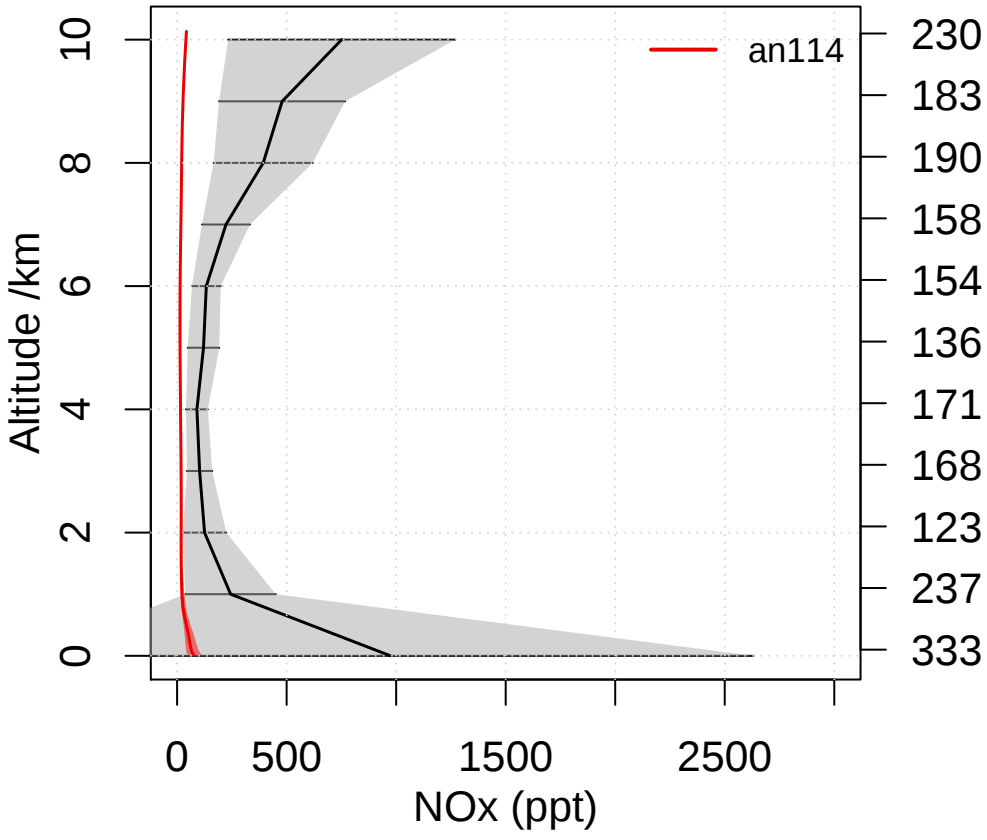


TRACE-A W-Africa Coast 1992 09
Lat -25 – -5 Lon 0 – 10

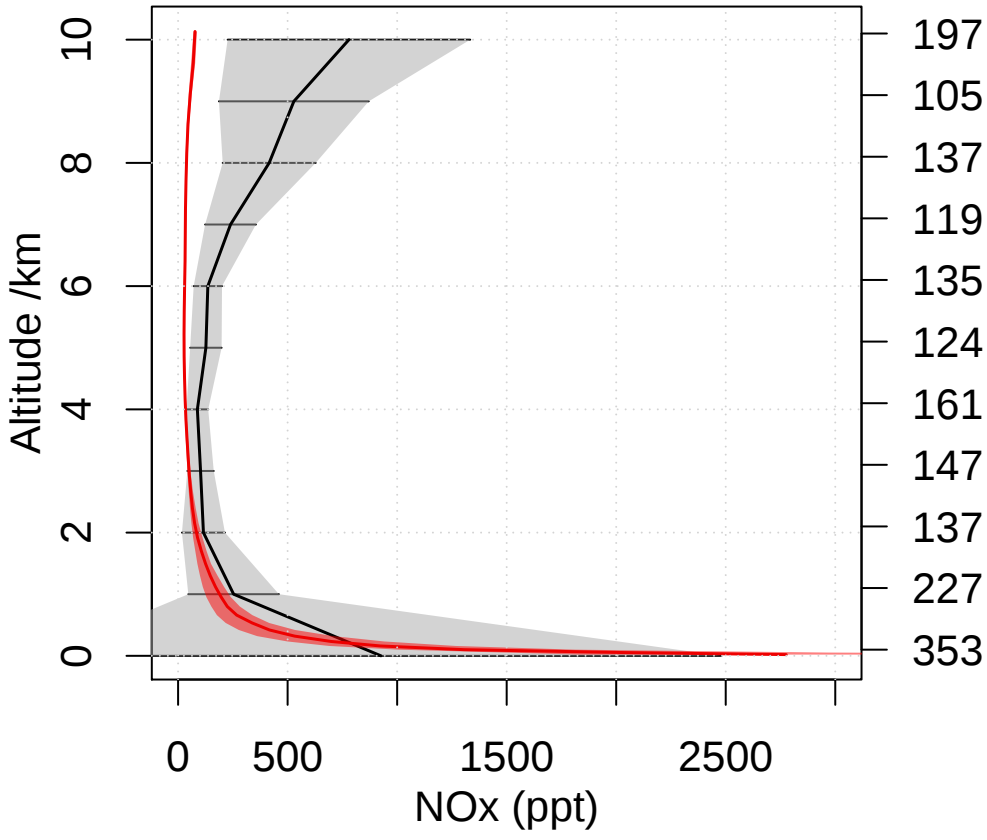


Emmons NOx comparison

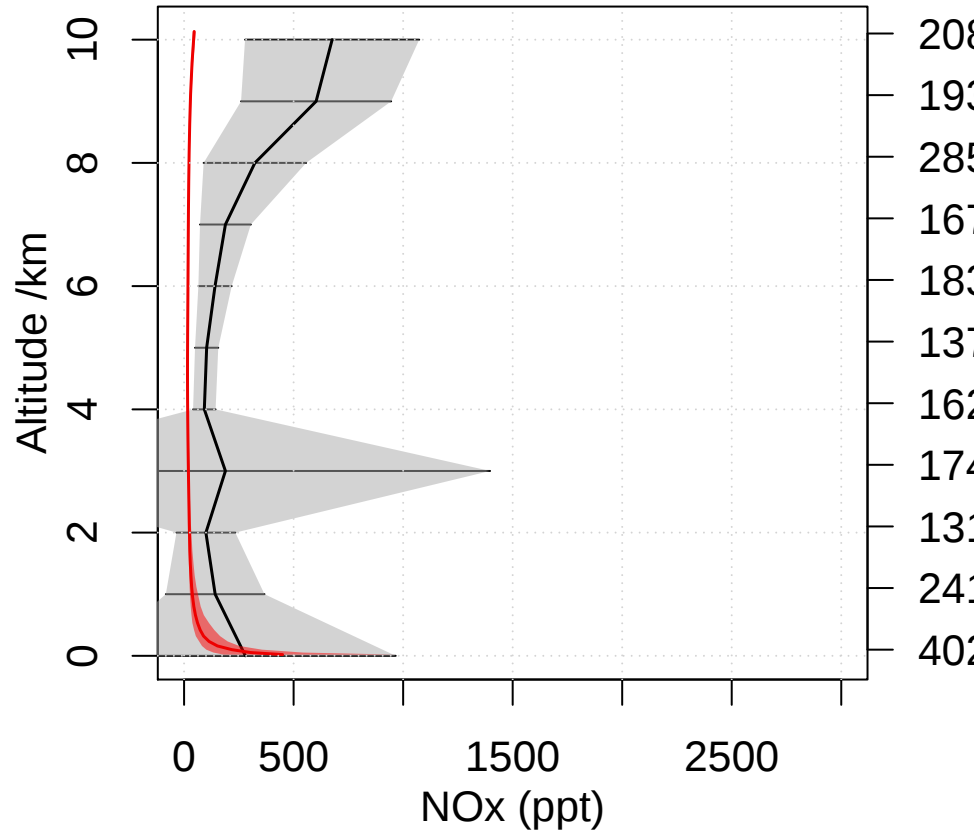
INTEX-NA East Coast 2004 07
Lat 32.5 – 40 Lon 296.5 – 307



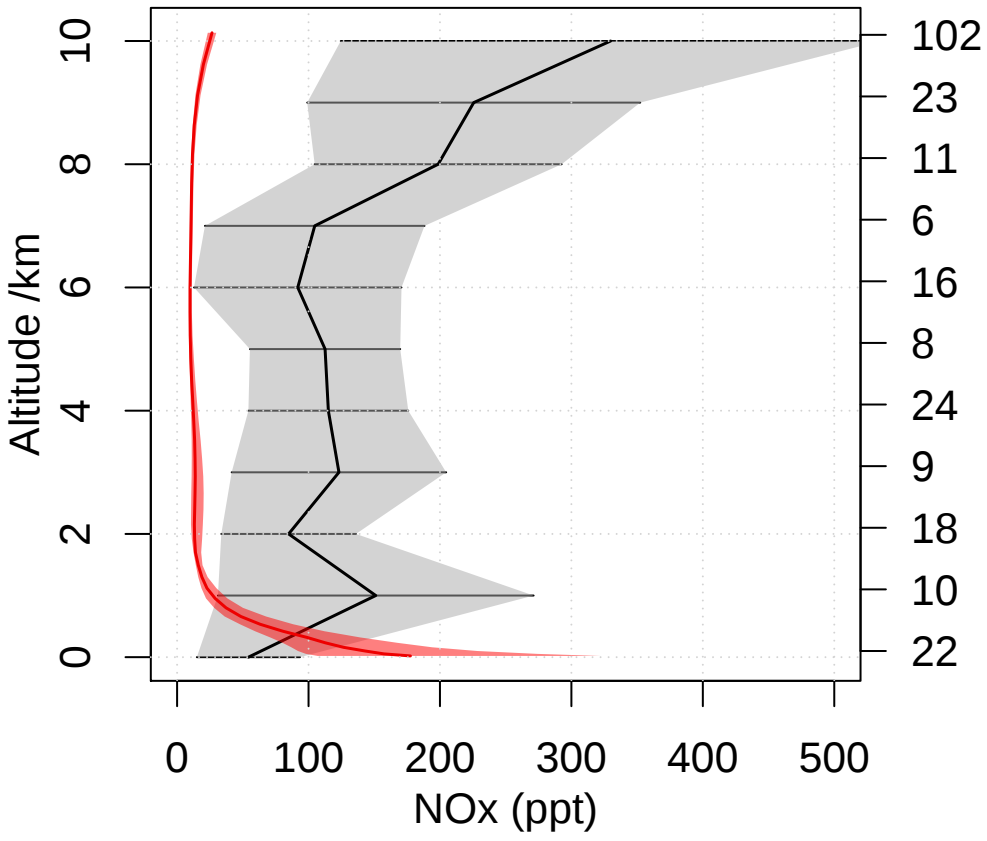
INTEX-NA Central 2004 07
Lat 30 – 40 Lon 259.5 – 285



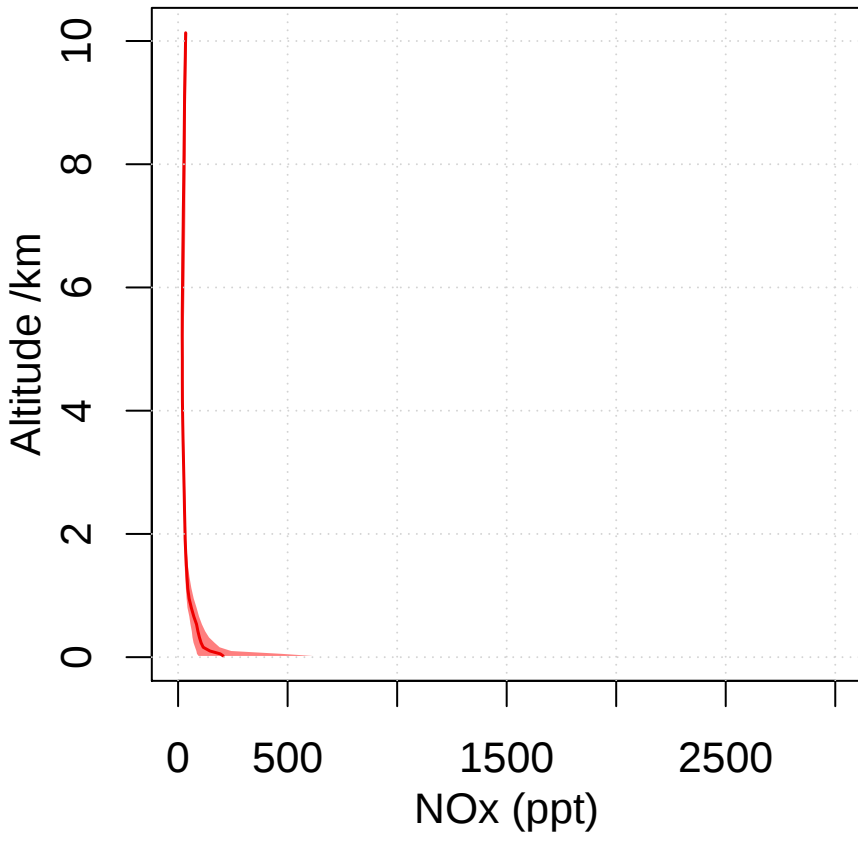
INTEX-NA North East 2004 07
Lat 42.5 – 52.5 Lon 285 – 310



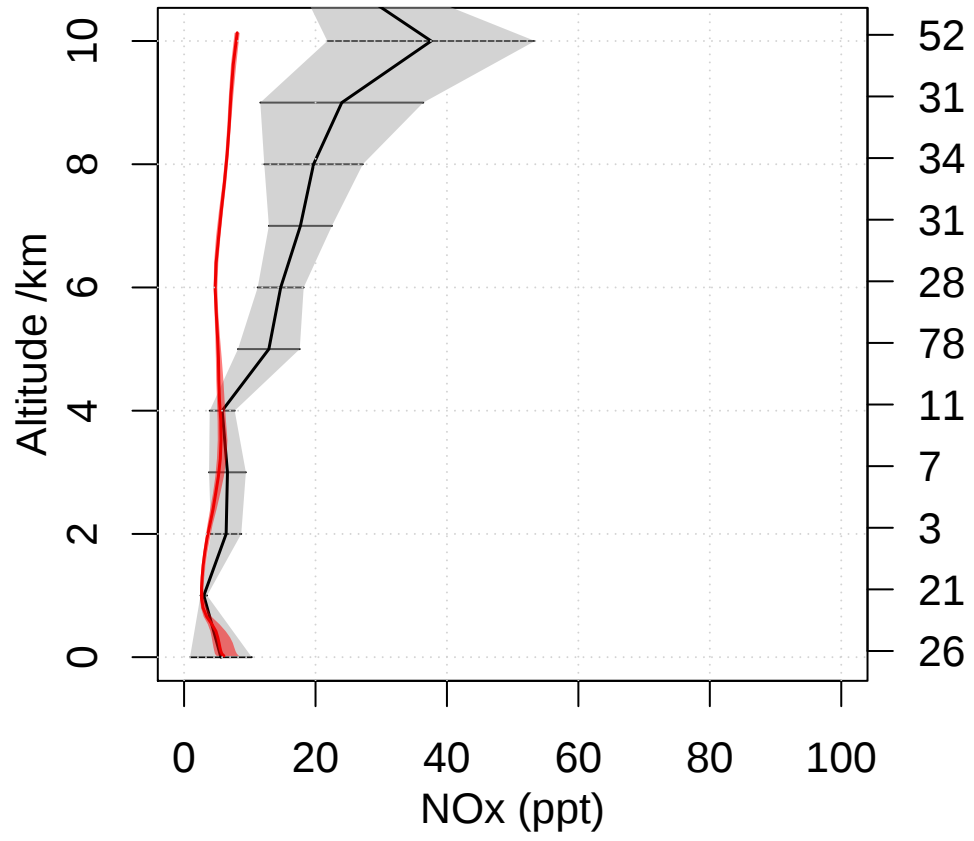
INTEX-NA West Coast 2004 07
Lat 32.5 – 45 Lon 217 – 240



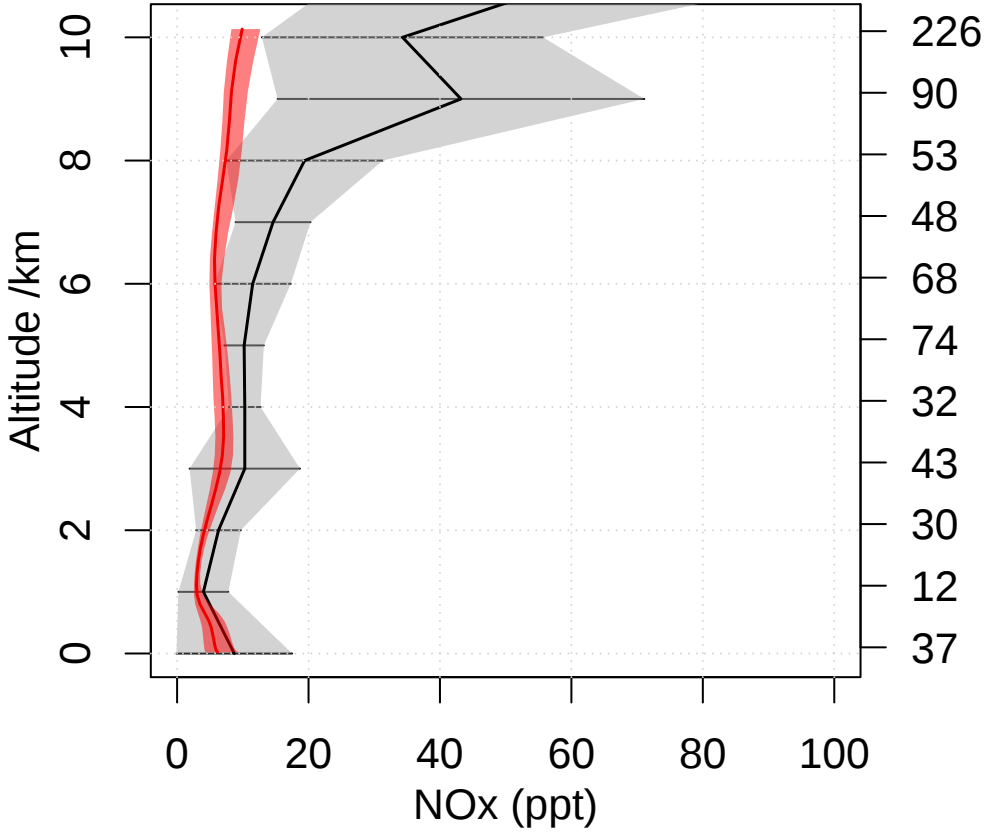
OP3 2008 07
Lat 2.5 – 7.5 Lon 112.5 – 120



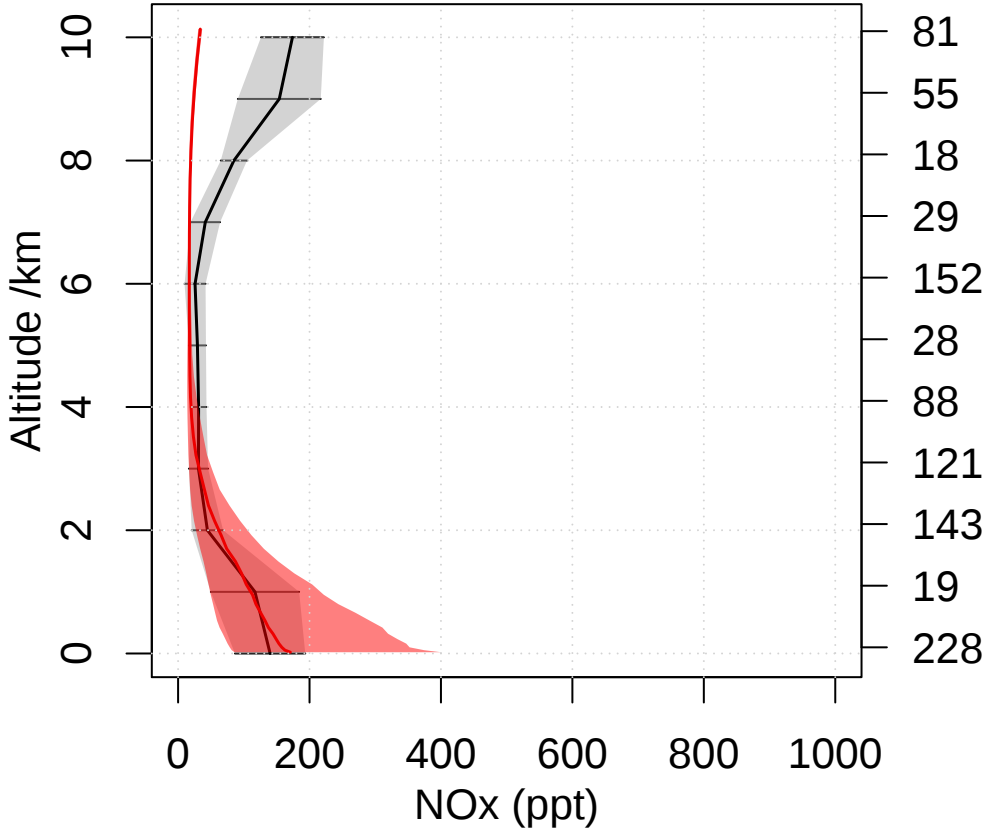
PEM-Tropics-B Christmas-Island 1999 07
Lat 0 – 10 Lon 200 – 220



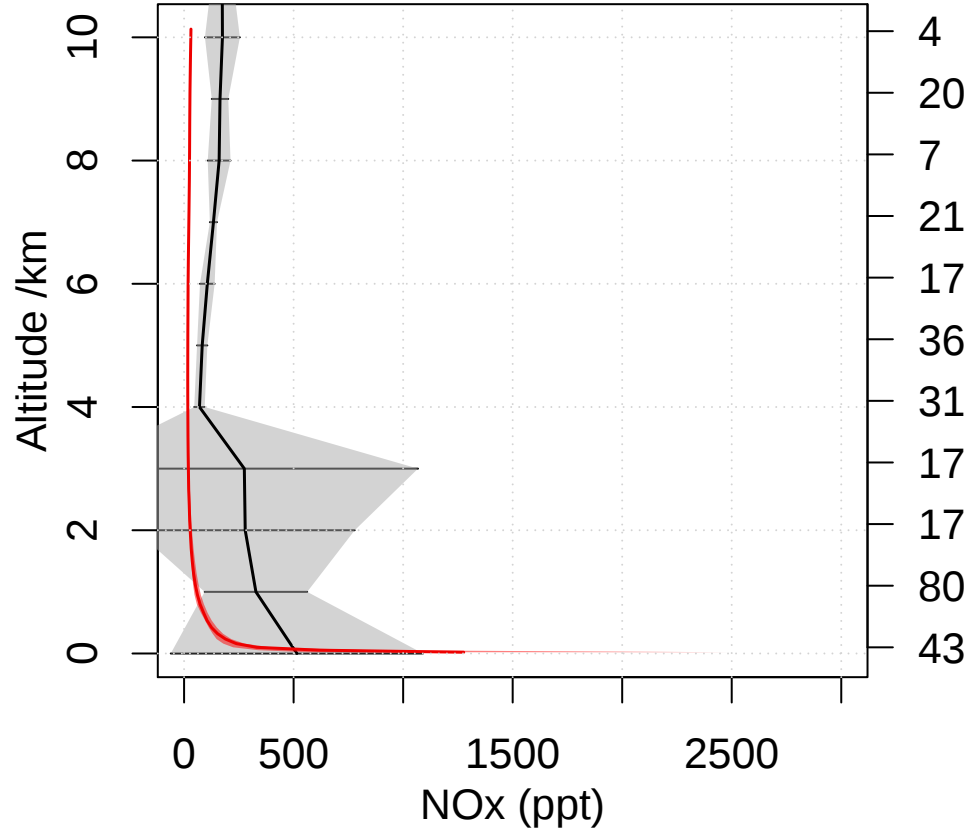
PEM-Tropics-B Tahiti 1999 03
Lat -20 – 0 Lon 200 – 230



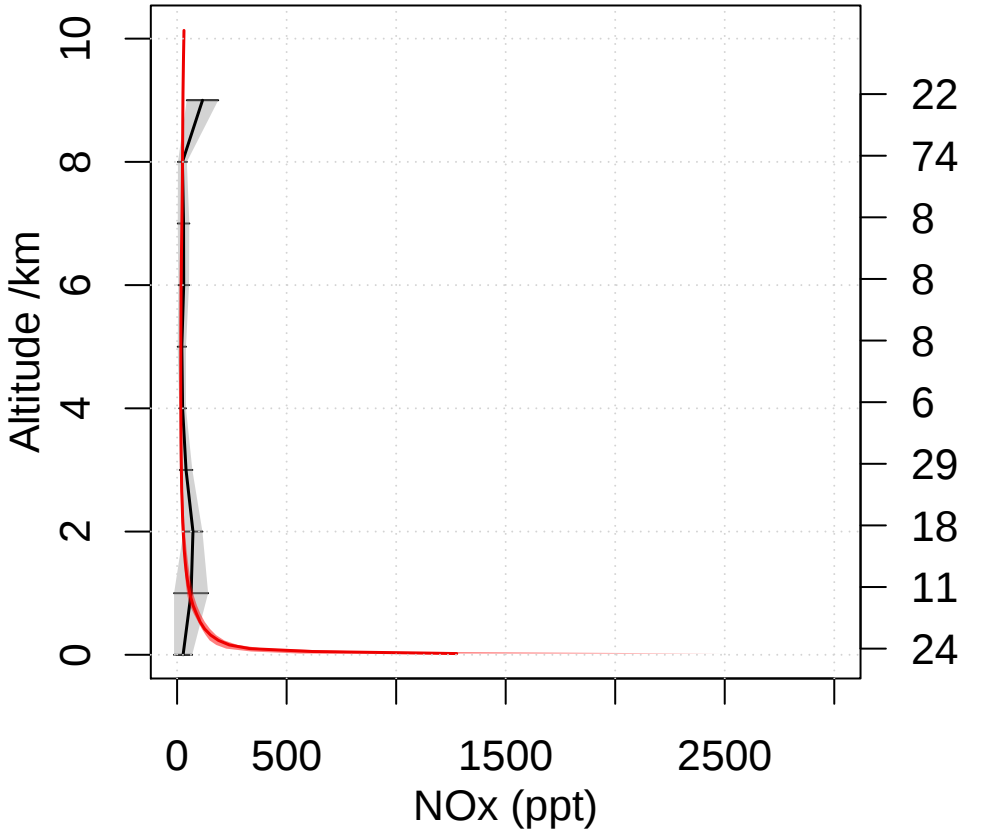
PEM-West-B Japan 1994 02
Lat 25 – 40 Lon 135 – 150



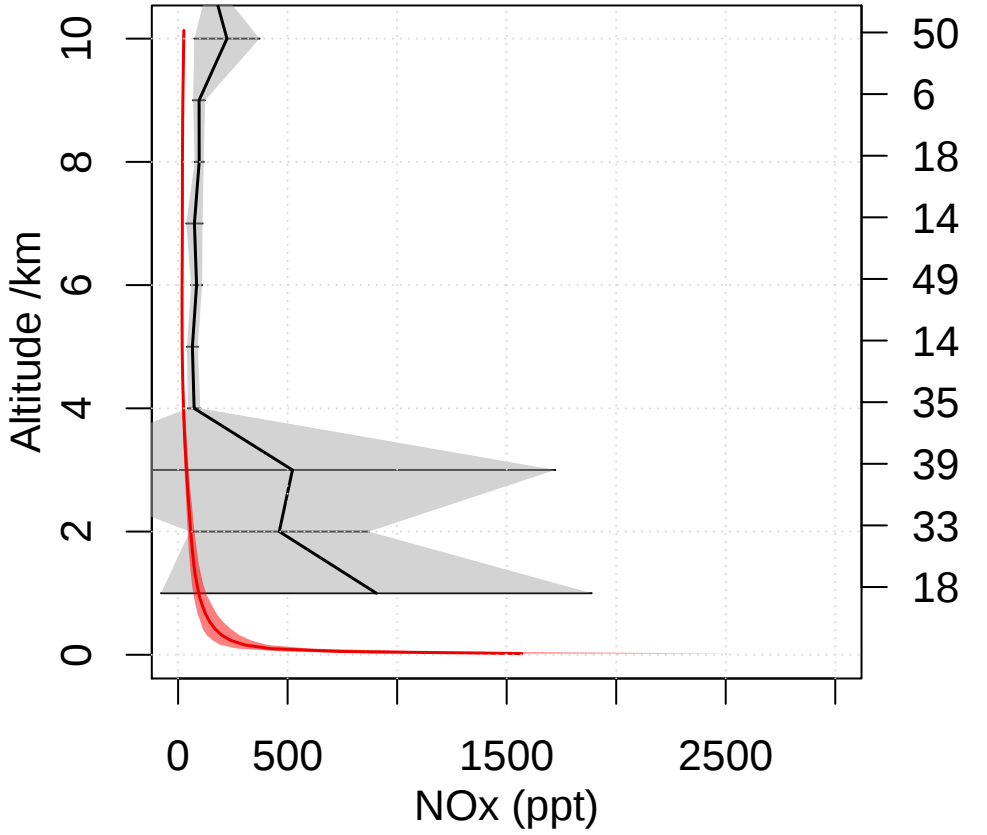
TRACE-A E-Brazil 1992 09
Lat -15 – -5 Lon 310 – 320



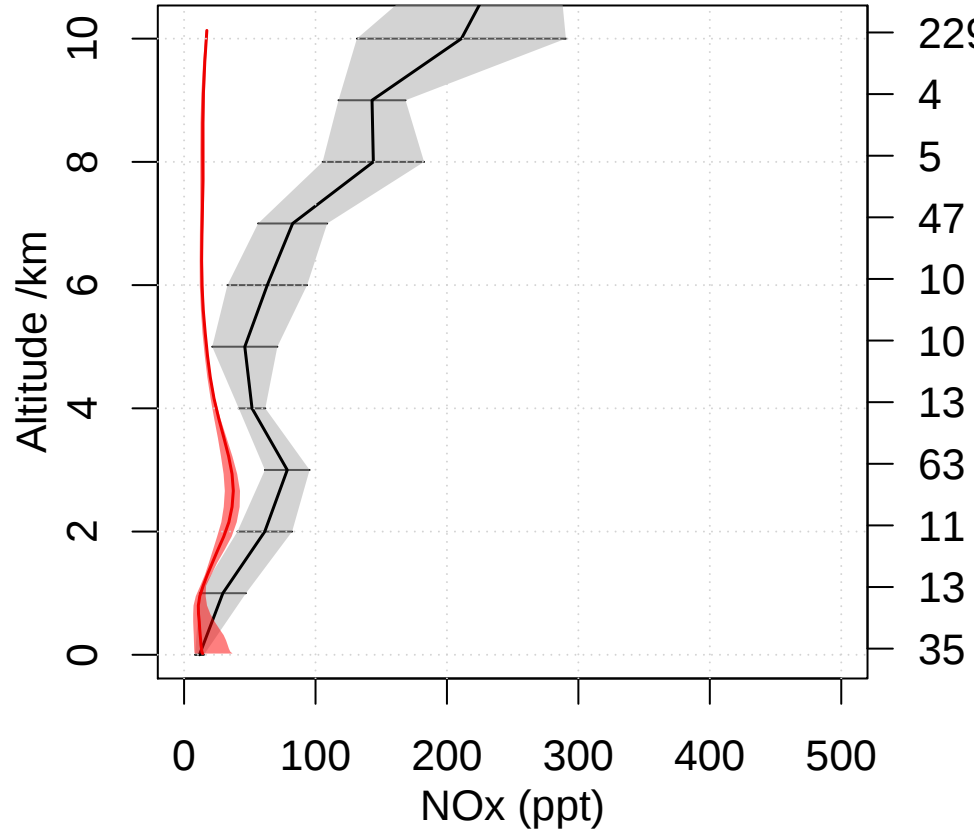
TRACE-A E-Brazil Coast 1992 09
Lat -35 – -25 Lon 310 – 320



TRACE-A S-Africa 1992 09
Lat -25 – -5 Lon 15 – 35



TRACE-A W-Africa Coast 1992 09
Lat -25 – -5 Lon 0 – 10



UKCA am12a

[OH] Air mass weighted (10⁶ molecules cm⁻³)

Mean OH= 9.21e+05 molec/cm3

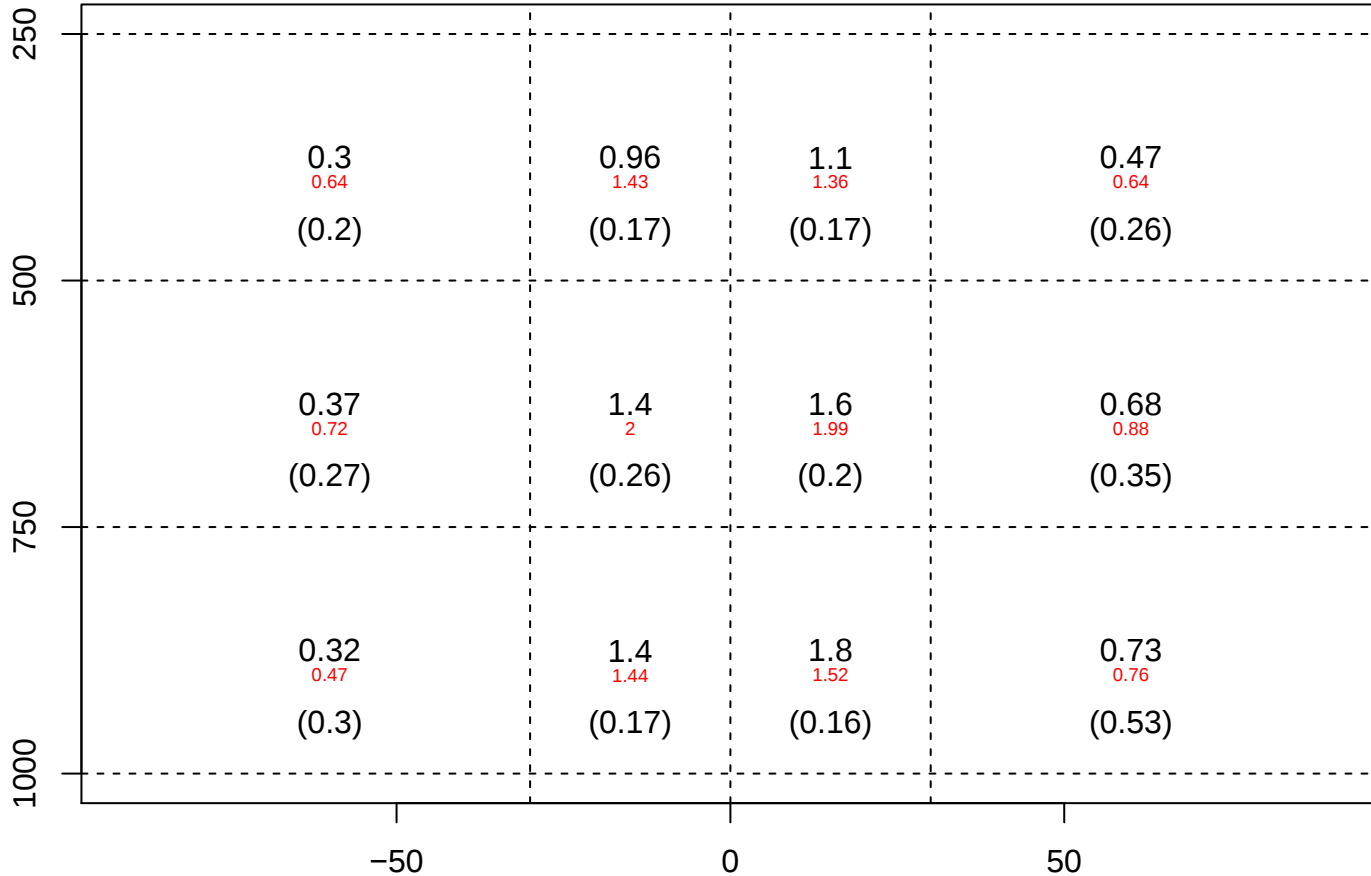
ACCMIP Multi-model Mean= 1.17 (+/- 0.1) e+06 molec/cm3

NH:SH ratio= 1.49 Patra et al 2014: 0.97 +/- 0.12

Red: Spivakovsky values

Values in (): Std dev

Pressure (hPa)



Latitude

UKCA an114

[OH] Air mass weighted (10⁶ molecules cm⁻³)

Mean OH= 9.23e+05 molec/cm3

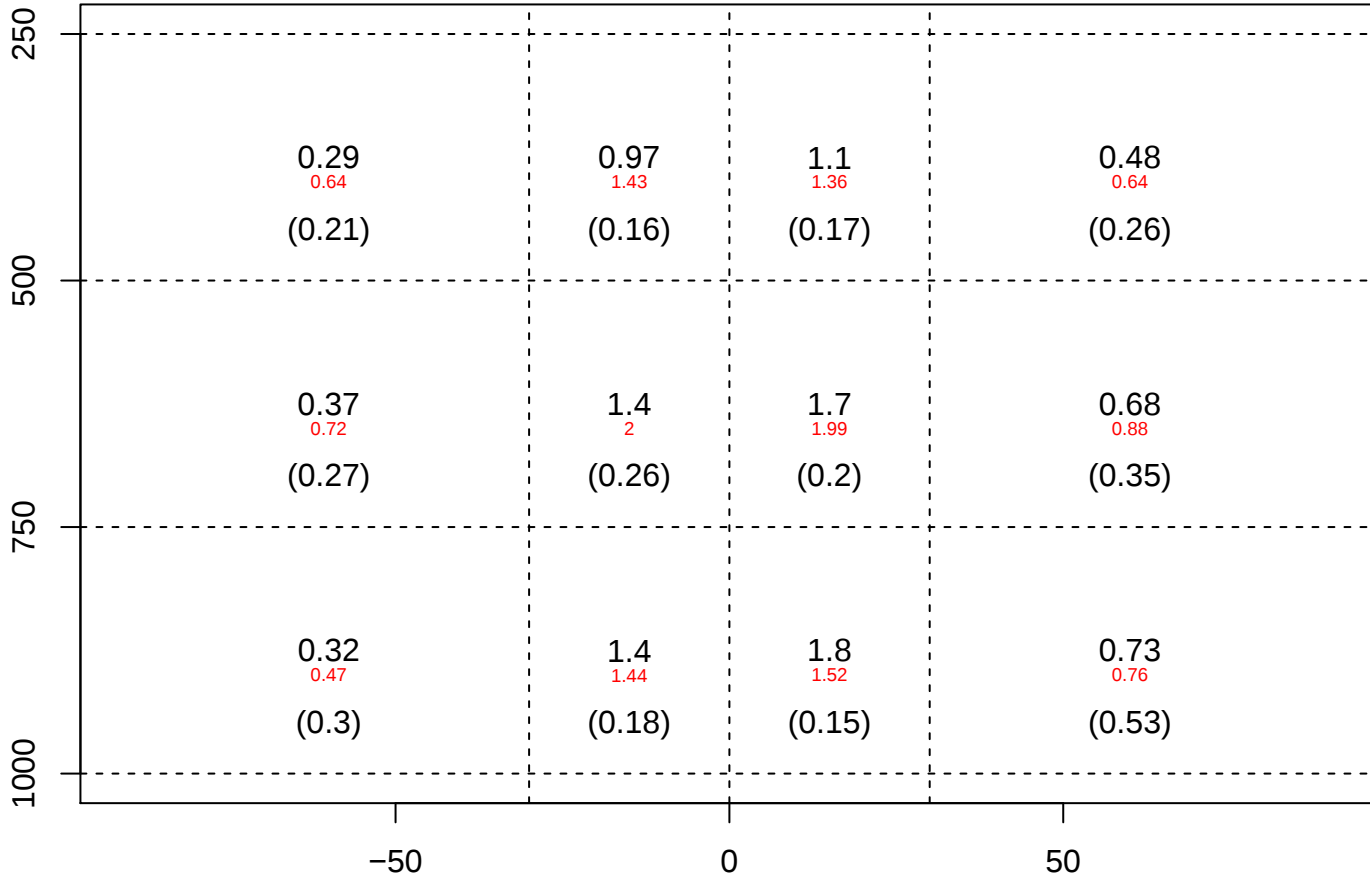
Red: Spivakovsky values

Values in (): Std dev

ACCMIP Multi-model Mean= 1.17 (+/- 0.1) e+06 molec/cm3

NH:SH ratio= 1.5 Patra et al 2014: 0.97 +/- 0.12

Pressure (hPa)

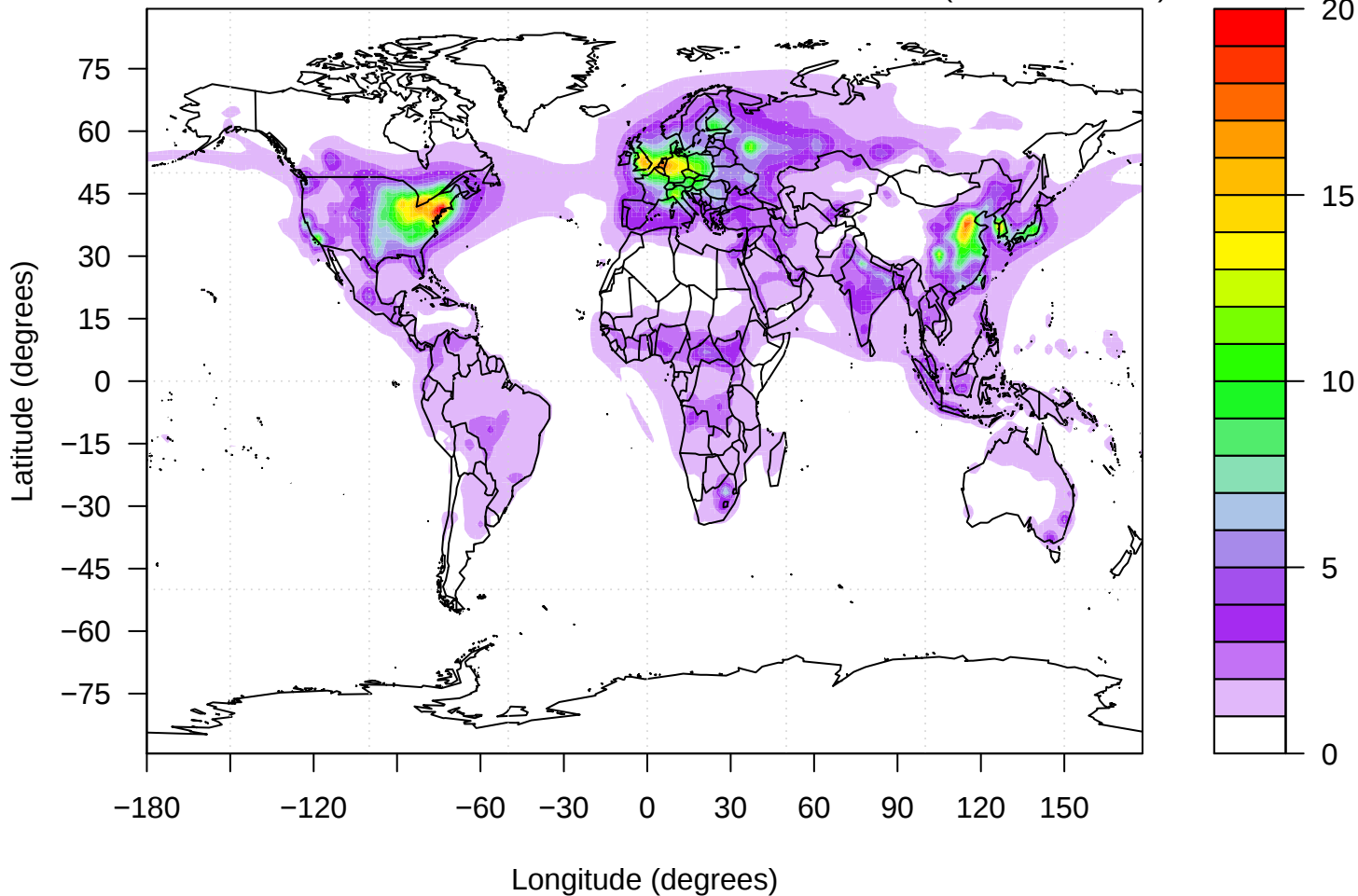


Latitude

am124 tropospheric NO₂ column

Min = 0.00636 Mean = 0.895 Max = 22.3

10¹⁵ (molecules cm⁻²)



an114 tropospheric NO₂ column

Min = 0.00571 Mean = 0.896 Max = 22.5

10¹⁵ (molecules cm⁻²)

