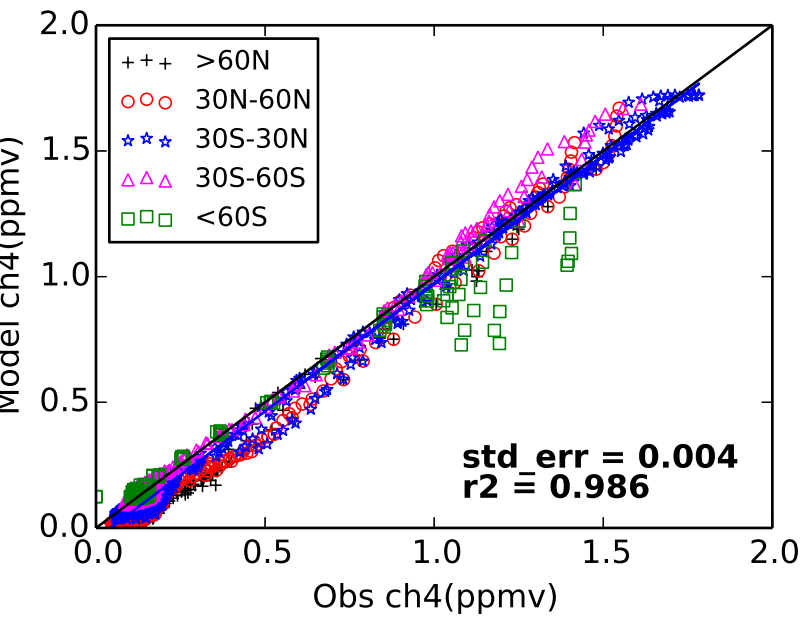
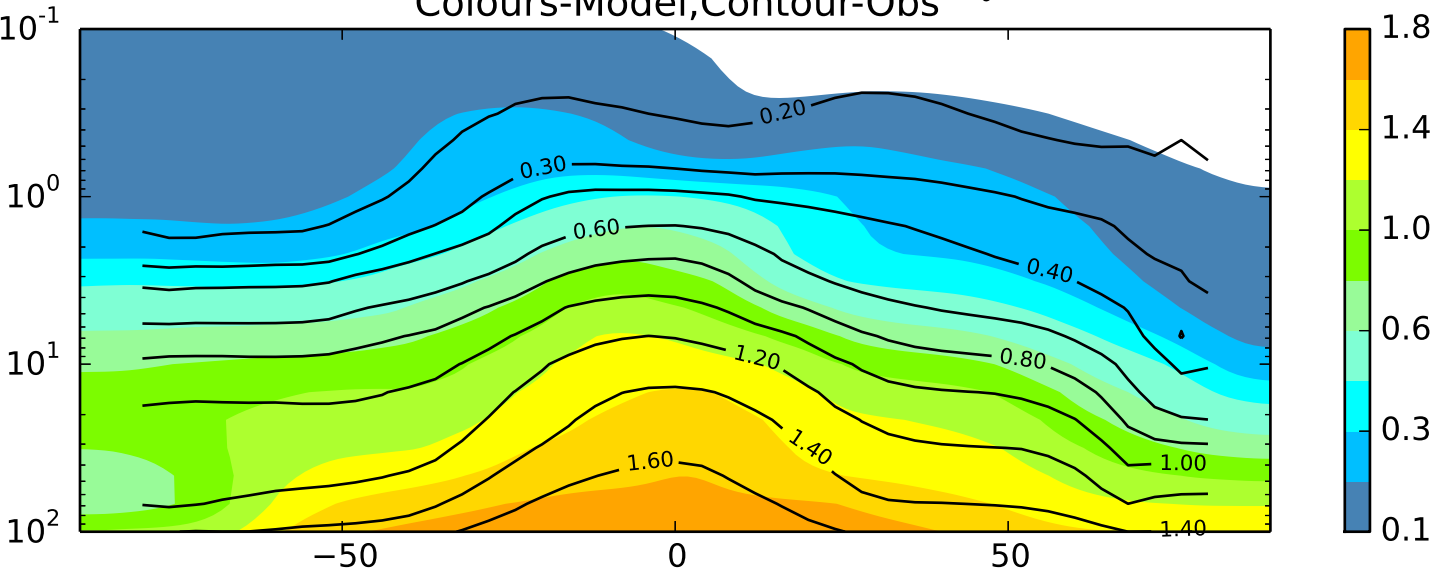


0.2

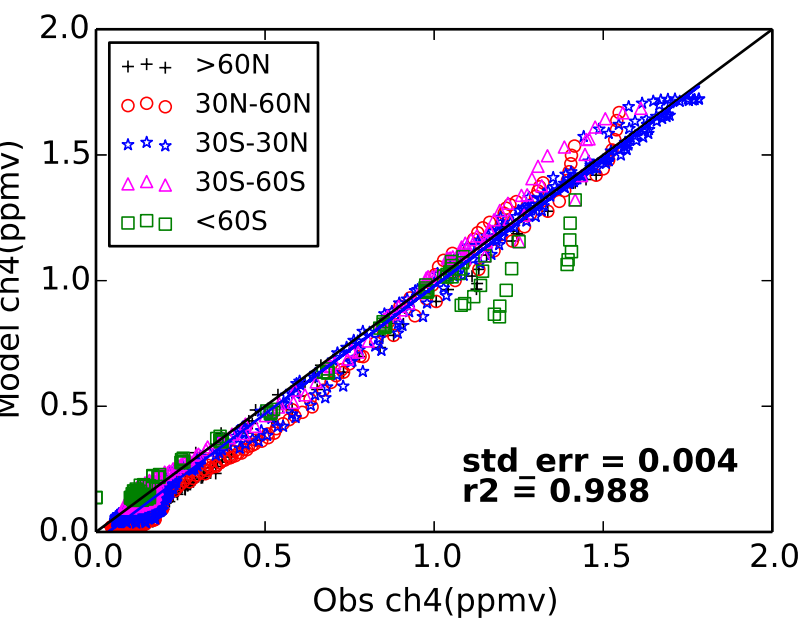
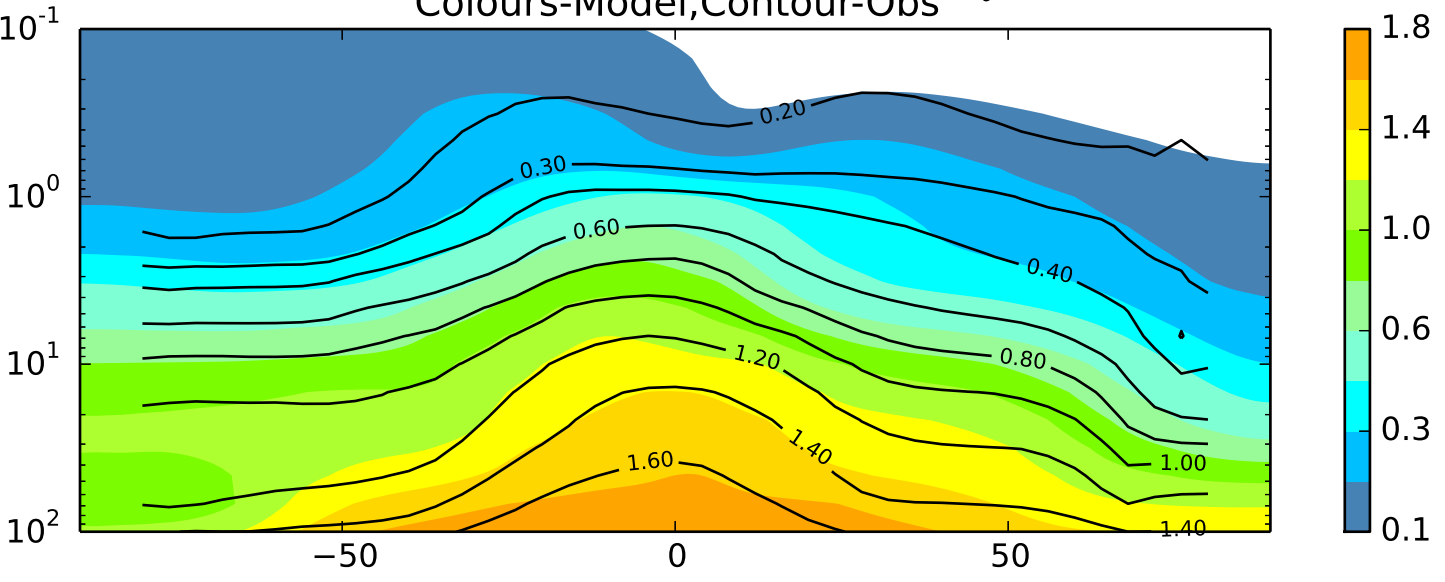
Colours-Model,Contour-Obs^{0.10}



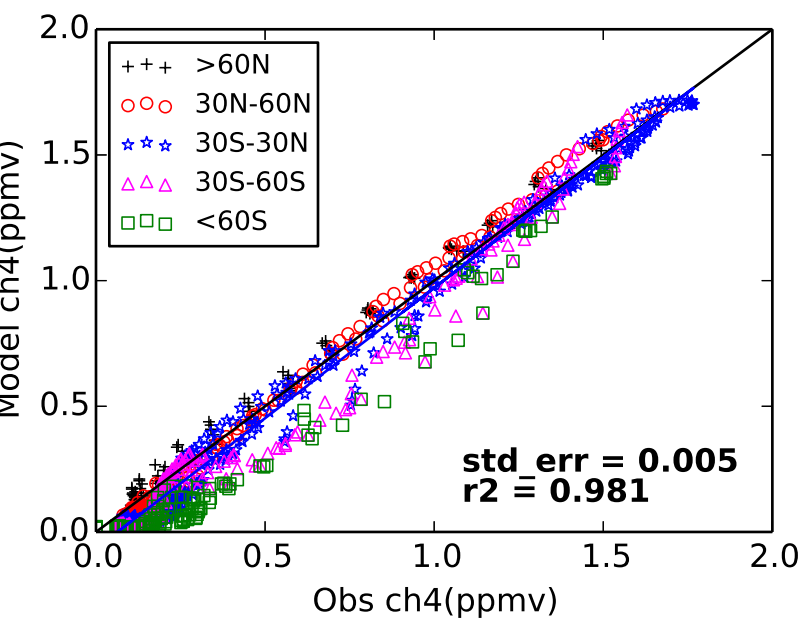
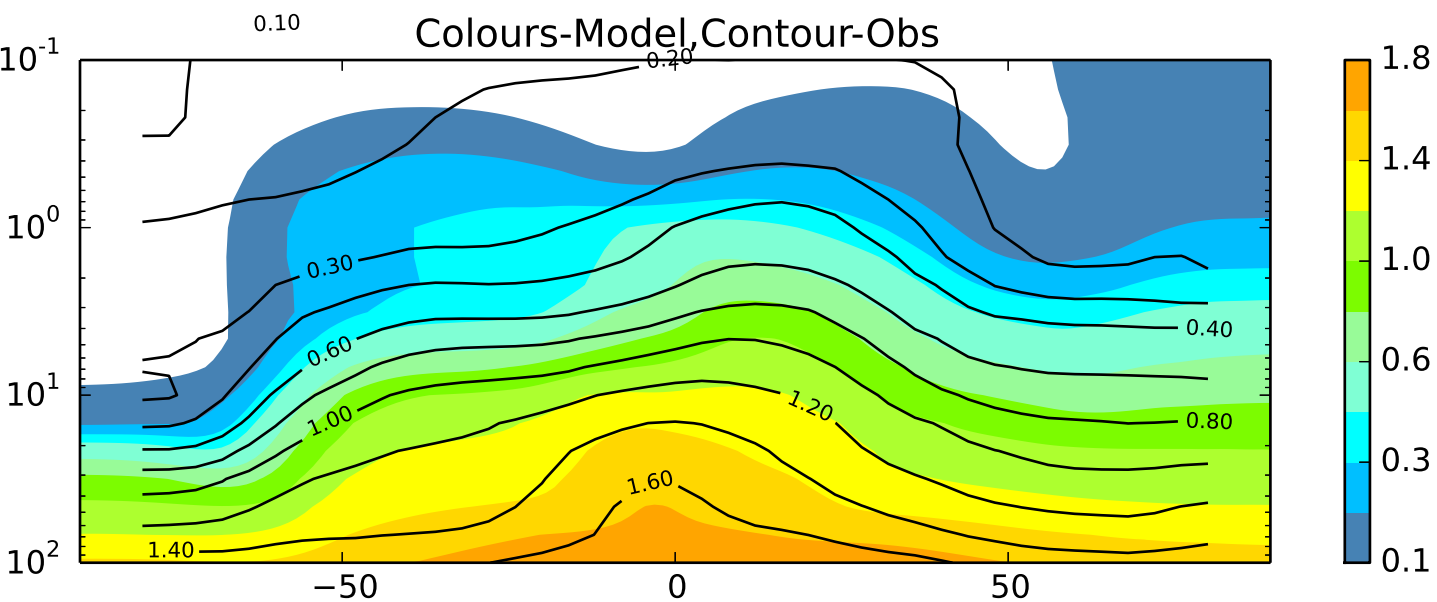
UKCA am124 vs HALOE:
CH4 (ppmv) Jan

0.2

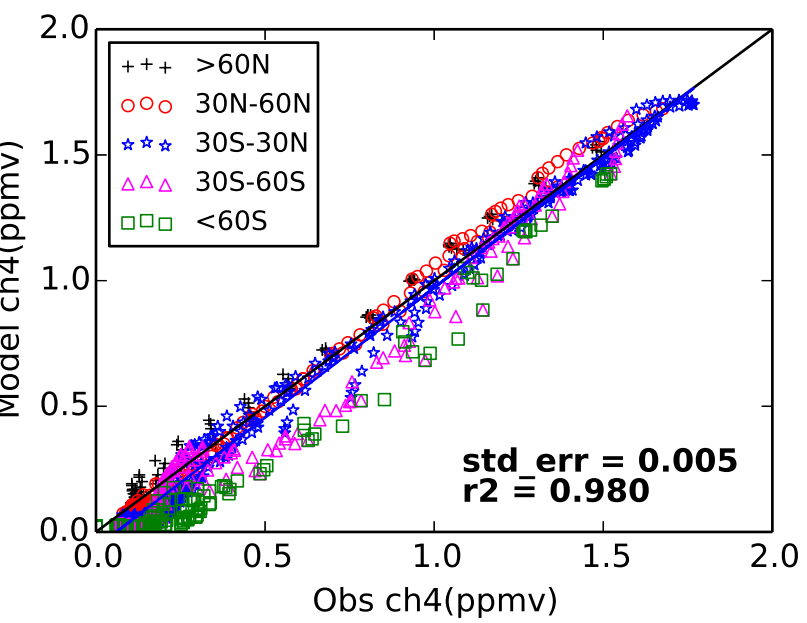
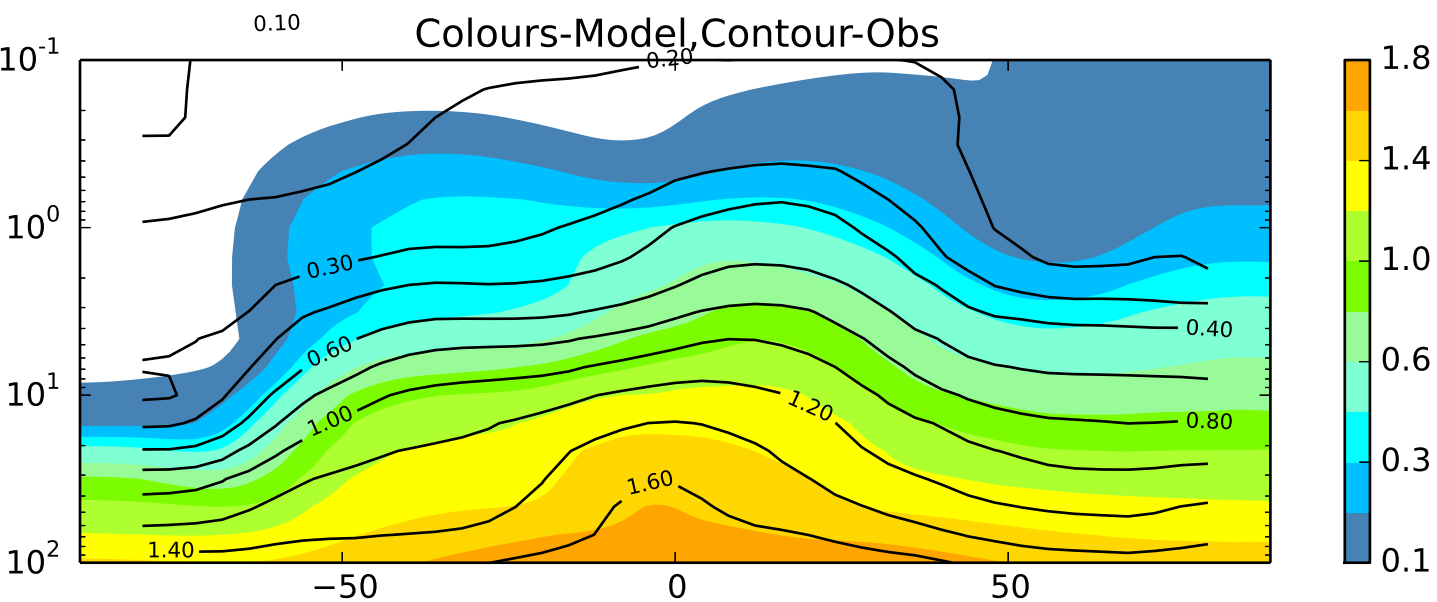
Colours-Model, Contour-Obs^{0.10}



UKCA ao124 vs HALOE:
CH4 (ppmv) Jan

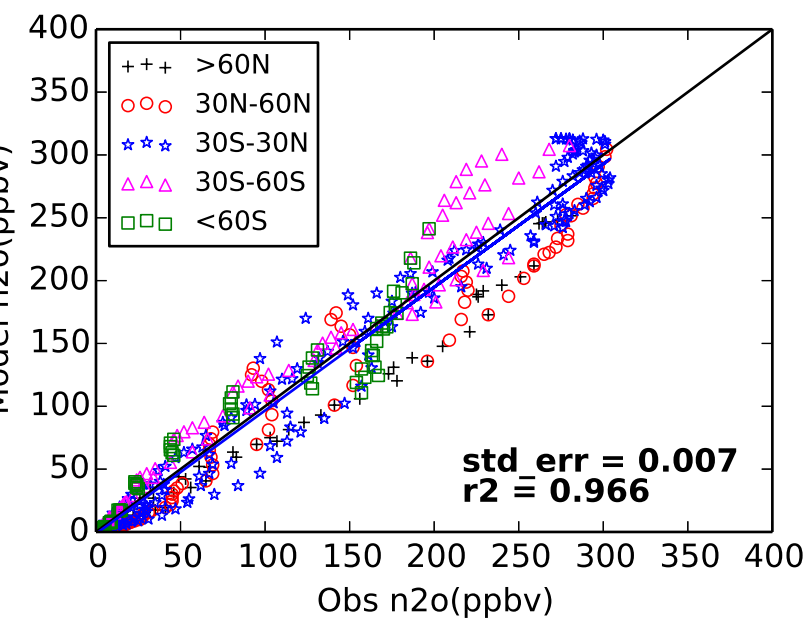
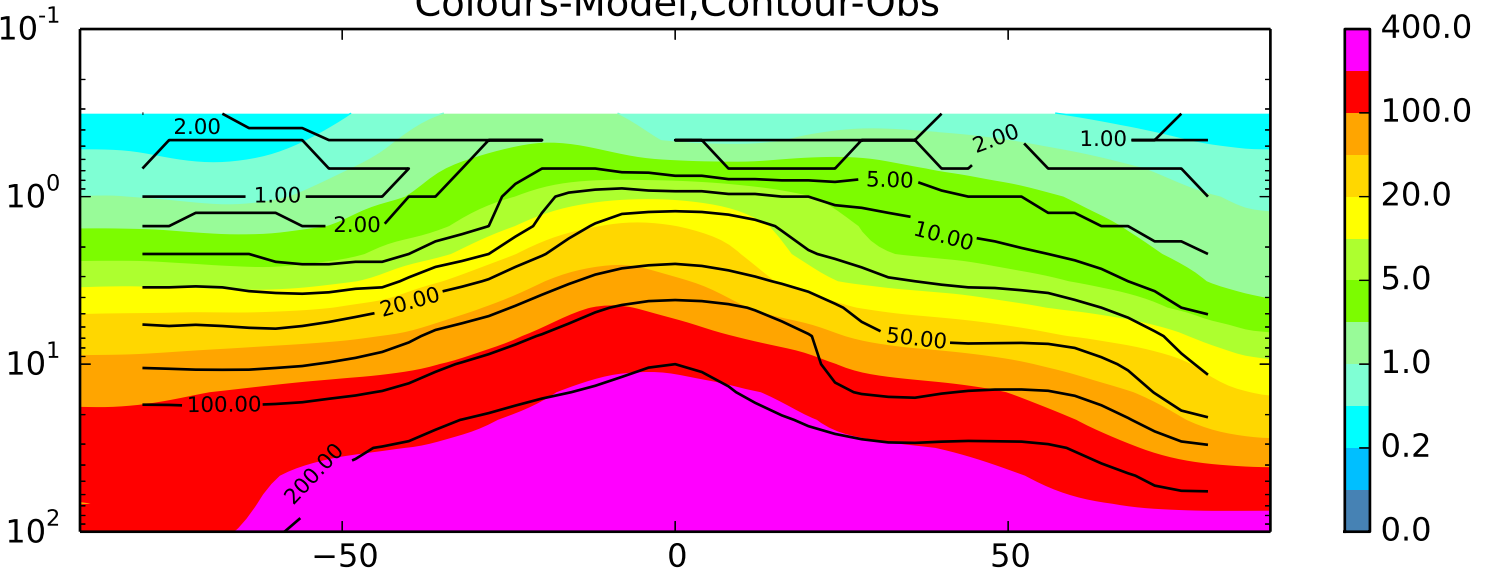


UKCA am124 vs HALOE:
 CH4 (ppmv) Jul



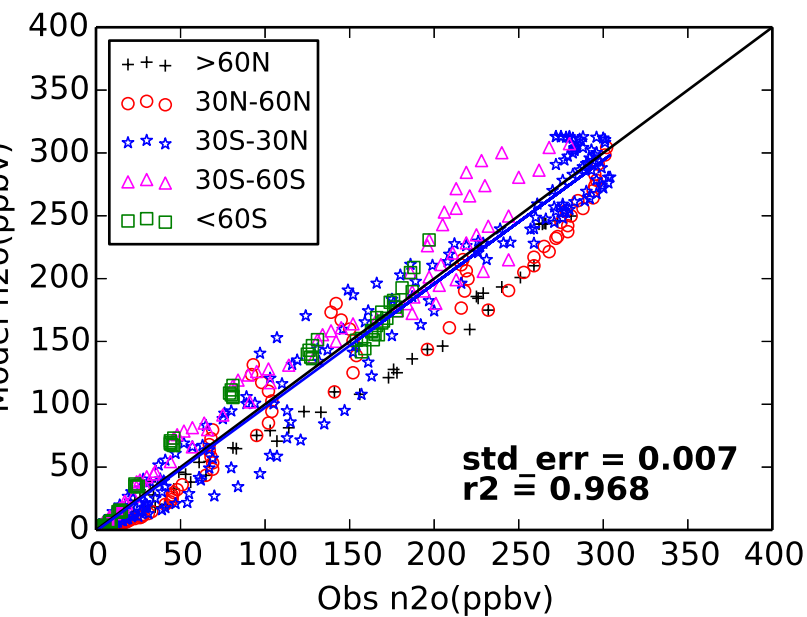
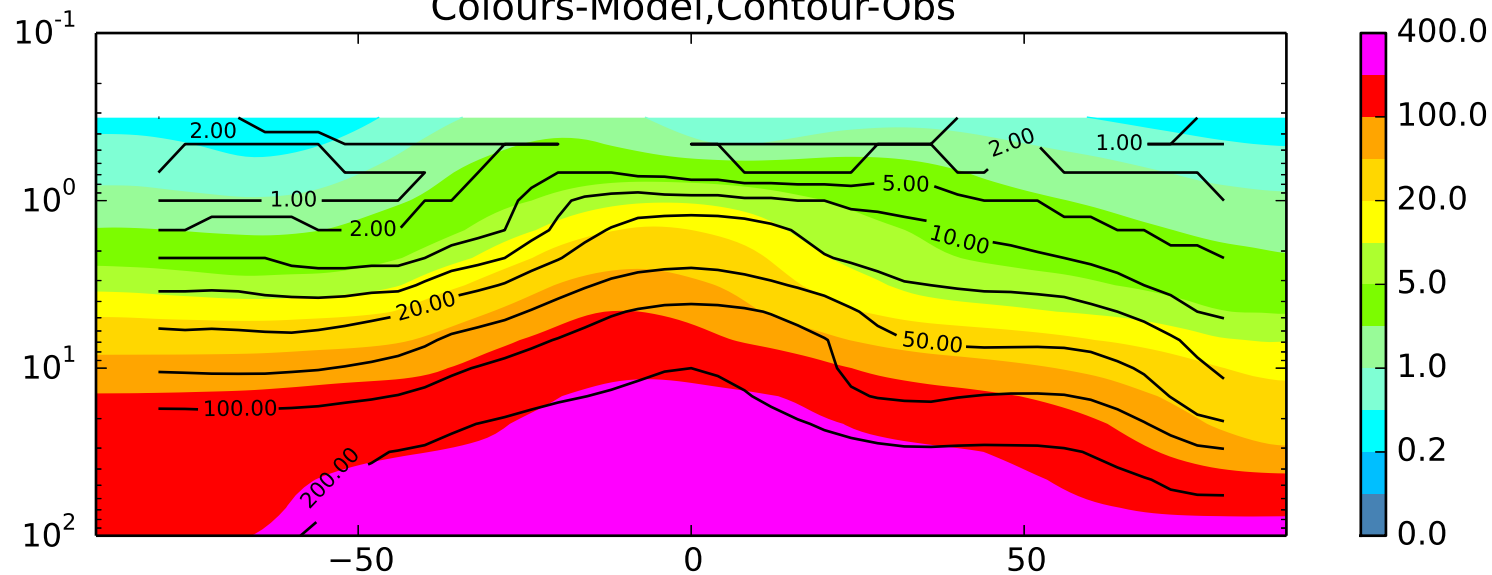
UKCA ao124 vs HALOE:
 CH₄ (ppmv) Jul

Colours-Model,Contour-Obs



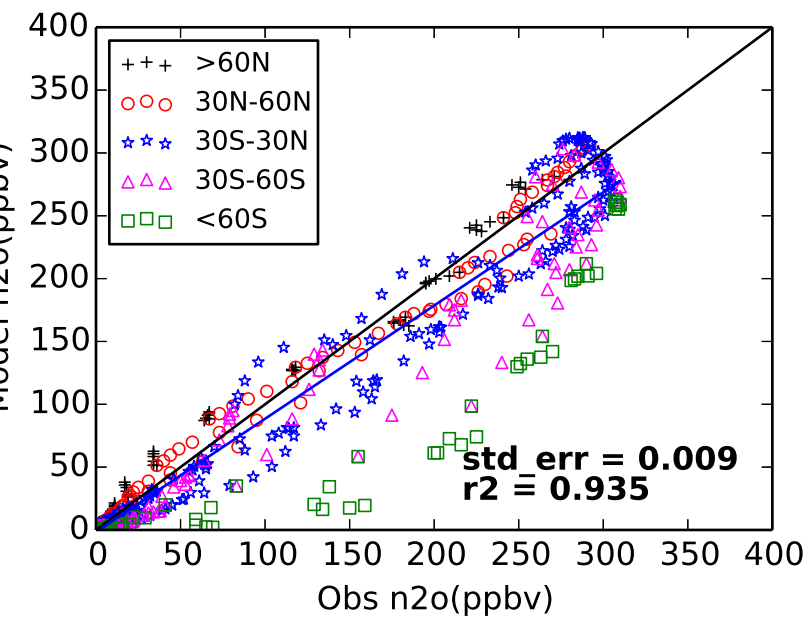
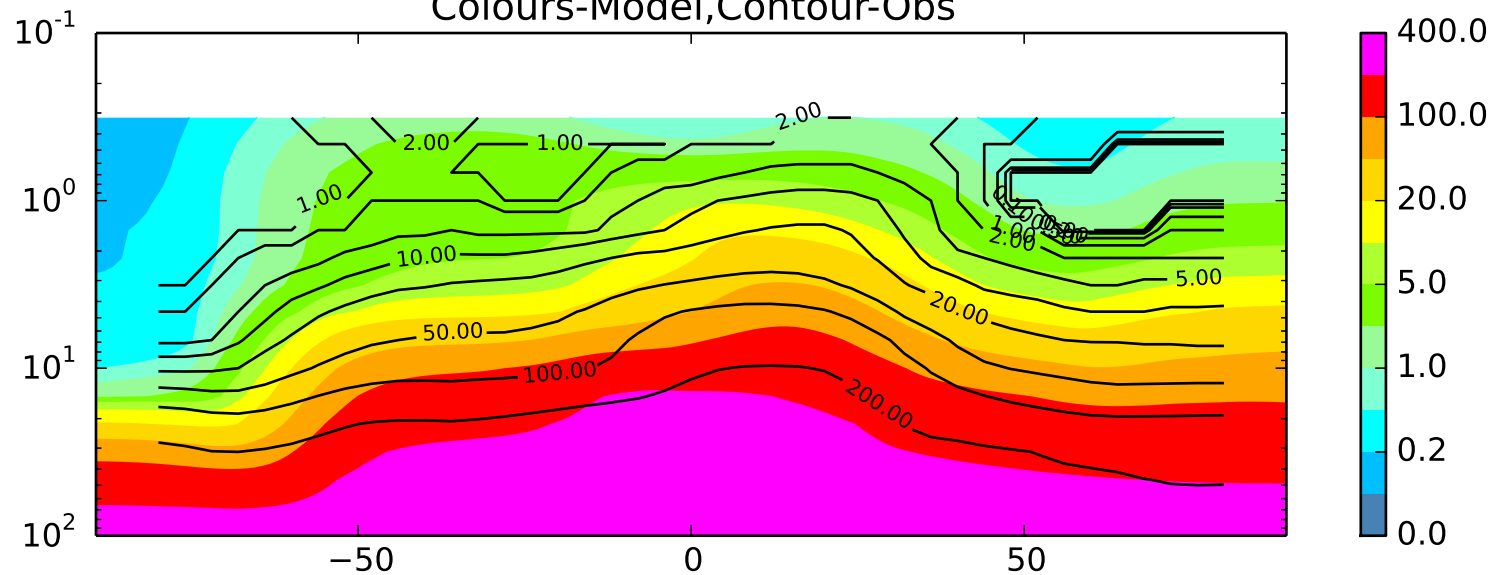
UKCA am124 vs HALOE:
N₂O (ppmv) Jan

Colours-Model,Contour-Obs



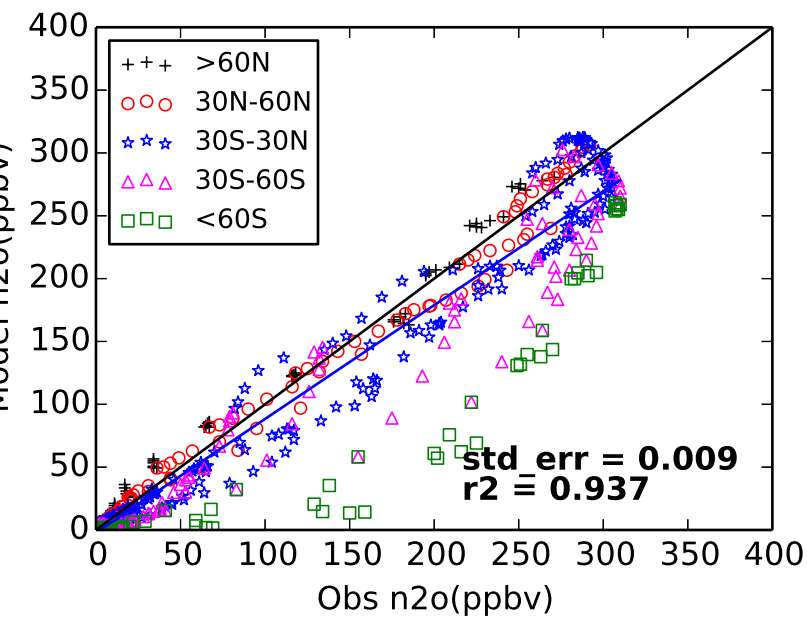
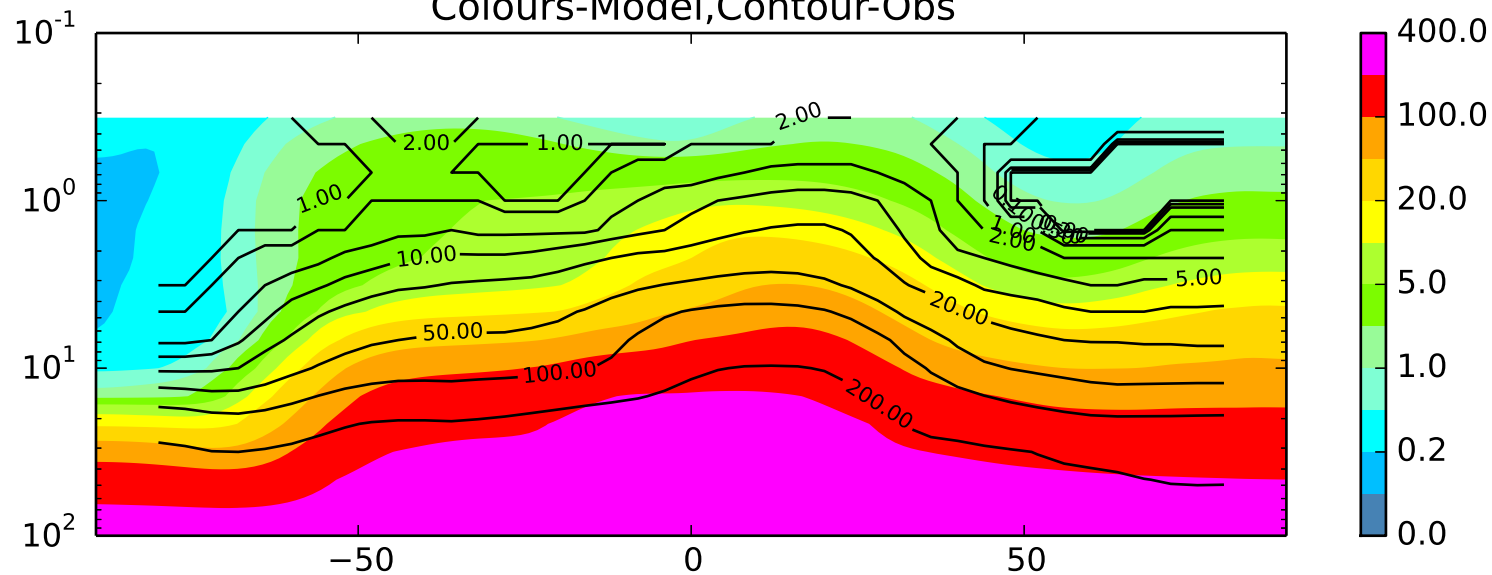
UKCA ao124 vs HALOE:
N₂O (ppmv) Jan

Colours-Model,Contour-Obs



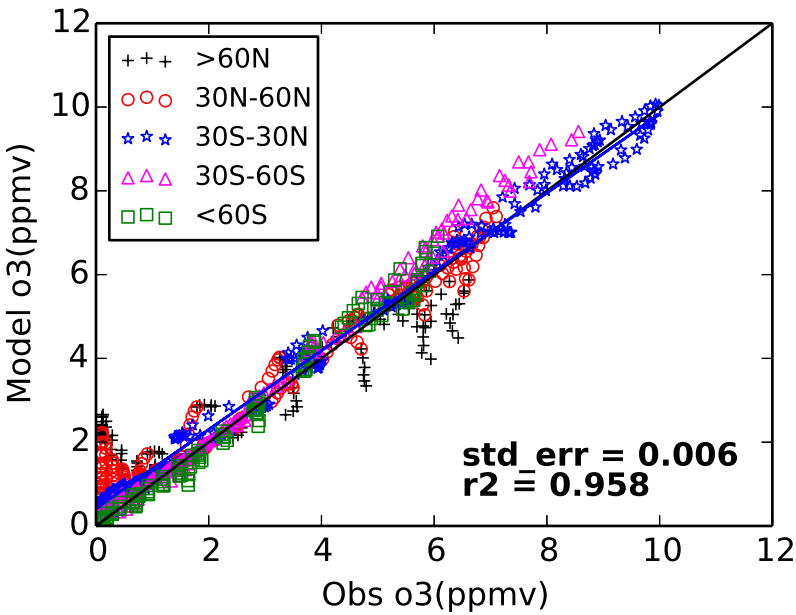
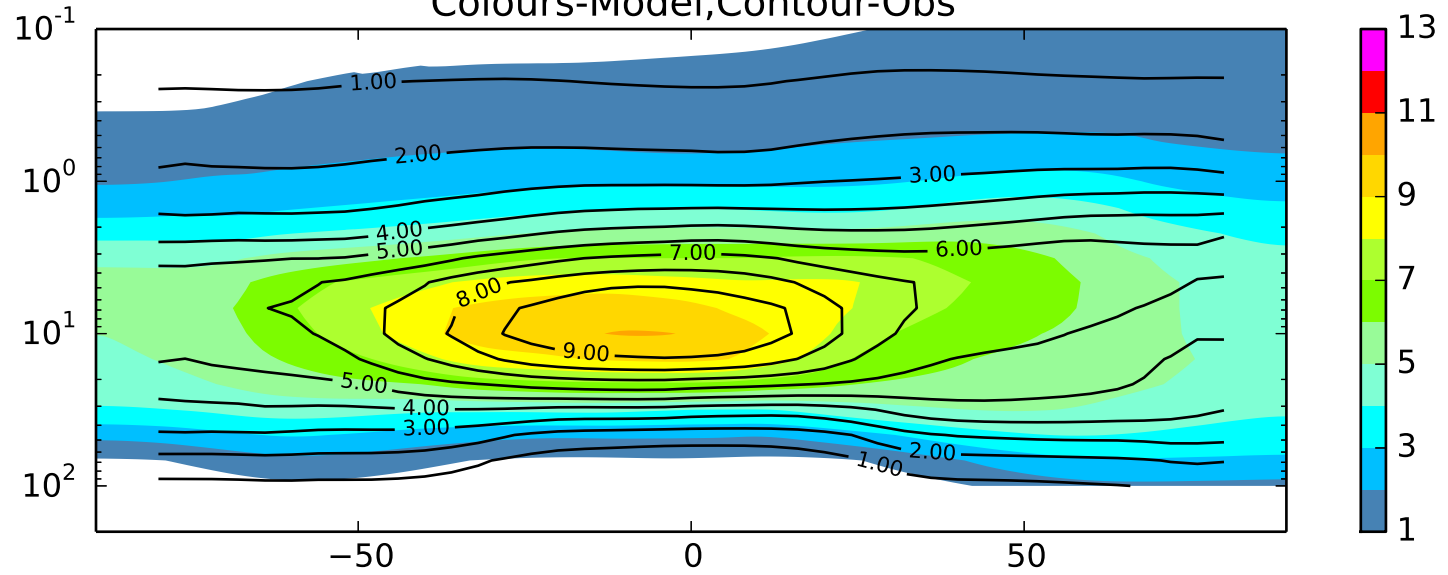
UKCA am124 vs HALOE:
N₂O (ppmv) Jul

Colours-Model,Contour-Obs



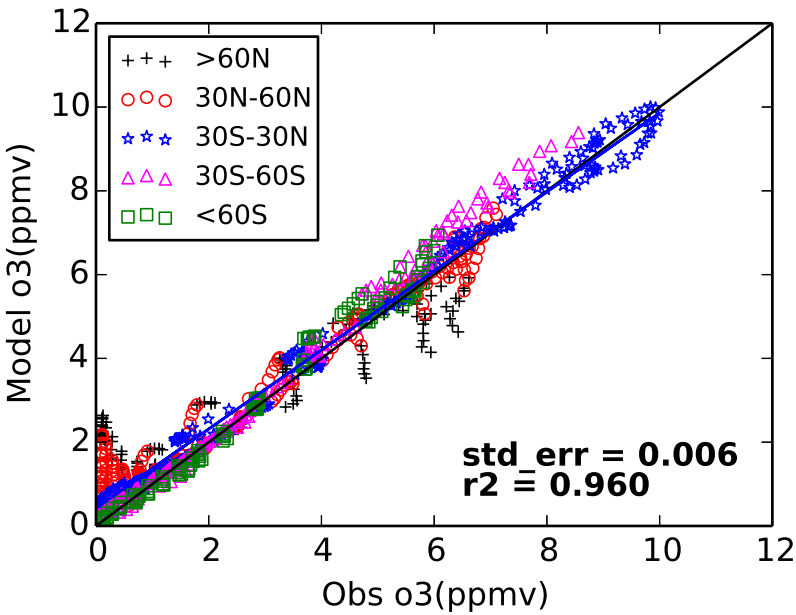
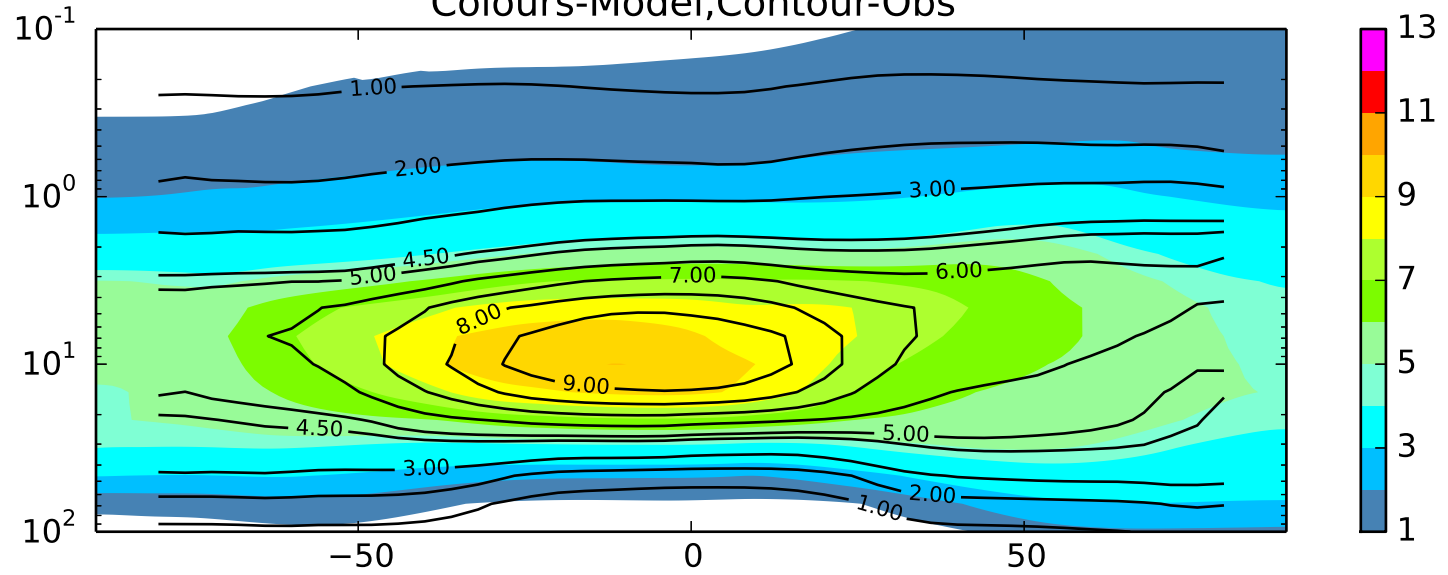
UKCA ao124 vs HALOE:
N₂O (ppmv) Jul

Colours-Model,Contour-Obs



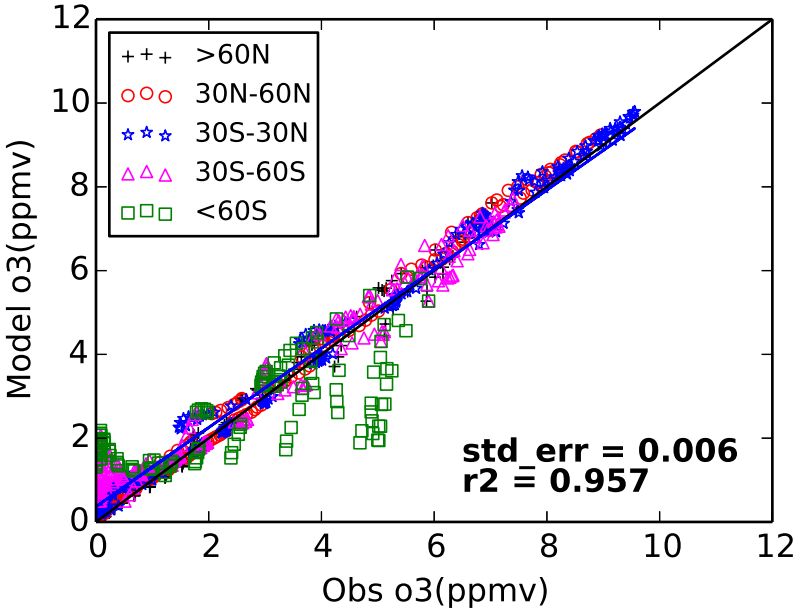
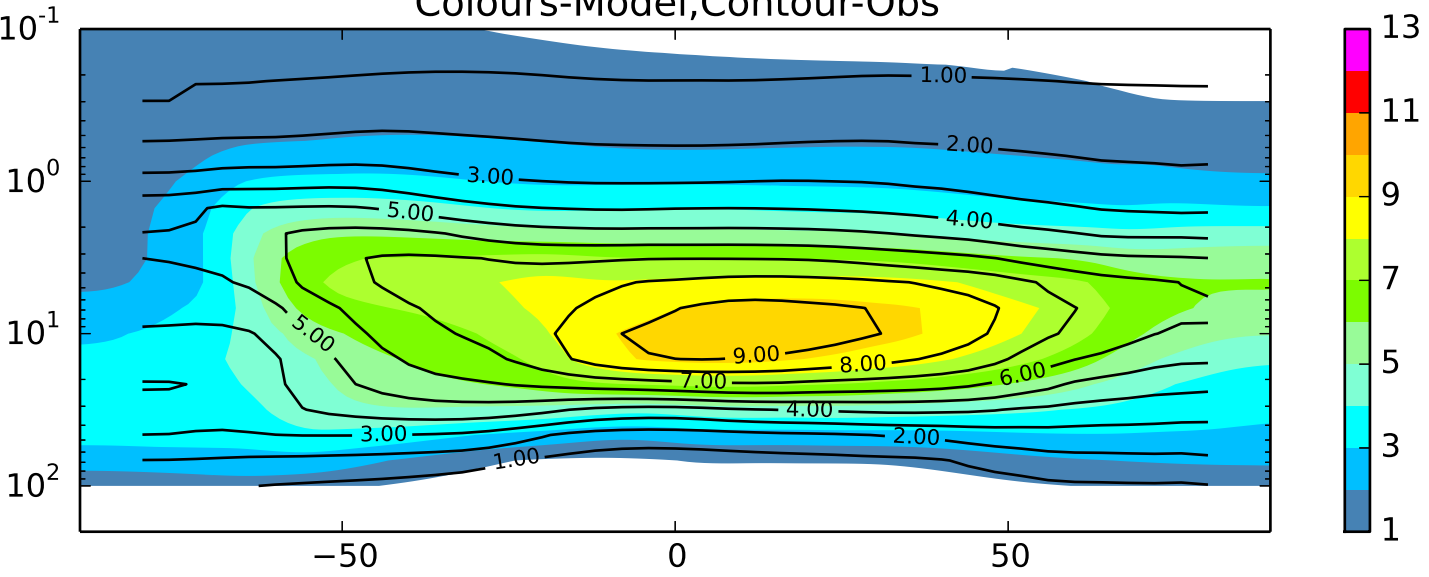
UKCA am124 vs HALOE:
O₃ (ppmv) Jan

Colours-Model,Contour-Obs



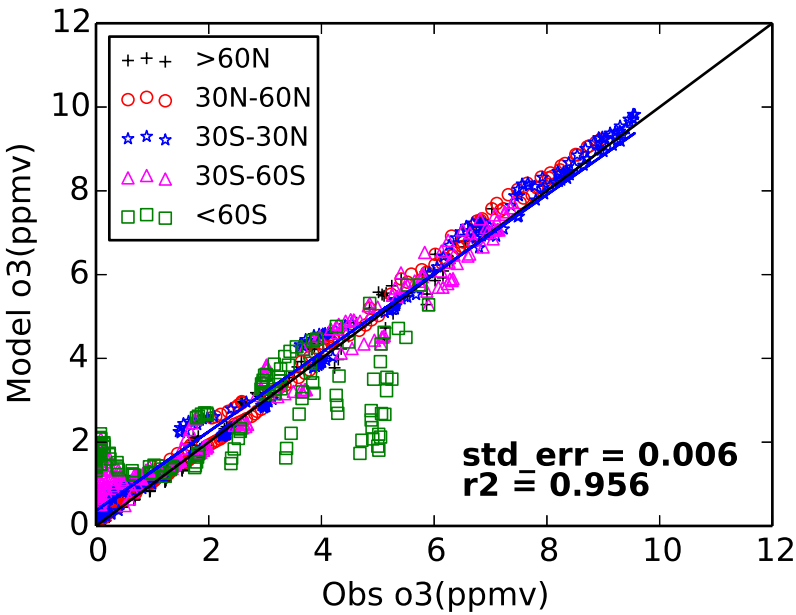
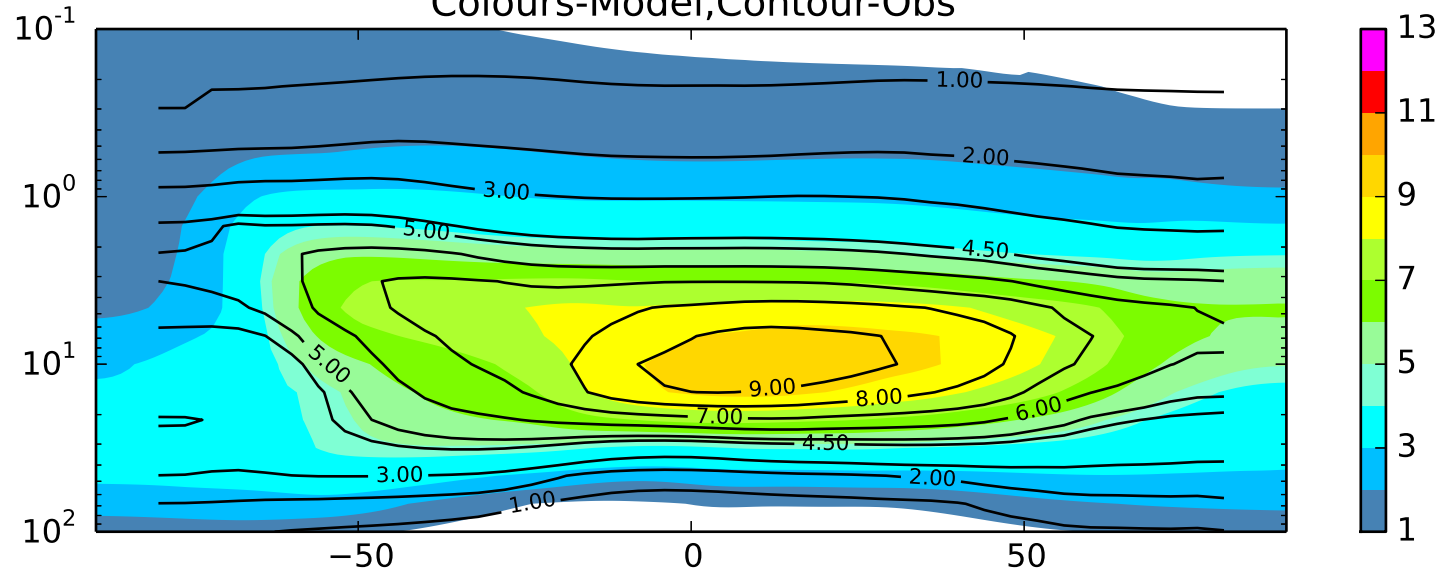
UKCA ao124 vs HALOE:
O₃ (ppmv) Jan

Colours-Model,Contour-Obs



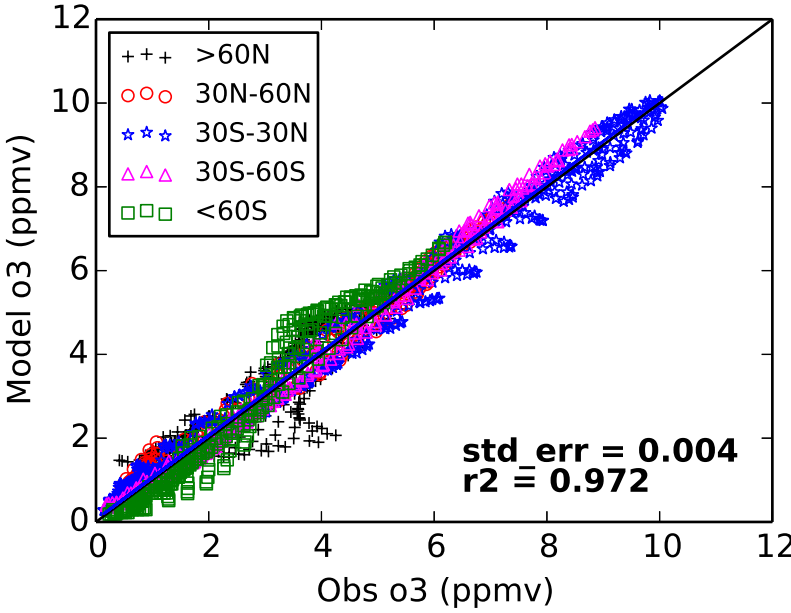
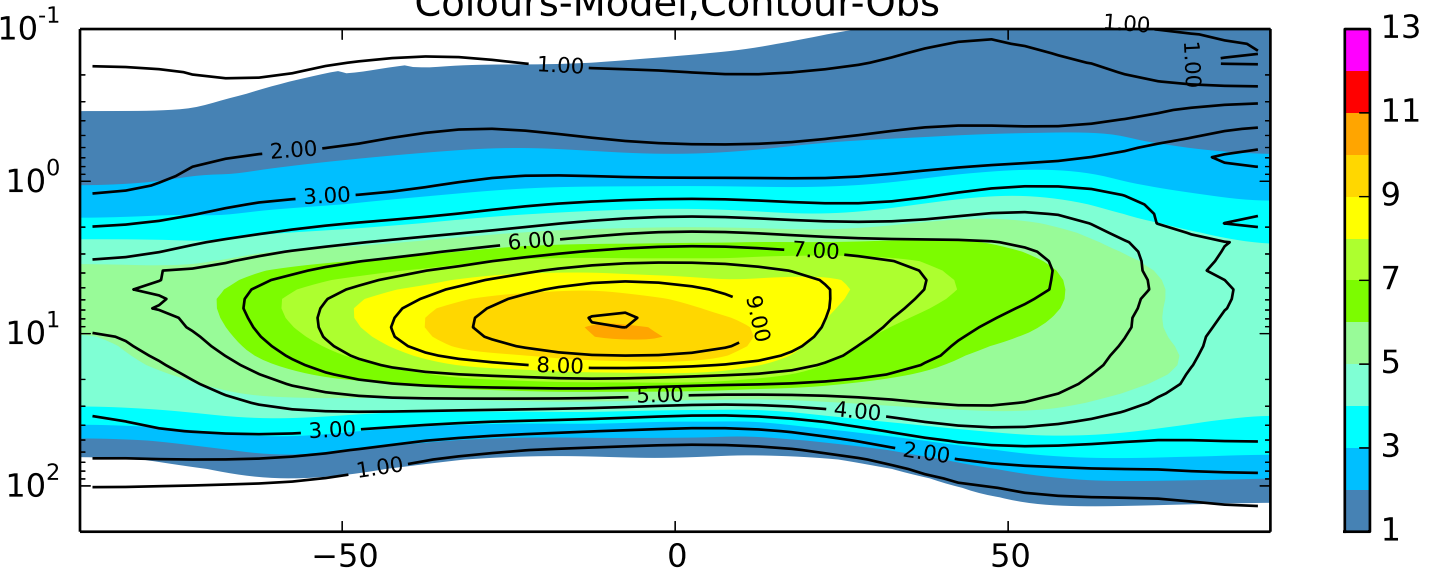
UKCA am124 vs HALOE:
O3 (ppmv) Jul

Colours-Model,Contour-Obs



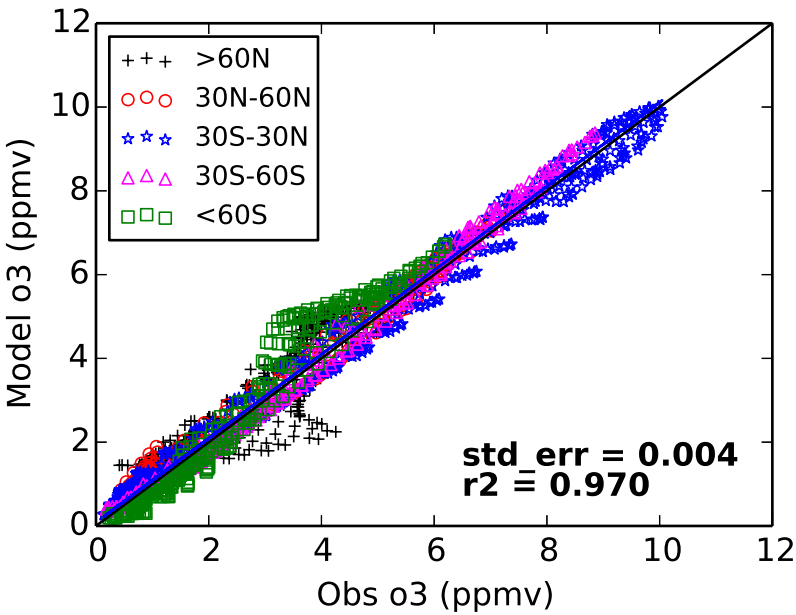
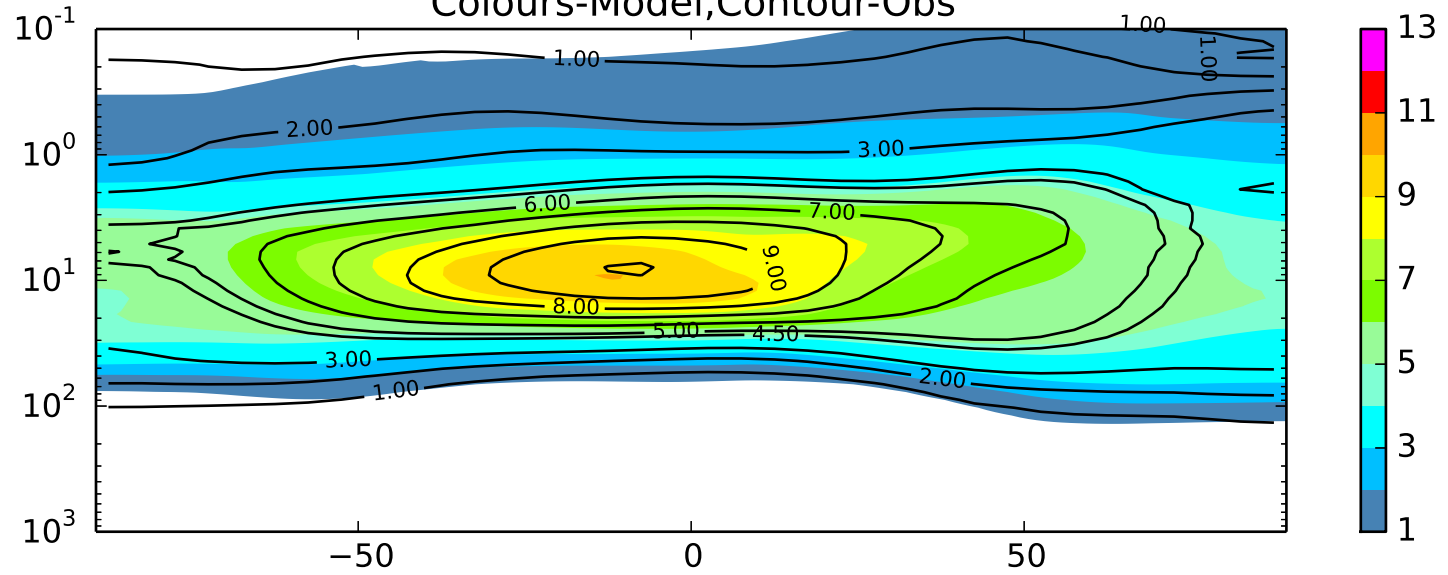
UKCA ao124 vs HALOE:
O₃ (ppmv) Jul

Colours-Model,Contour-Obs



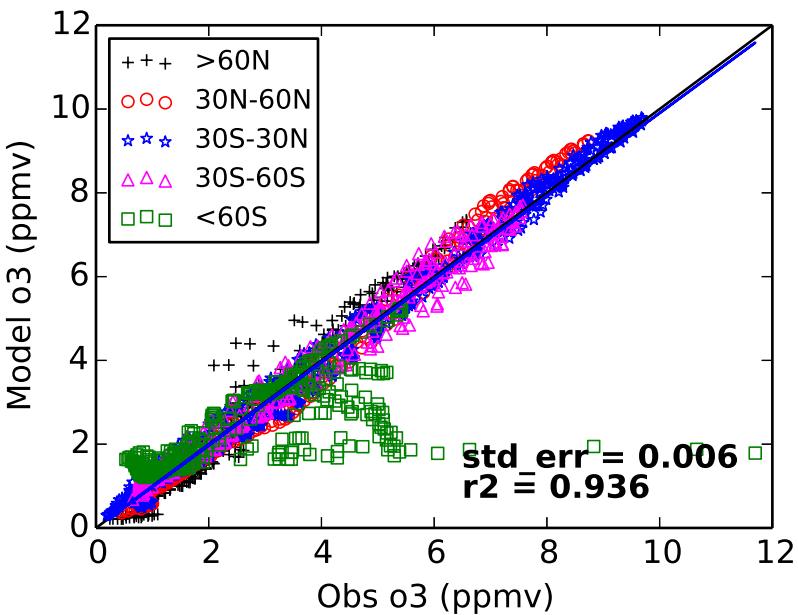
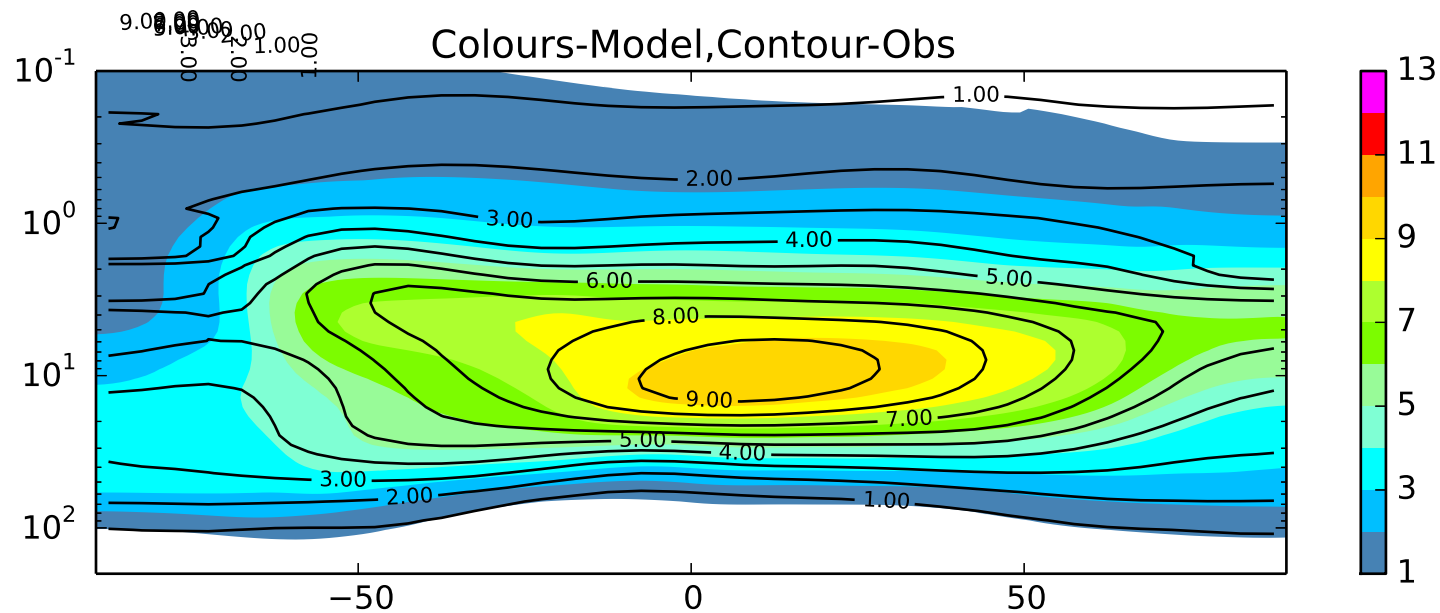
UKCA am124 vs NIWA-CCMVal:
O3 (ppmv) Jan

Colours-Model,Contour-Obs



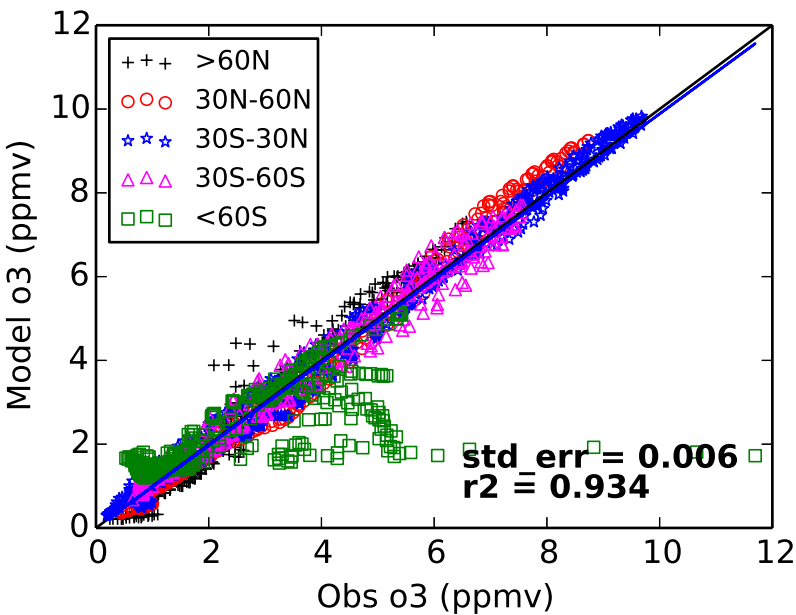
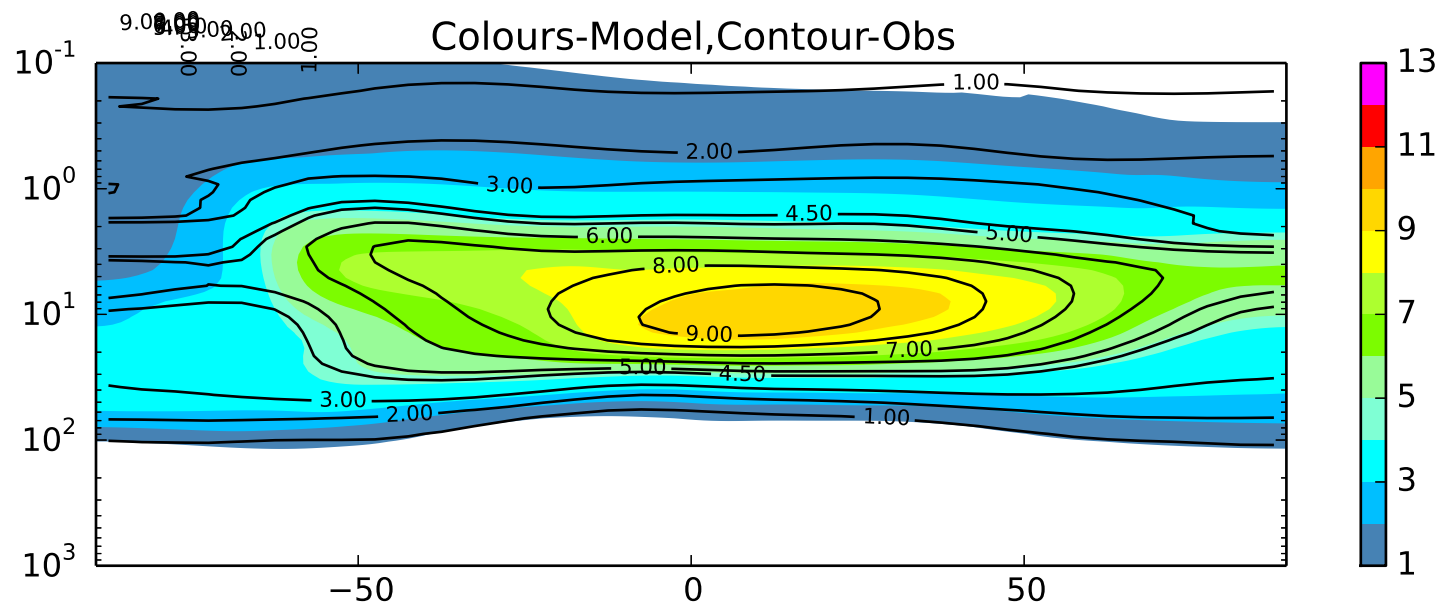
UKCA ao124 vs NIWA-CCMVal:
O₃ (ppmv) Jan

Colours-Model, Contour-Obs

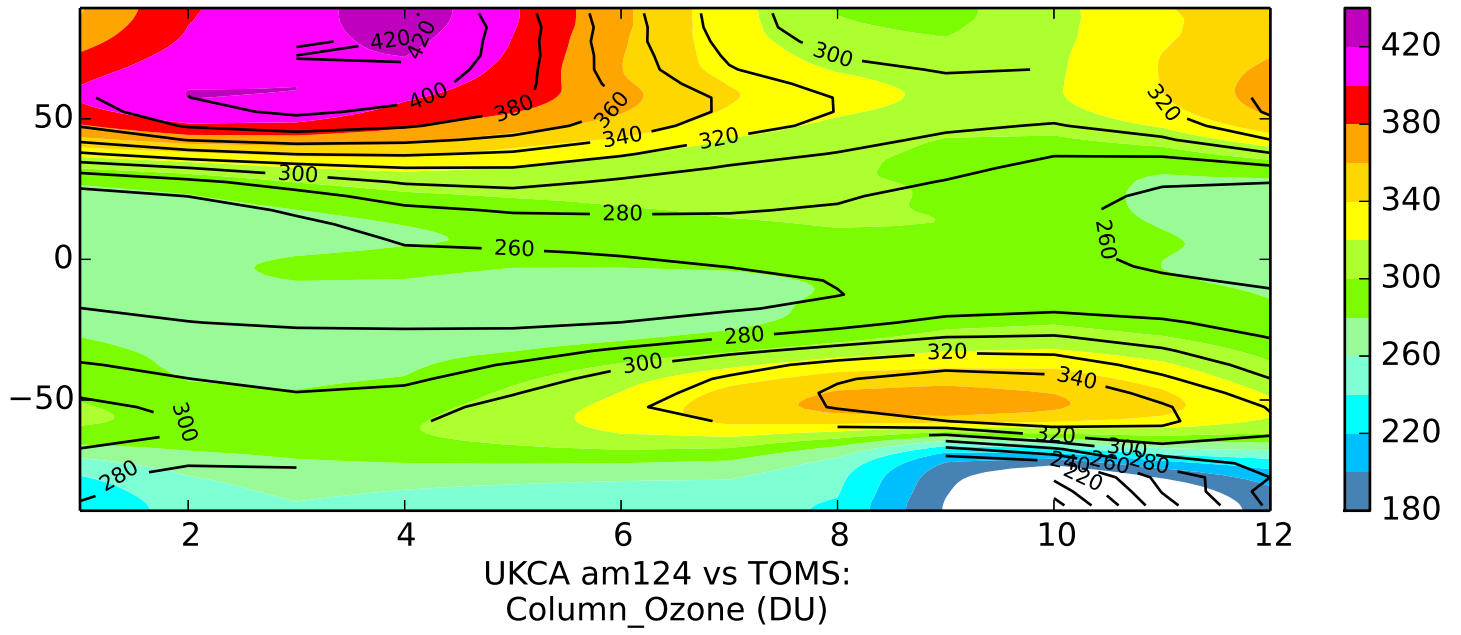


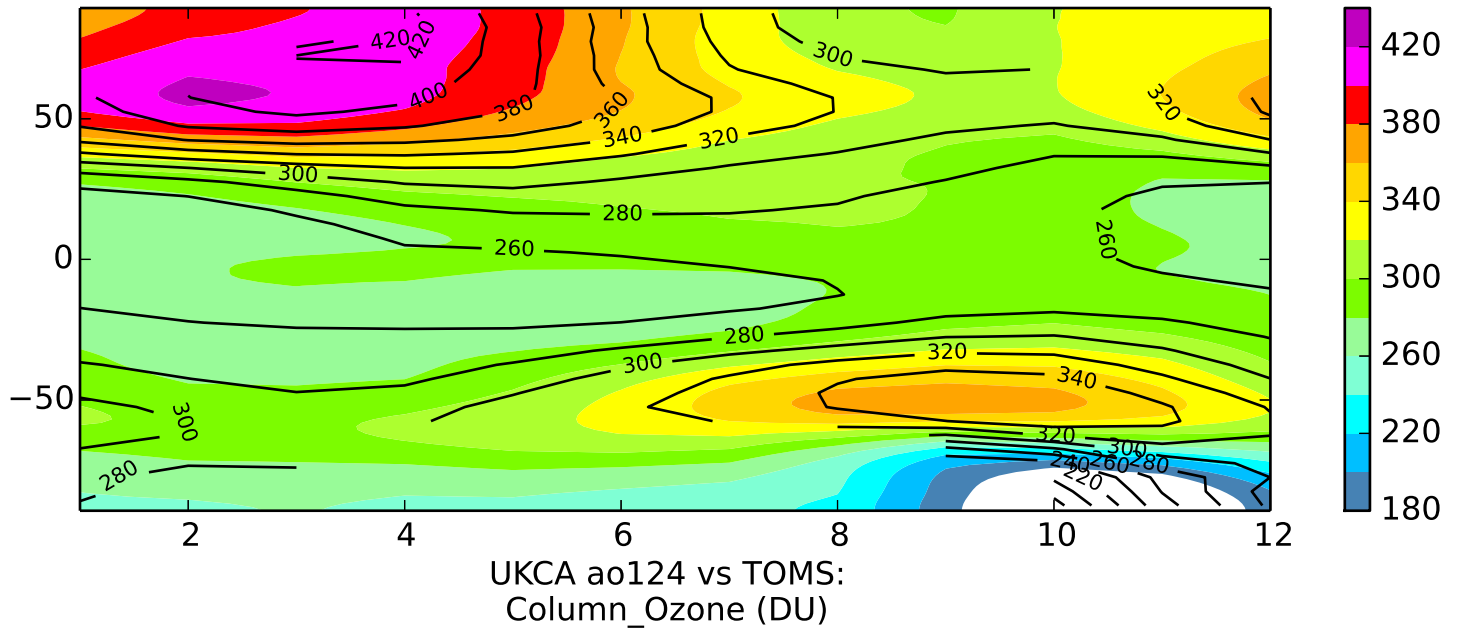
UKCA am124 vs NIWA-CCMVal:
O₃ (ppmv) Jul

Colours-Model, Contour-Obs

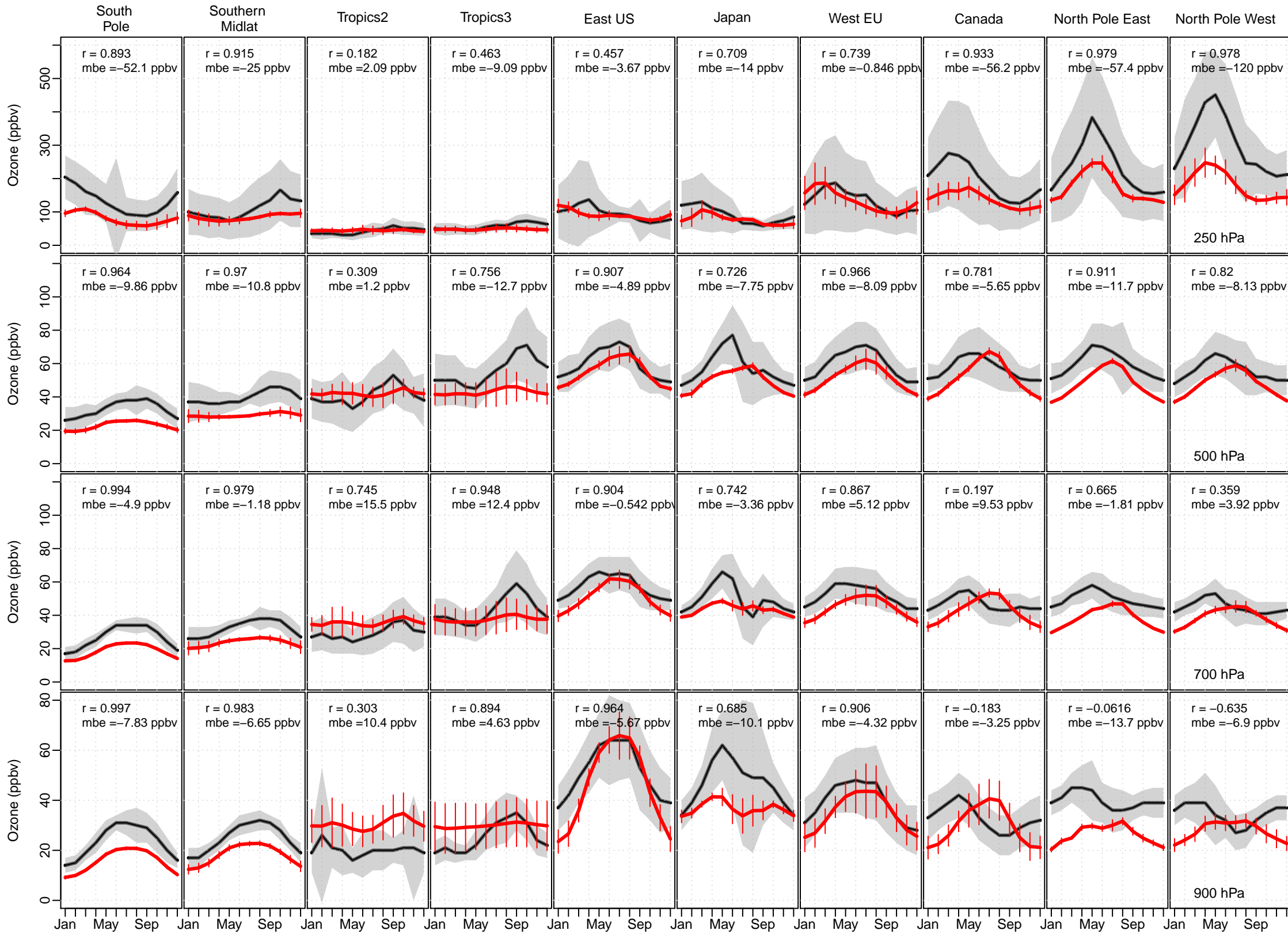


UKCA ao124 vs NIWA-CCMVal:
O₃ (ppmv) Jul

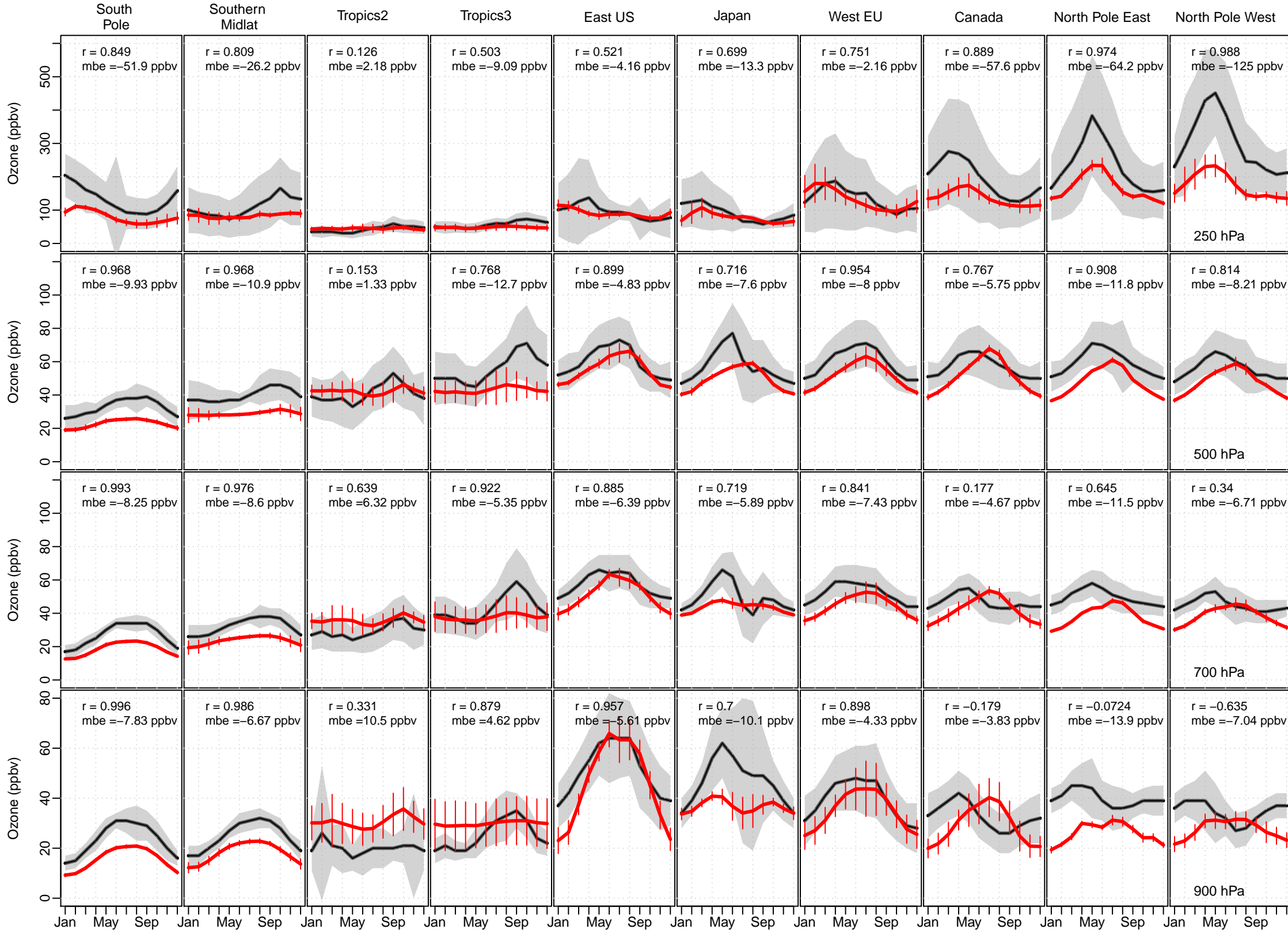




am124 Tilmes ozone sonde comparison

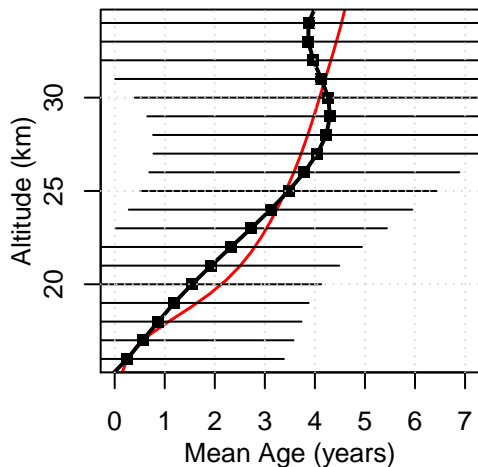


ao124 Tilmes ozone sonde comparison

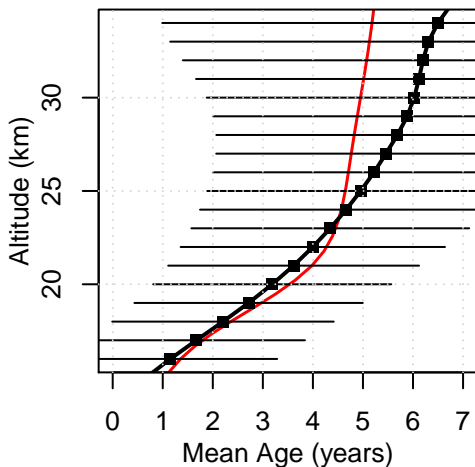


UKCA am124 Mean Age of Air

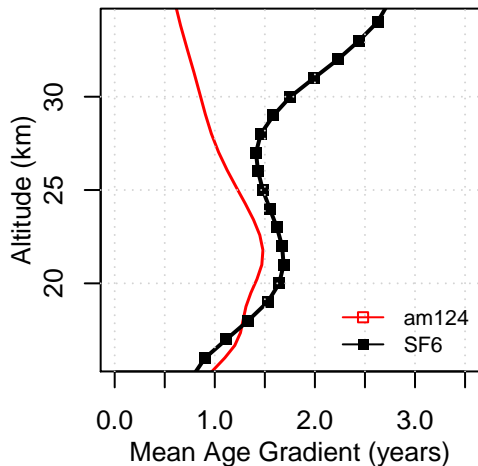
Tropical Mean Age Profile



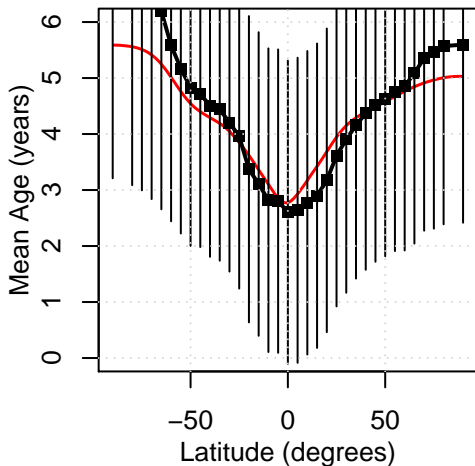
Midlatitude Mean Age Profile



Trop-Midlat Mean Age Gradient Prof

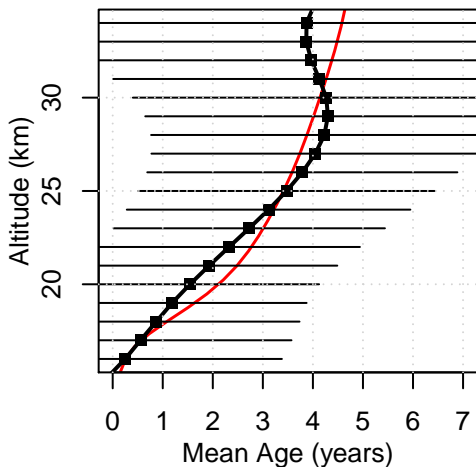


Mean Age, 23km (~50hPa)

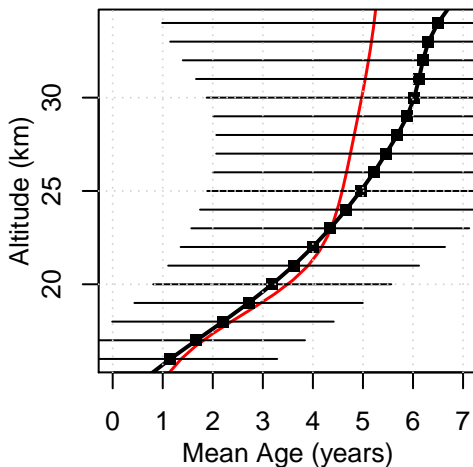


UKCA ao124 Mean Age of Air

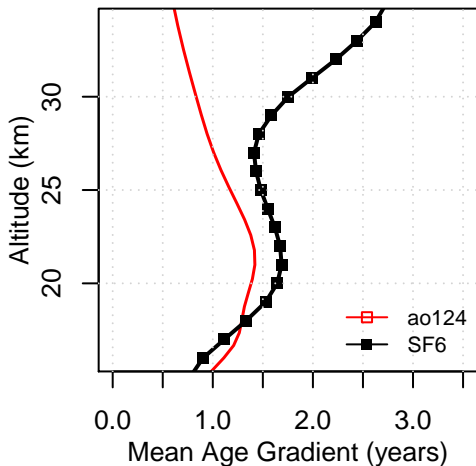
Tropical Mean Age Profile



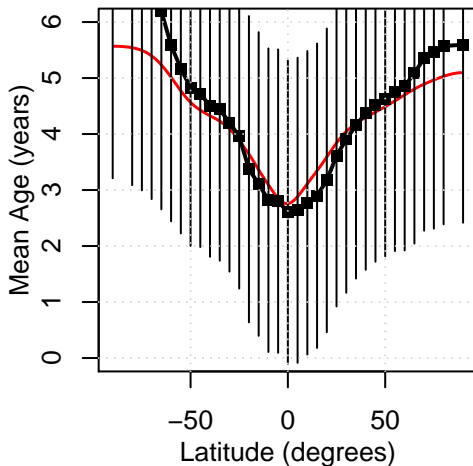
Midlatitude Mean Age Profile



Trop-Midlat Mean Age Gradient Prof

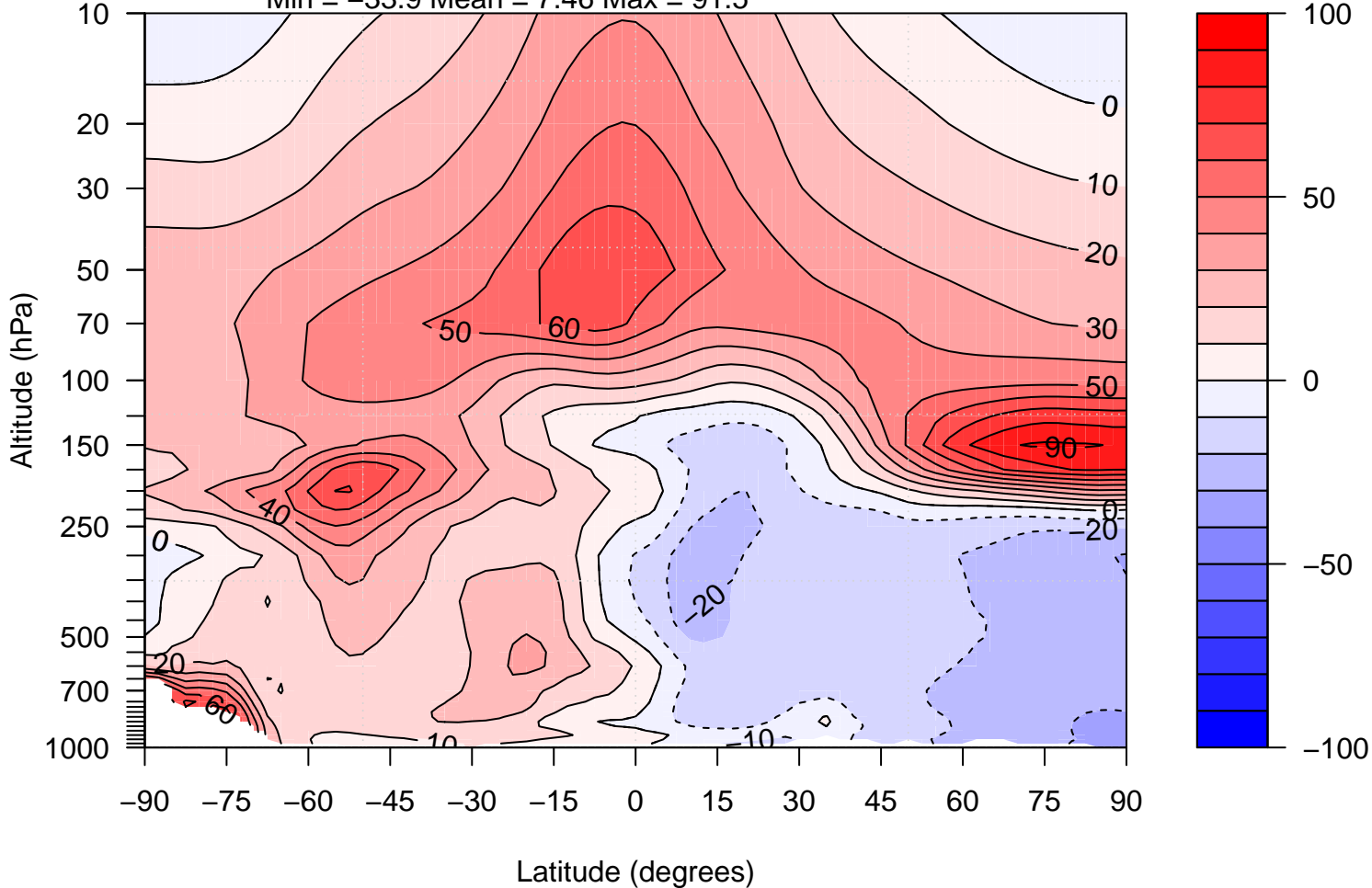


Mean Age, 23km (~50hPa)



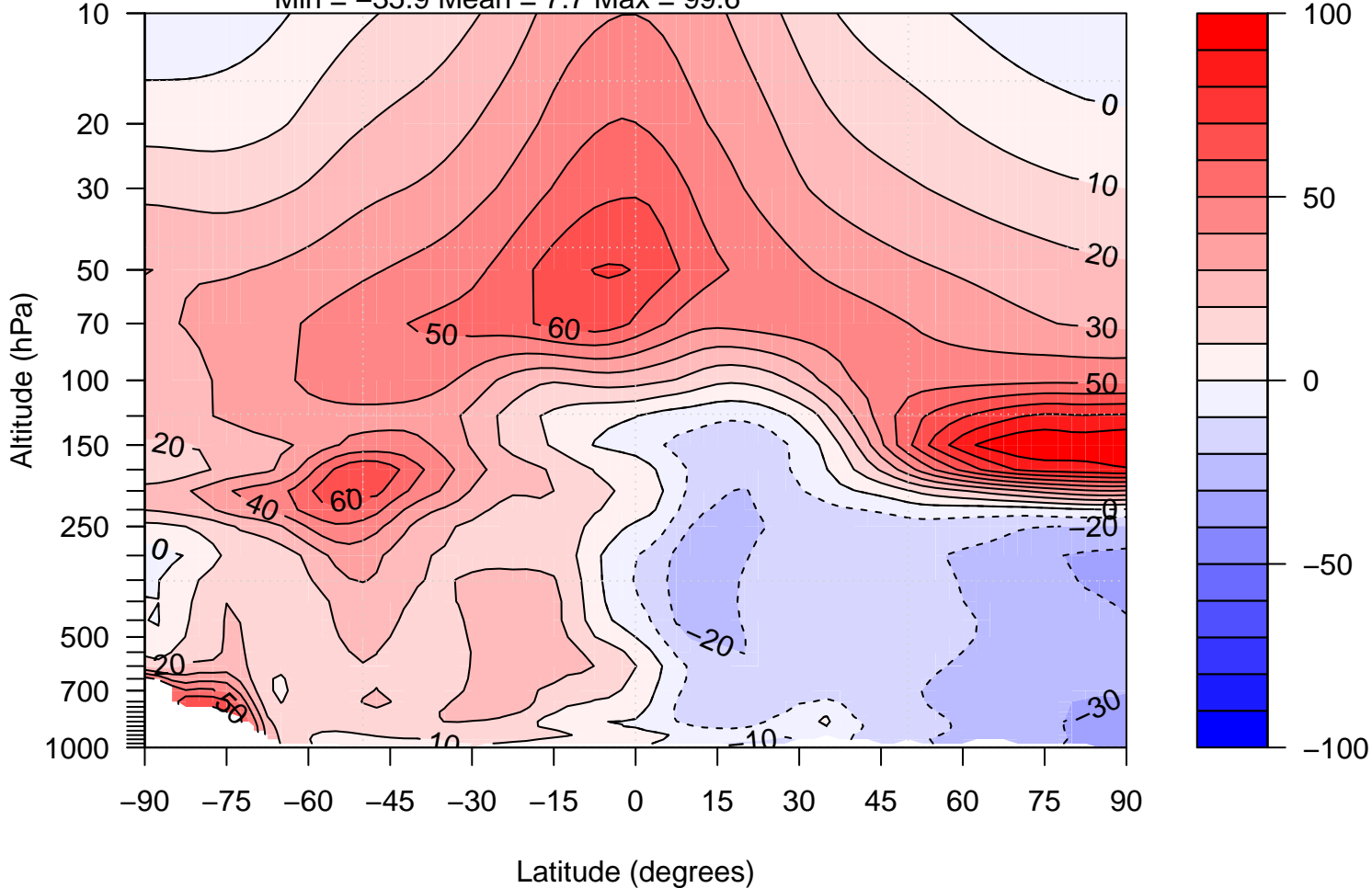
am124 – ERA Q bias

Min = -33.9 Mean = 7.46 Max = 91.5

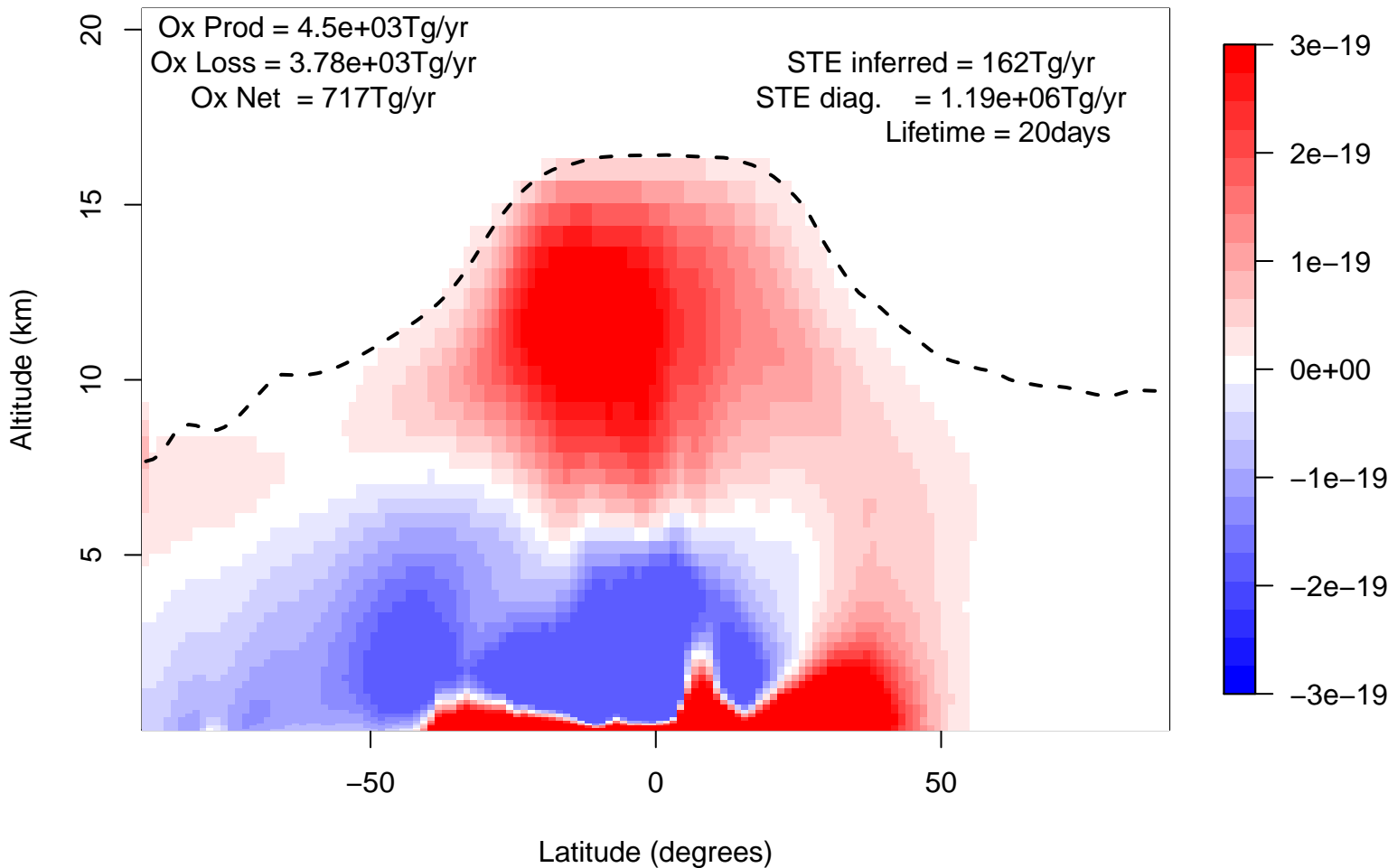


ao124 - ERA Q bias

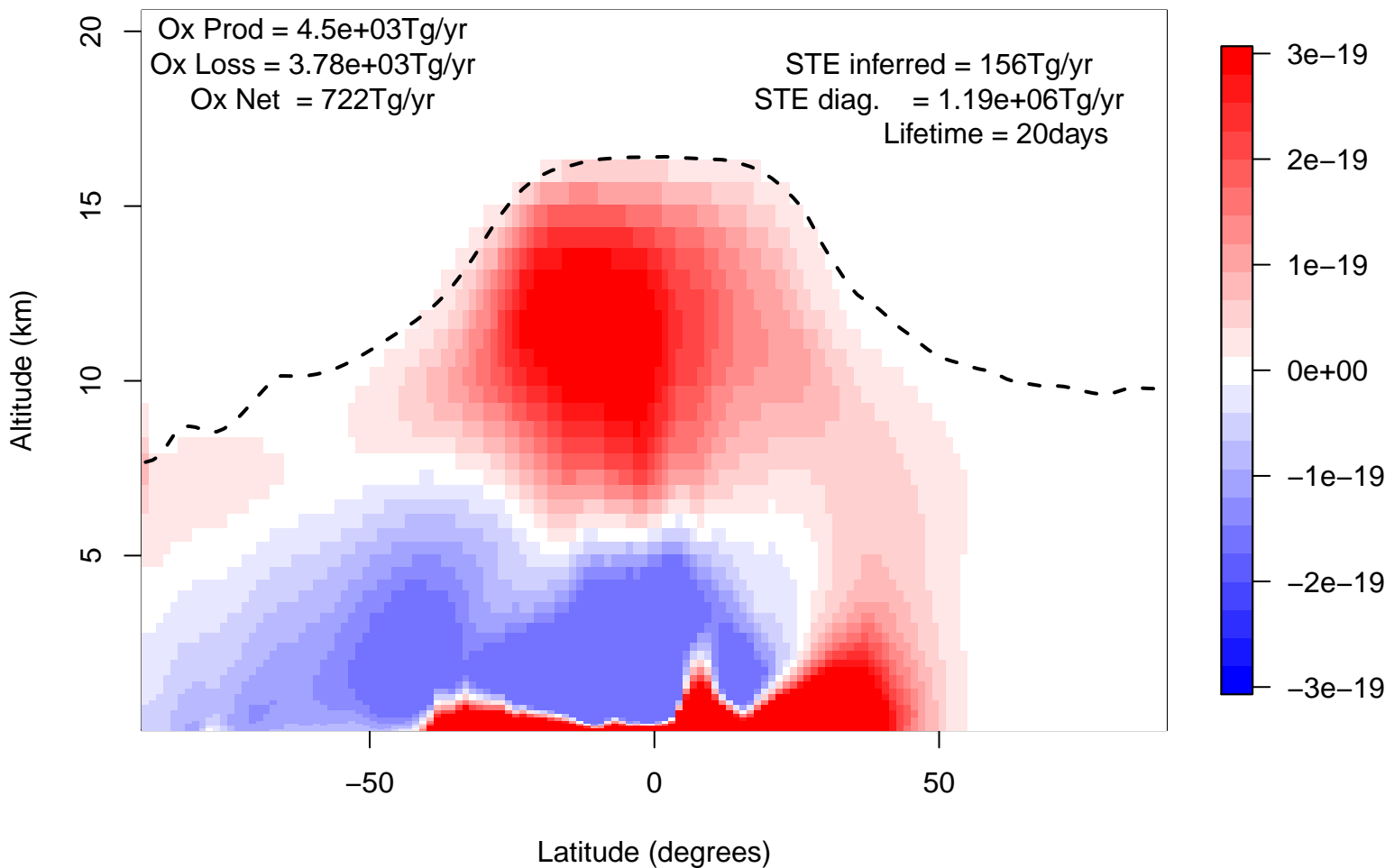
Min = -35.9 Mean = 7.7 Max = 99.6

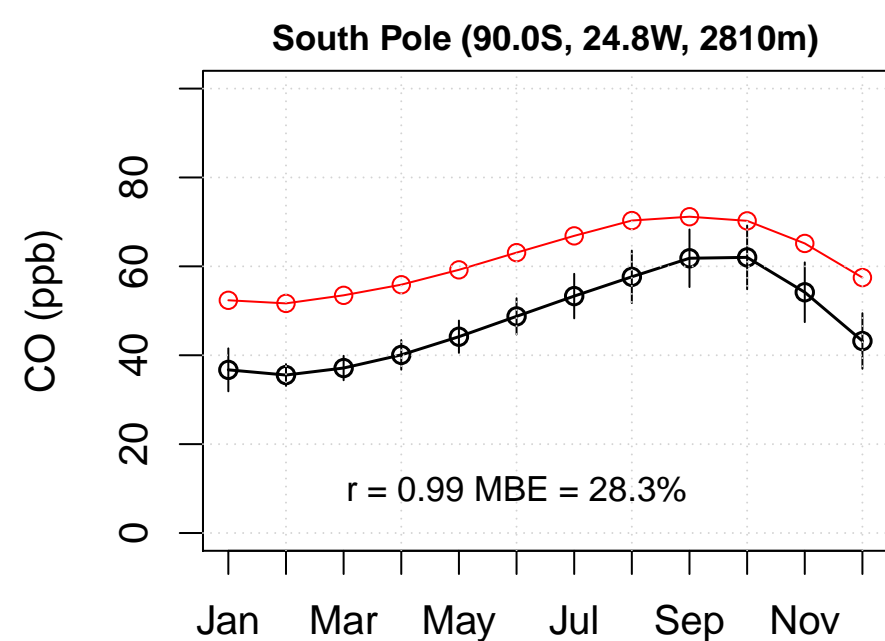
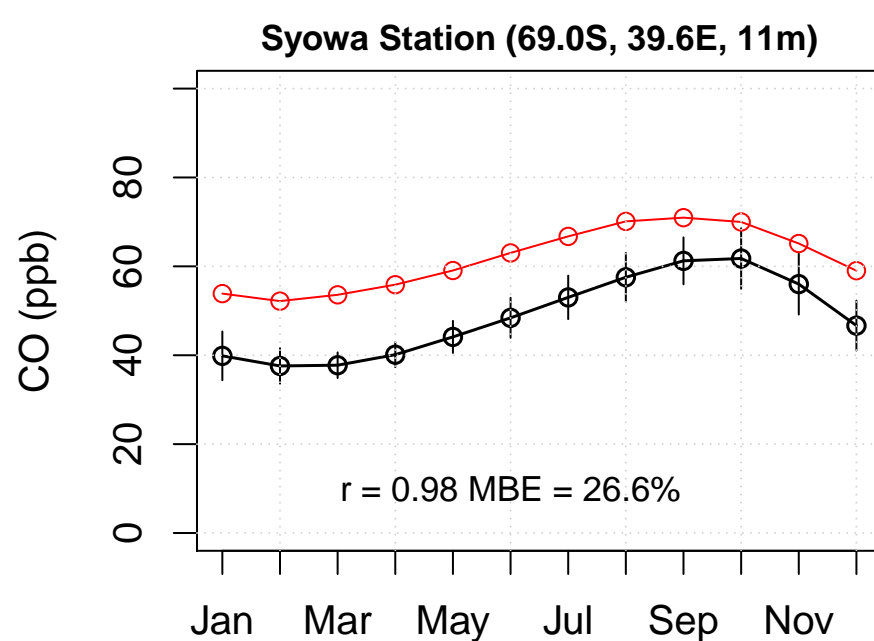
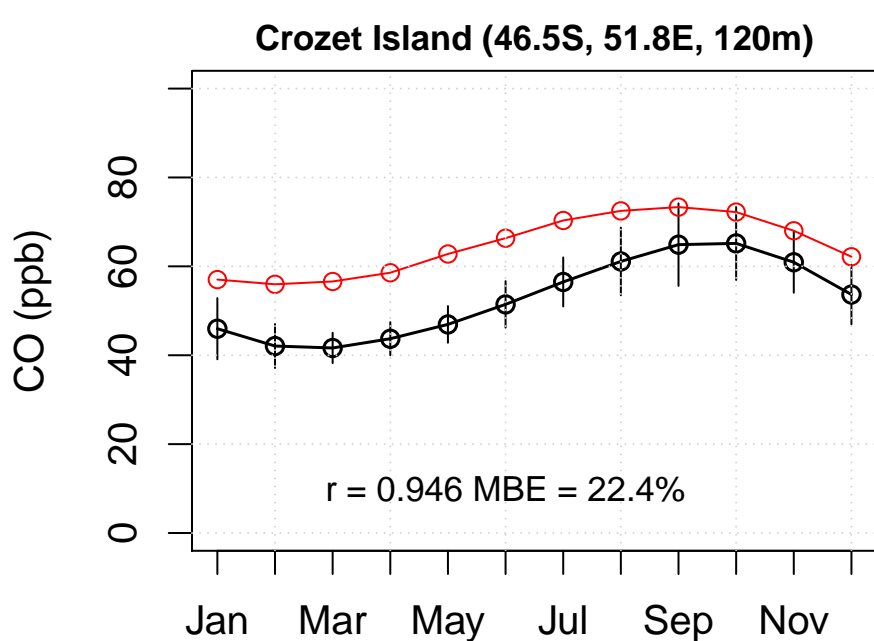
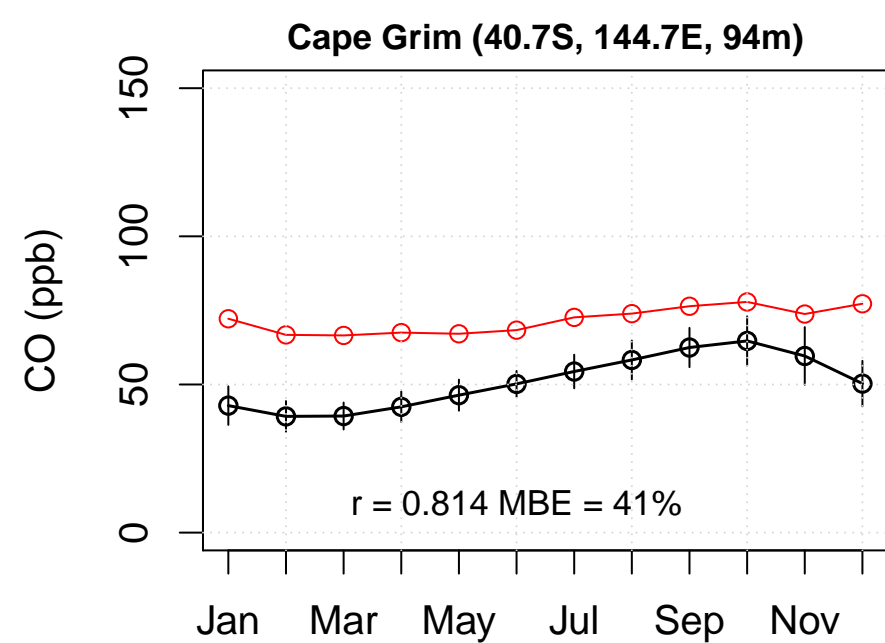
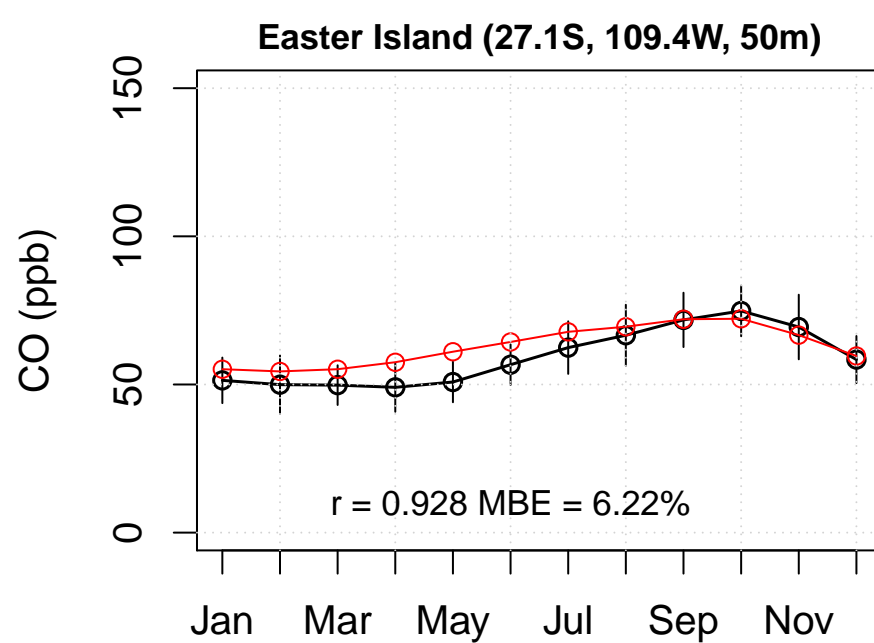
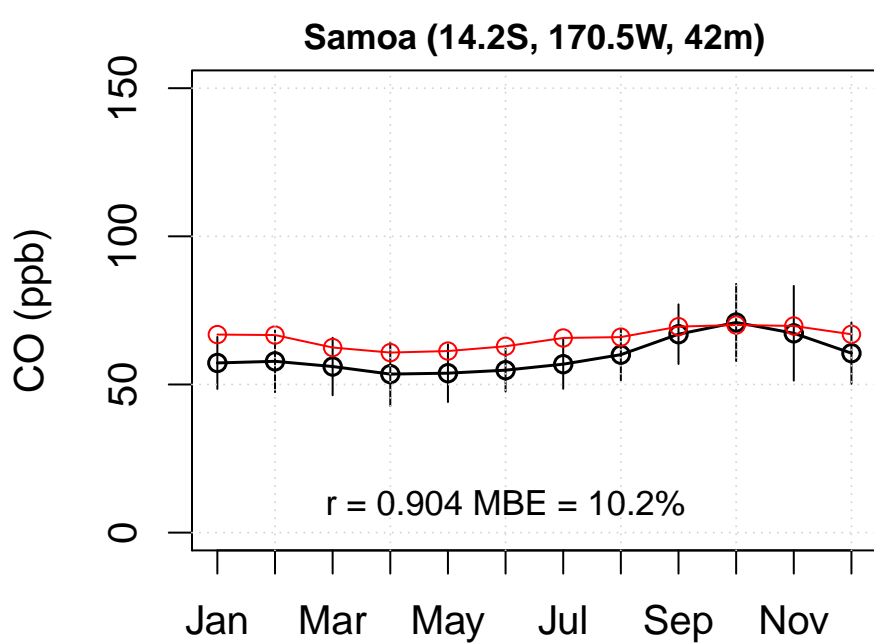
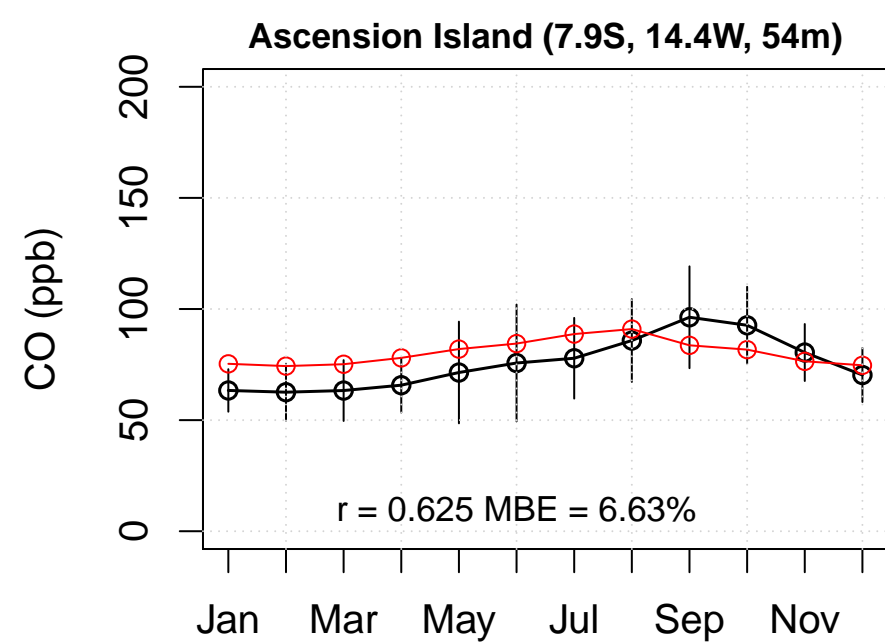
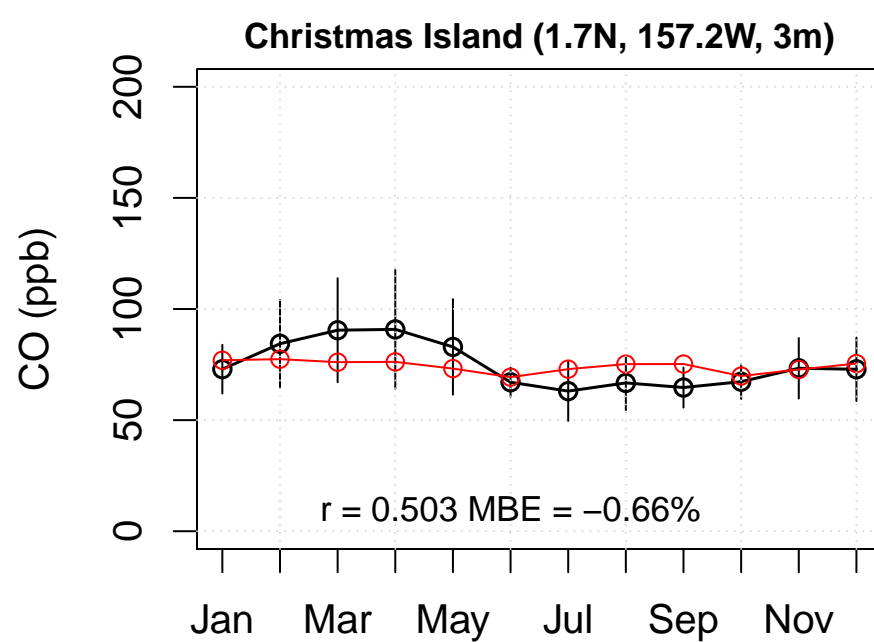
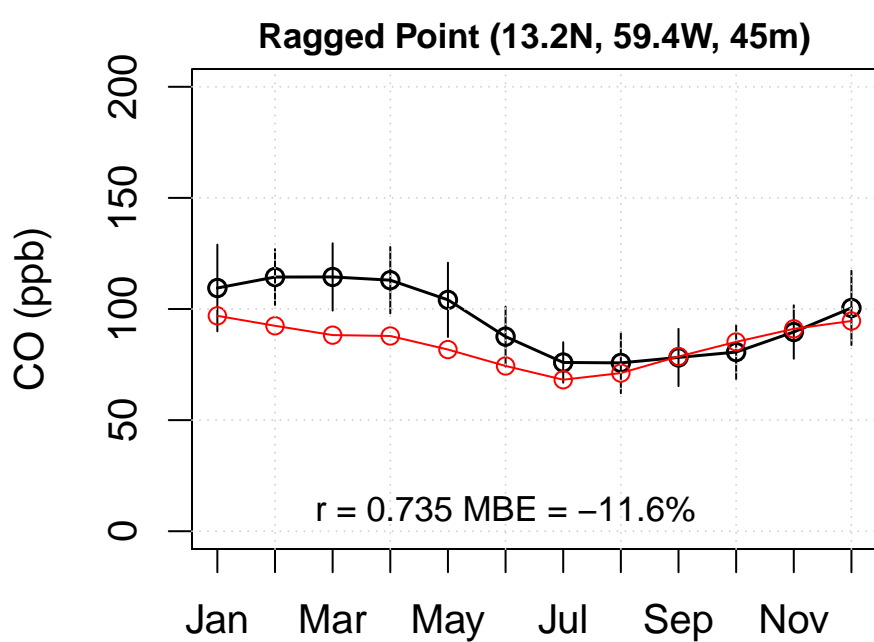
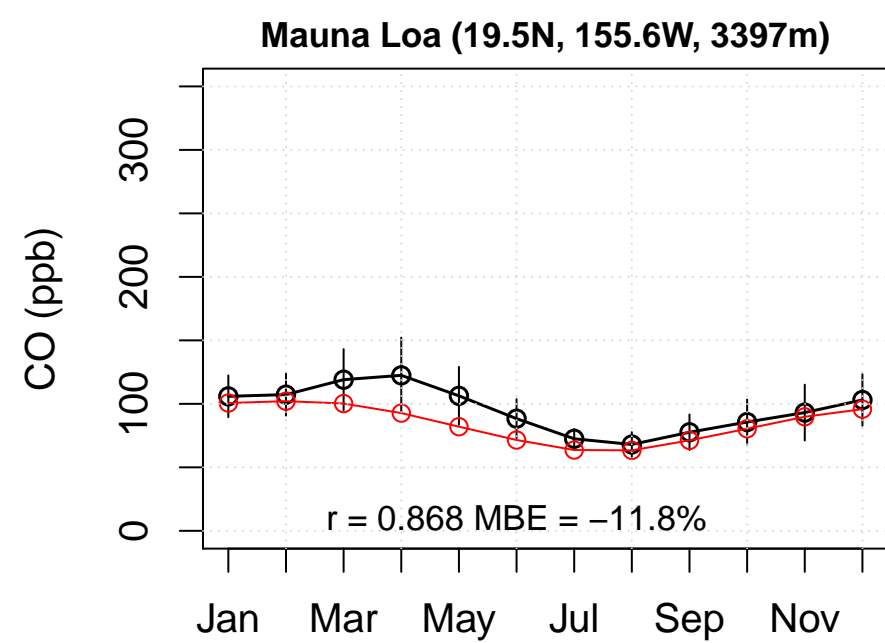
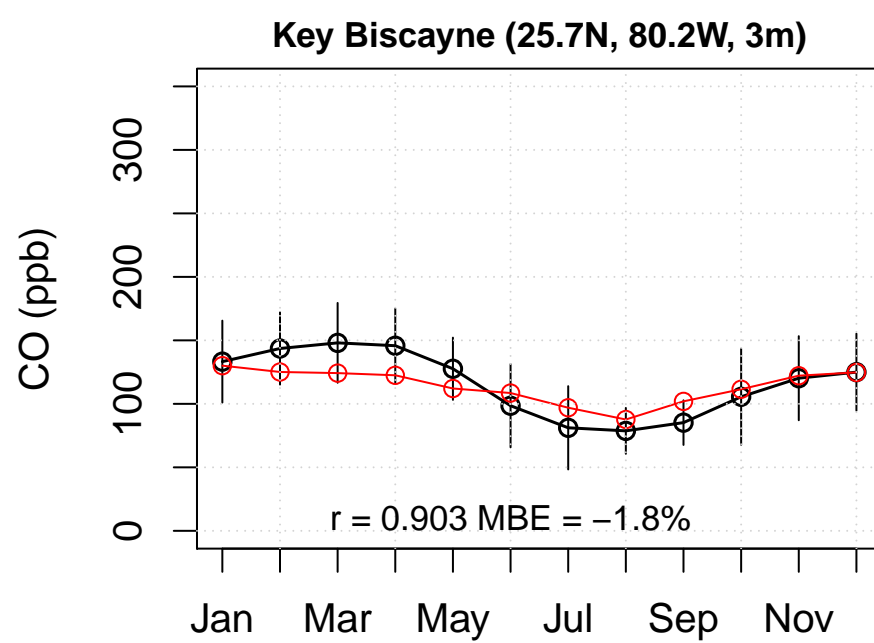
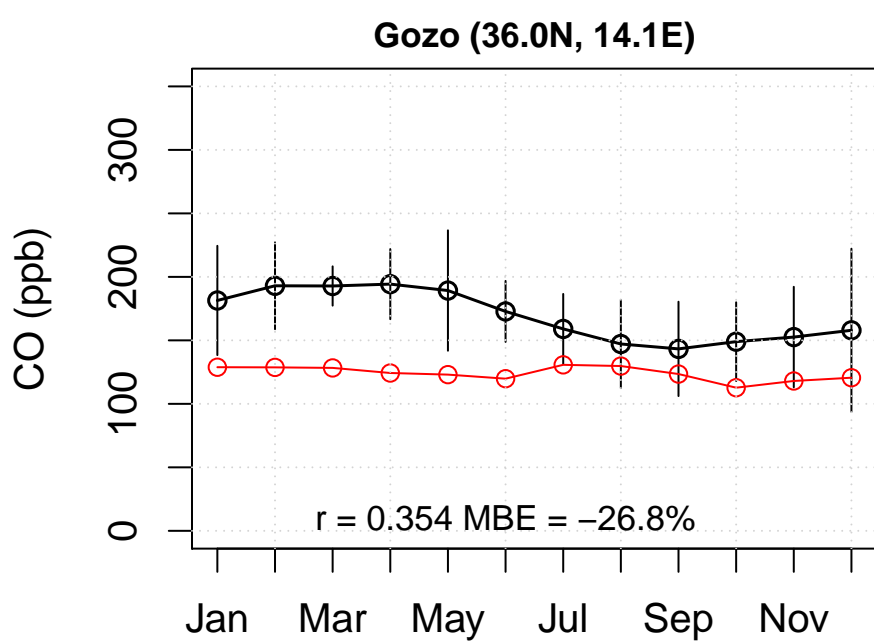
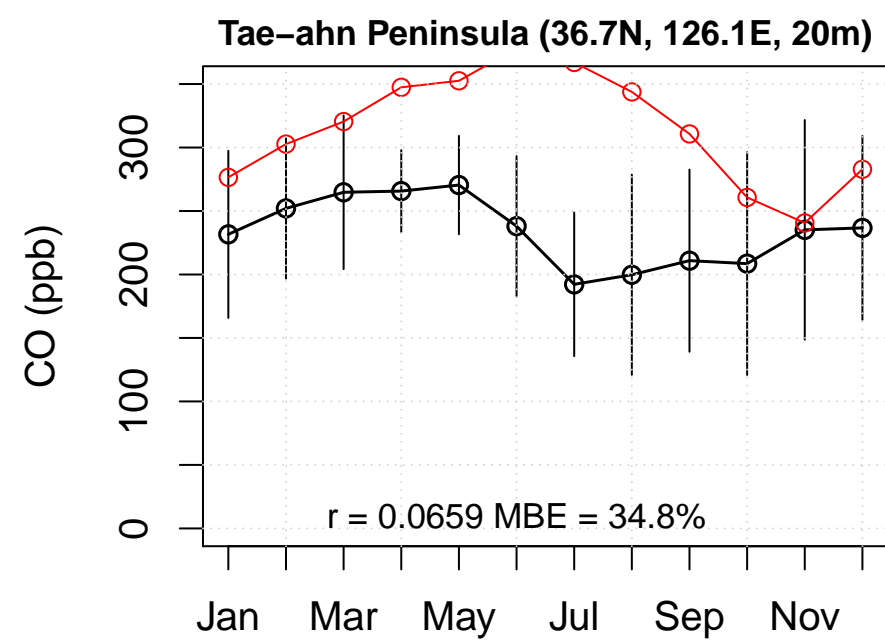
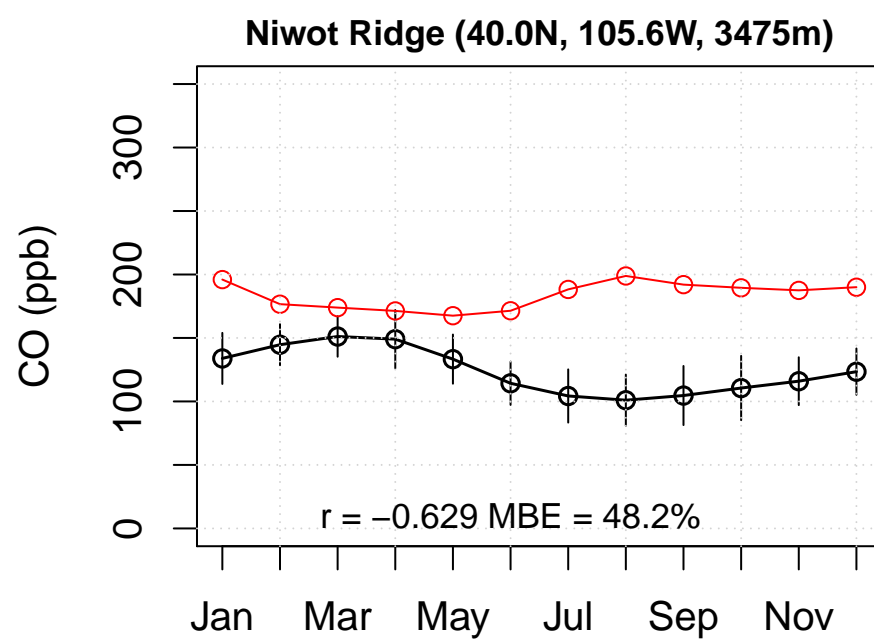
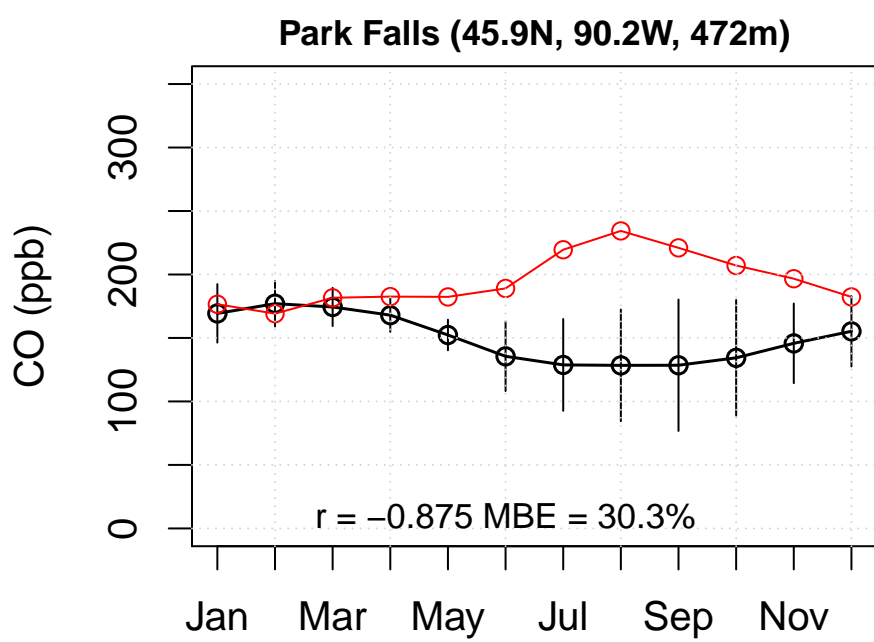
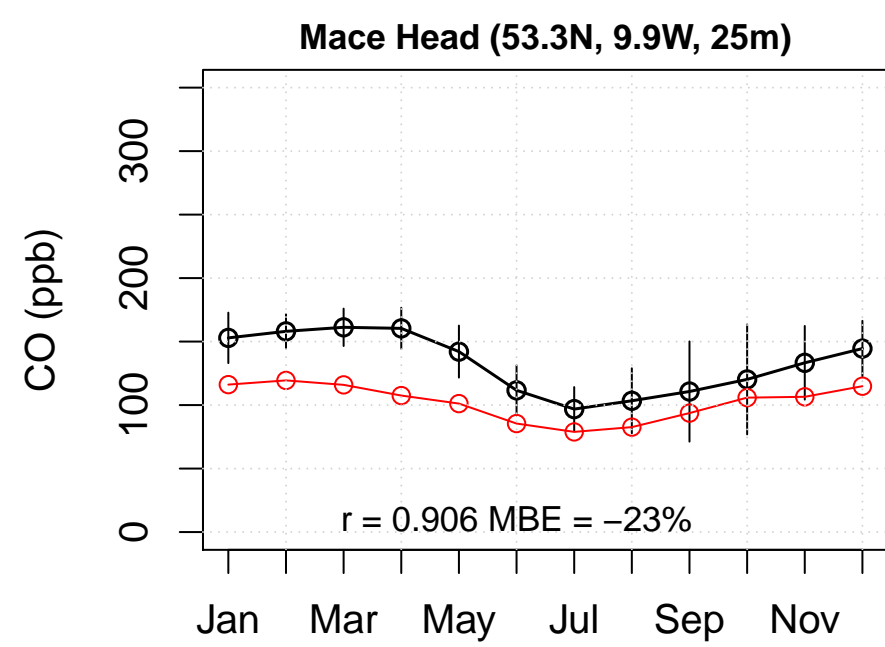
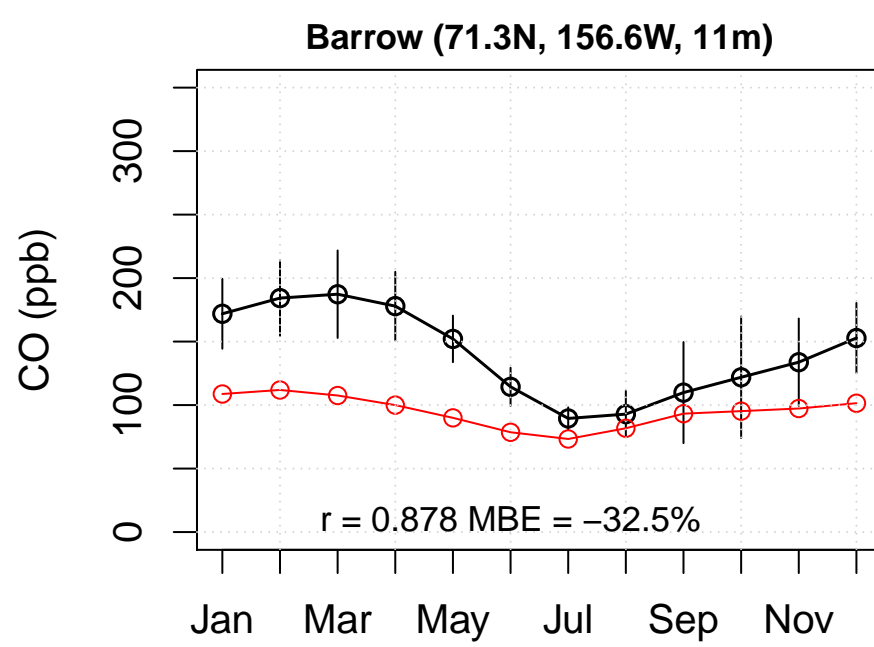
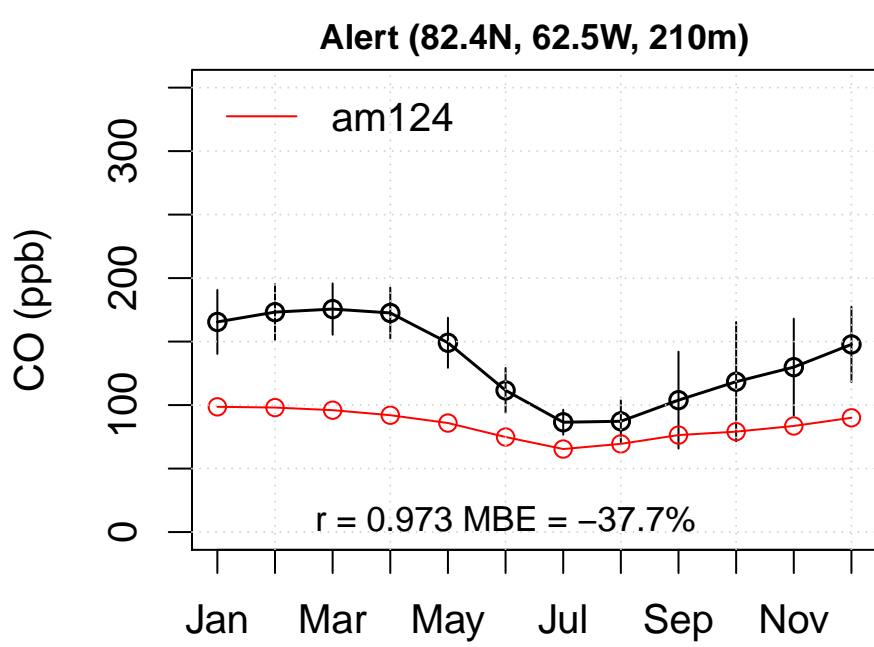


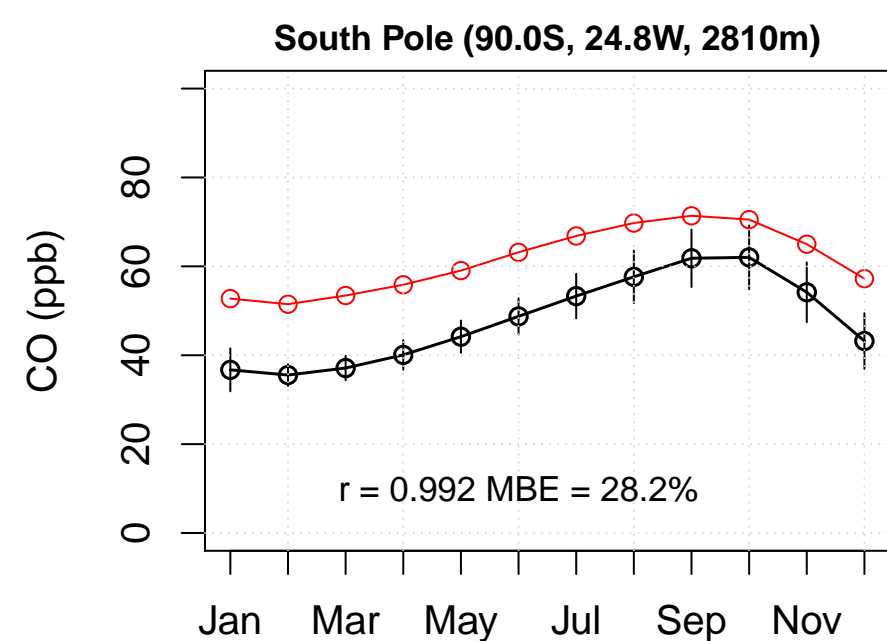
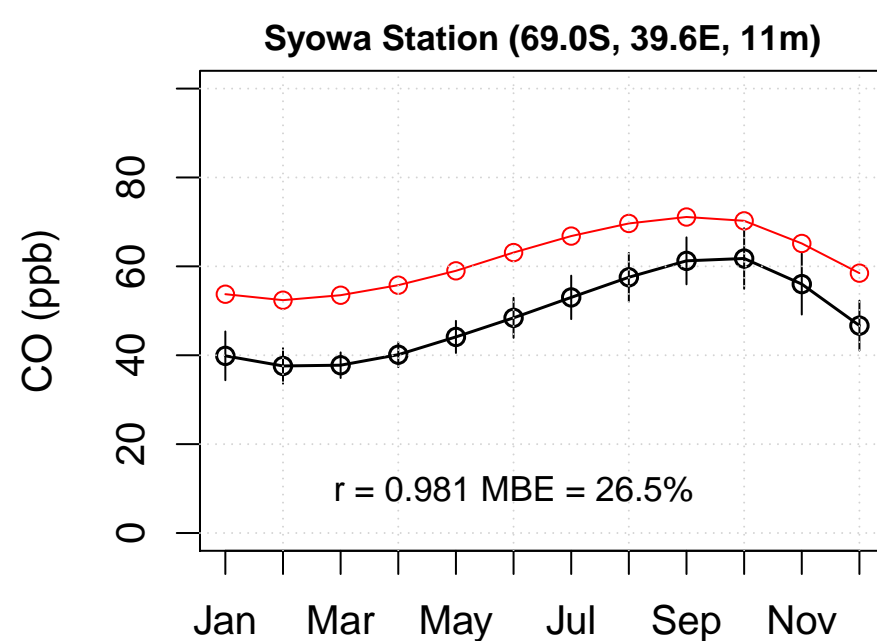
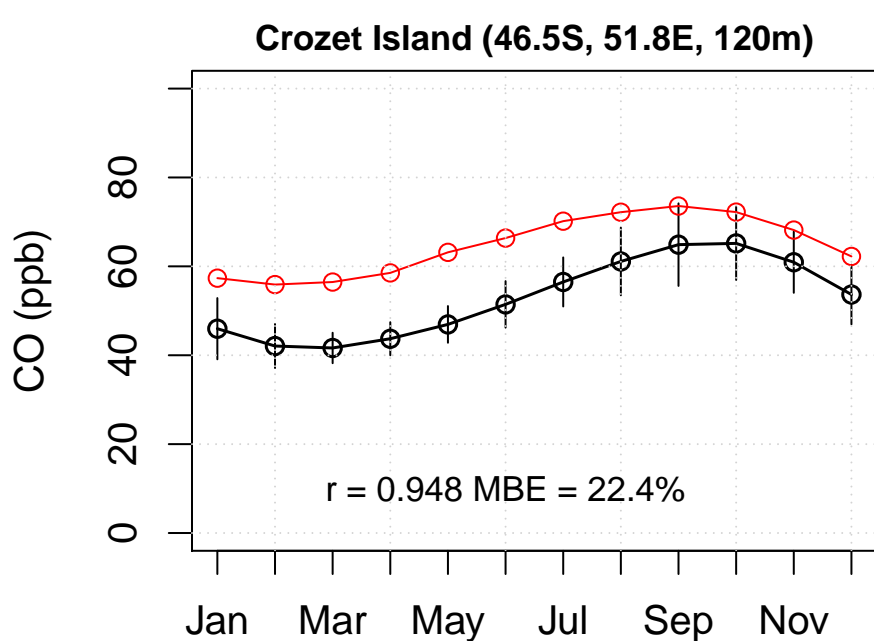
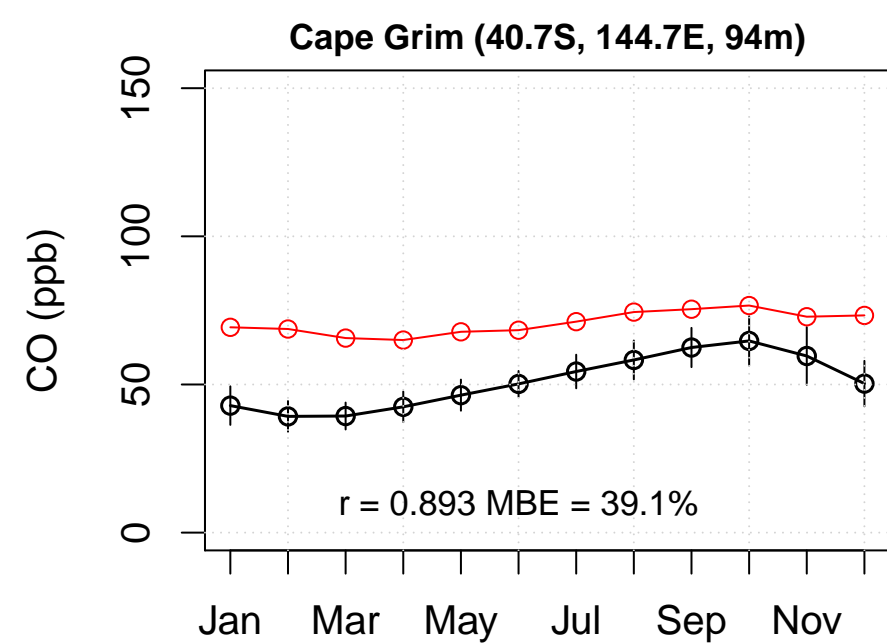
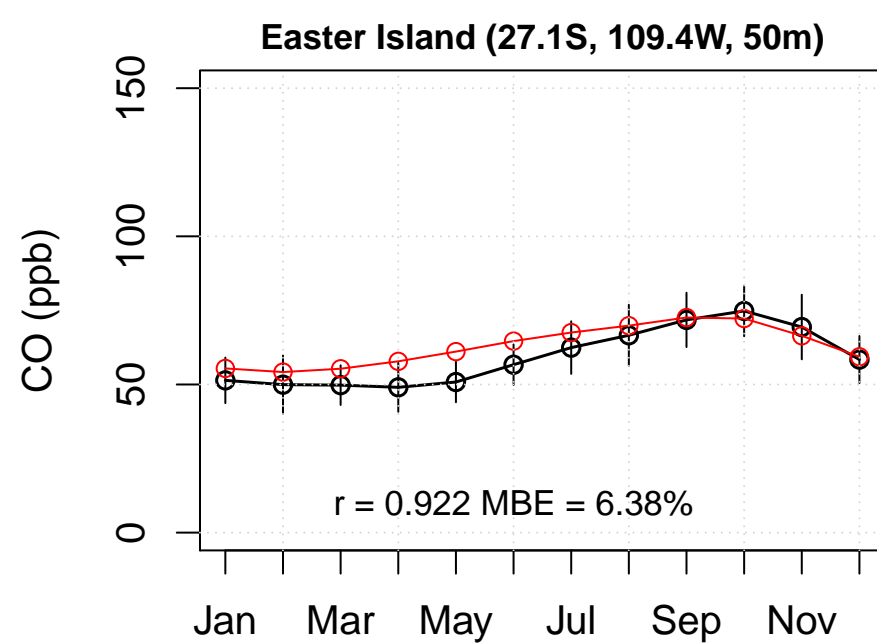
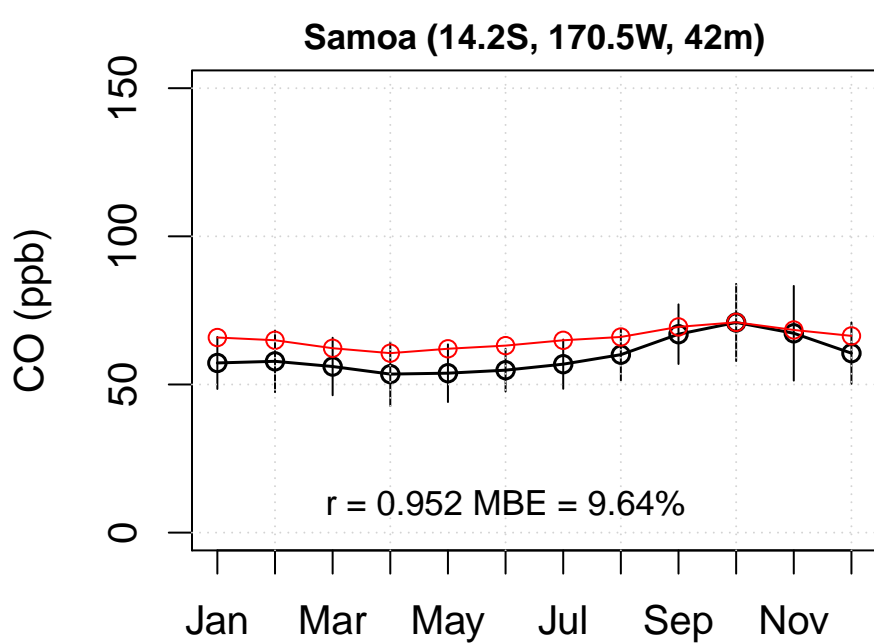
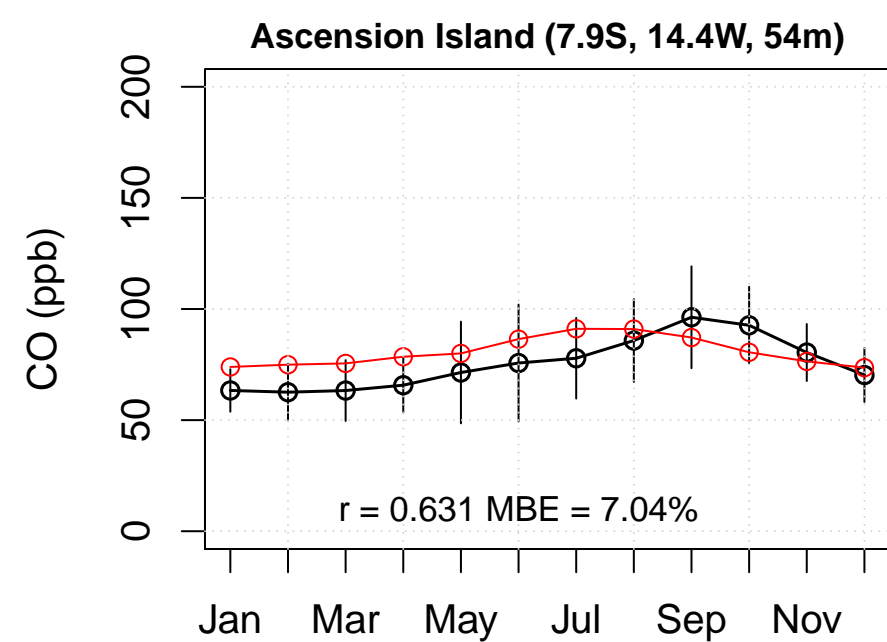
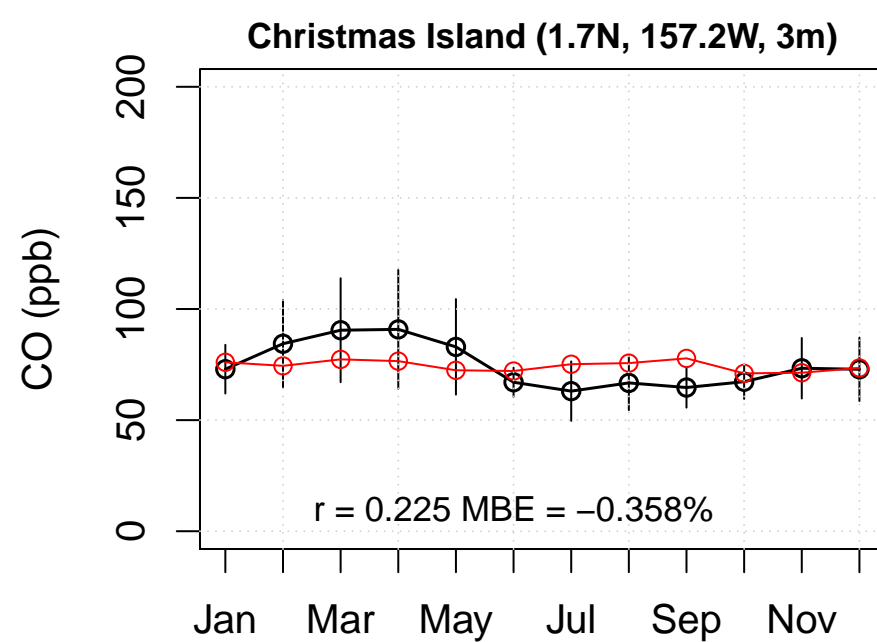
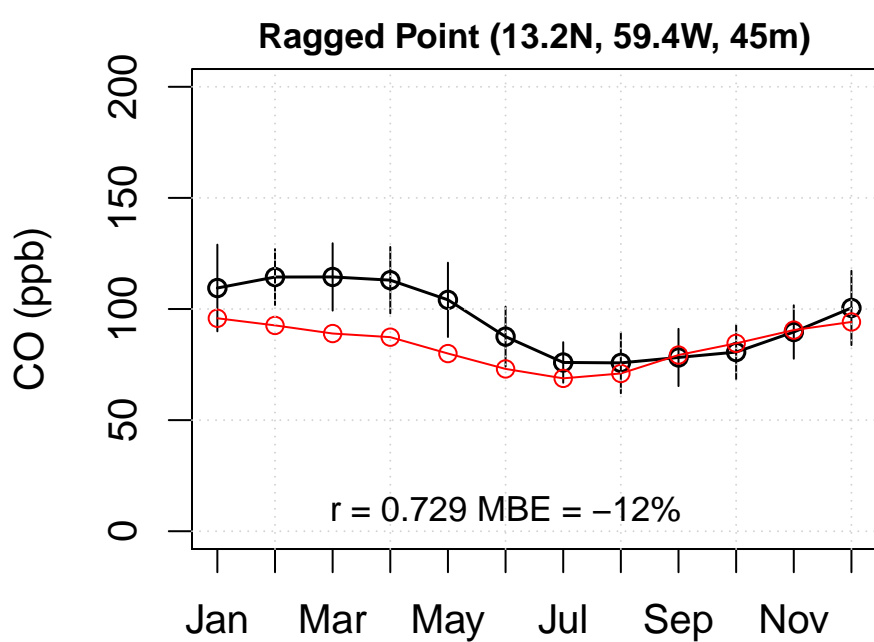
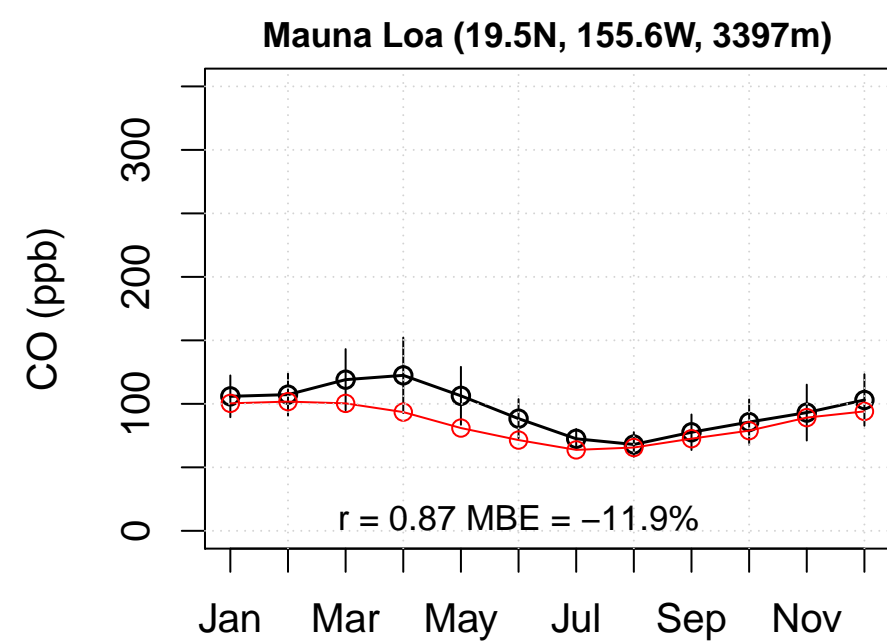
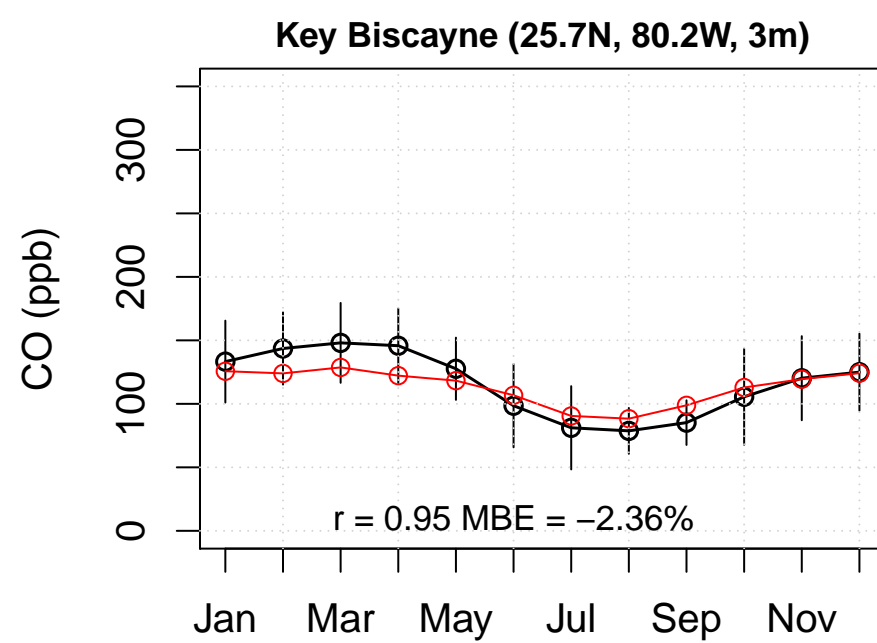
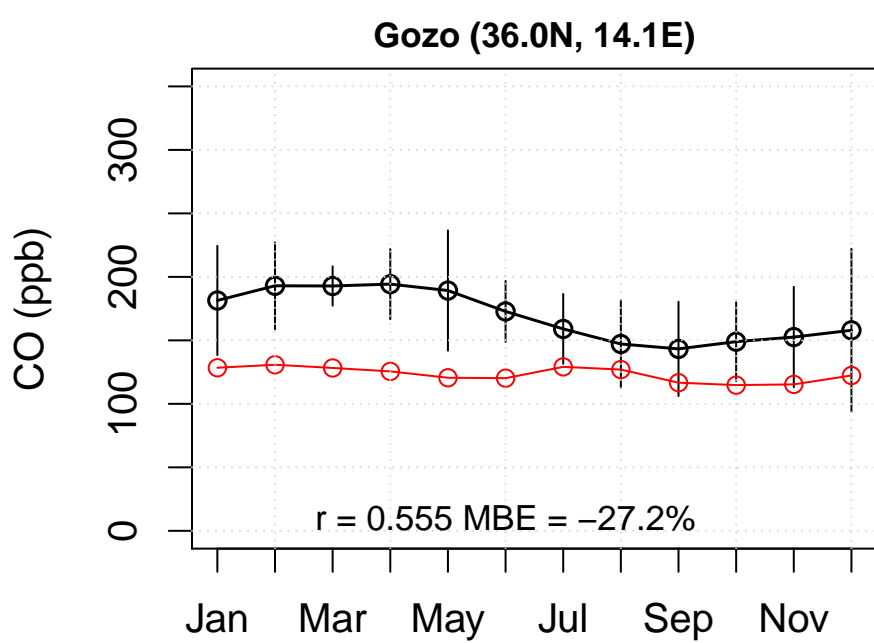
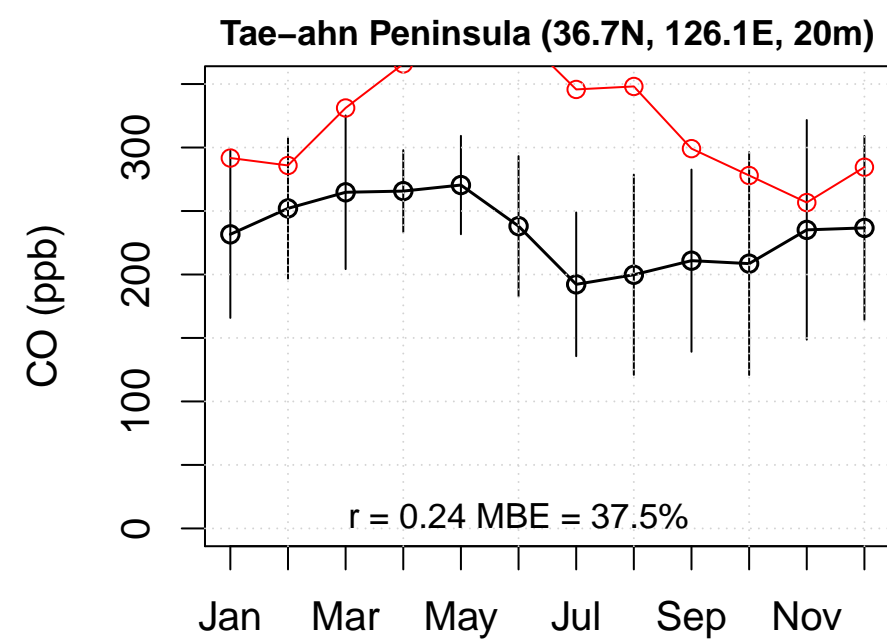
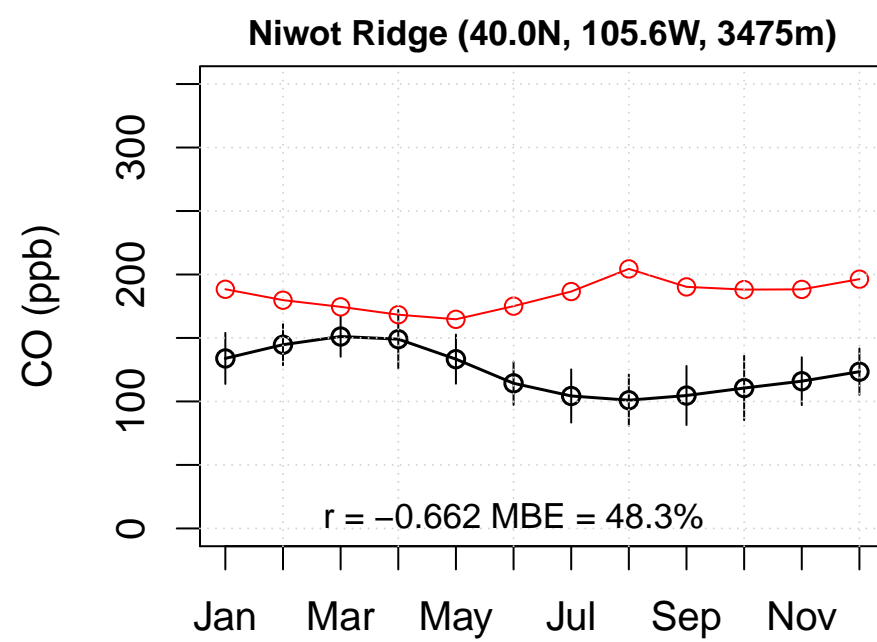
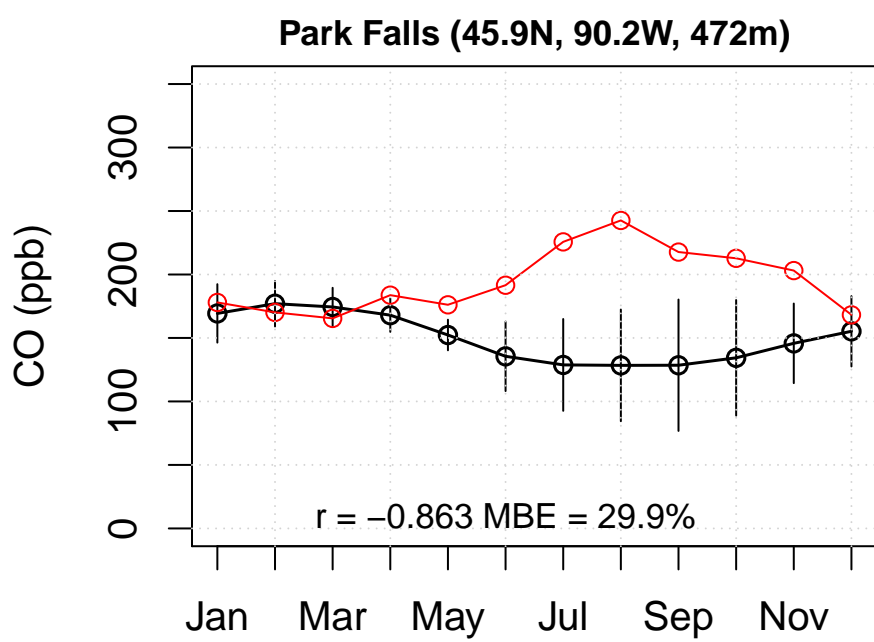
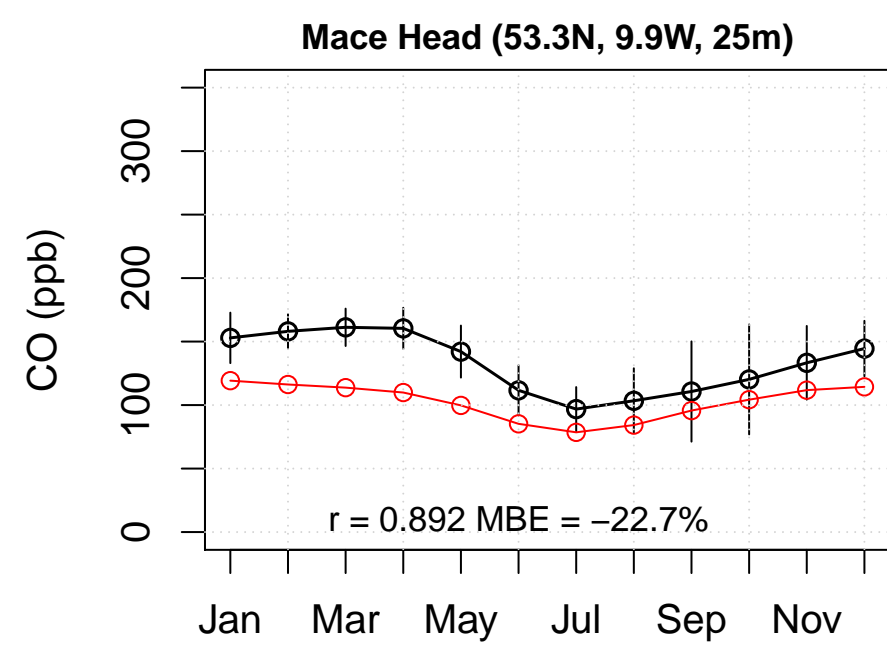
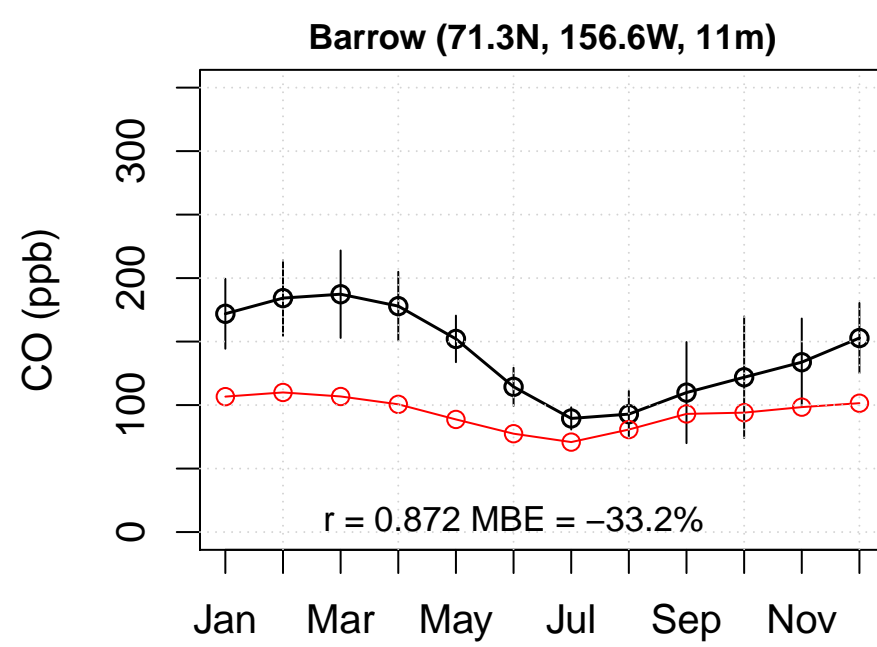
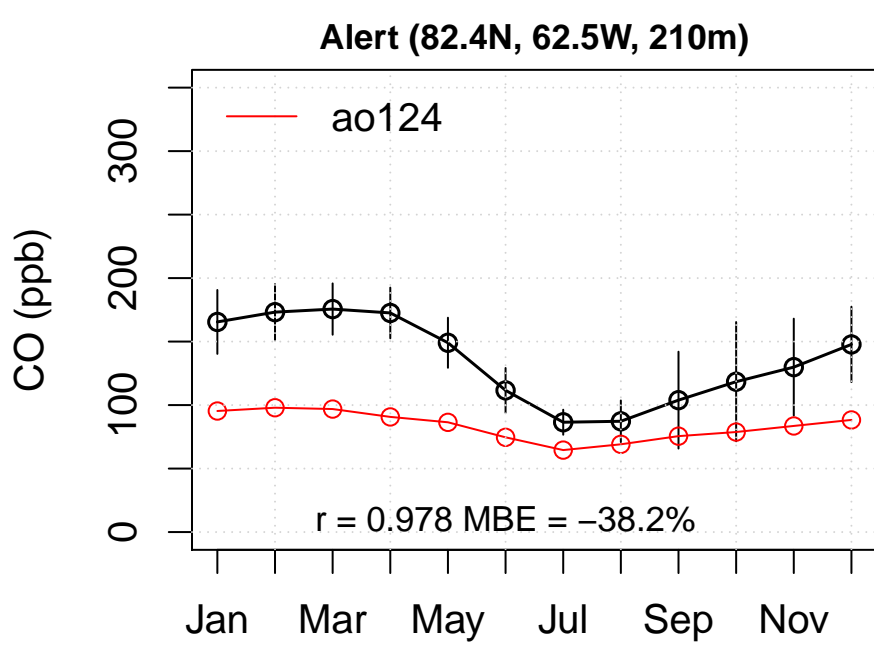
UKCA am124 Ox Net Chemical Production



UKCA ao124 Ox Net Chemical Production



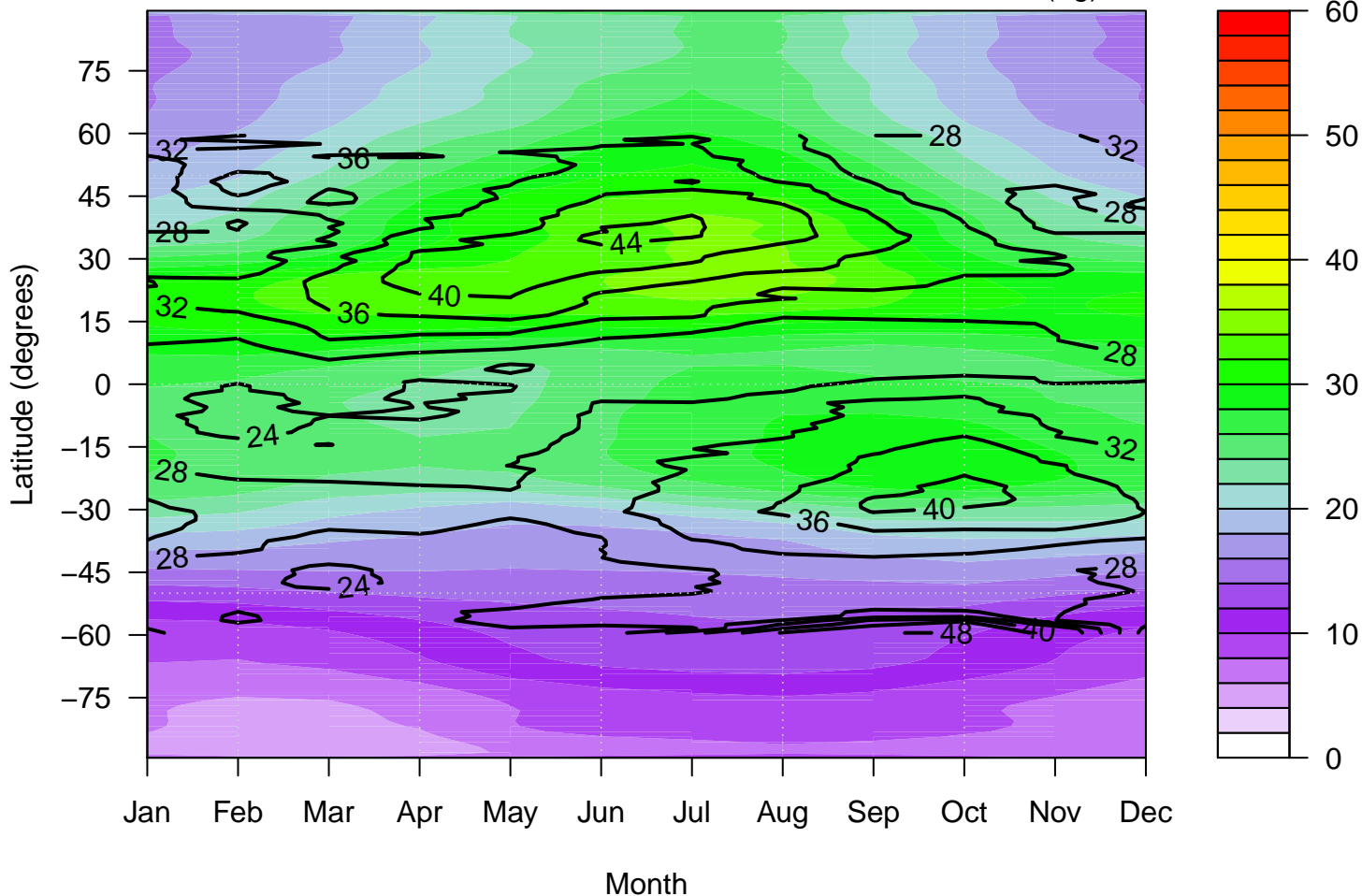




am124 tropospheric O₃ column

Min = 4.3 Mean = 21 Max = 35

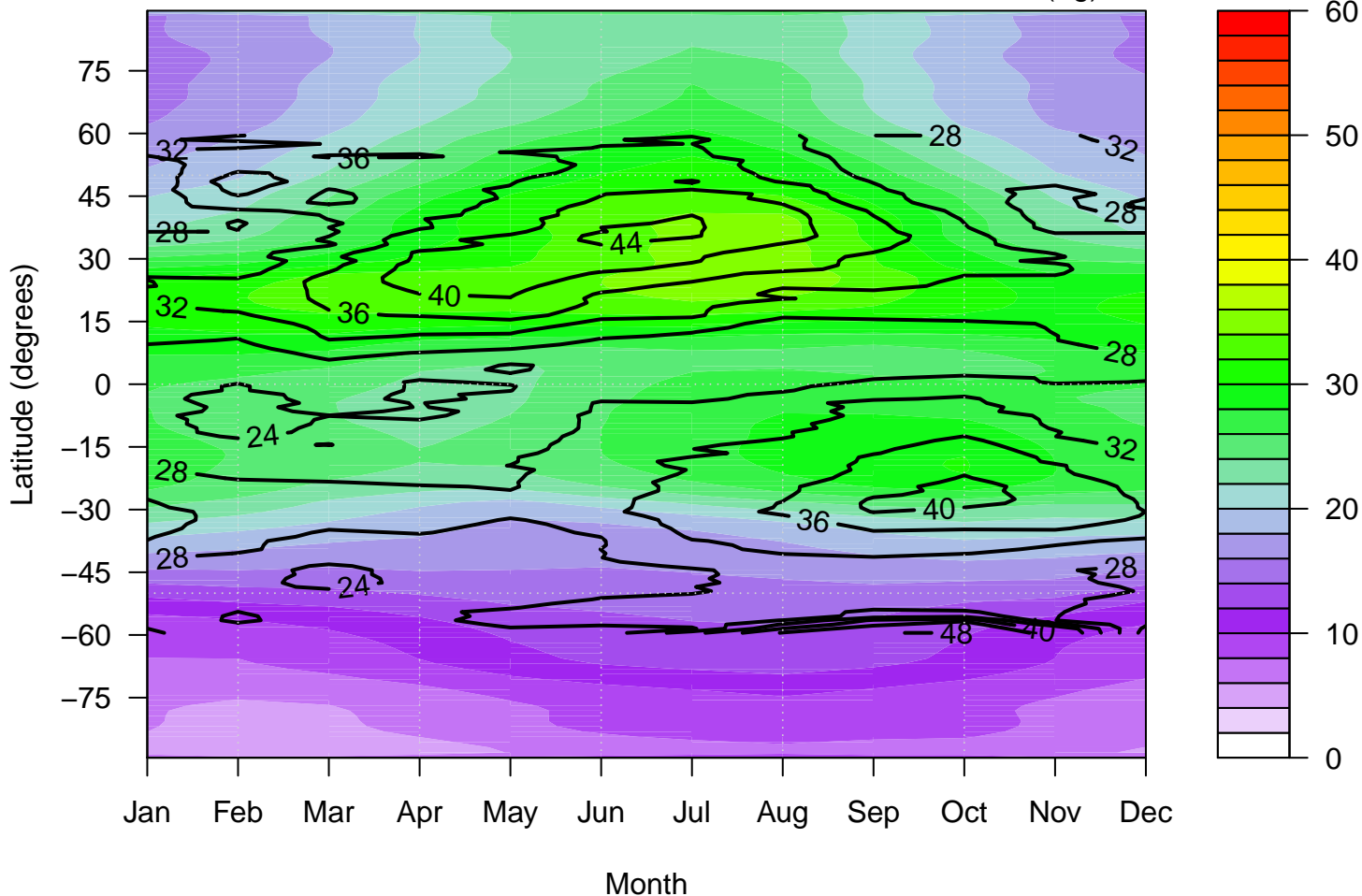
Burden (Tg) = 258



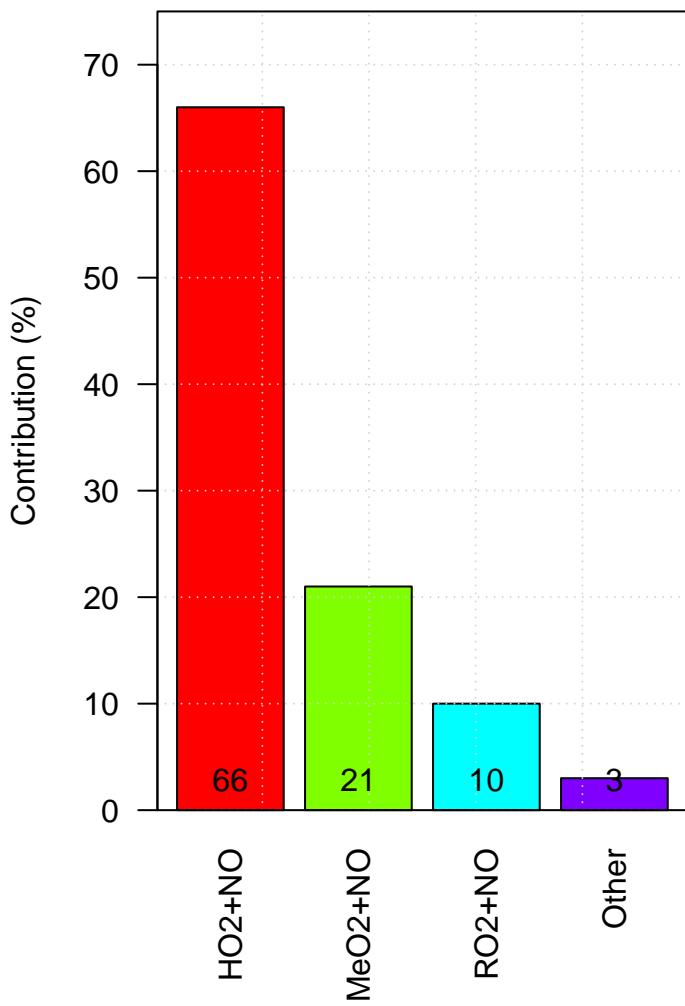
ao124 tropospheric O₃ column

Min = 4.41 Mean = 21 Max = 35.4

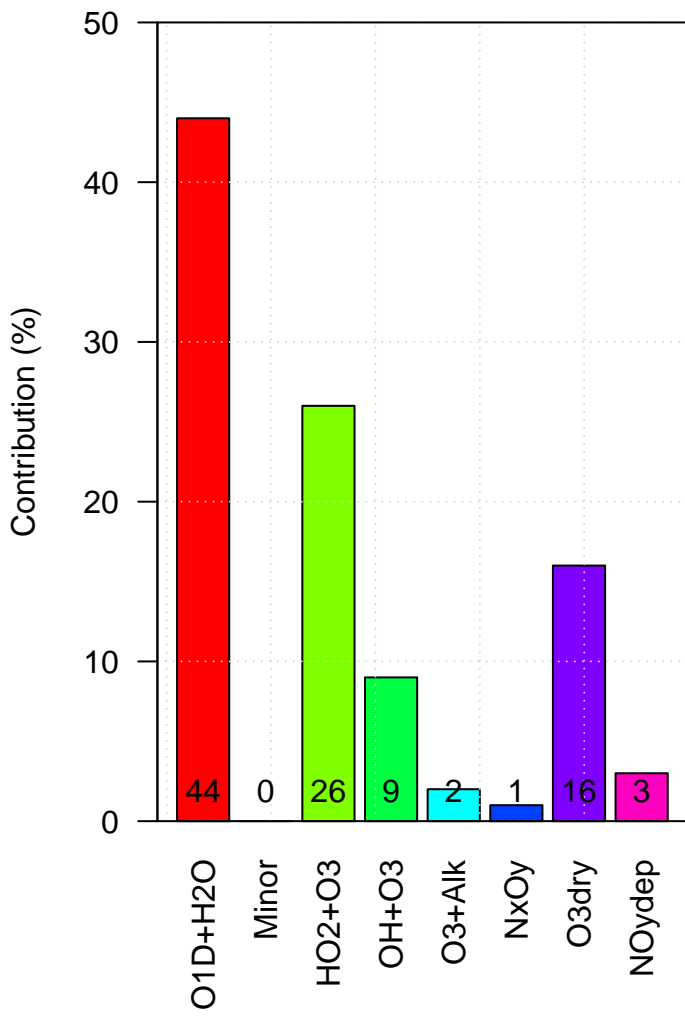
Burden (Tg) = 258



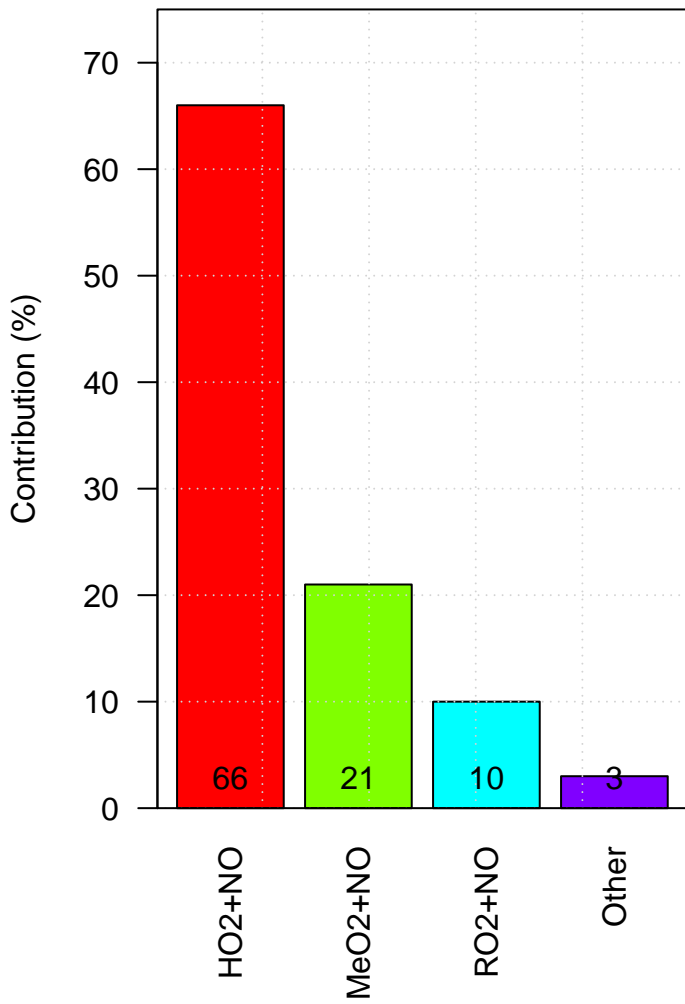
am124 Production of Tropospheric Ox



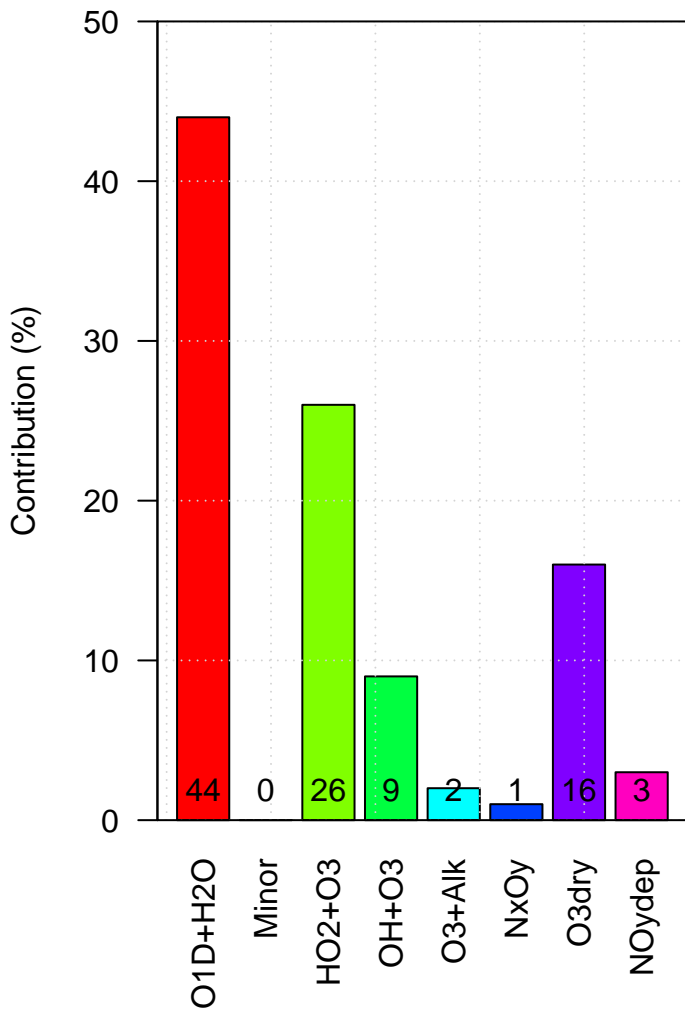
am124 Loss of Tropospheric Ox



ao124 Production of Tropospheric Ox

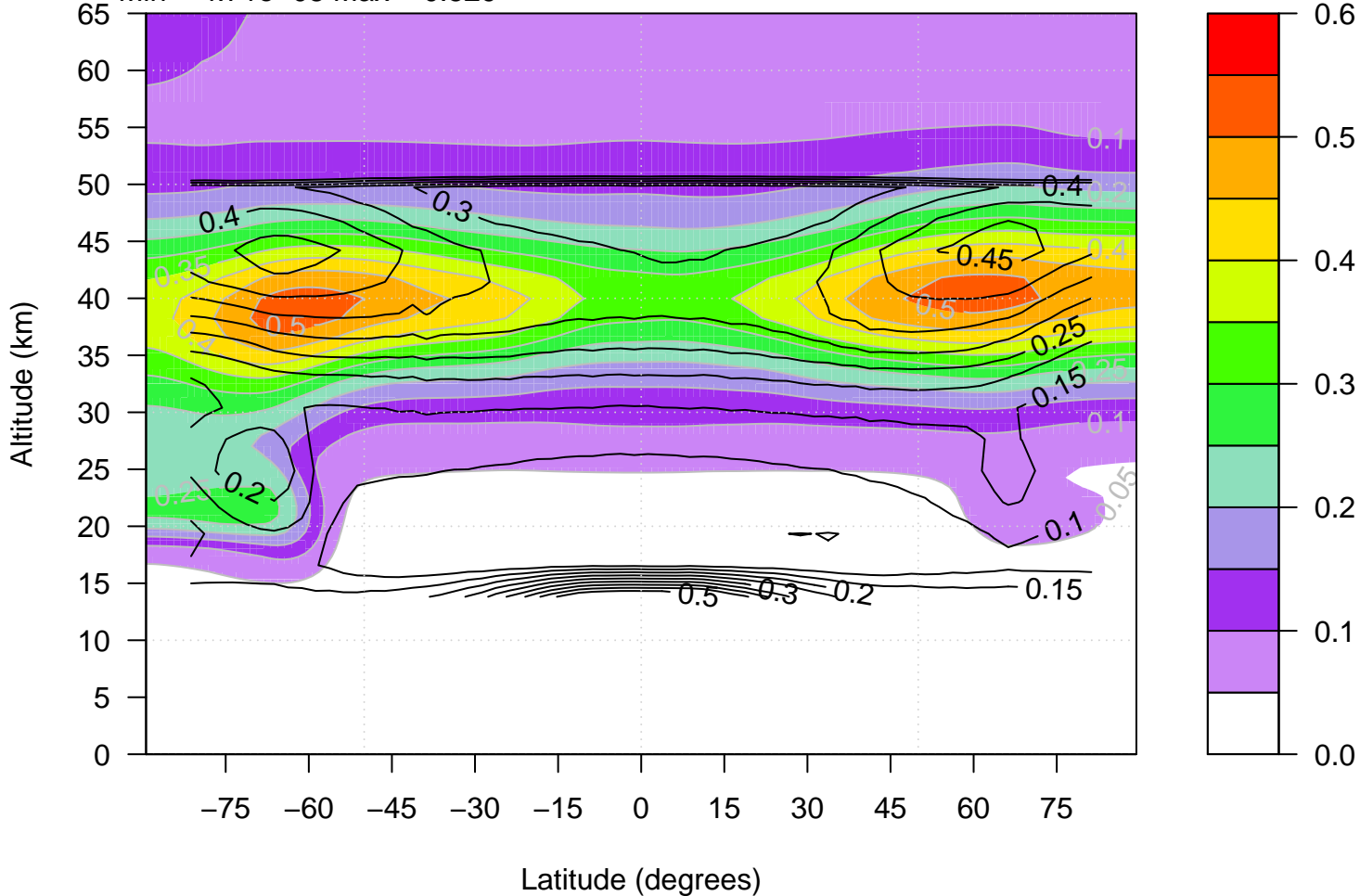


ao124 Loss of Tropospheric Ox



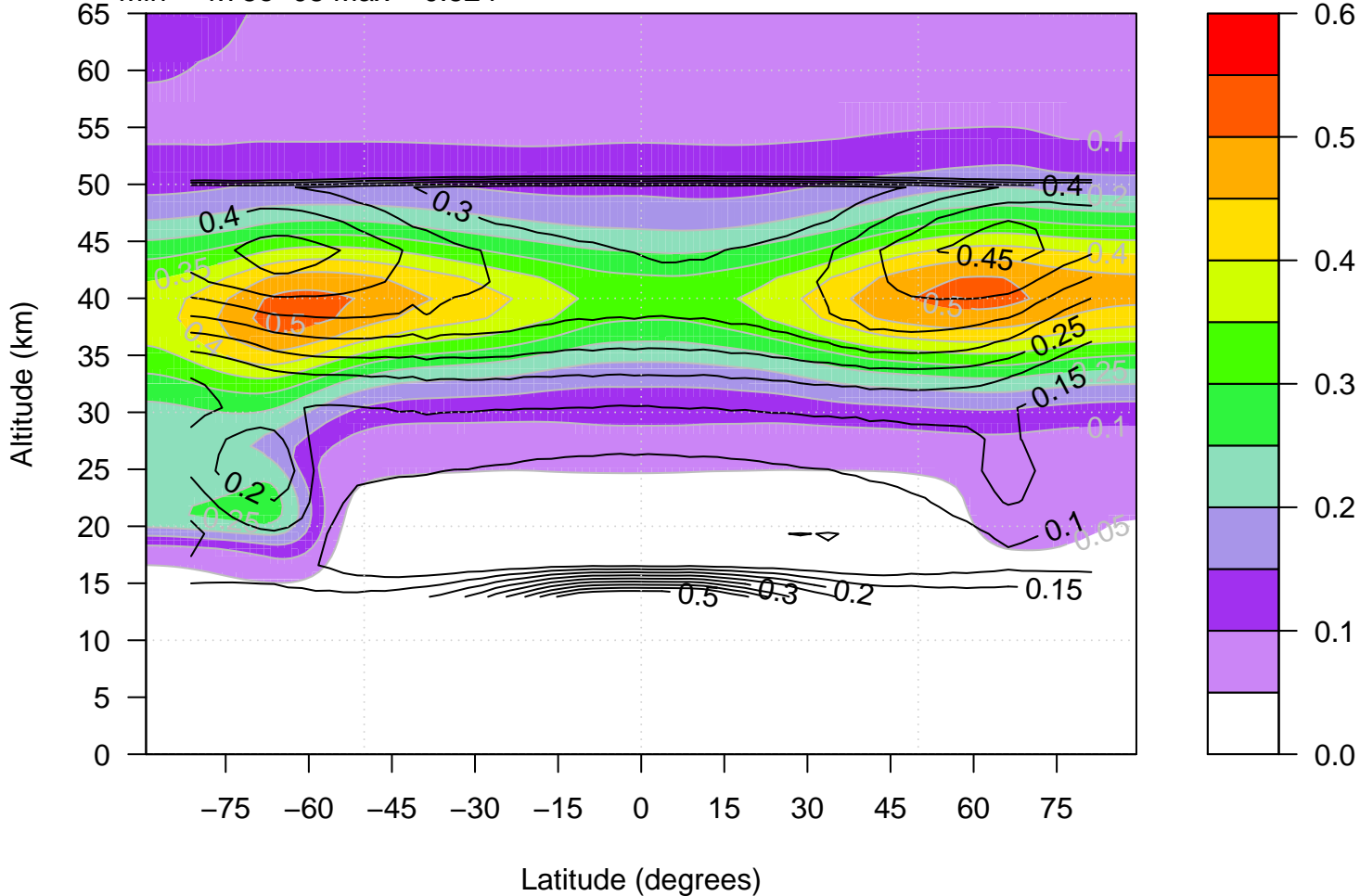
MLS – UKCA am124 ClO comparison

Min = 4.71×10^{-8} Max = 0.529



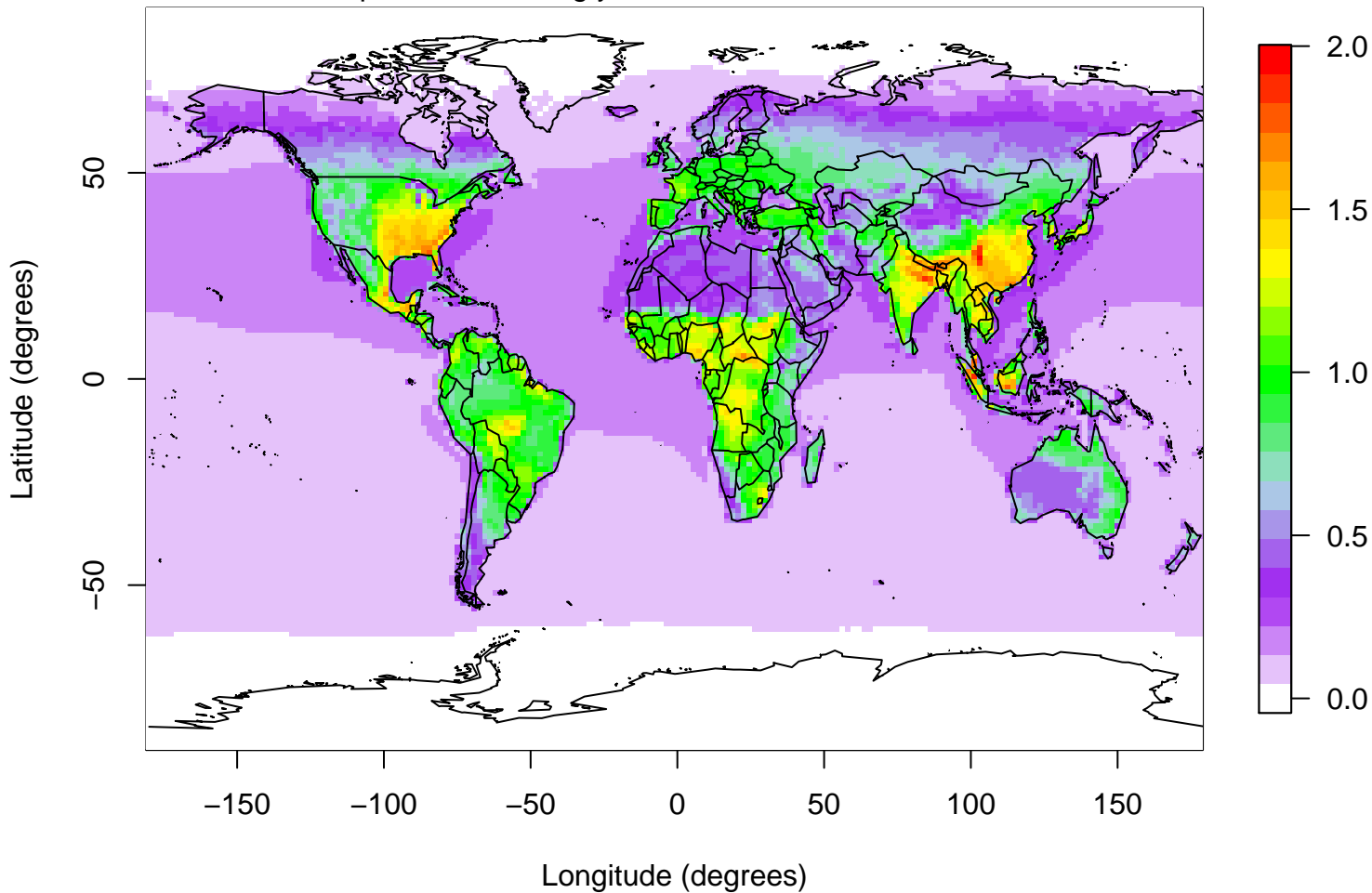
MLS – UKCA ao124 ClO comparison

Min = 4.75×10^{-8} Max = 0.524



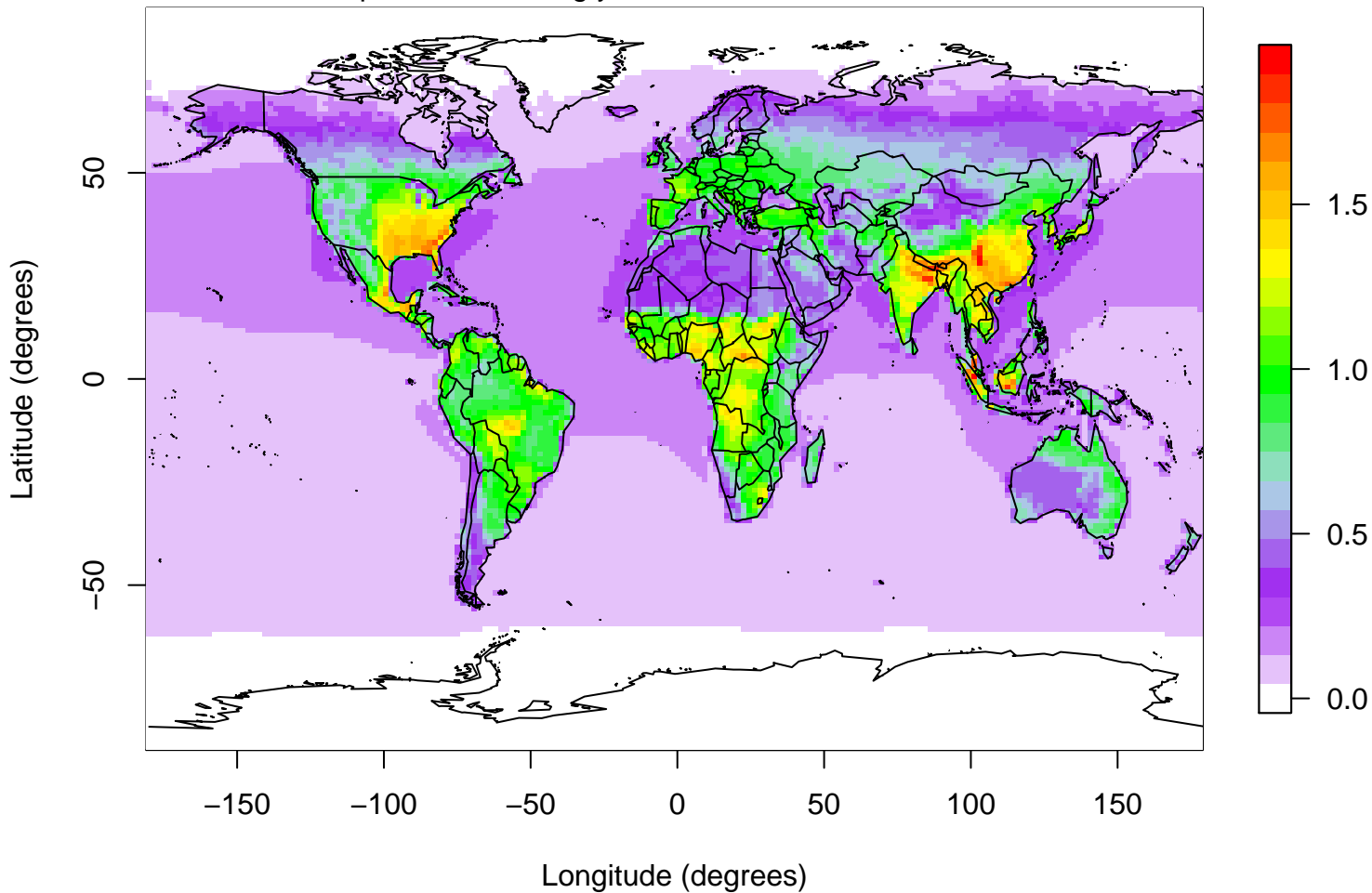
UKCA Ox deposition am124

Total Ox Deposition = 879 Tg/yr



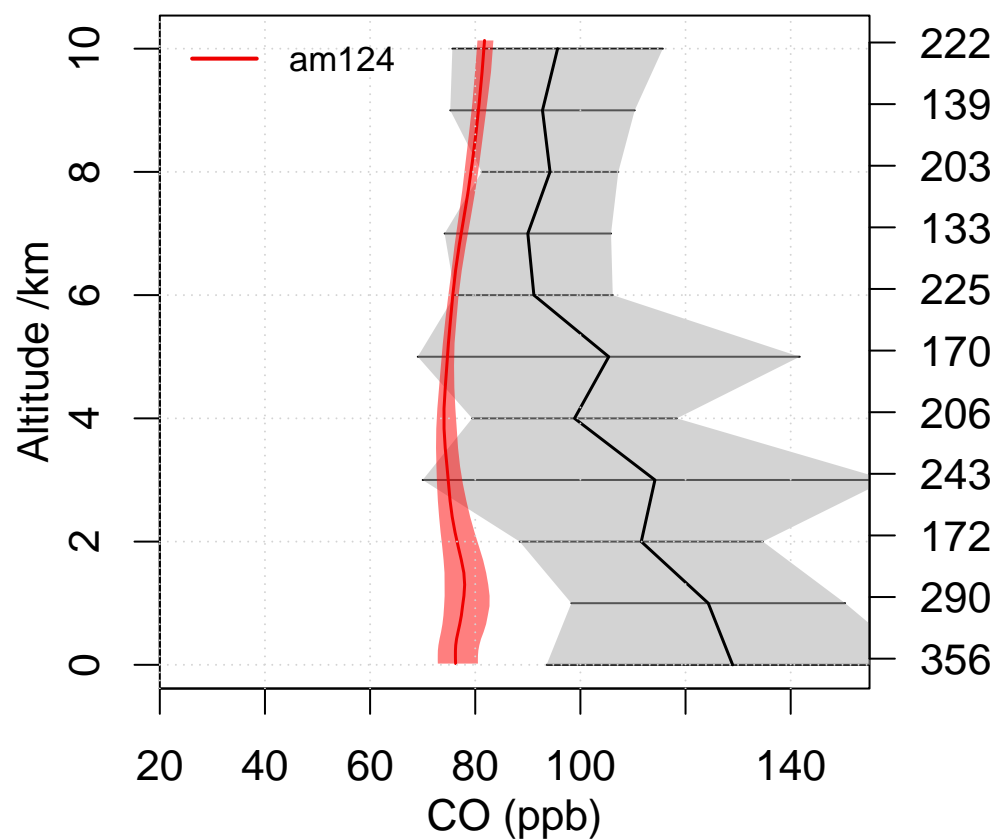
UKCA Ox deposition ao124

Total Ox Deposition = 879 Tg/yr

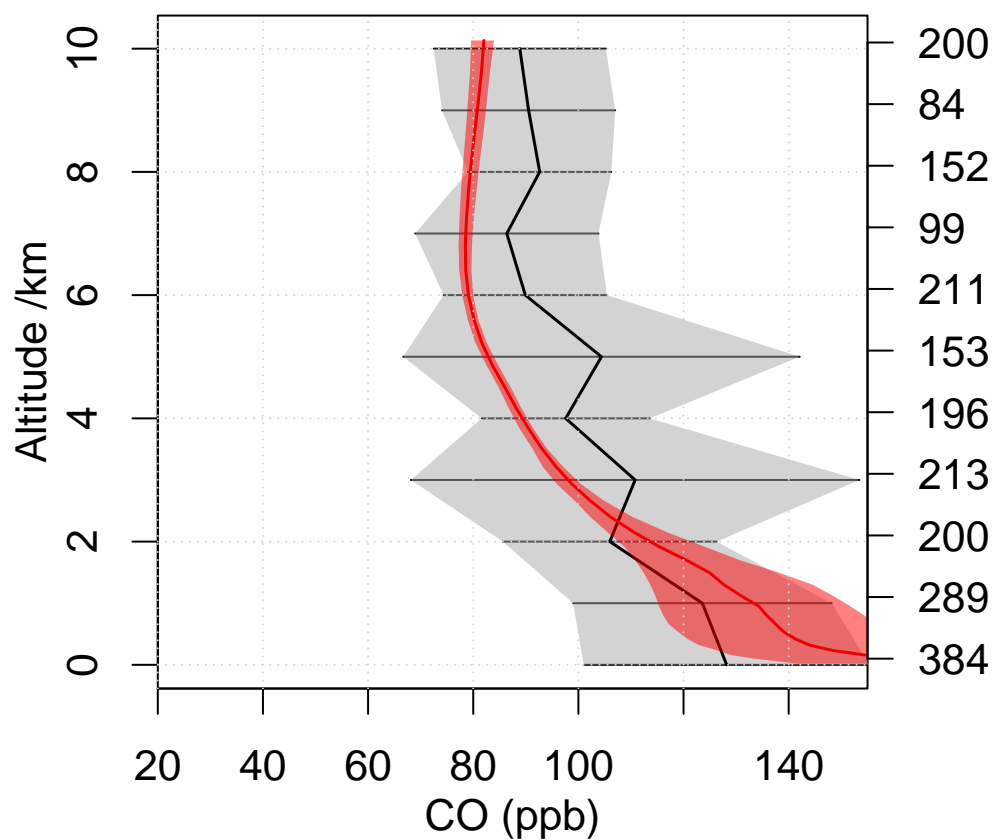


Emmons CO comparison

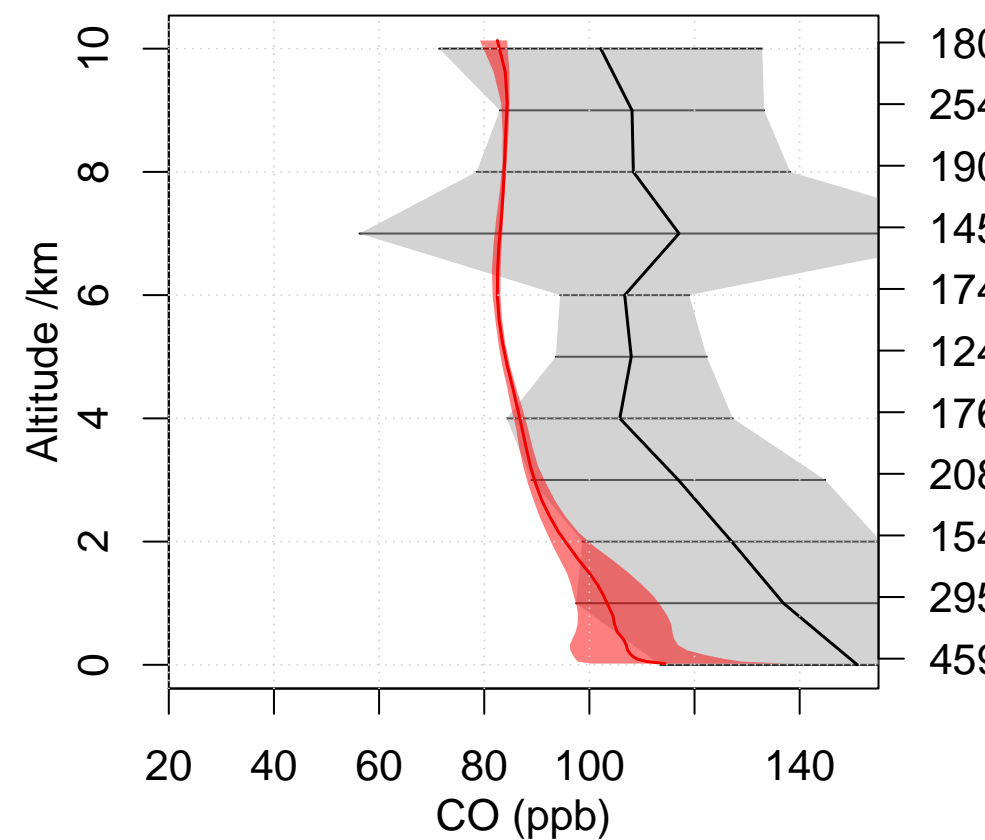
INTEX-NA East Coast 2004 07
Lat 32.5 – 40 Lon 296.5 – 307



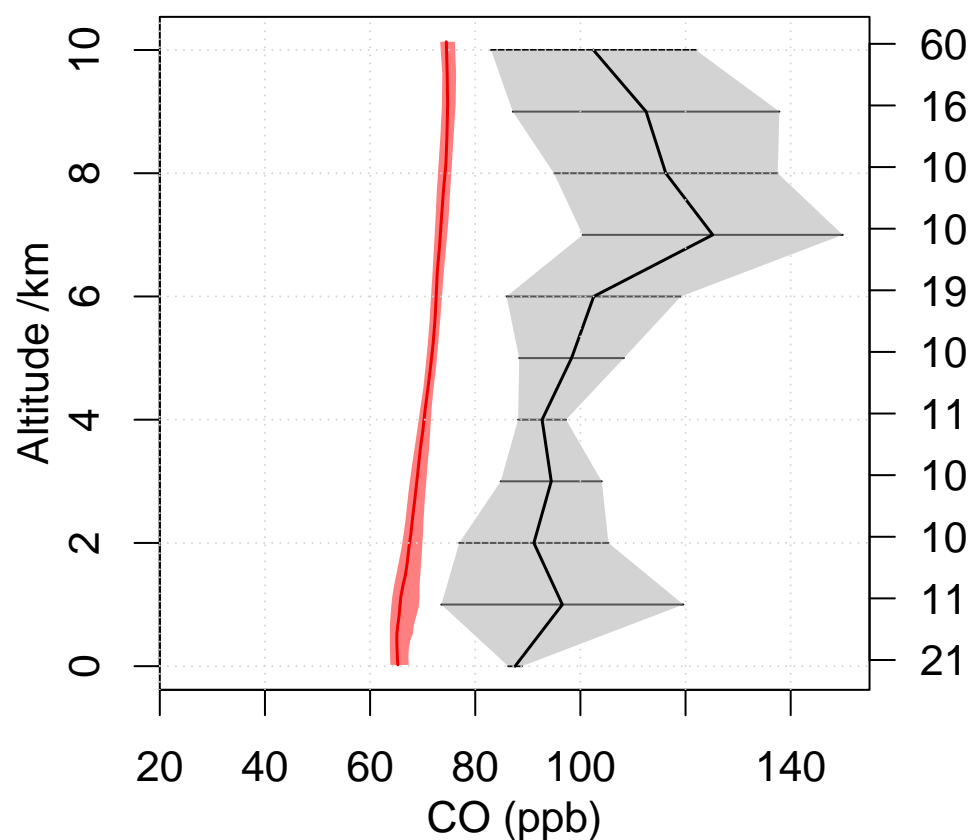
INTEX-NA Central 2004 07
Lat 30 – 40 Lon 259.5 – 285



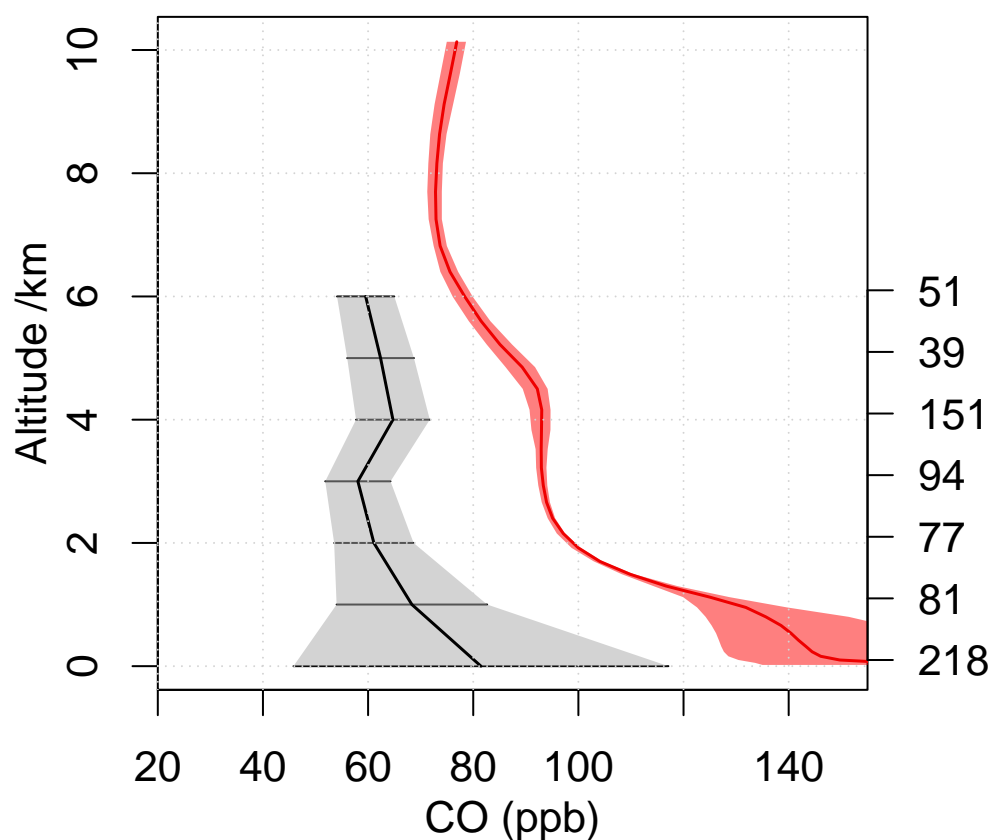
INTEX-NA North East 2004 07
Lat 42.5 – 52.5 Lon 285 – 310



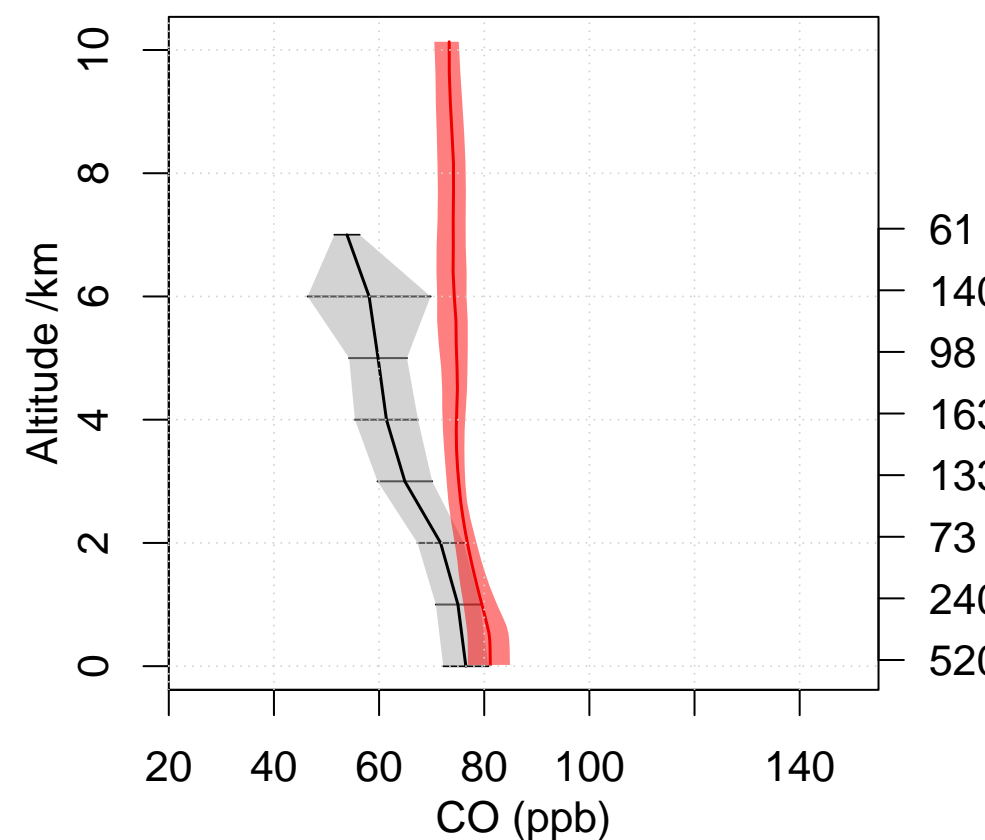
INTEX-NA West Coast 2004 07
Lat 32.5 – 45 Lon 217 – 240



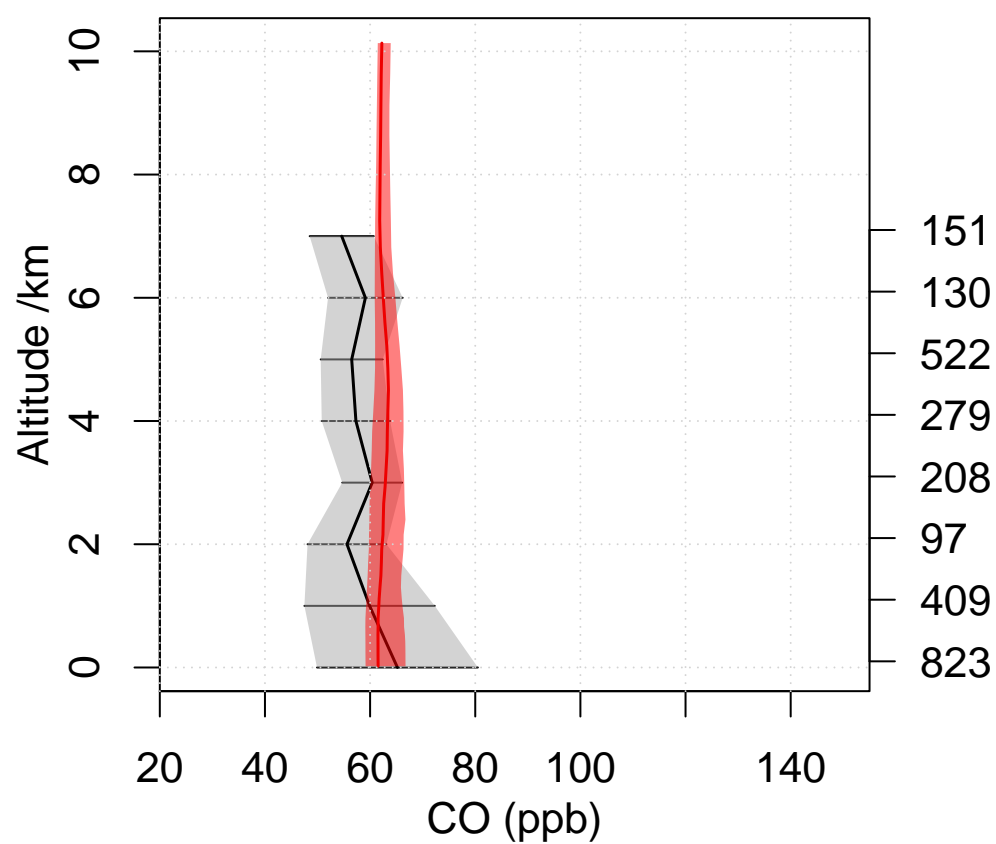
OP3 2008 07
Lat 2.5 – 7.5 Lon 112.5 – 120



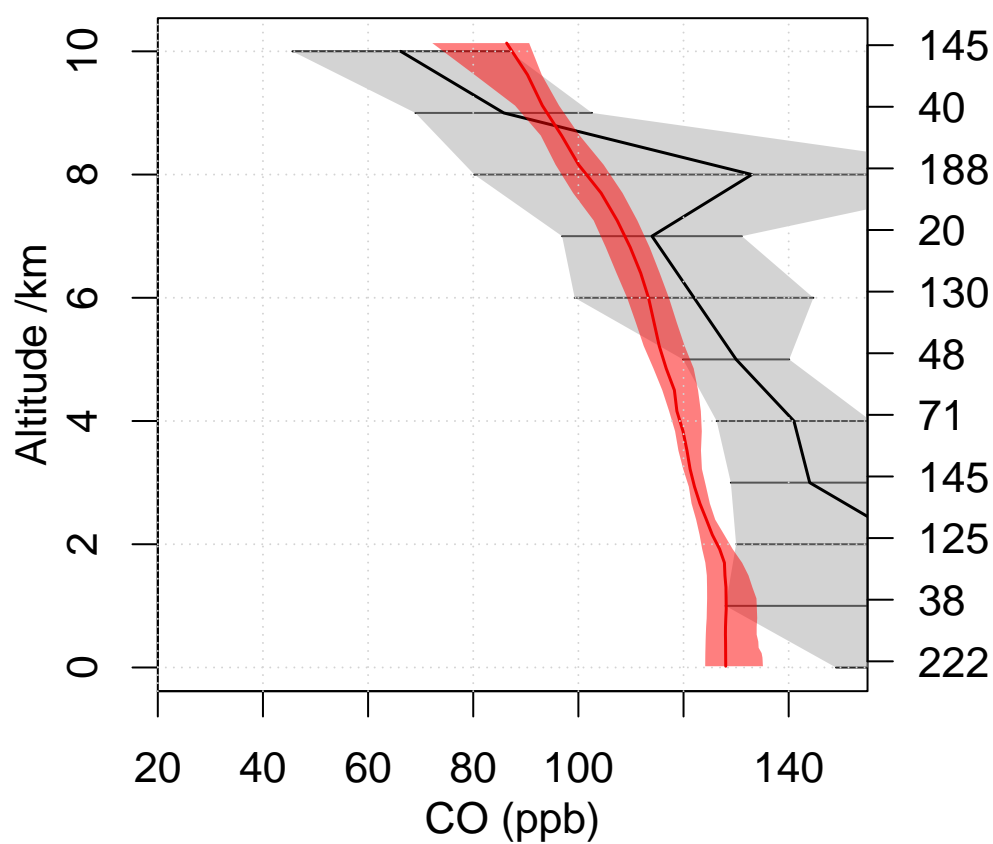
PEM-Tropics-B Christmas-Island 1999 0
Lat 0 – 10 Lon 200 – 220



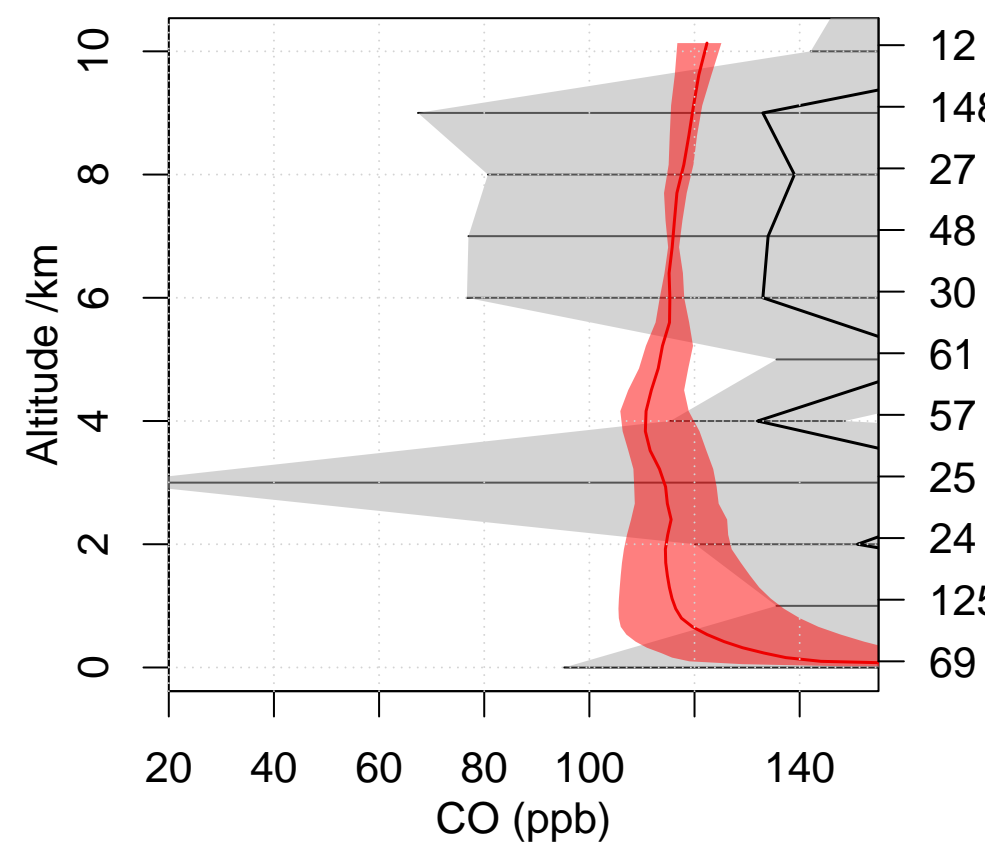
PEM-Tropics-B Tahiti 1999 03
Lat -20 – 0 Lon 200 – 230



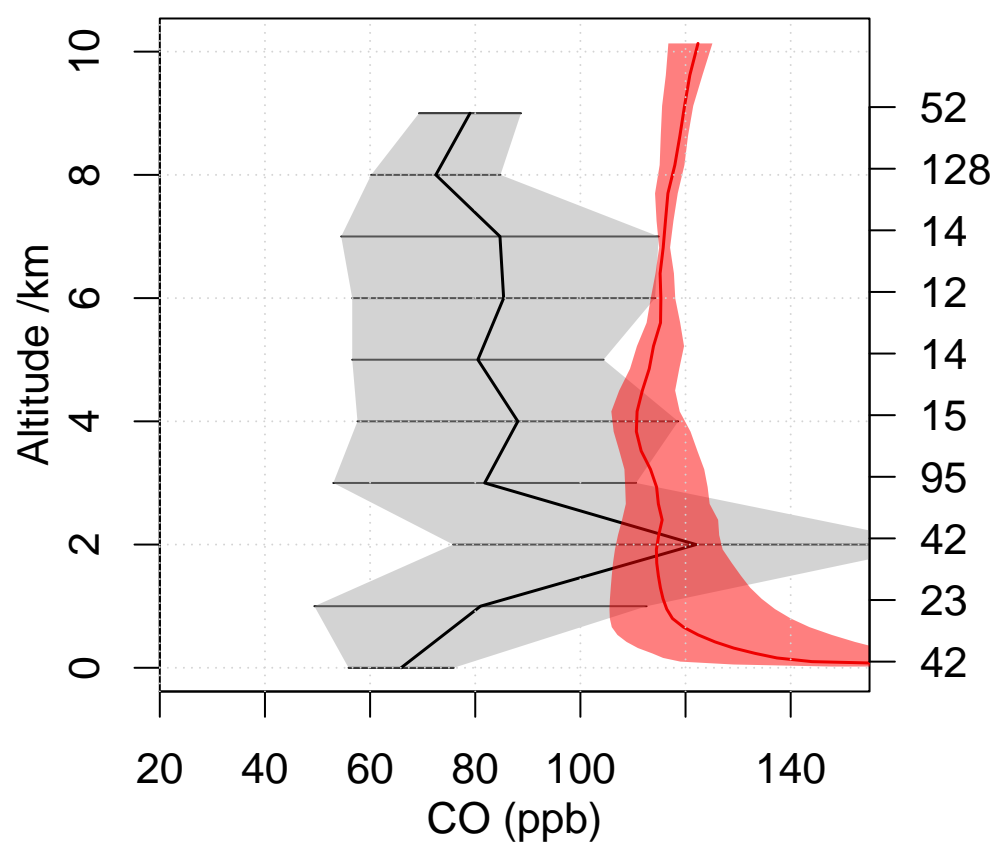
PEM-West-B Japan 1994 02
Lat 25 – 40 Lon 135 – 150



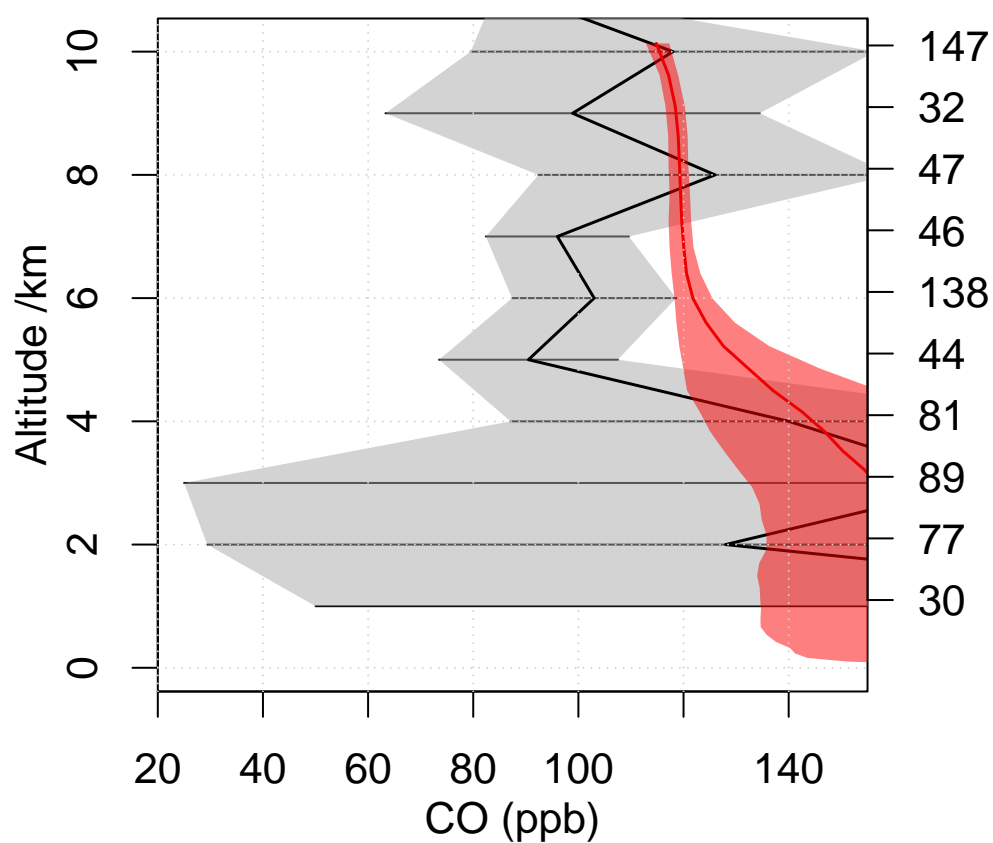
TRACE-A E-Brazil 1992 09
Lat -15 – -5 Lon 310 – 320



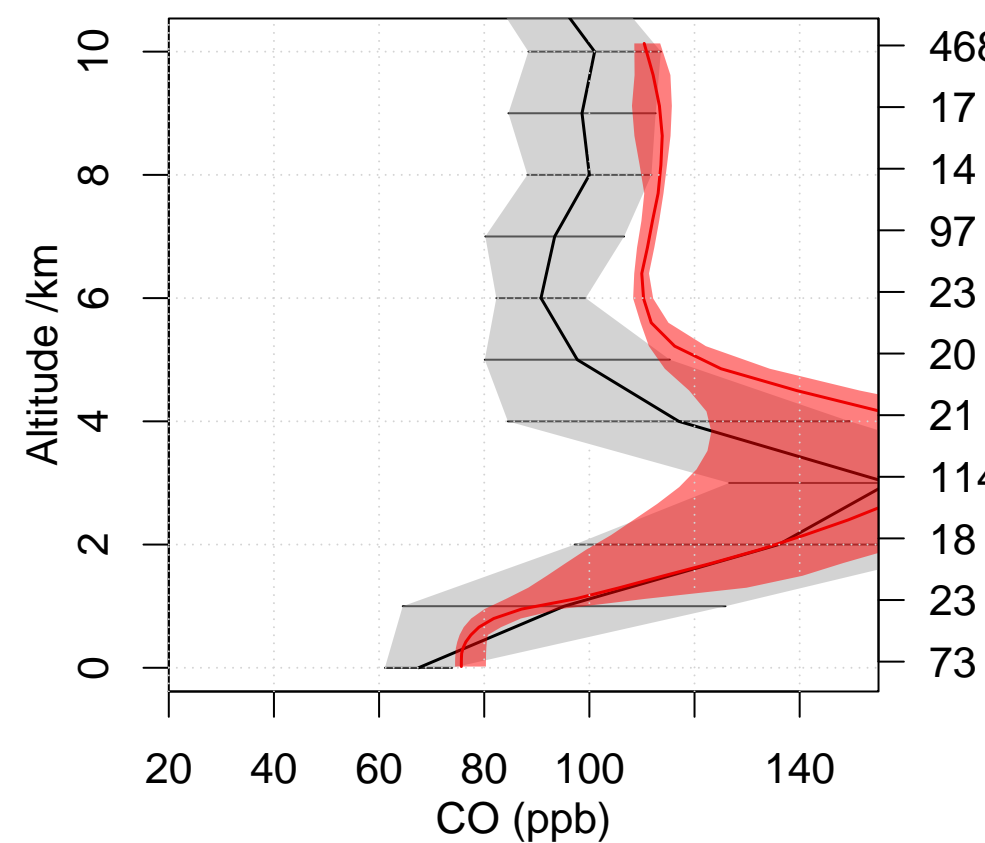
TRACE-A E-Brazil Coast 1992 09
Lat -35 – -25 Lon 310 – 320



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

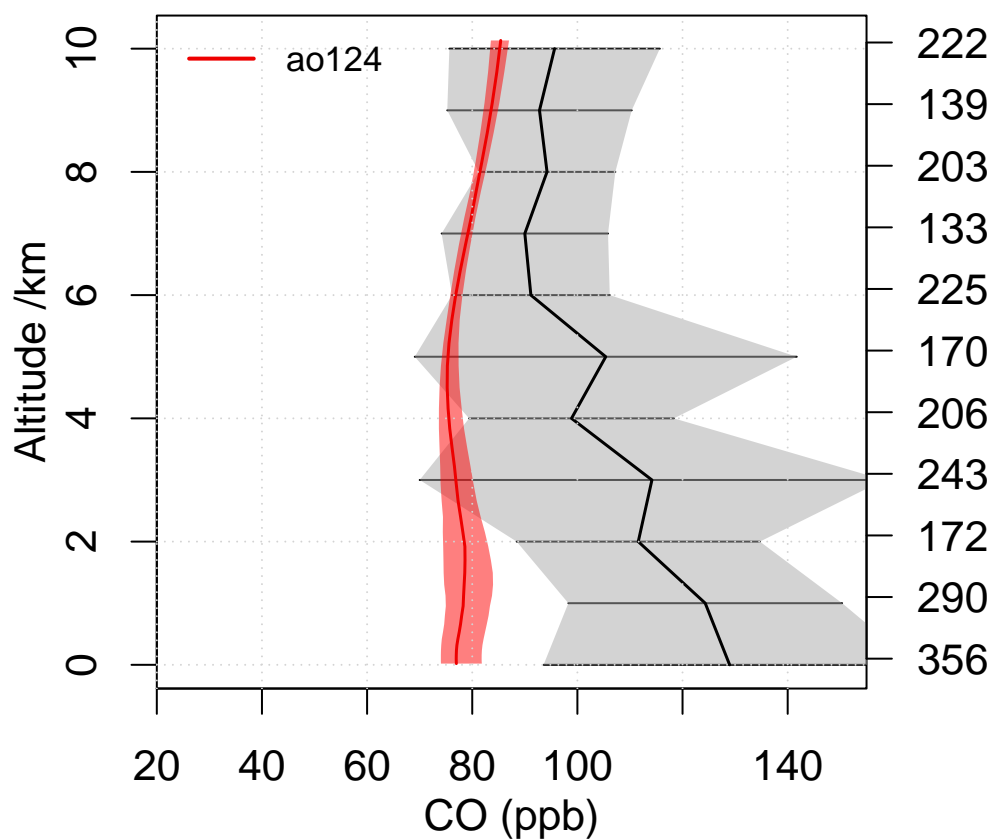


TRACE-A W-Africa Coast 1992 09
Lat -25 – -5 Lon 0 – 10

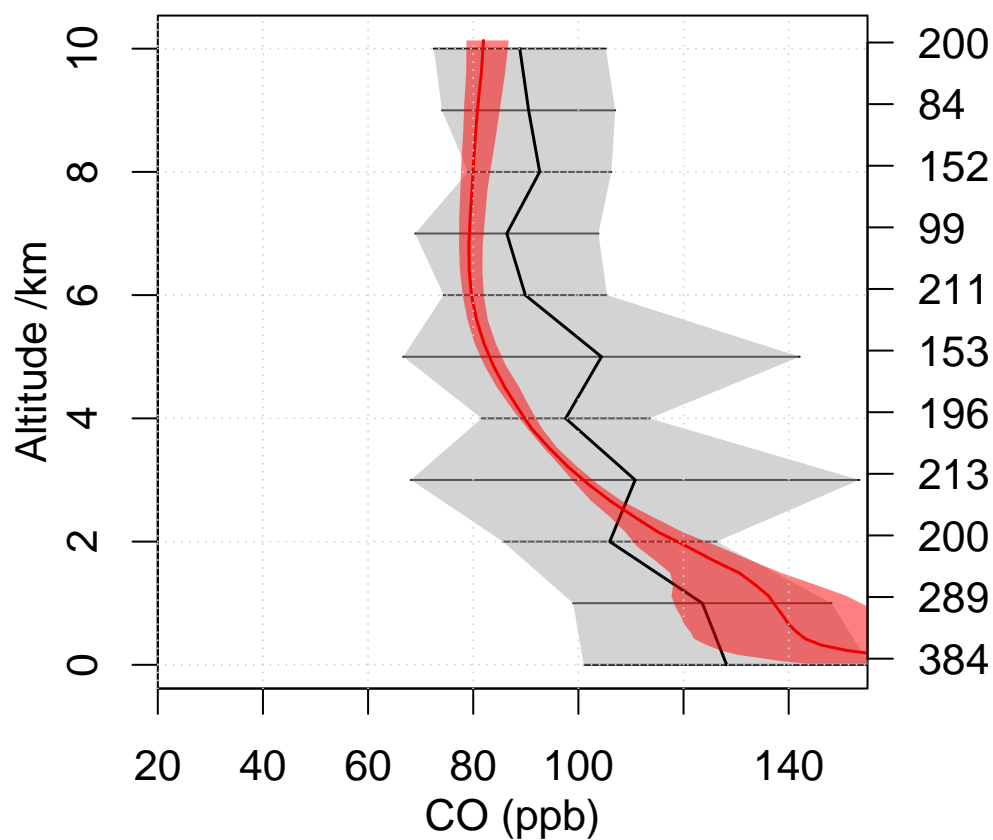


Emmons CO comparison

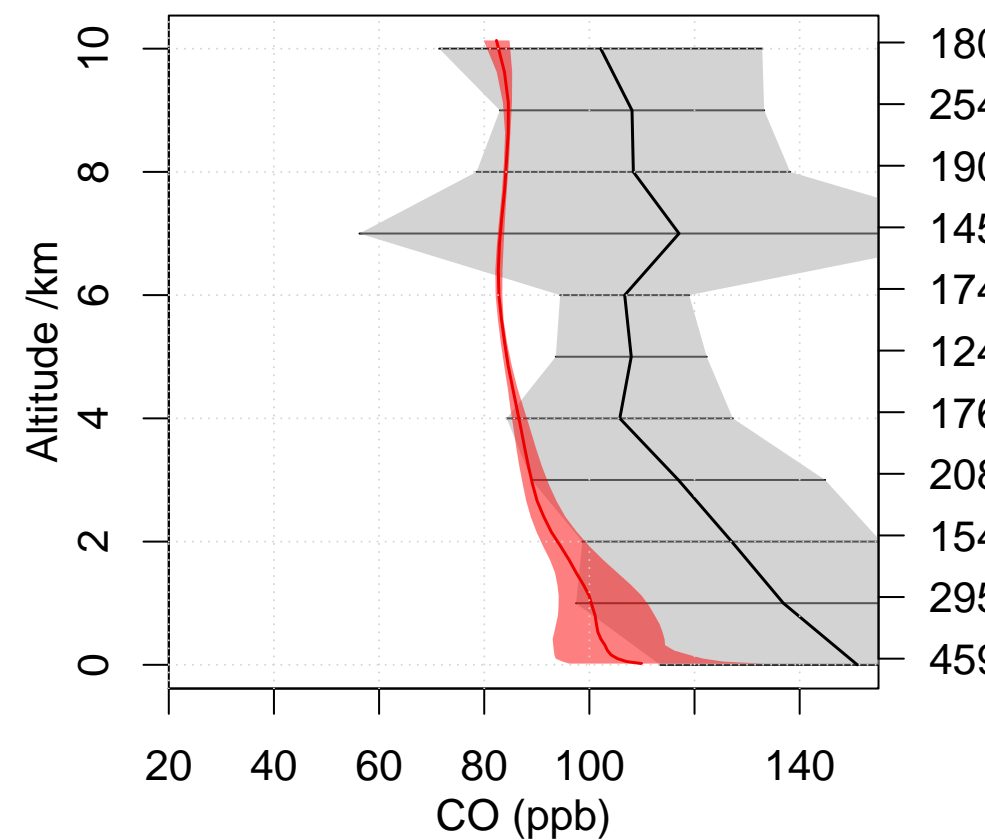
INTEX-NA East Coast 2004 07
Lat 32.5 – 40 Lon 296.5 – 307



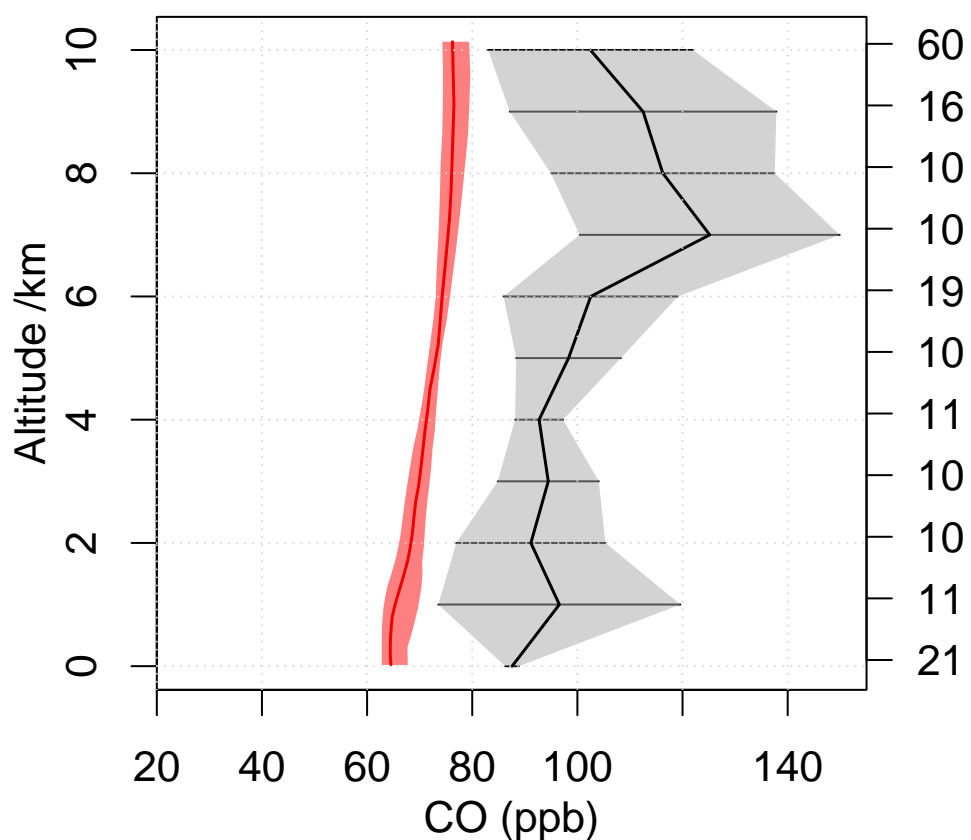
INTEX-NA Central 2004 07
Lat 30 – 40 Lon 259.5 – 285



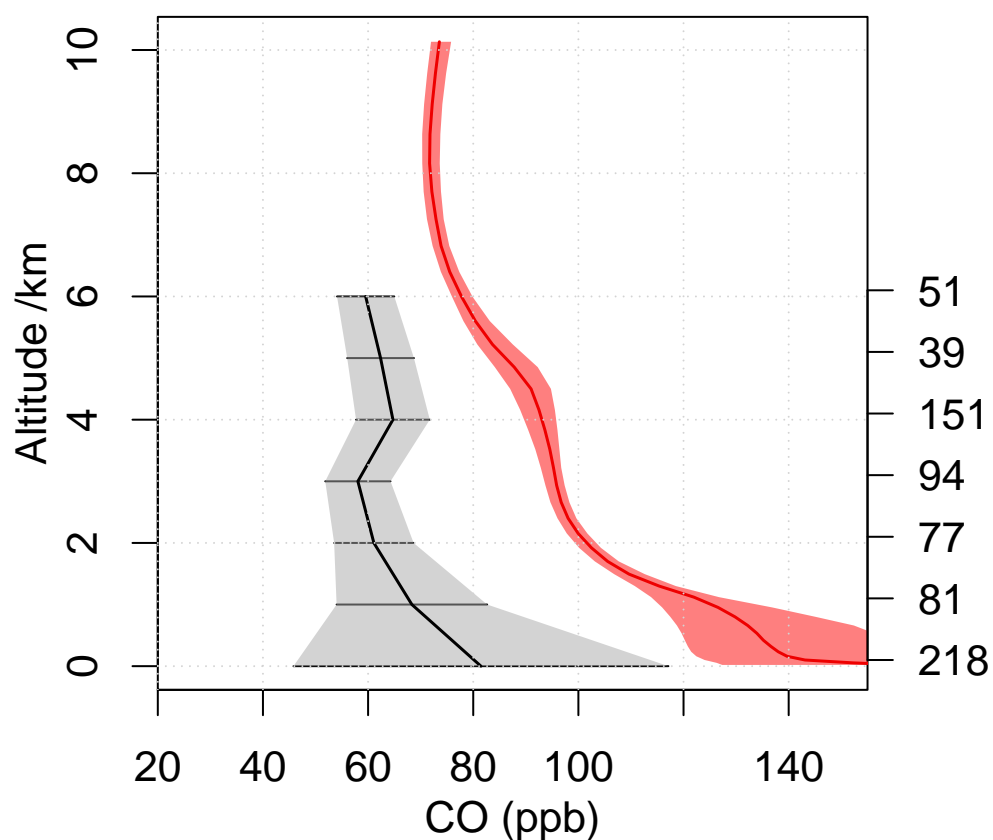
INTEX-NA North East 2004 07
Lat 42.5 – 52.5 Lon 285 – 310



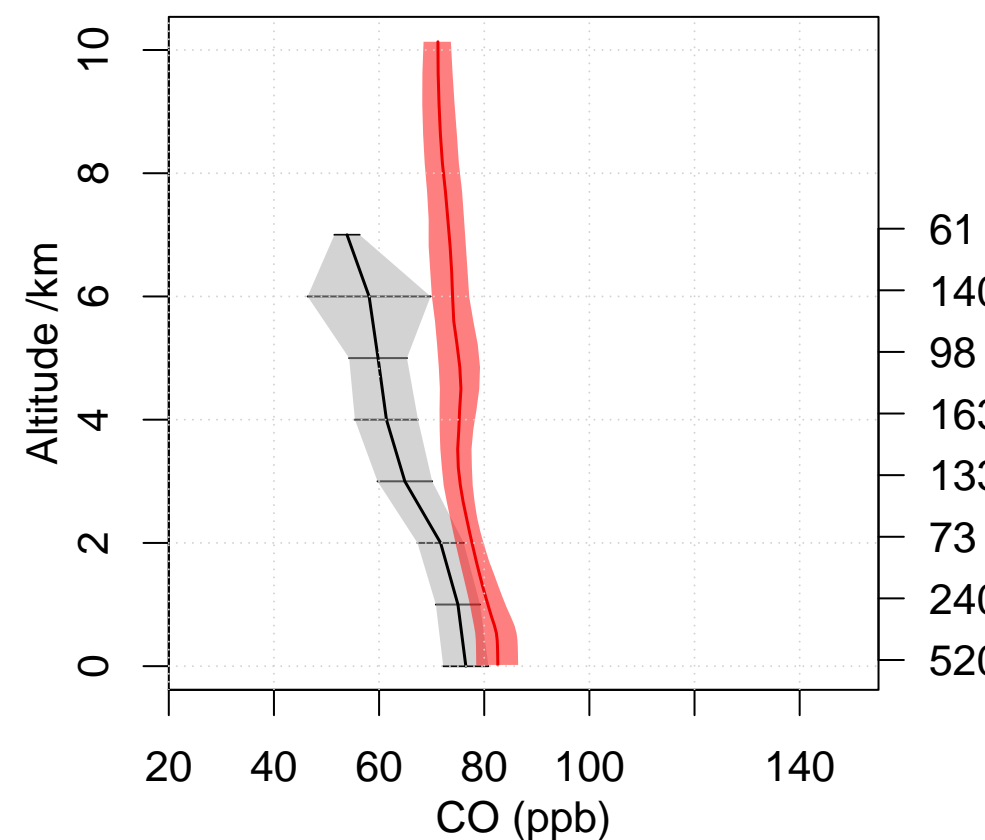
INTEX-NA West Coast 2004 07
Lat 32.5 – 45 Lon 217 – 240



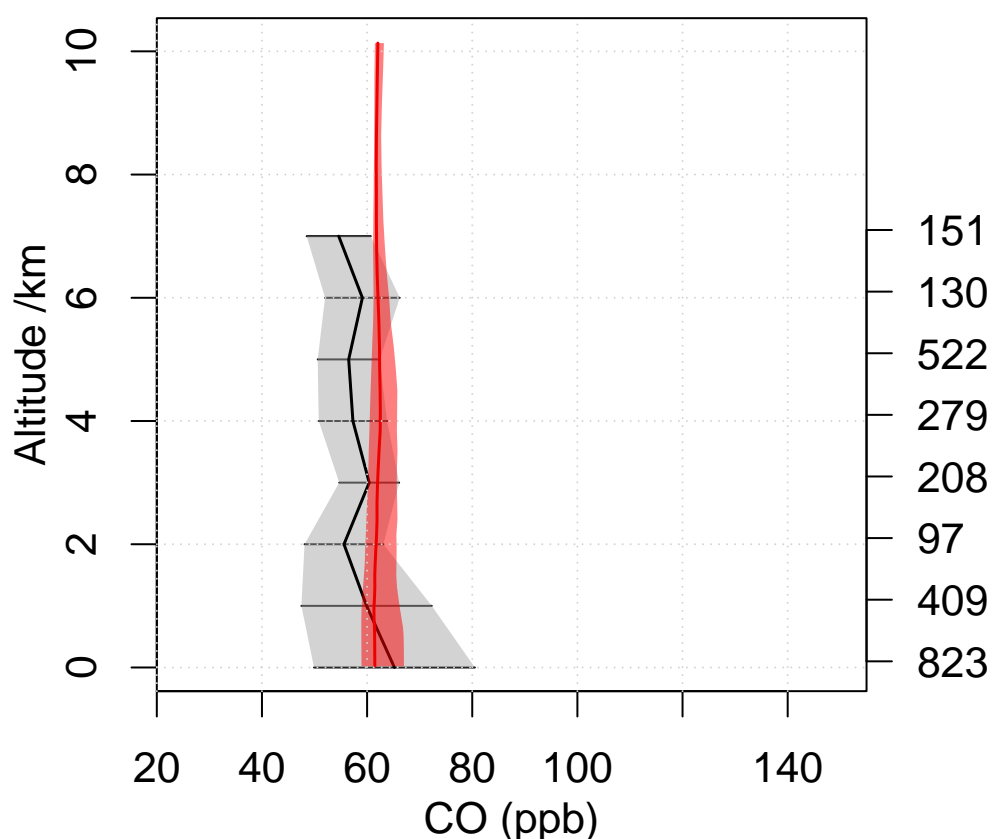
OP3 2008 07
Lat 2.5 – 7.5 Lon 112.5 – 120



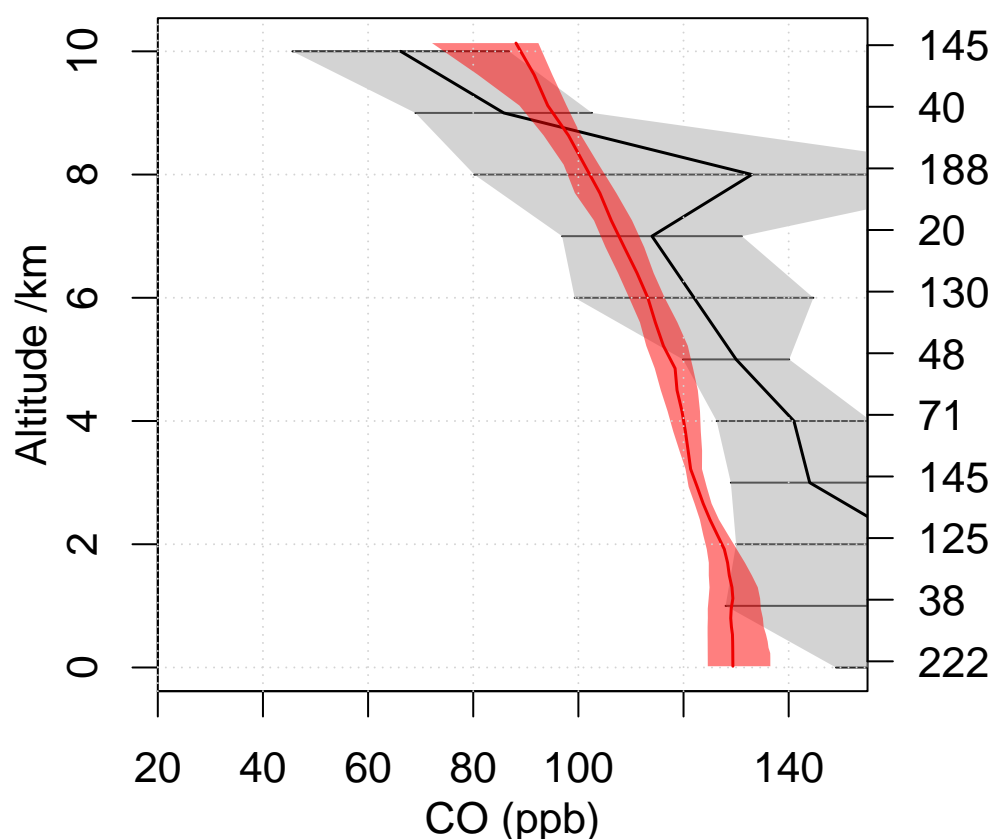
PEM-Tropics-B Christmas-Island 1999 07
Lat 0 – 10 Lon 200 – 220



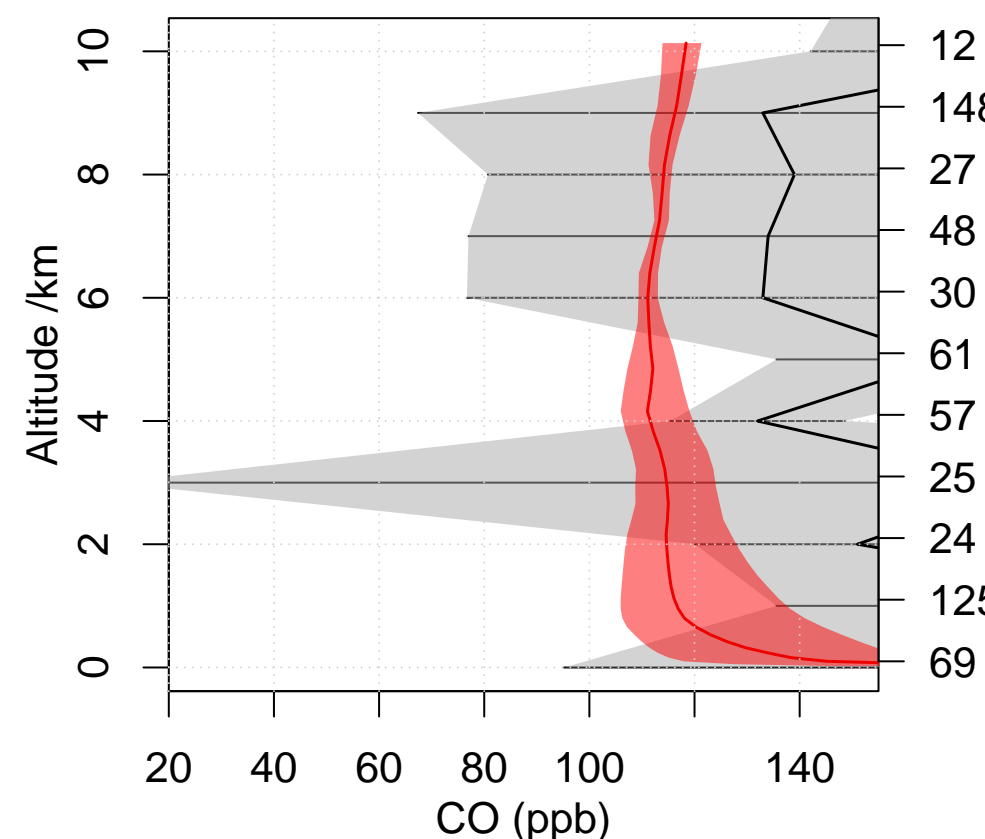
PEM-Tropics-B Tahiti 1999 03
Lat -20 – 0 Lon 200 – 230



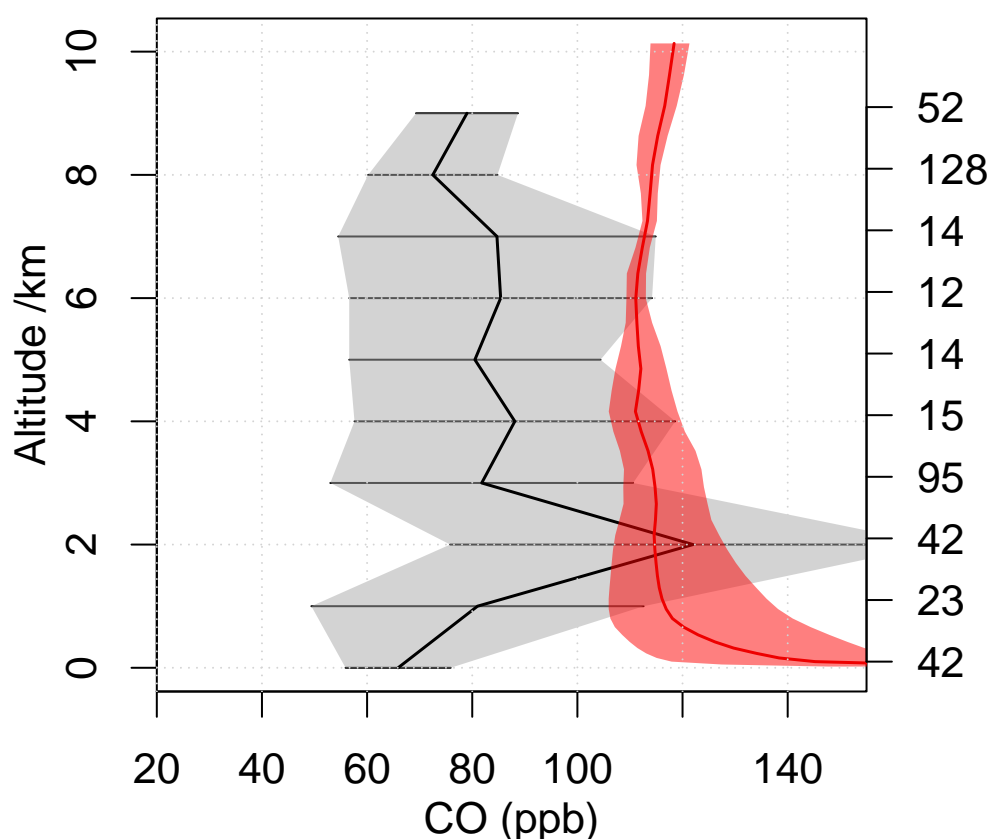
PEM-West-B Japan 1994 02
Lat 25 – 40 Lon 135 – 150



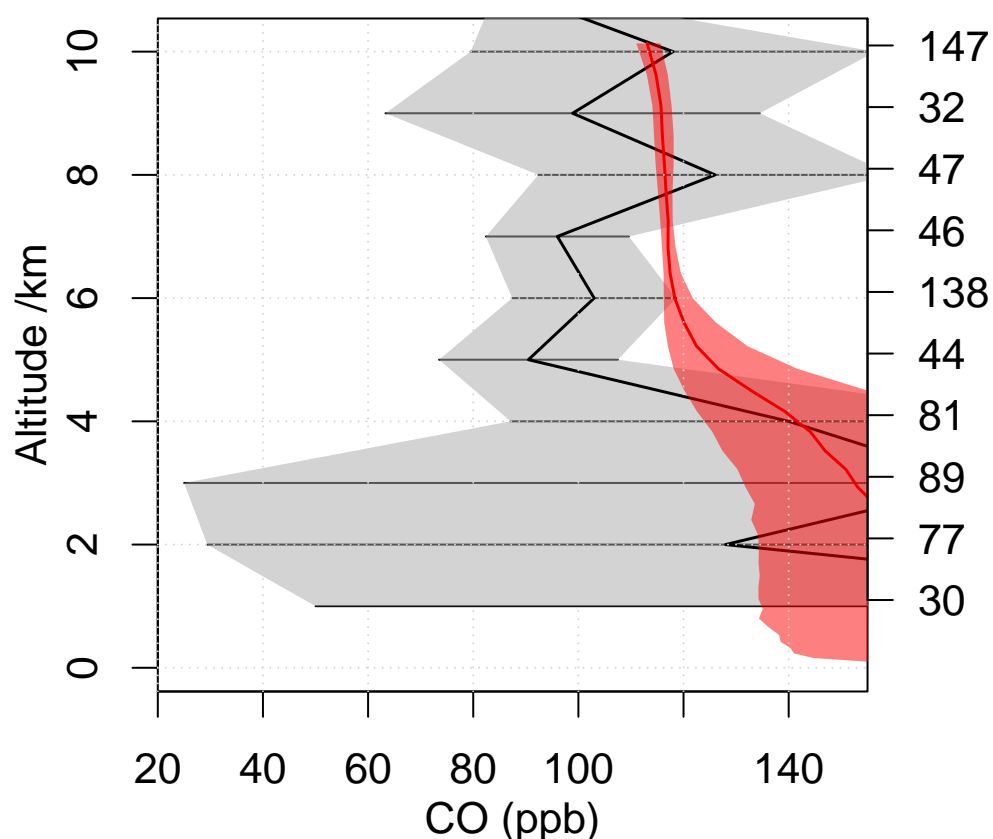
TRACE-A E-Brazil 1992 09
Lat -15 – -5 Lon 310 – 320



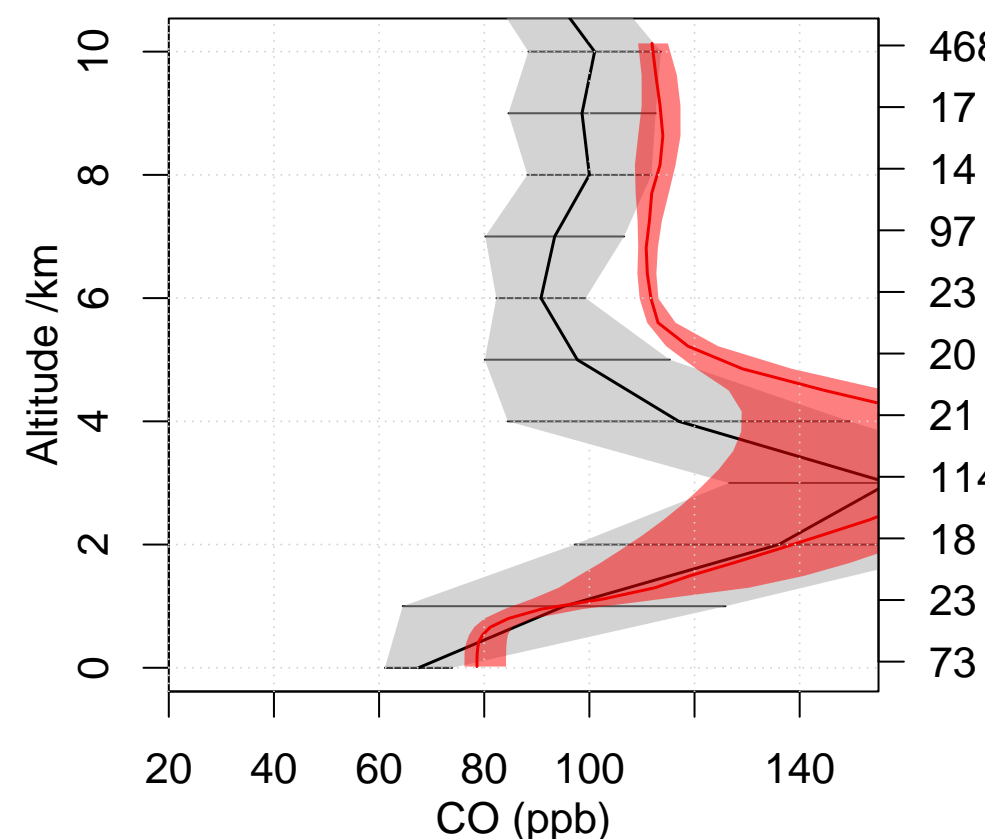
TRACE-A E-Brazil Coast 1992 09
Lat -35 – -25 Lon 310 – 320

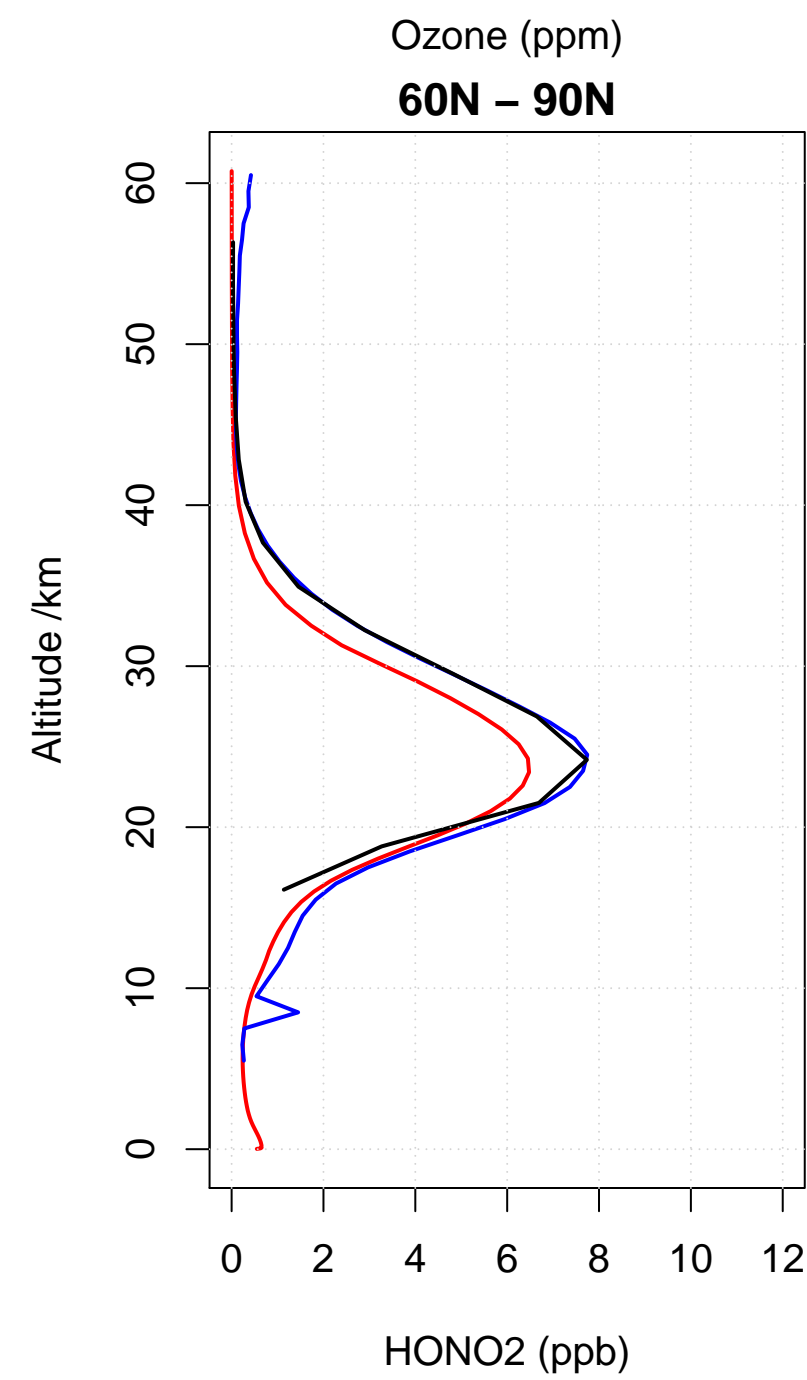
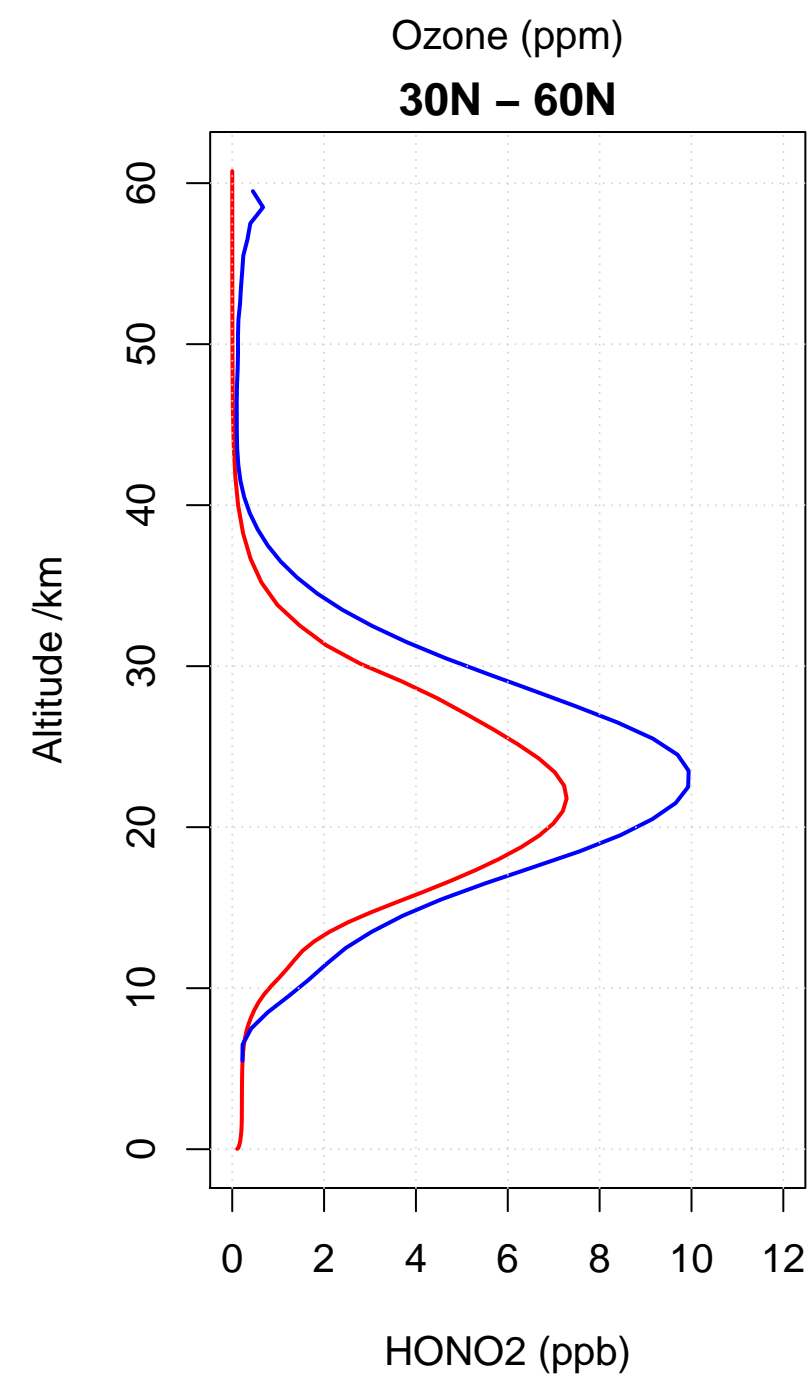
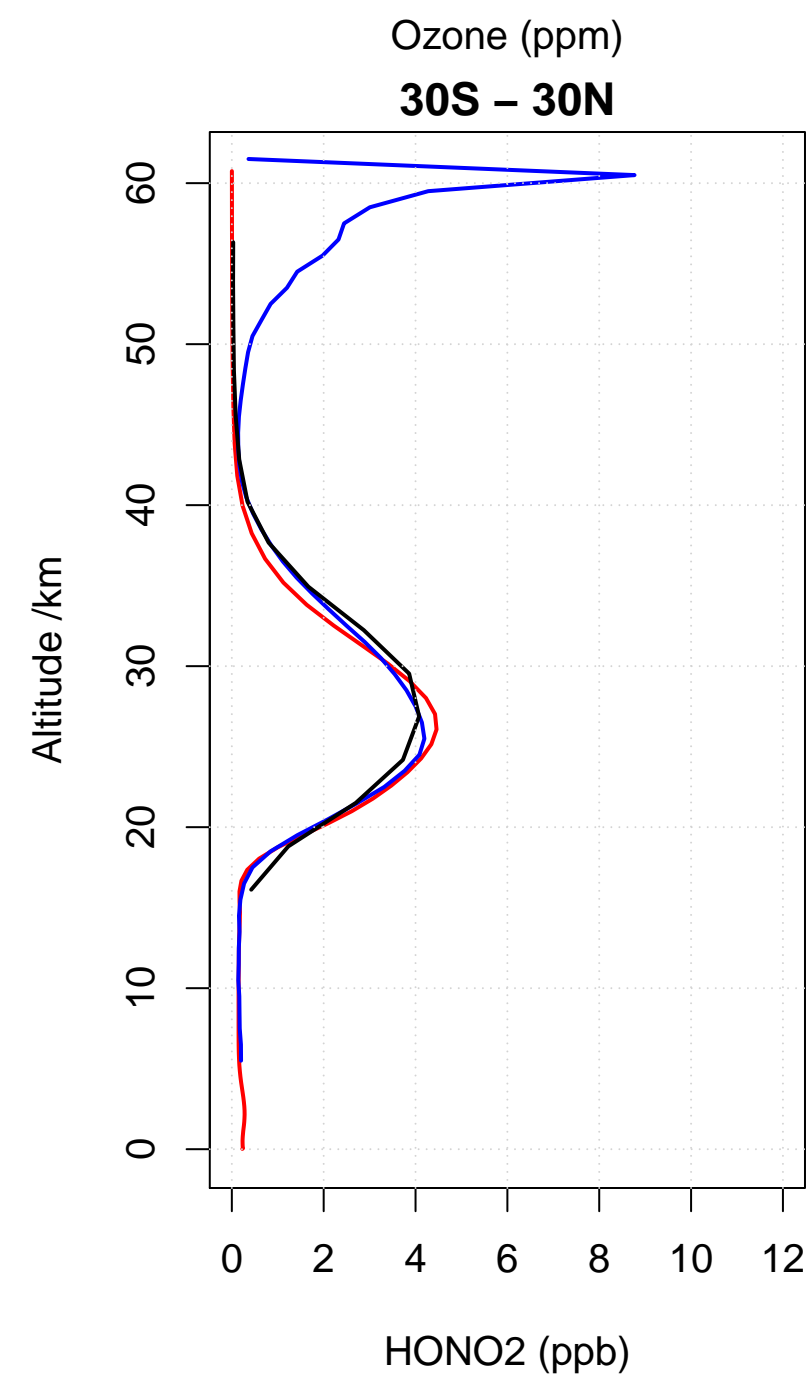
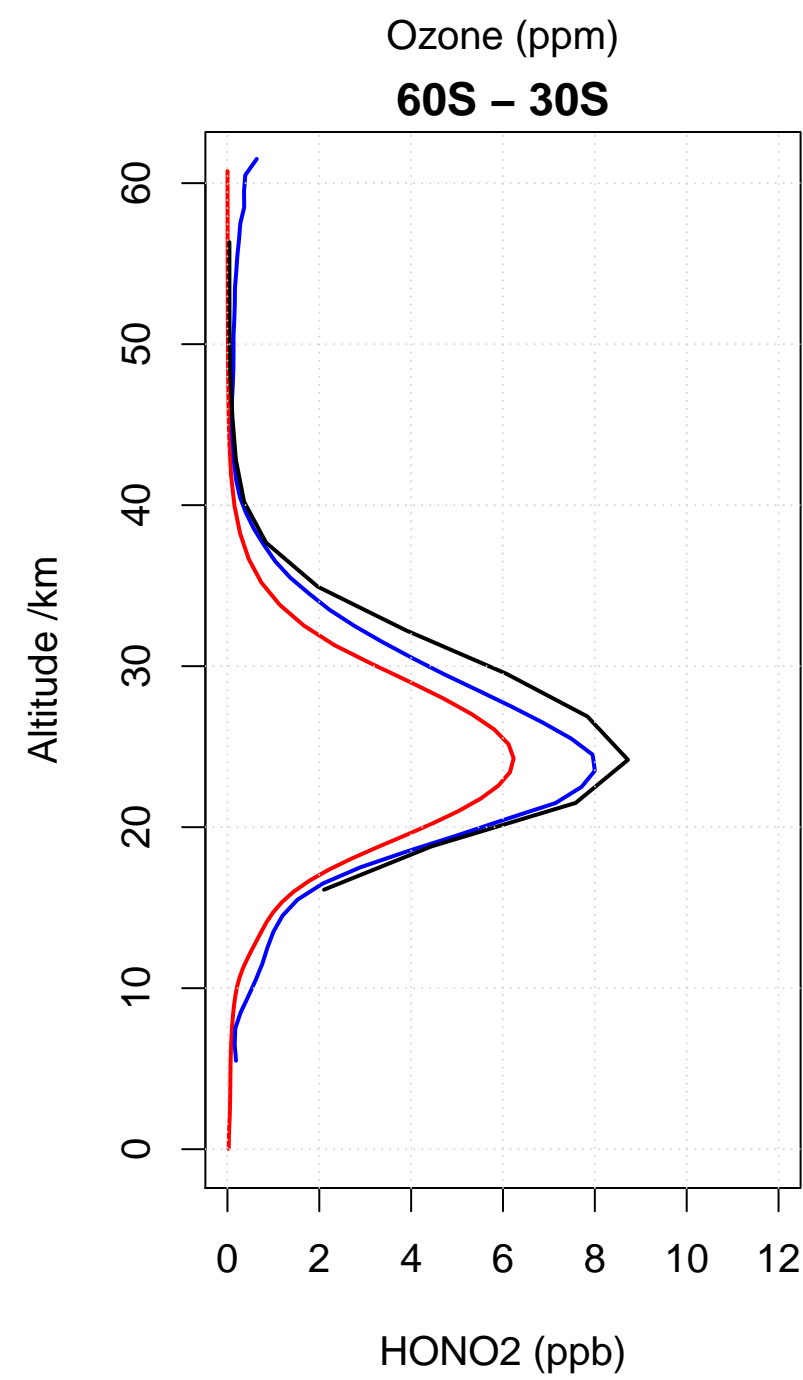
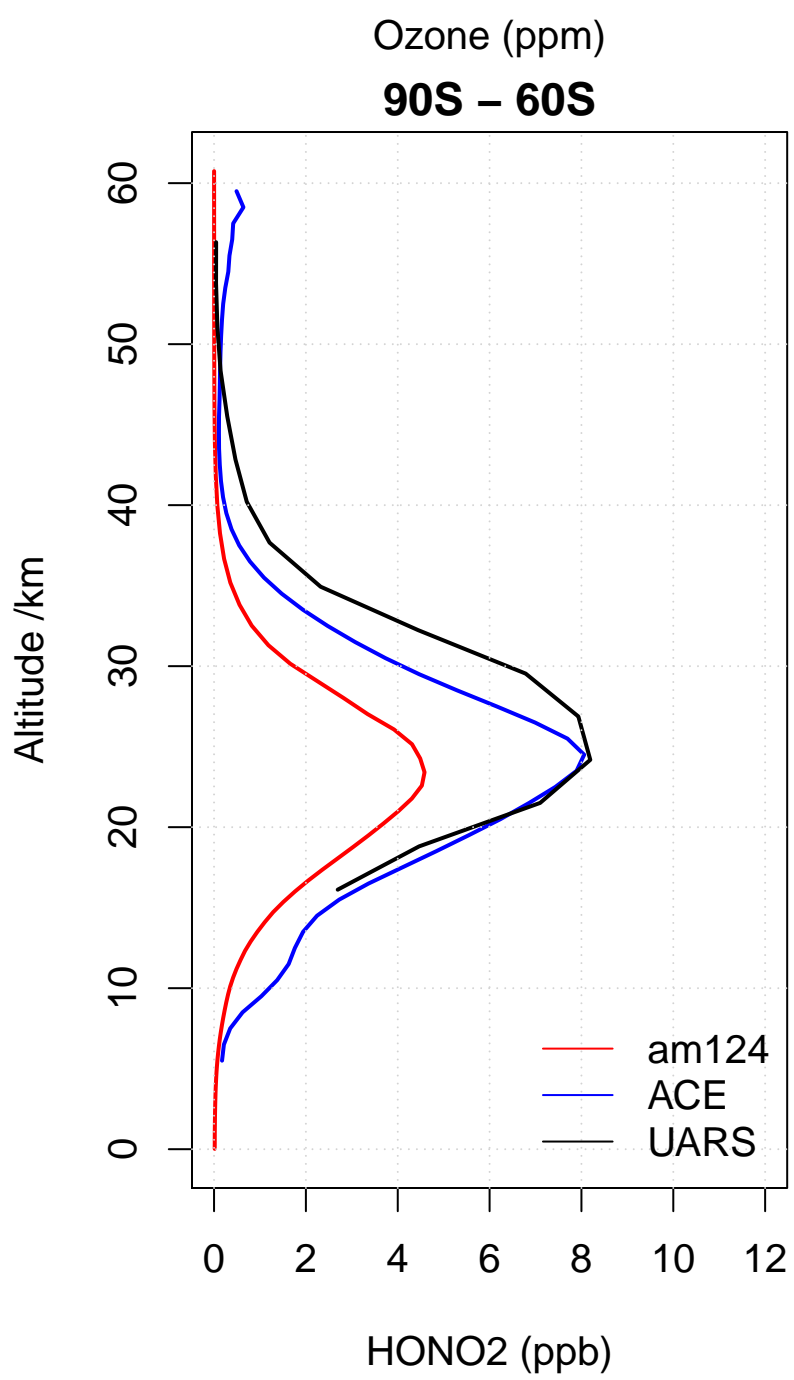
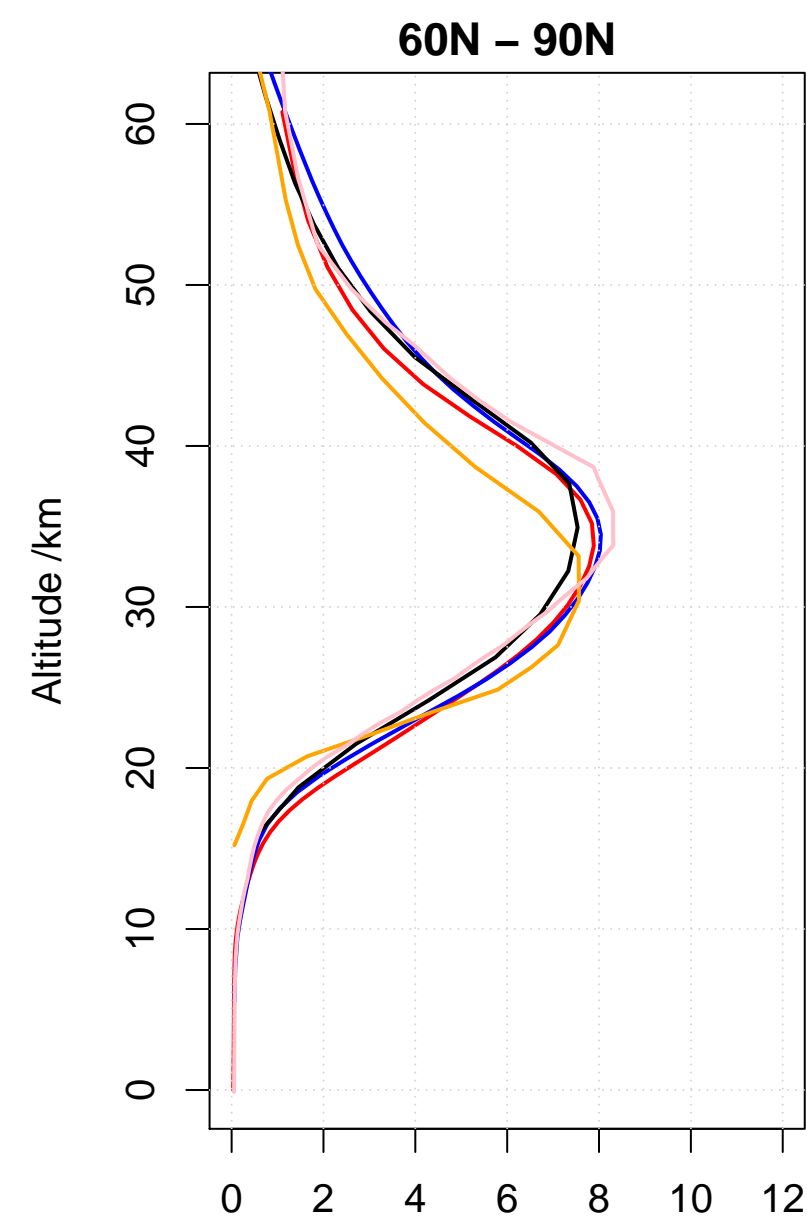
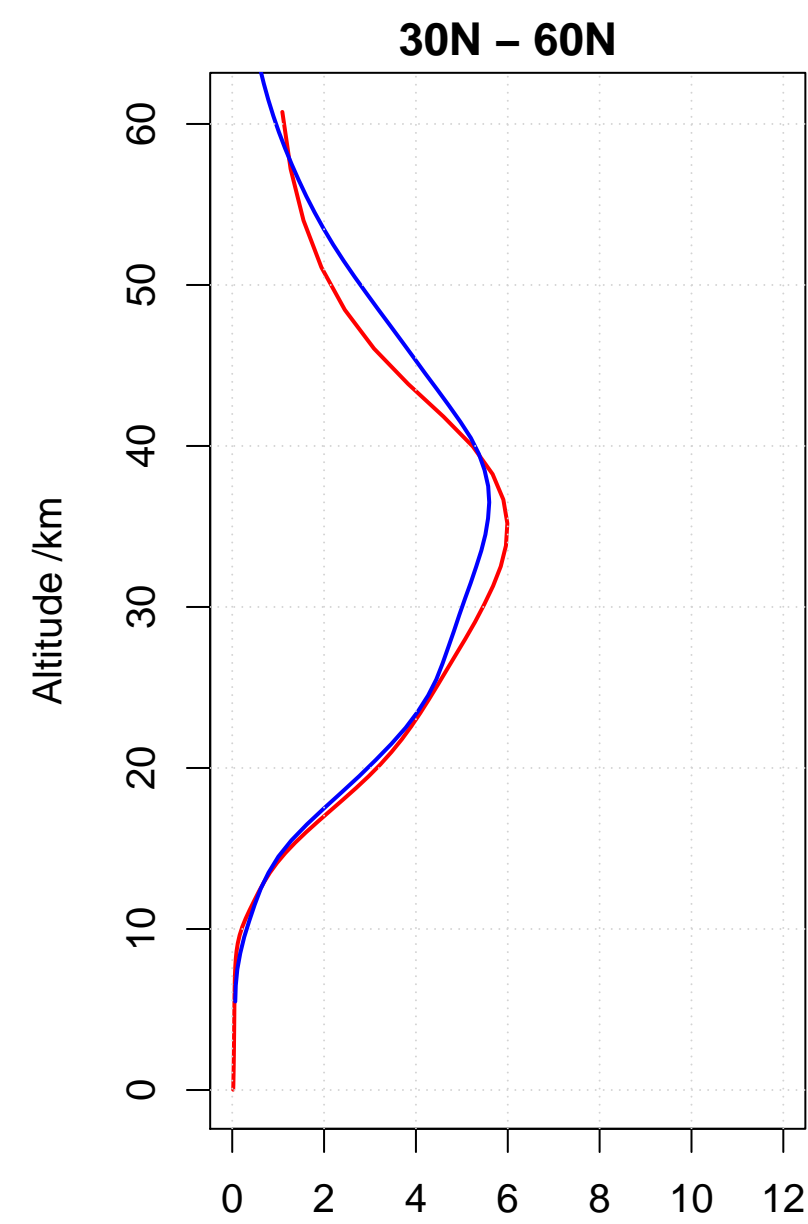
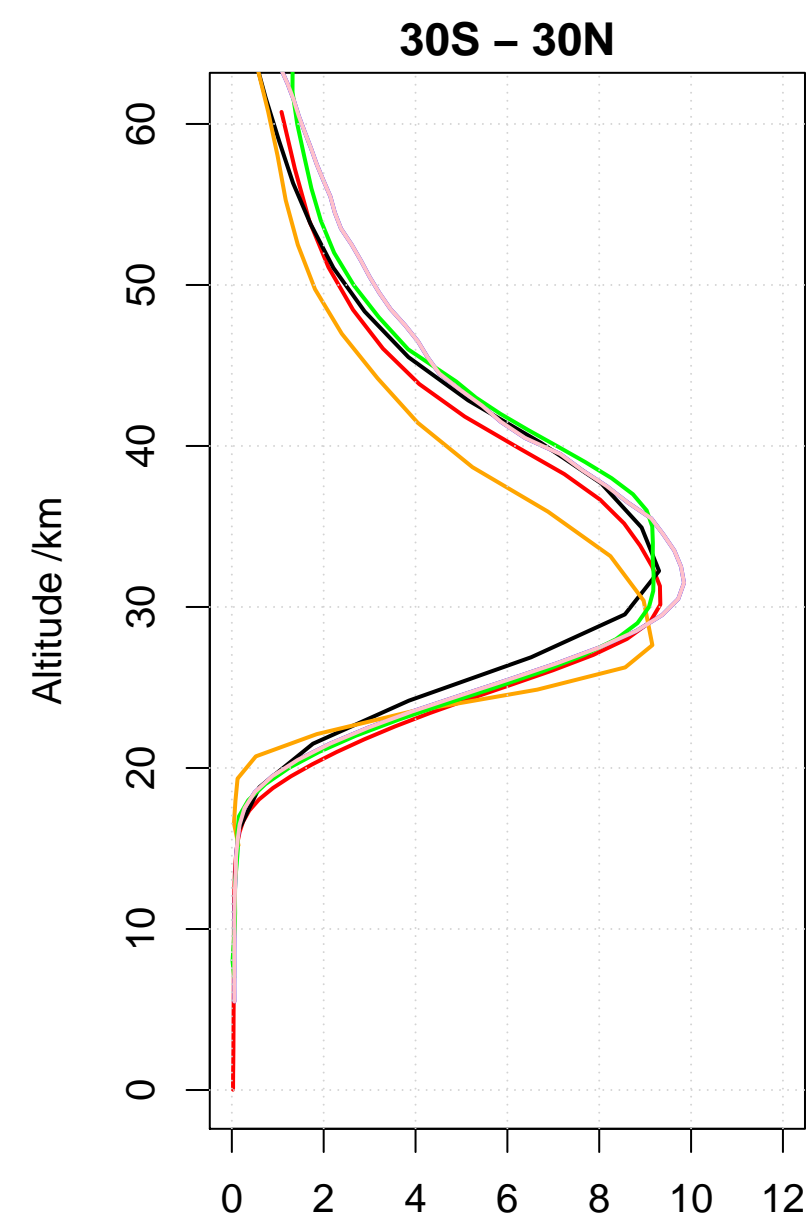
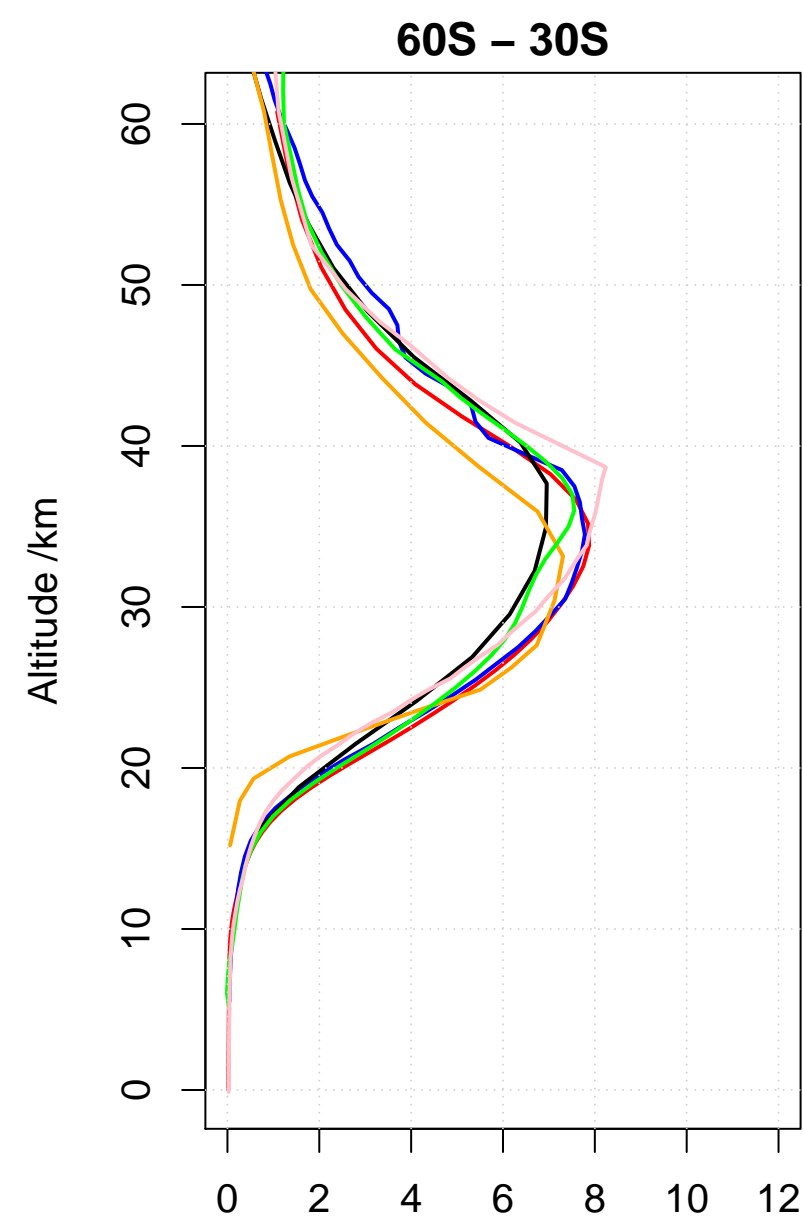
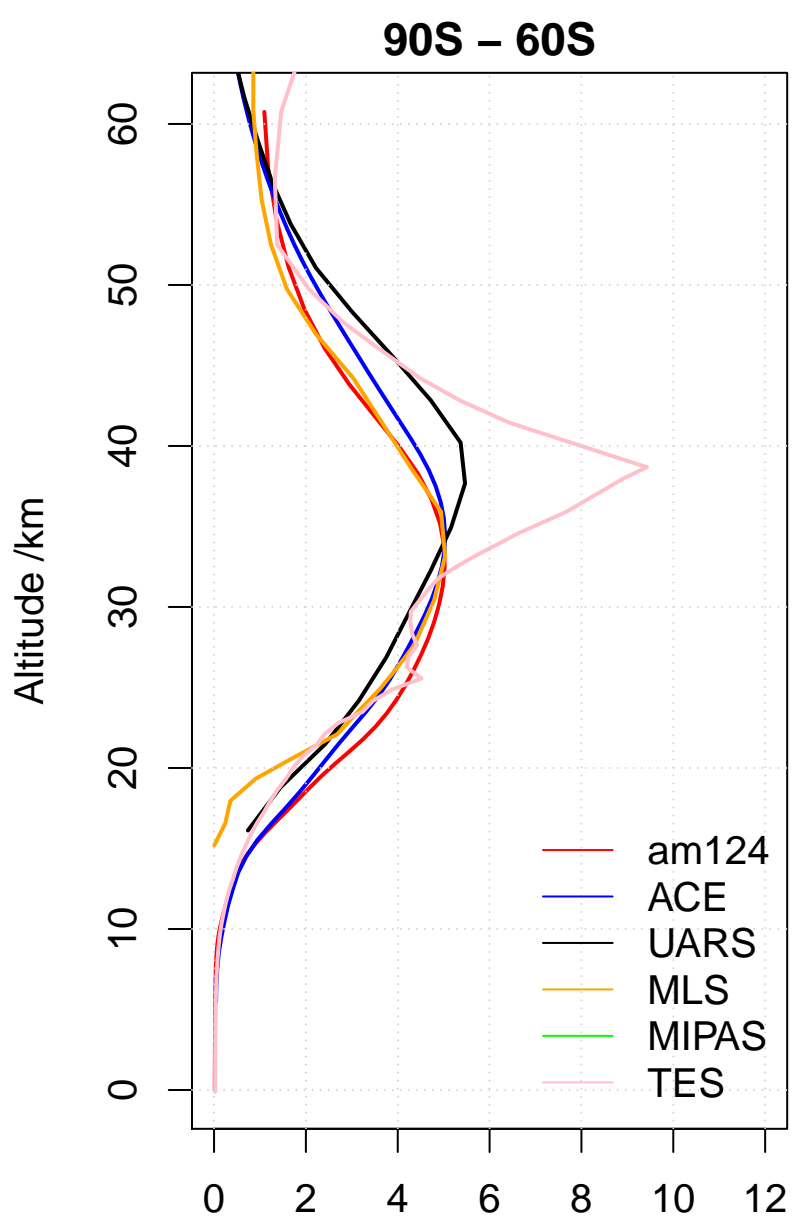


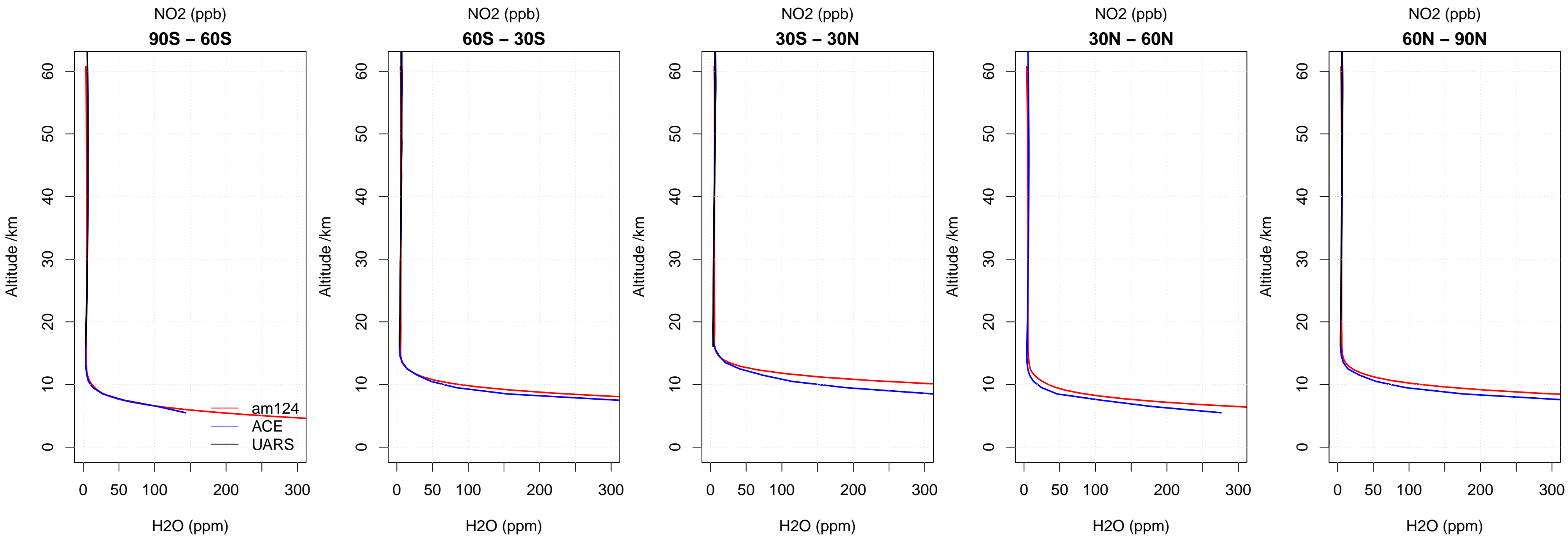
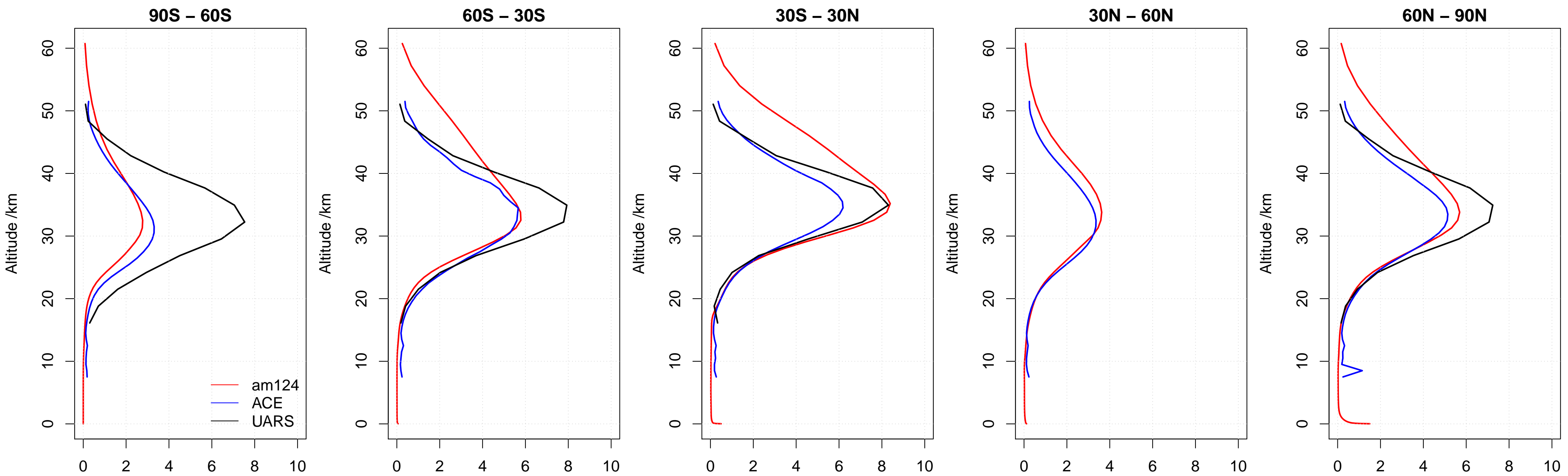
TRACE-A S-Africa 1992 09
Lat -25 – -5 Lon 15 – 35

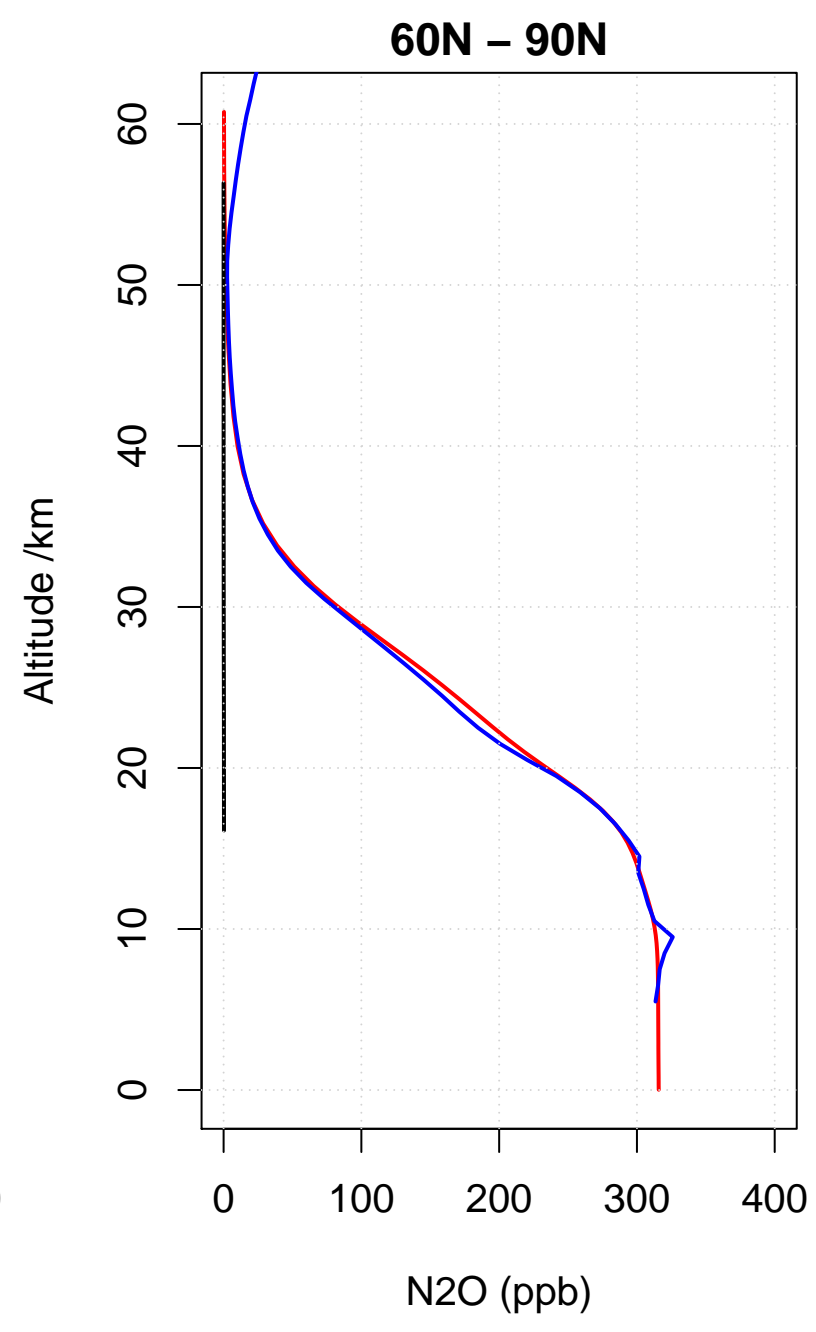
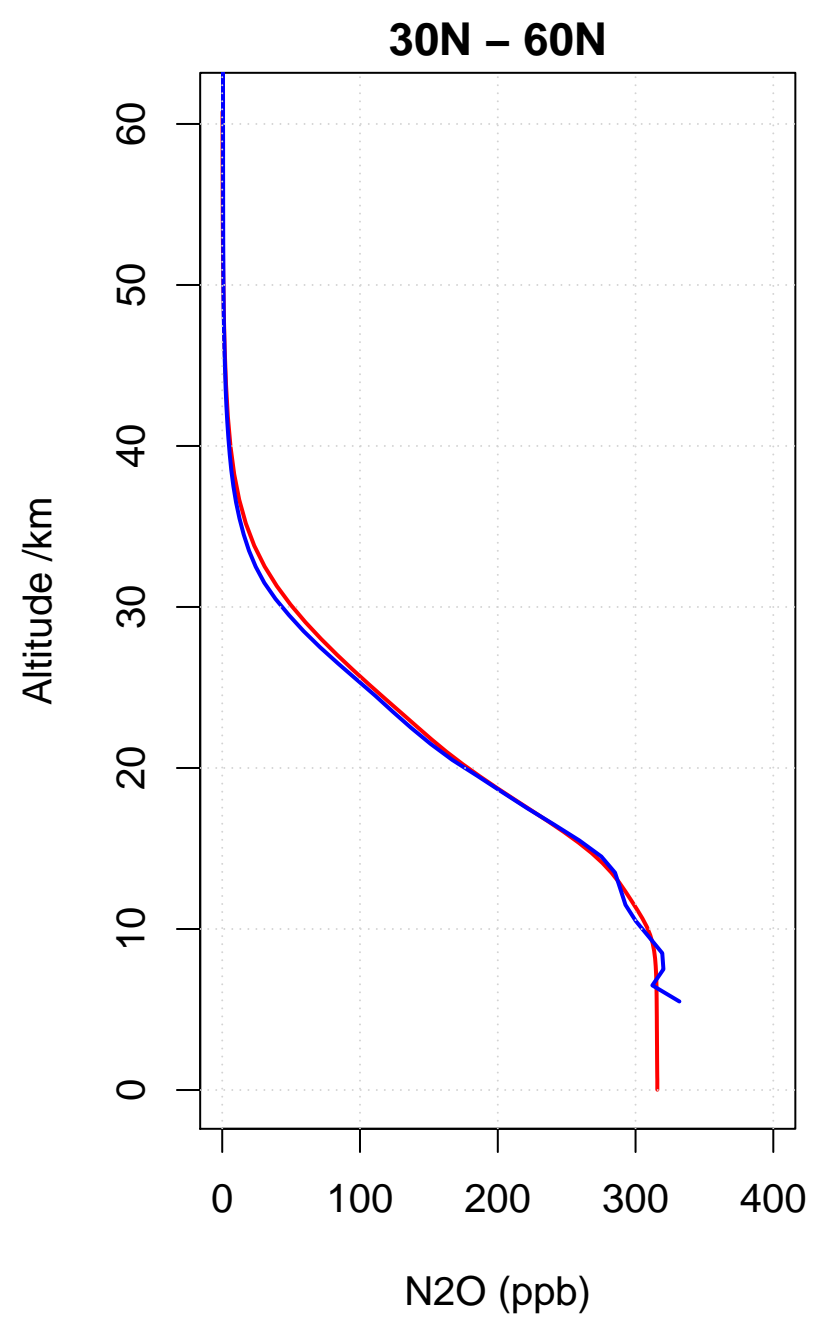
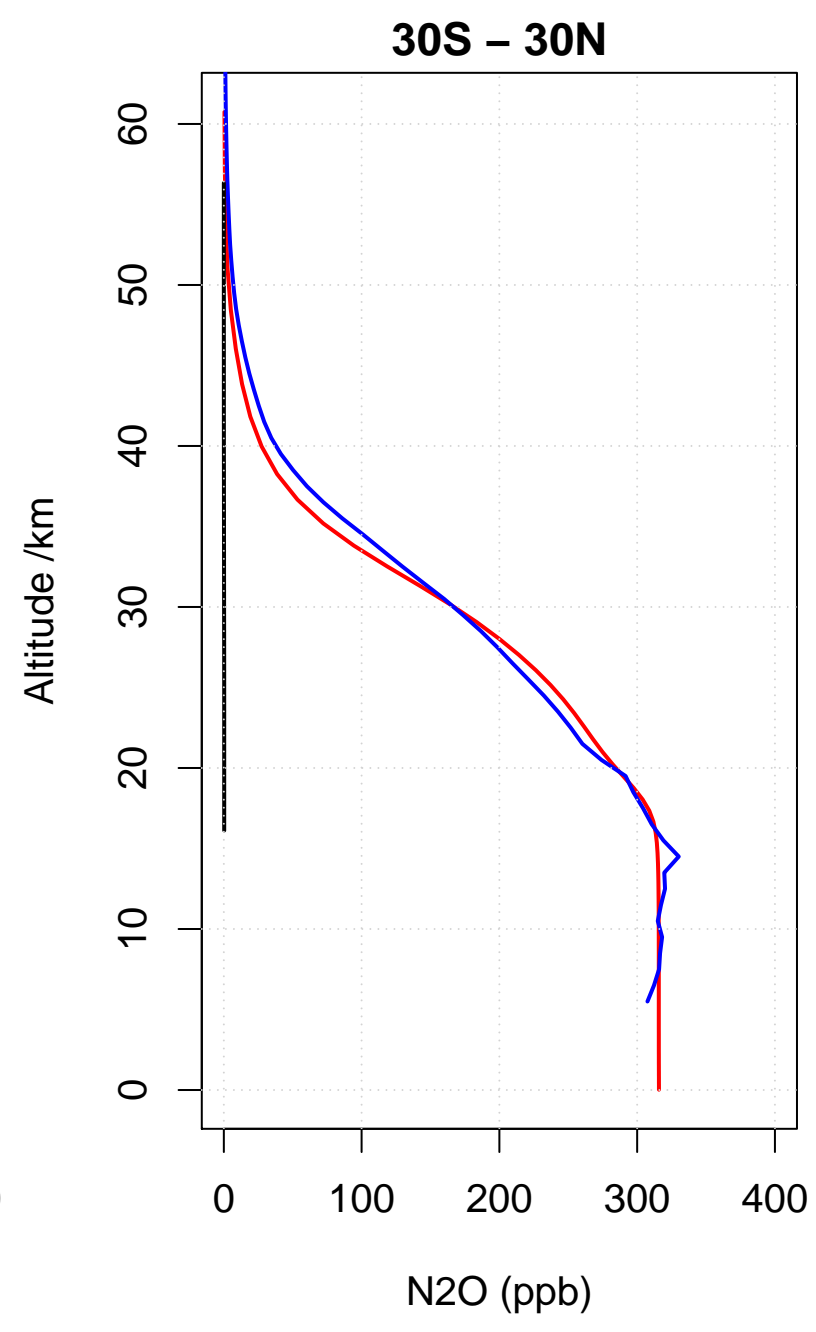
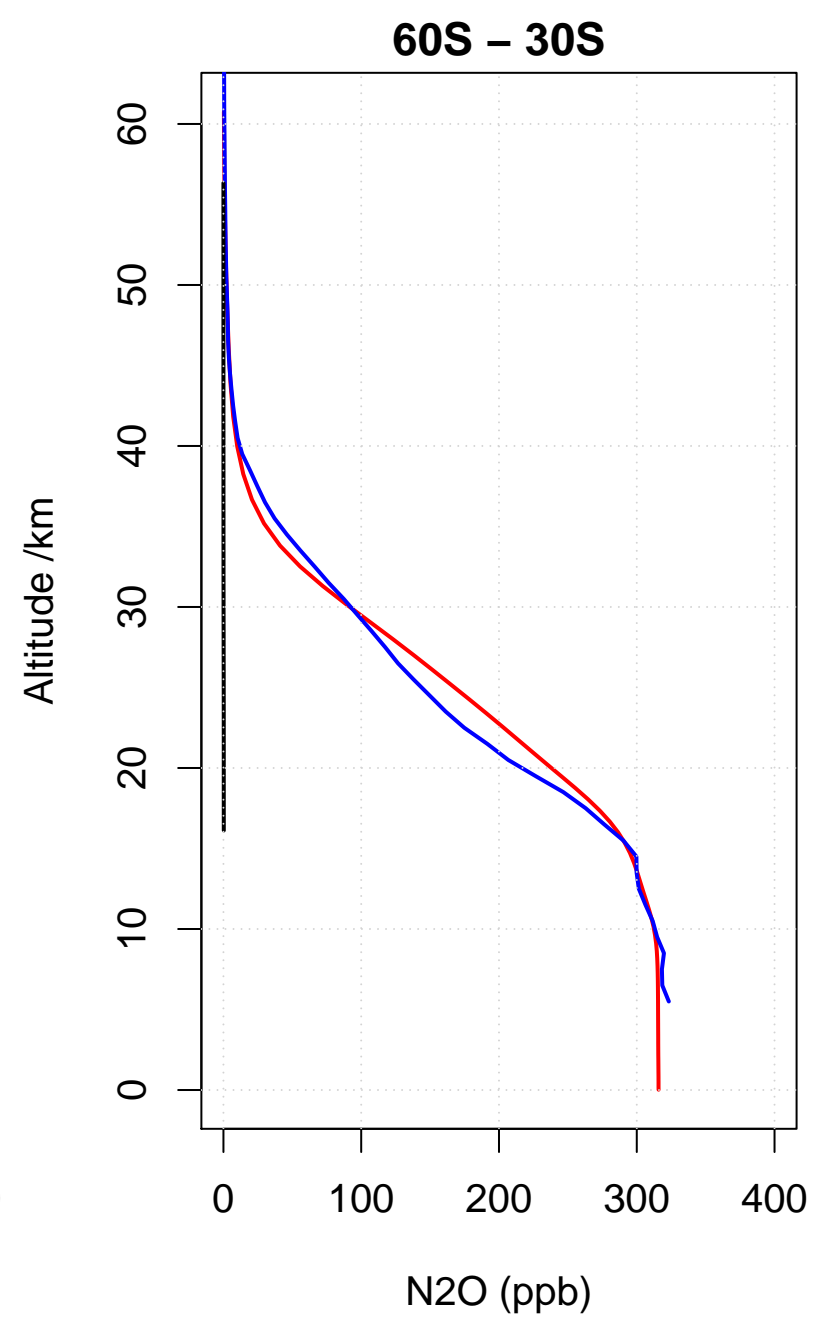
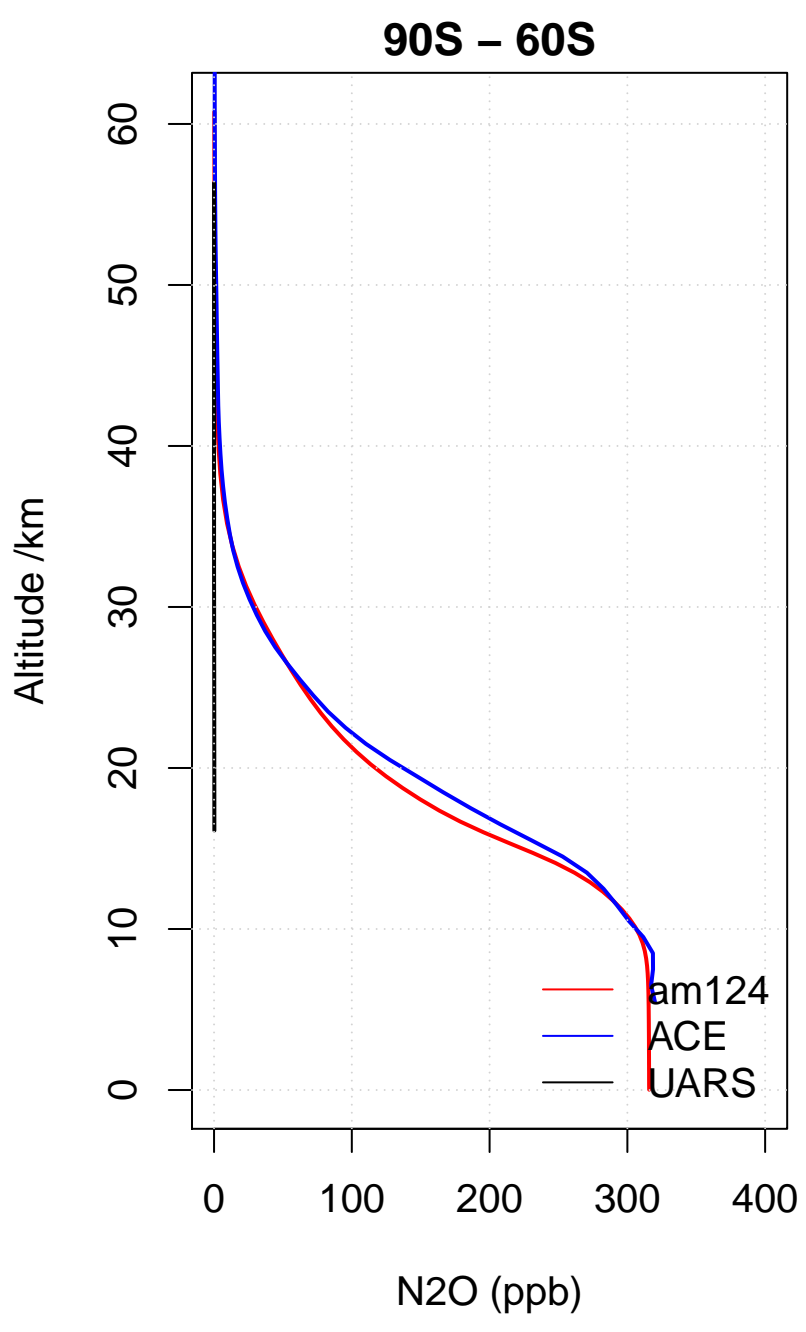


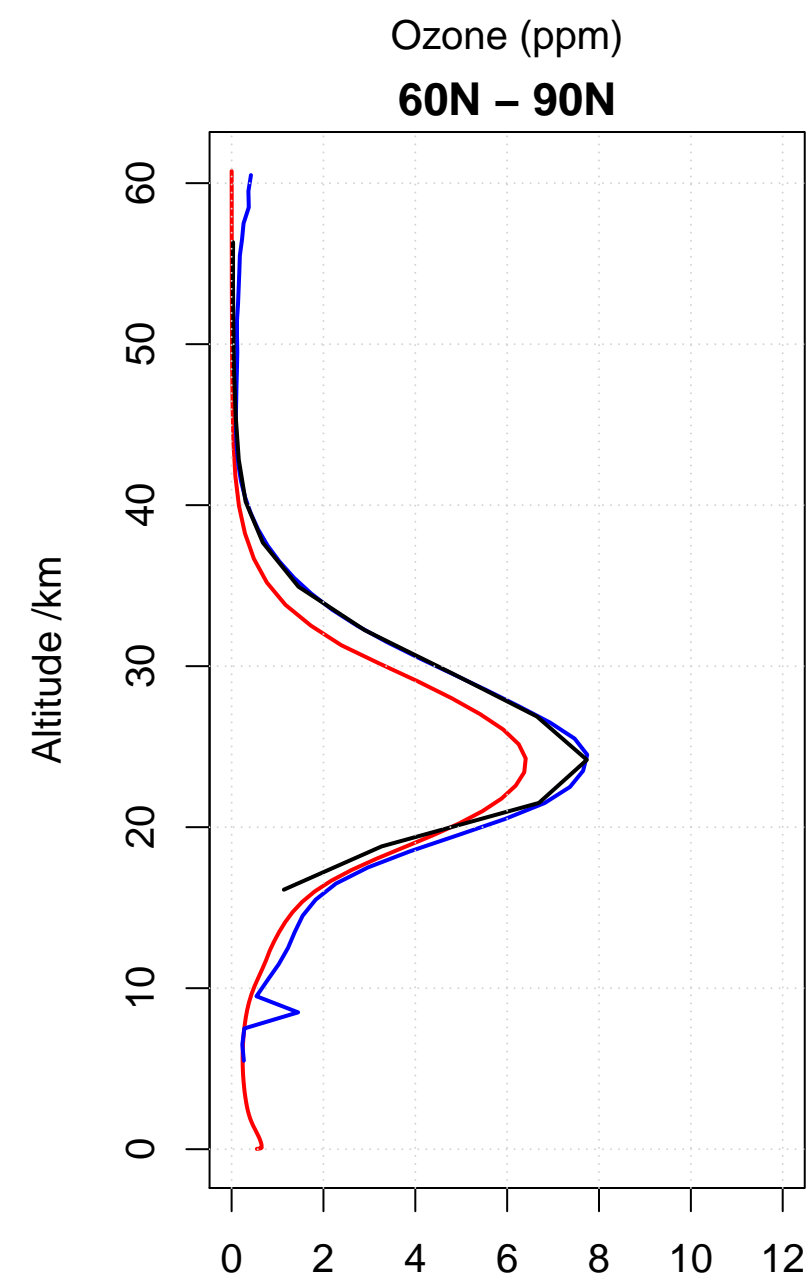
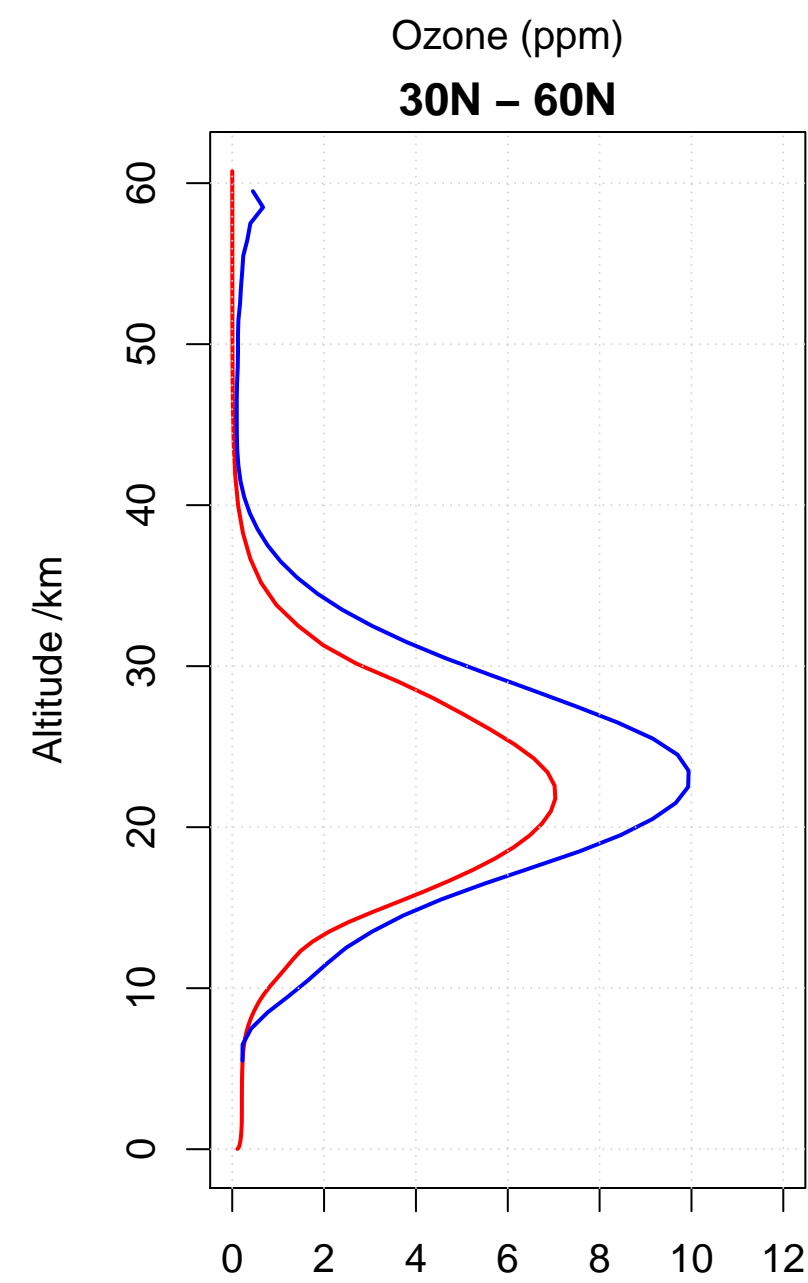
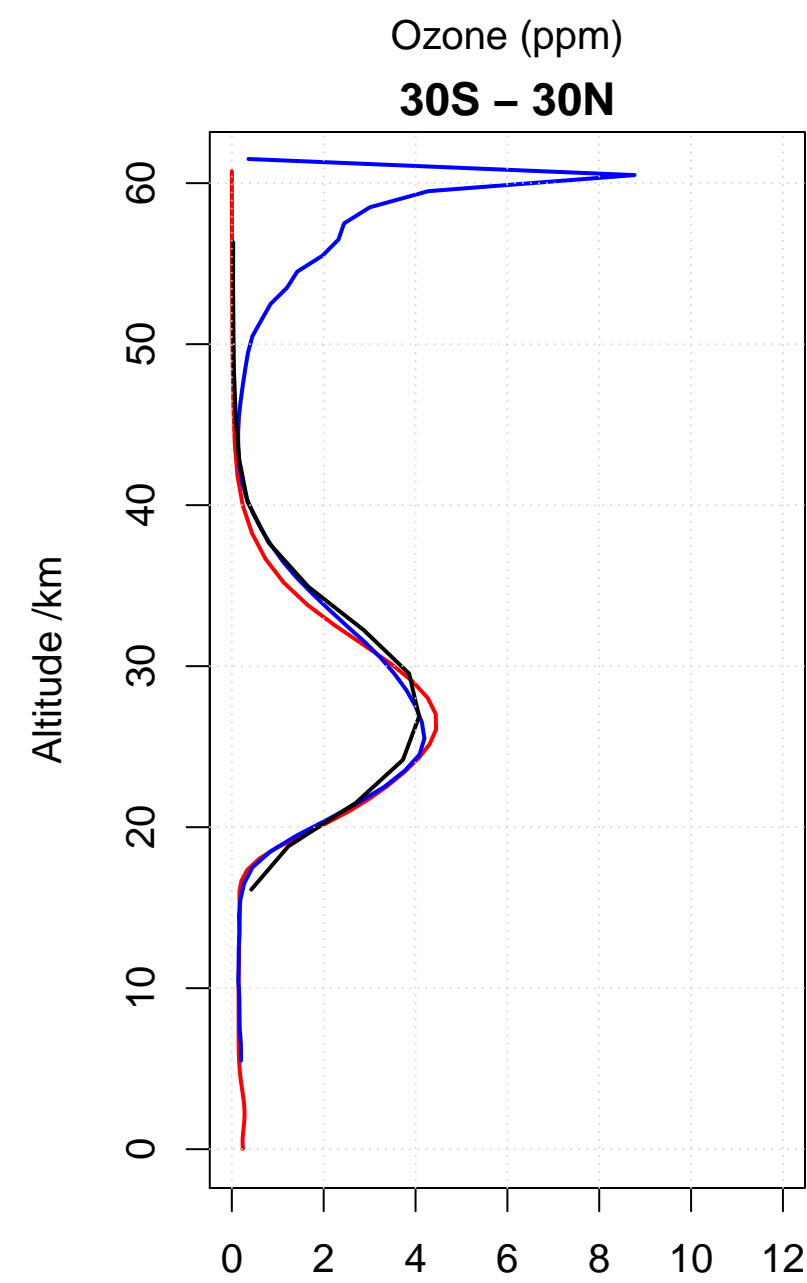
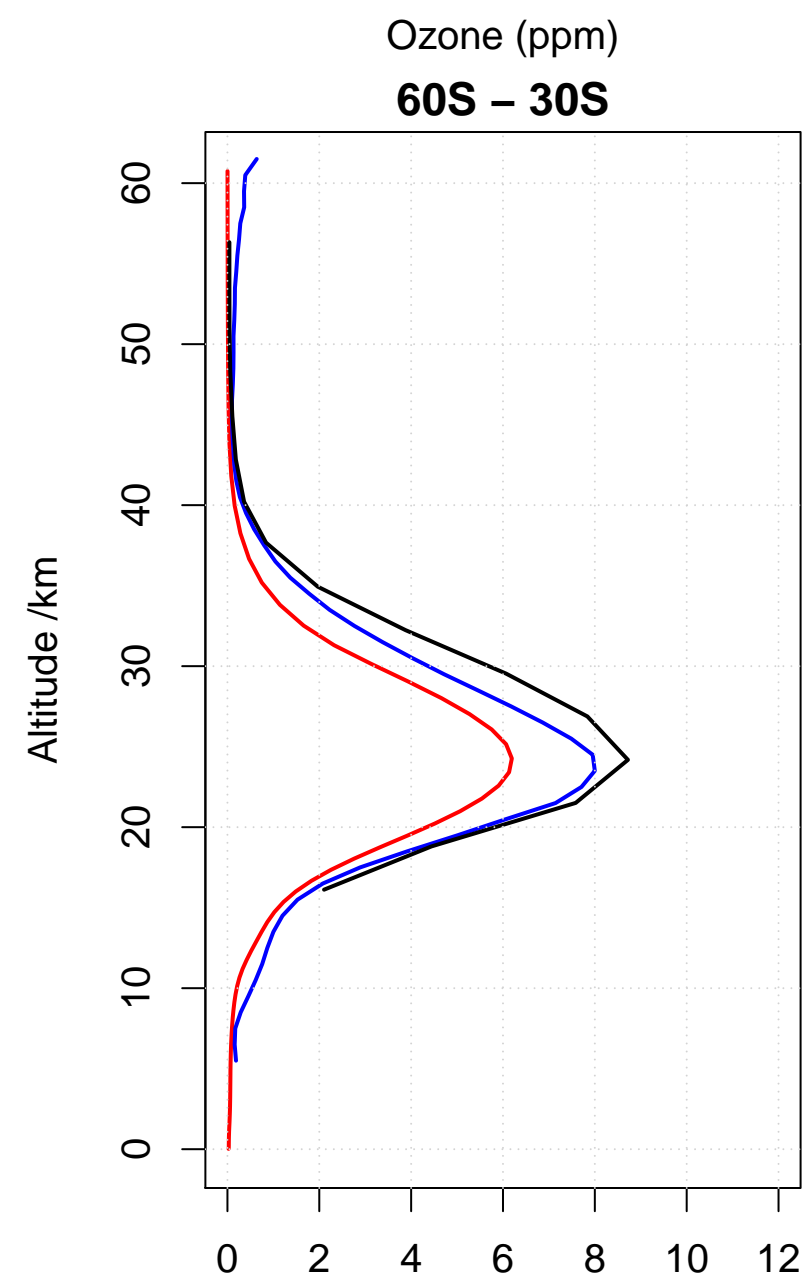
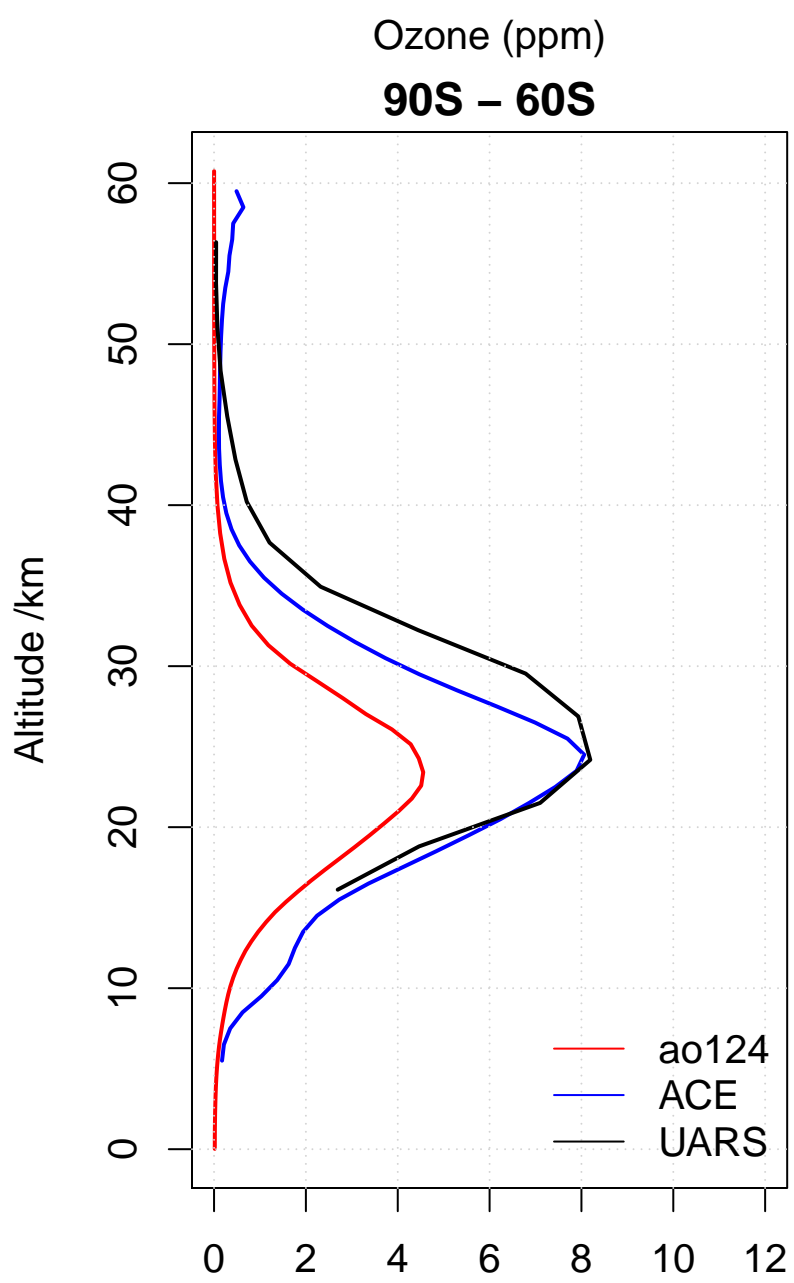
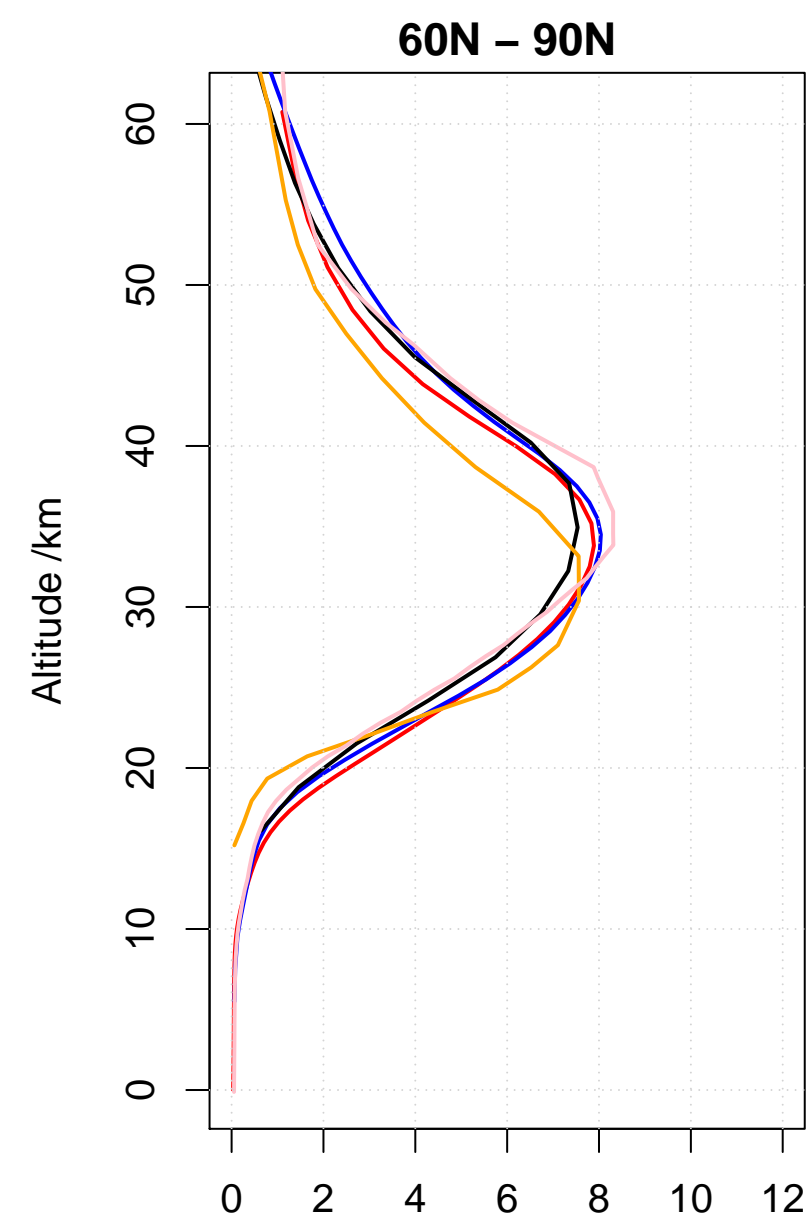
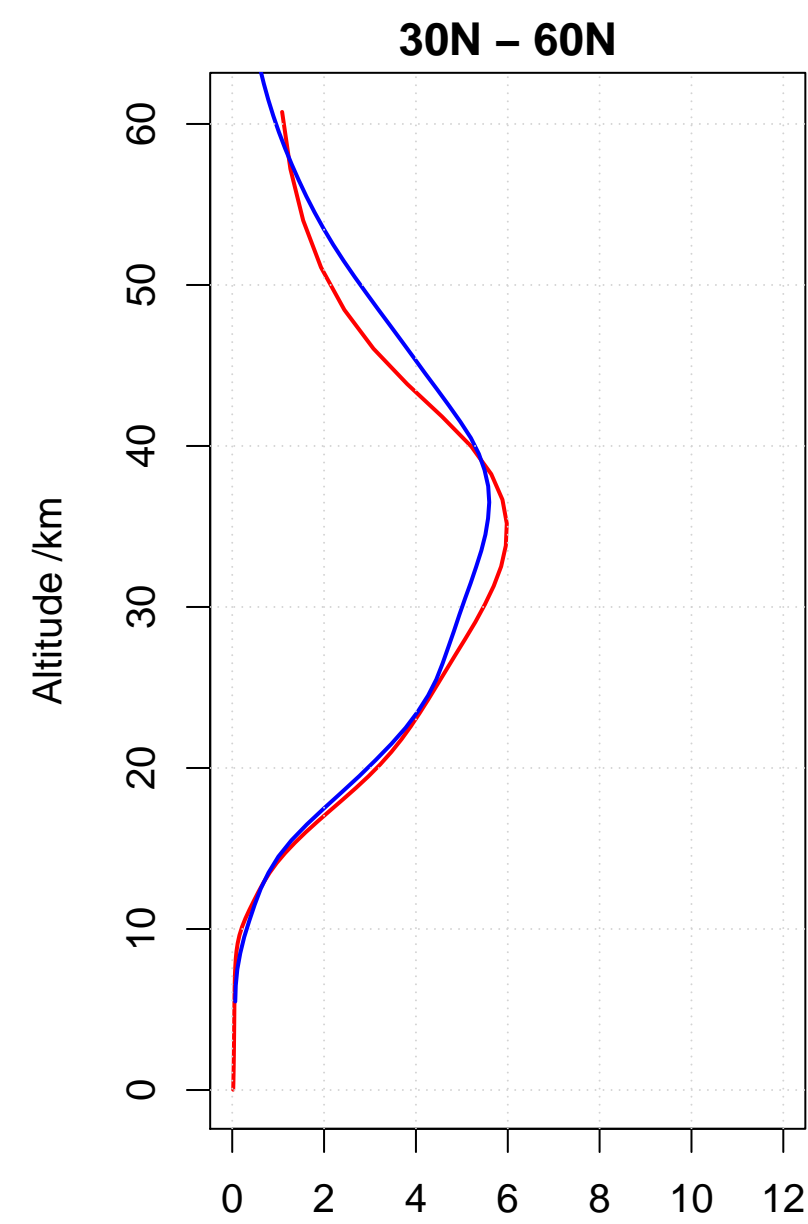
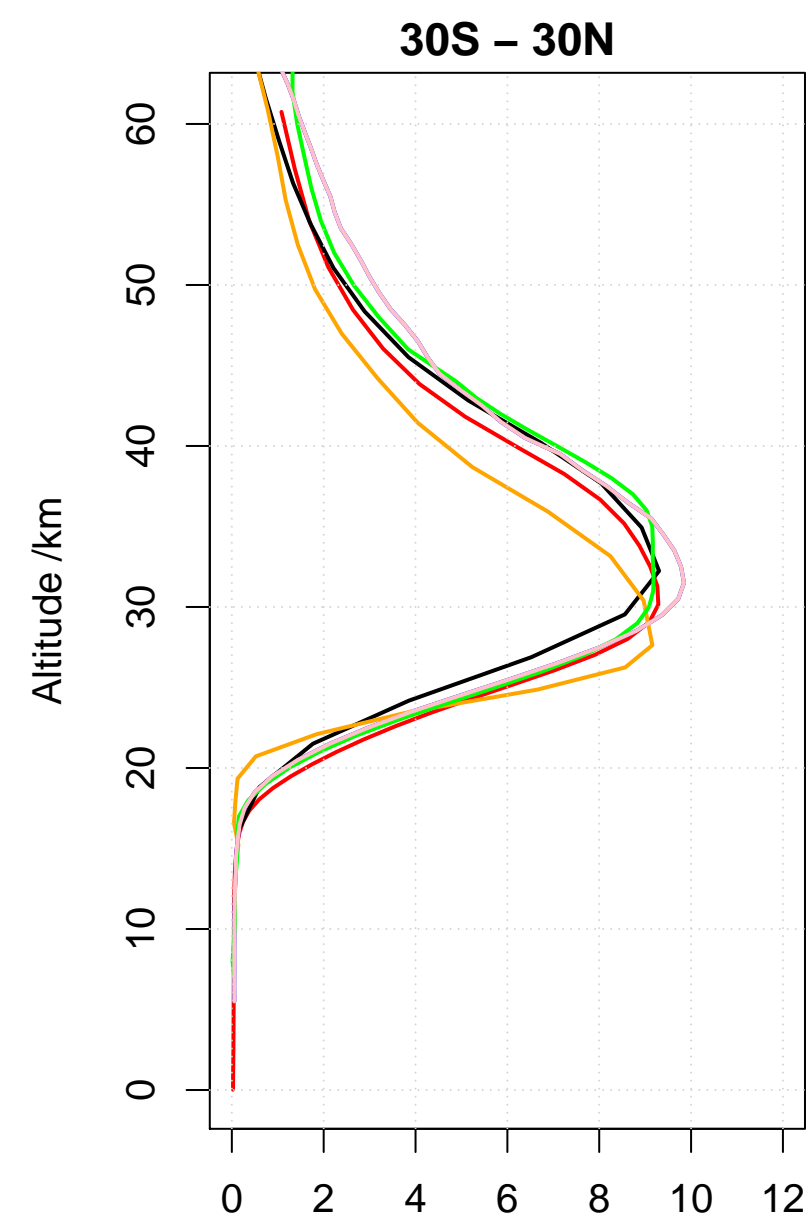
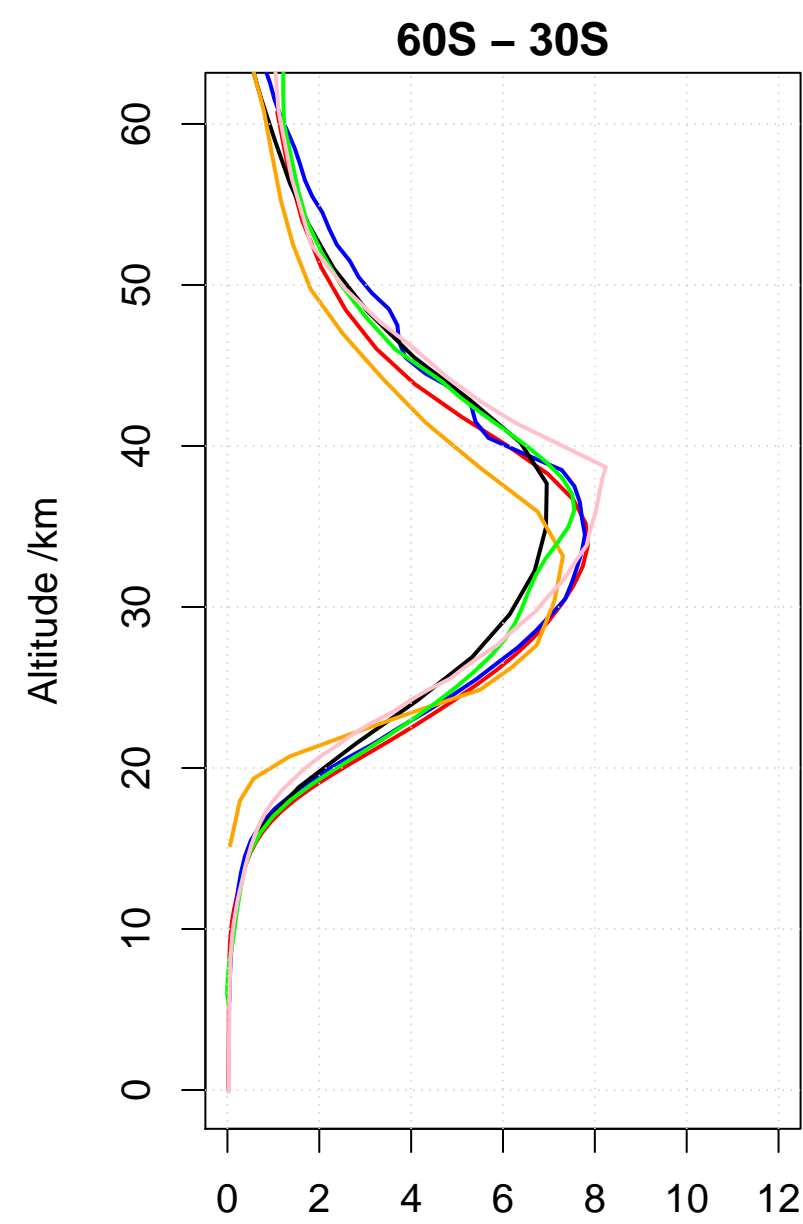
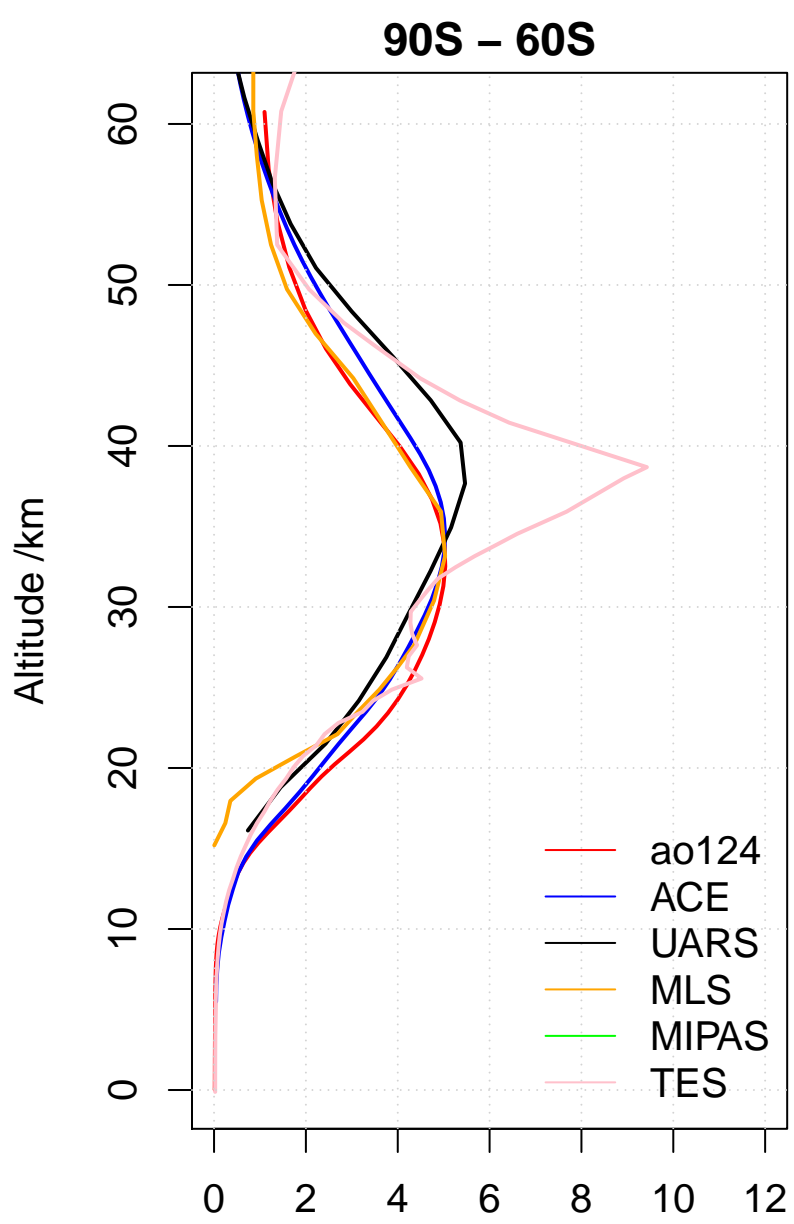
TRACE-A W-Africa Coast 1992 09
Lat -25 – -5 Lon 0 – 10

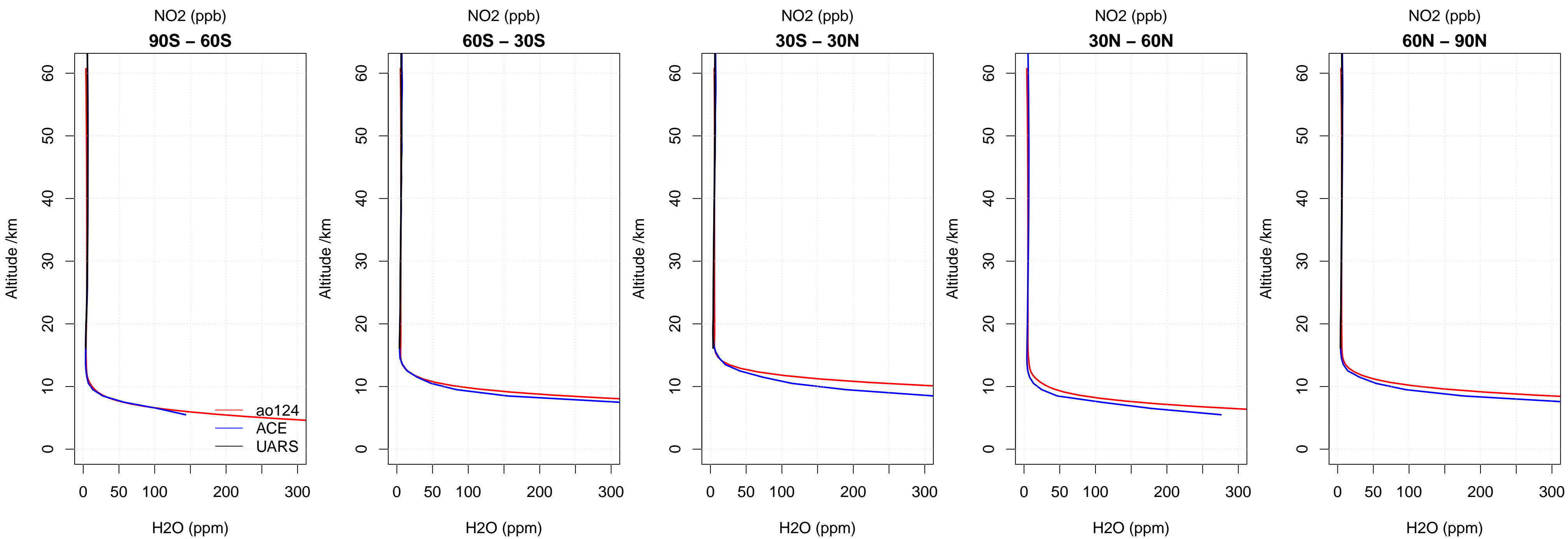
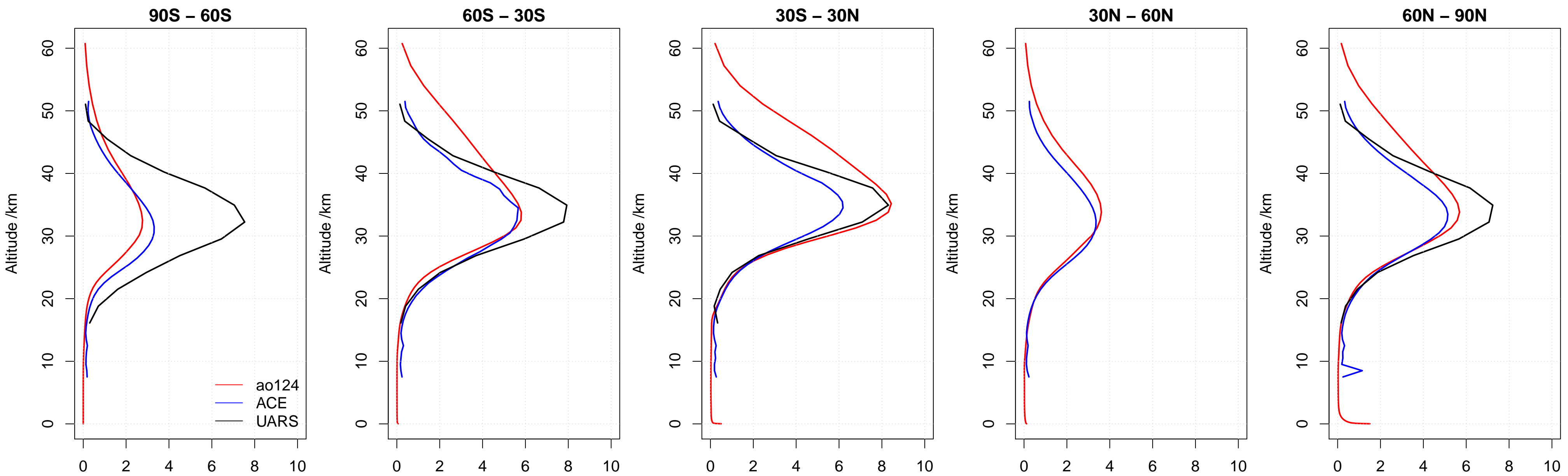


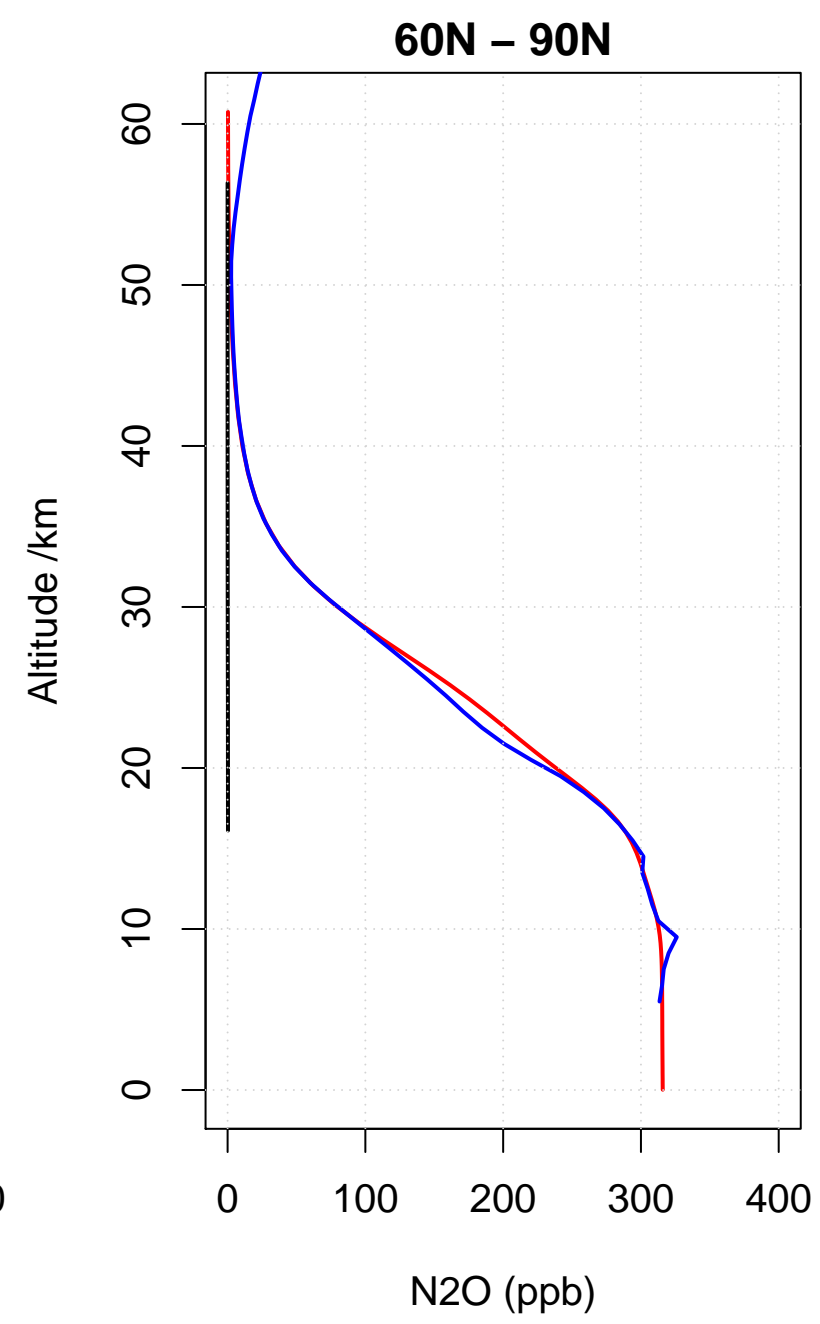
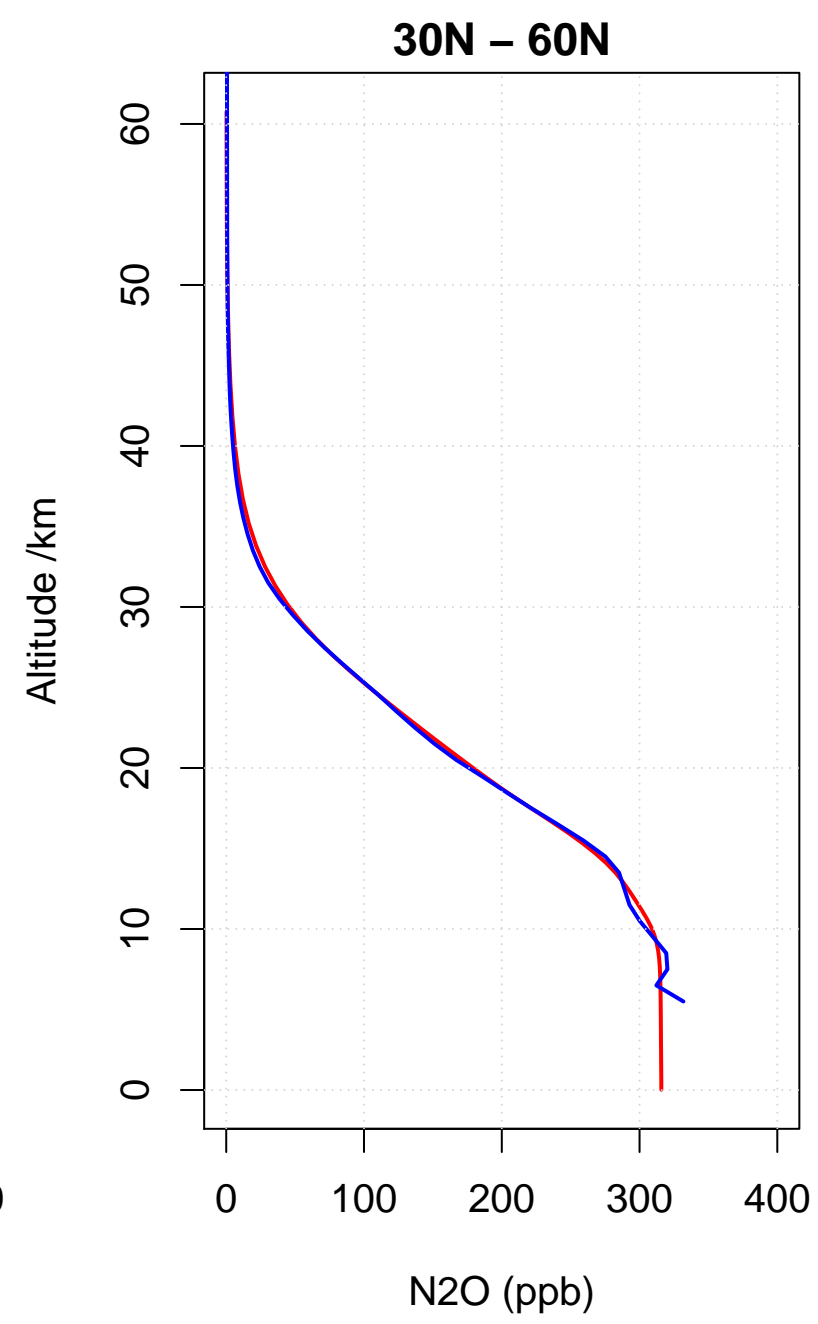
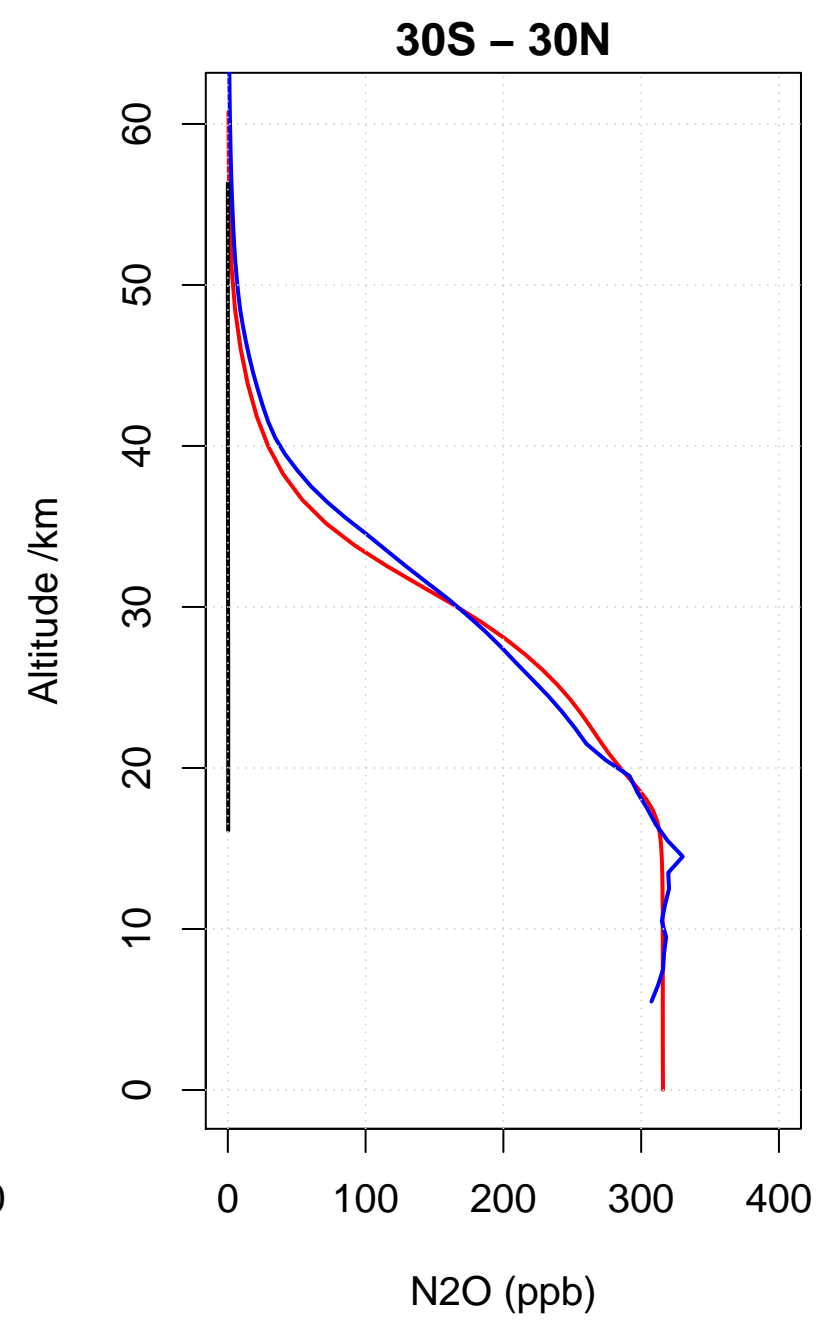
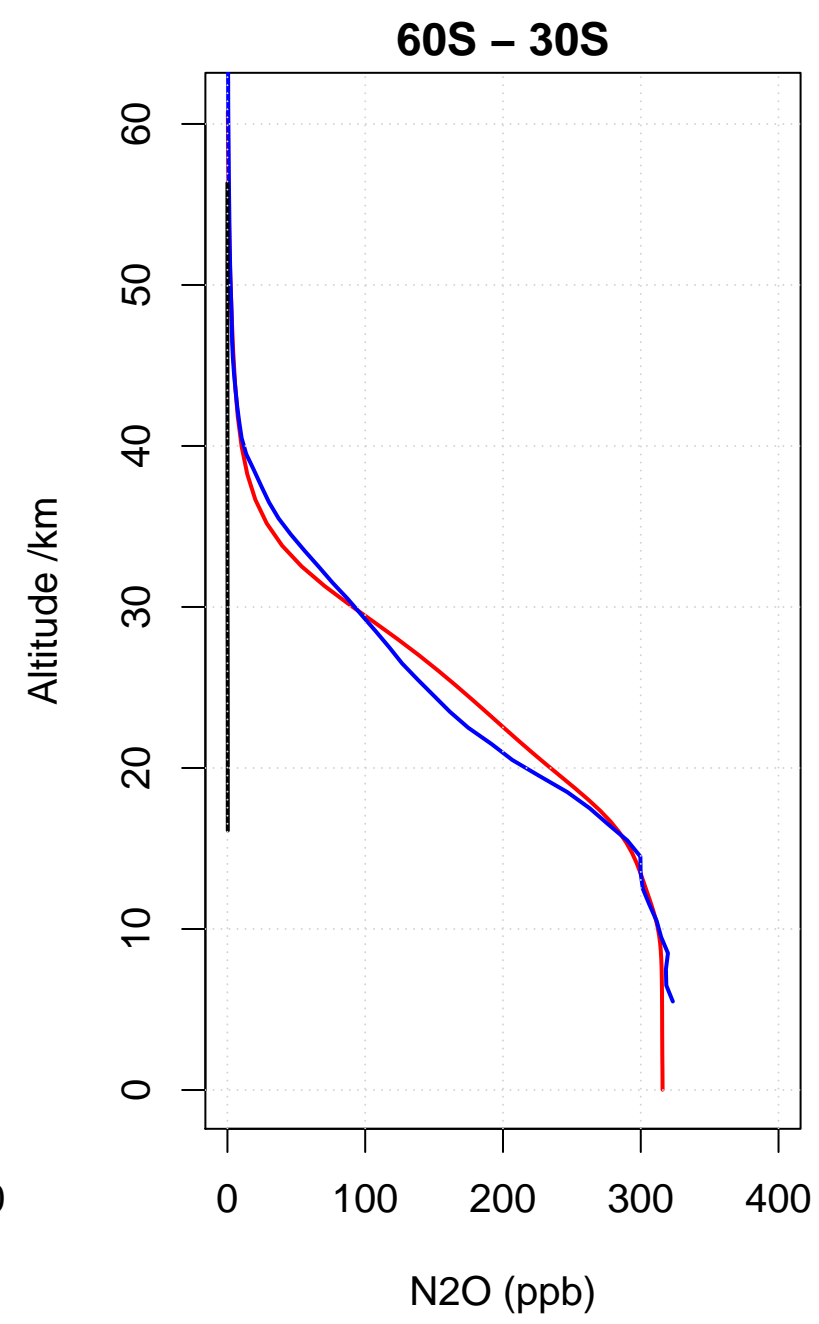
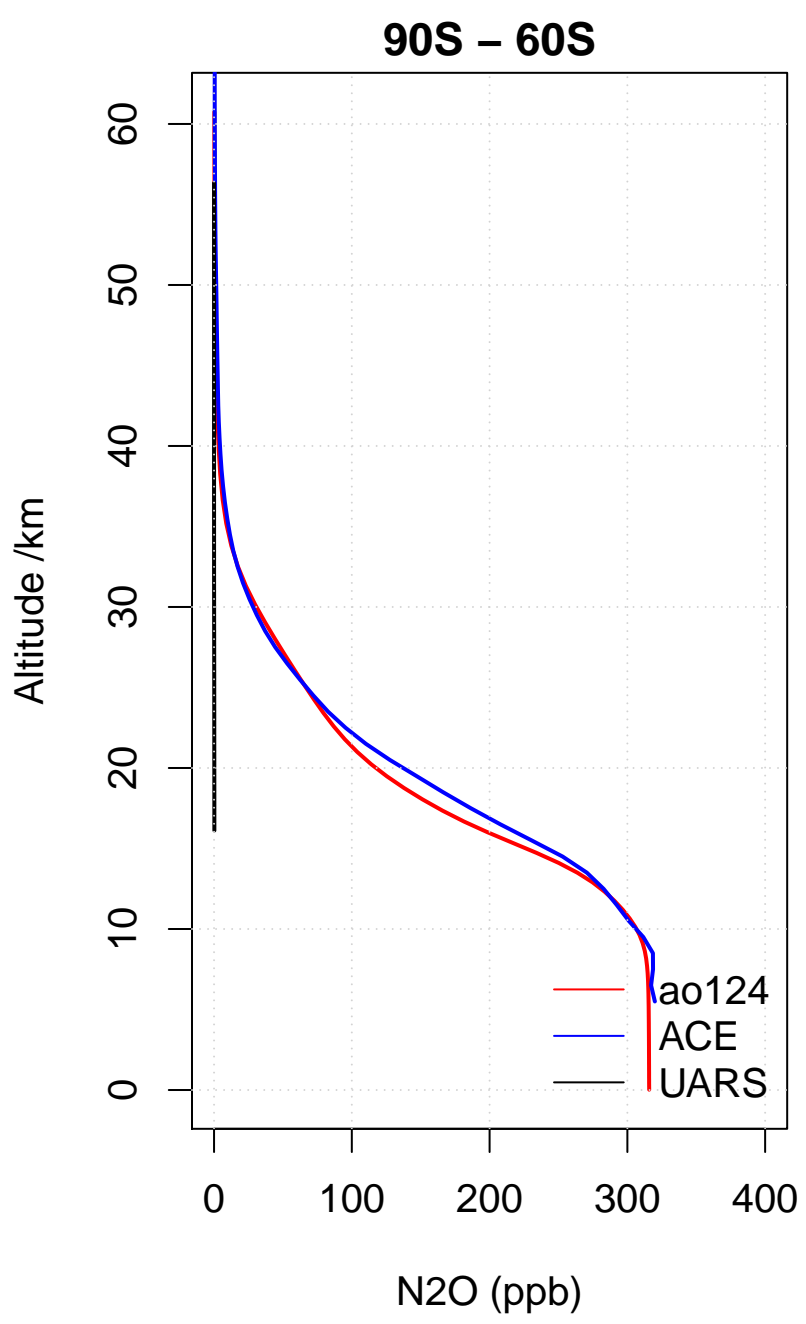






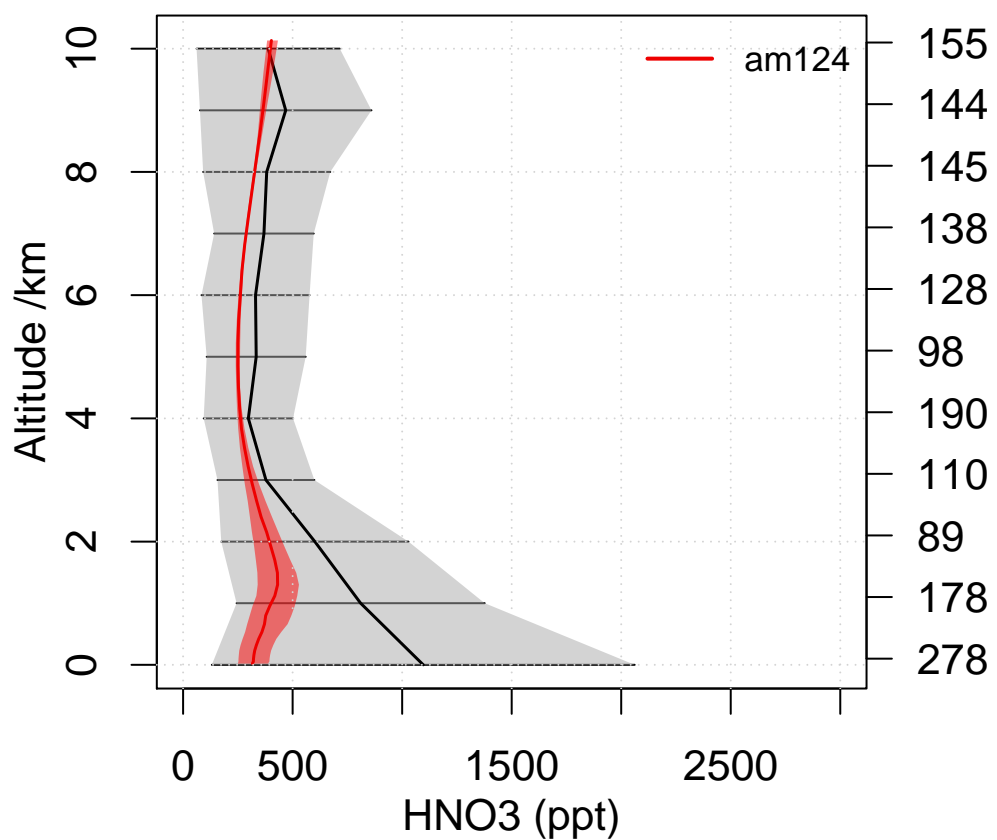




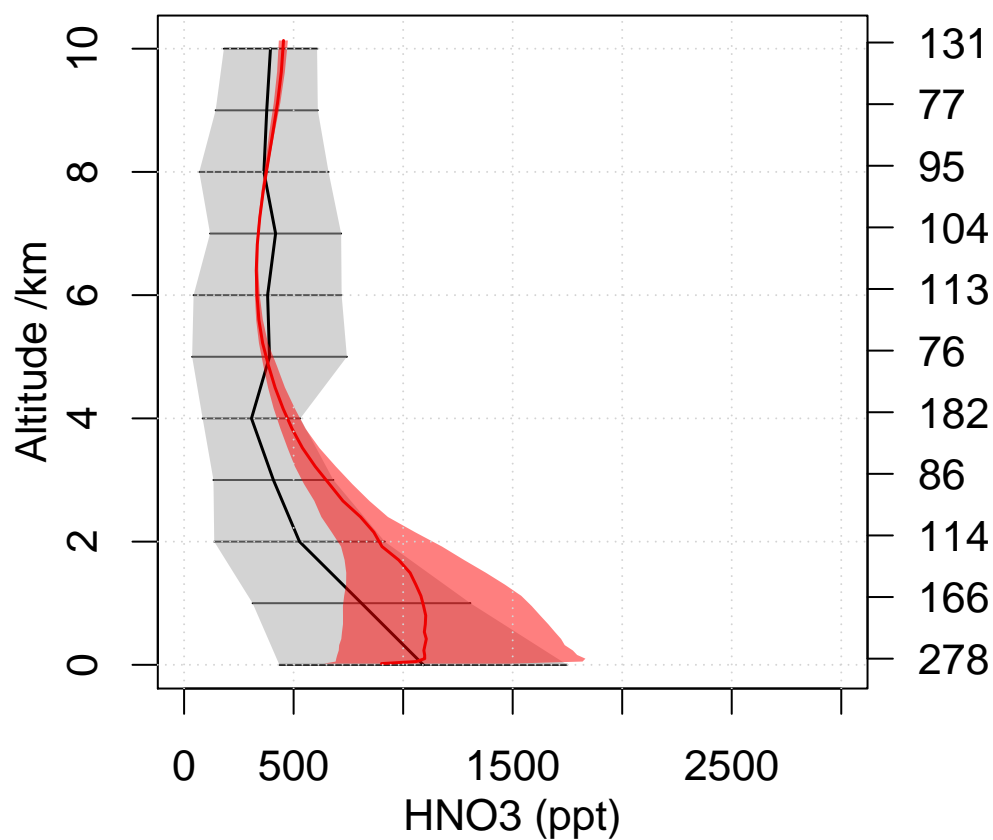


Emmons HNO3 comparison

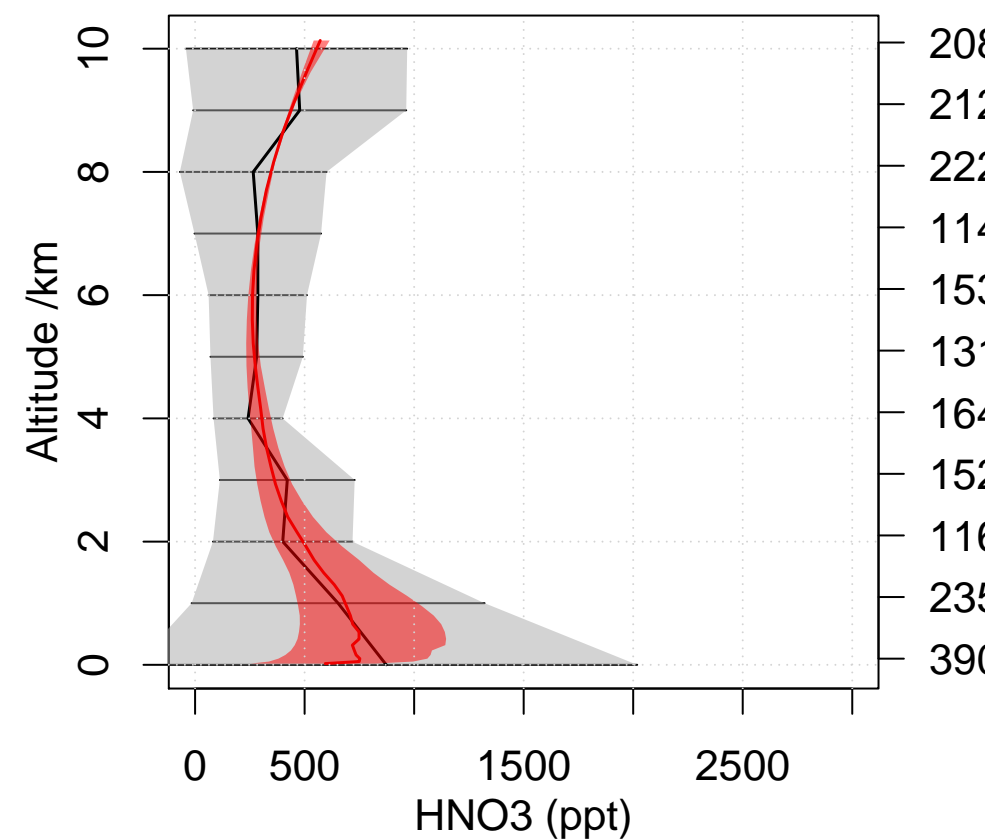
INTEX-NA East Coast 2004 07
Lat 32.5 – 40 Lon 296.5 – 307



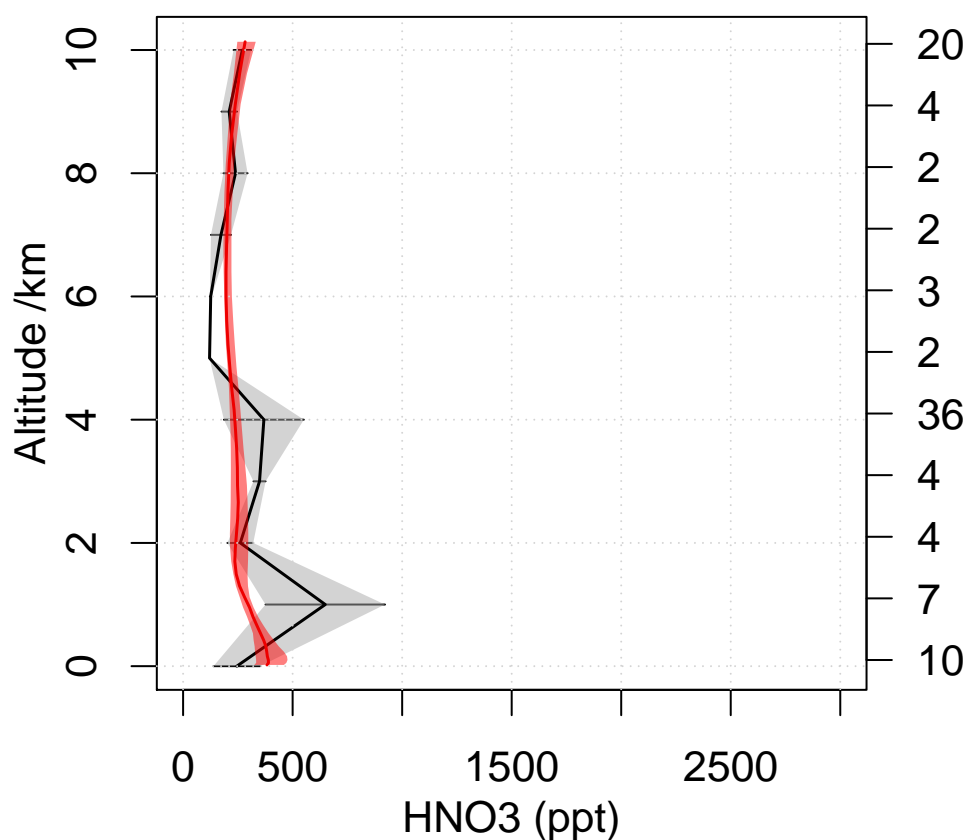
INTEX-NA Central 2004 07
Lat 30 – 40 Lon 259.5 – 285



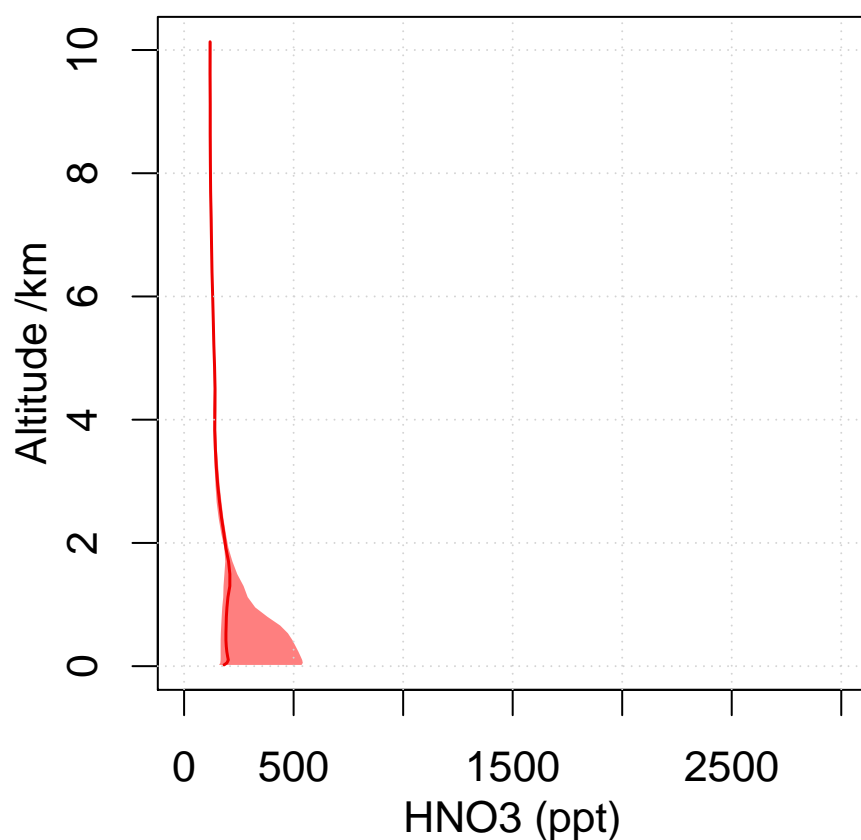
INTEX-NA North East 2004 07
Lat 42.5 – 52.5 Lon 285 – 310



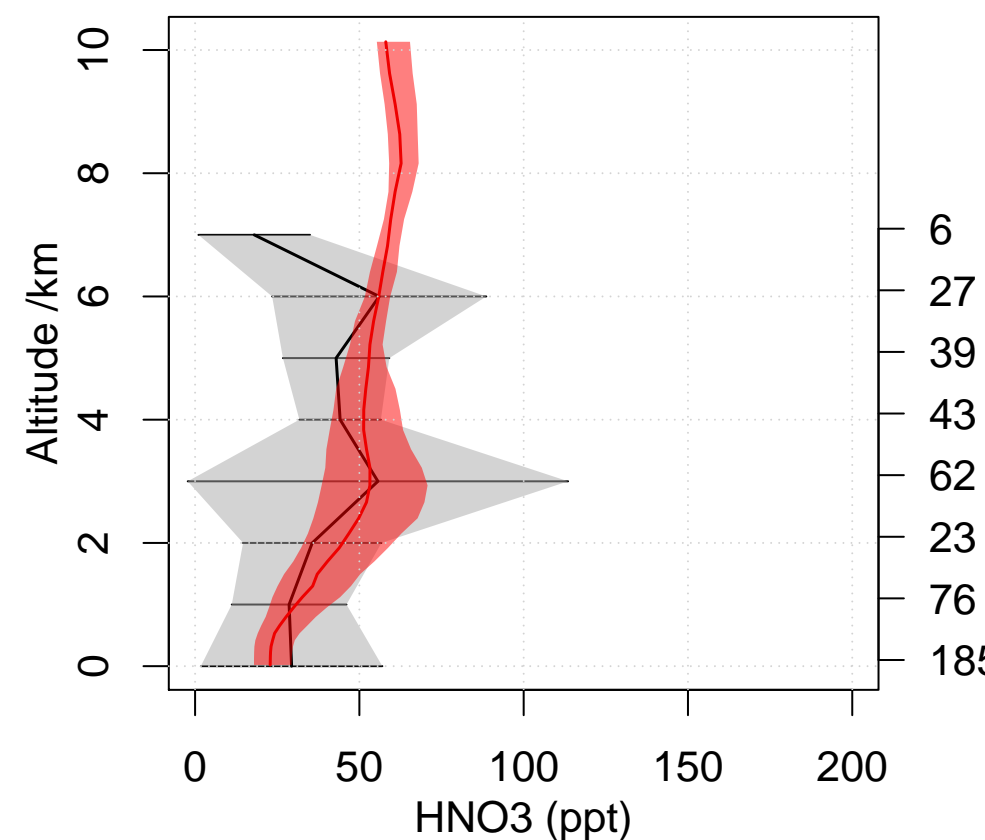
INTEX-NA West Coast 2004 07
Lat 32.5 – 45 Lon 217 – 240



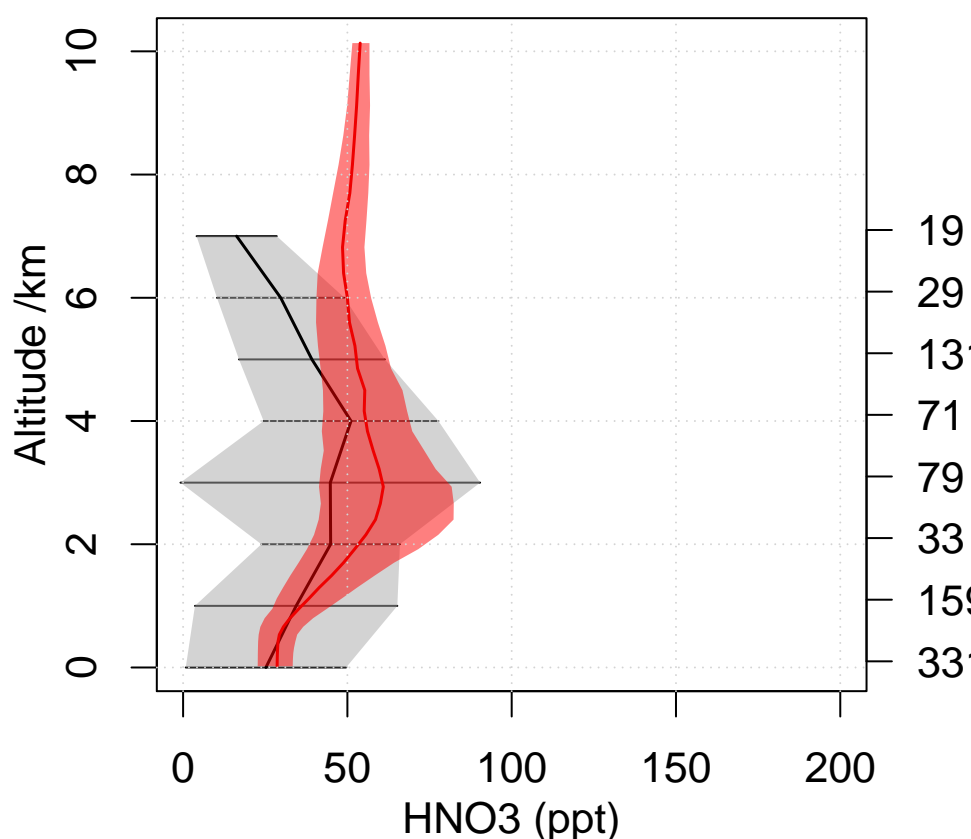
OP3 2008 07
Lat 2.5 – 7.5 Lon 112.5 – 120



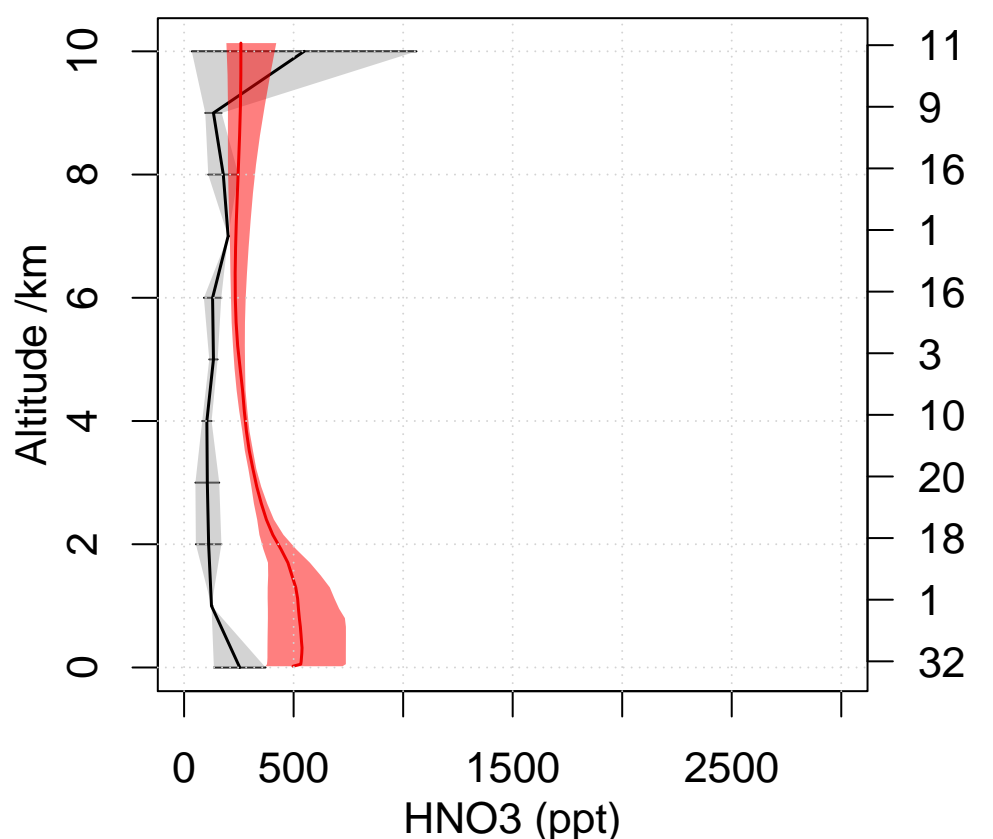
PEM-Tropics-B Christmas-Island 1999 07
Lat 0 – 10 Lon 200 – 220



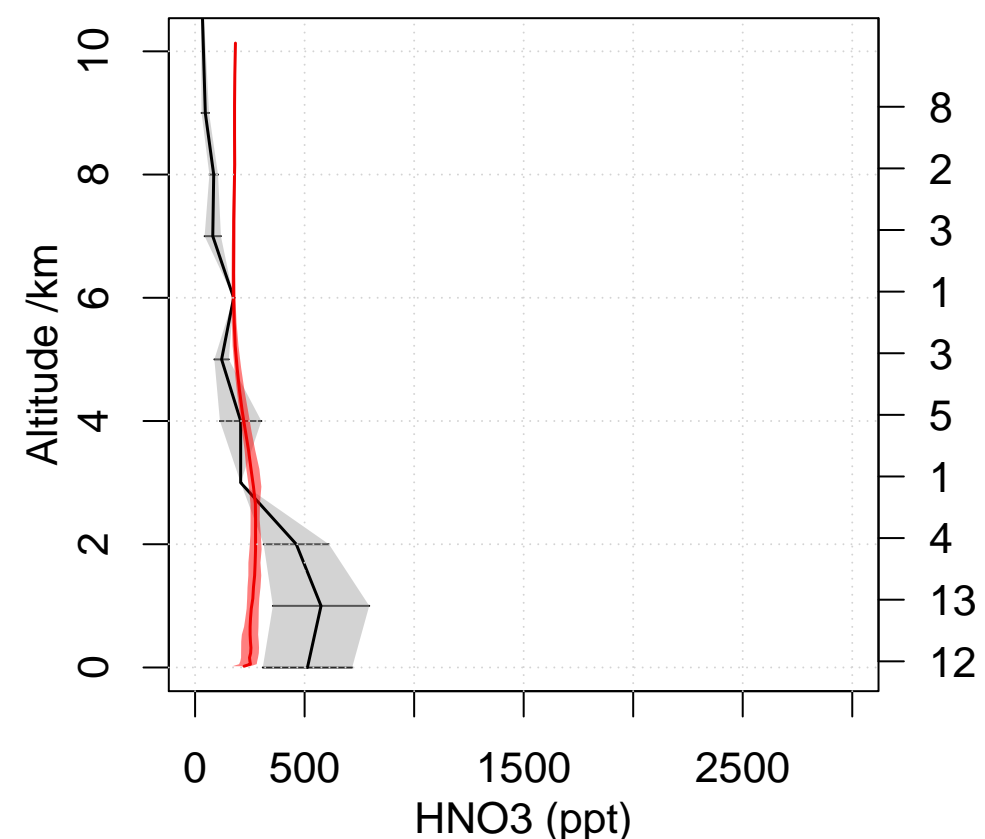
PEM-Tropics-B Tahiti 1999 03
Lat -20 – 0 Lon 200 – 230



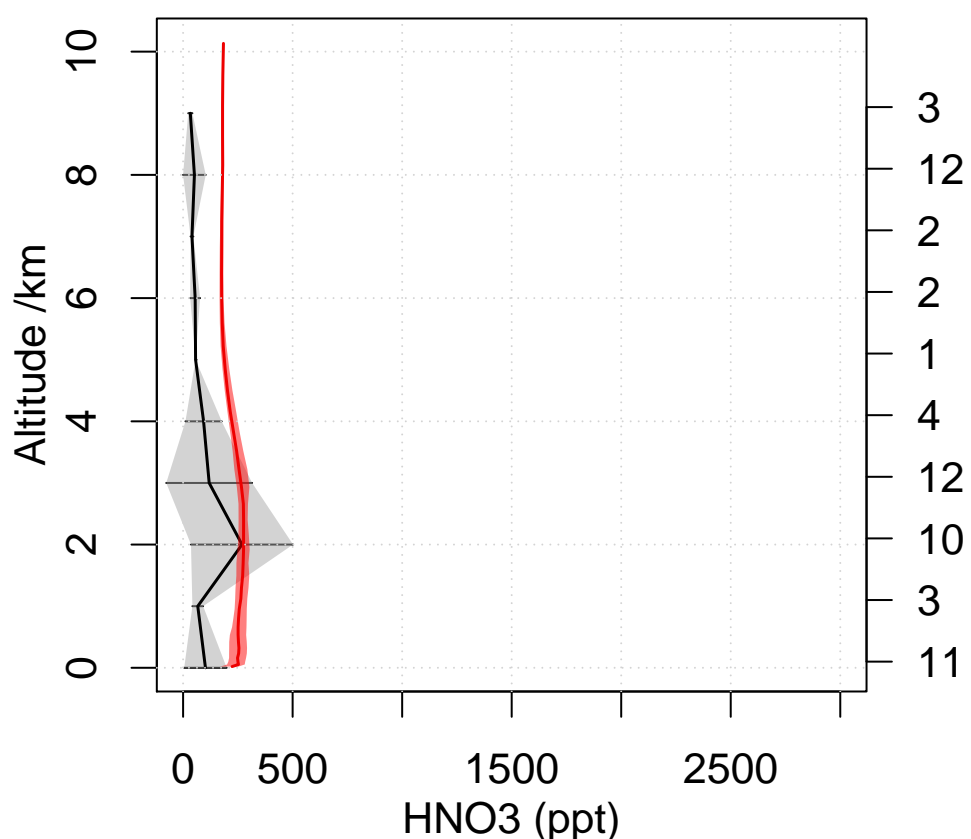
PEM-West-B Japan 1994 02
Lat 25 – 40 Lon 135 – 150



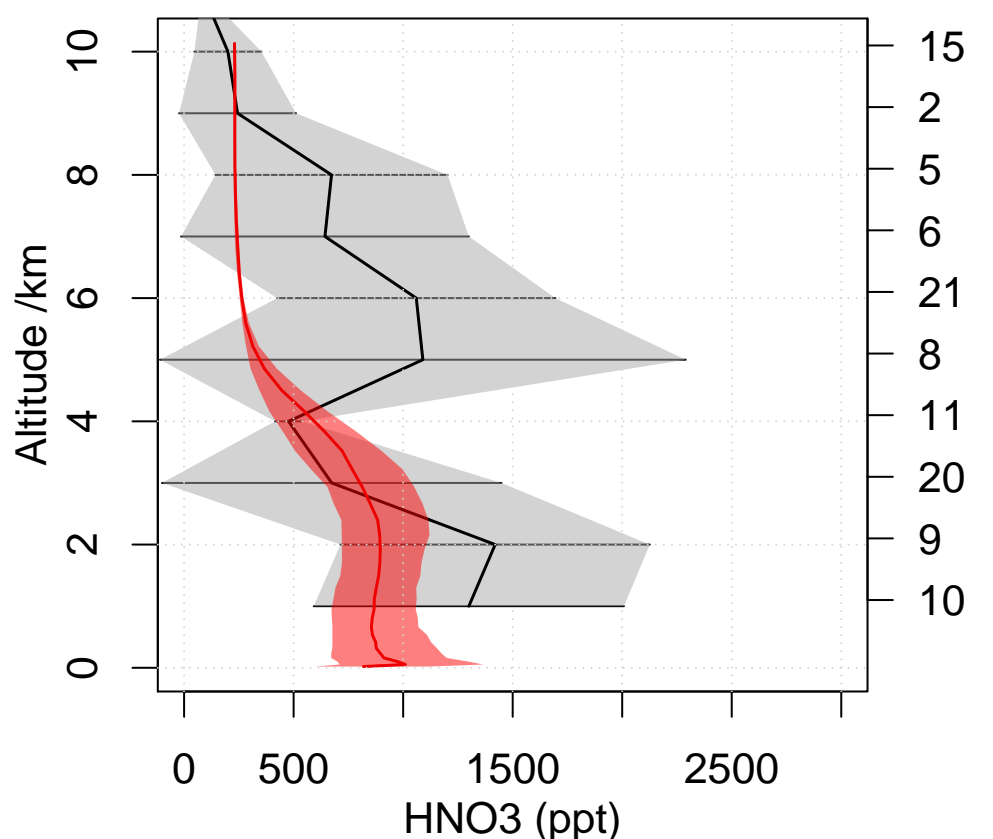
TRACE-A E-Brazil 1992 09
Lat -15 – -5 Lon 310 – 320



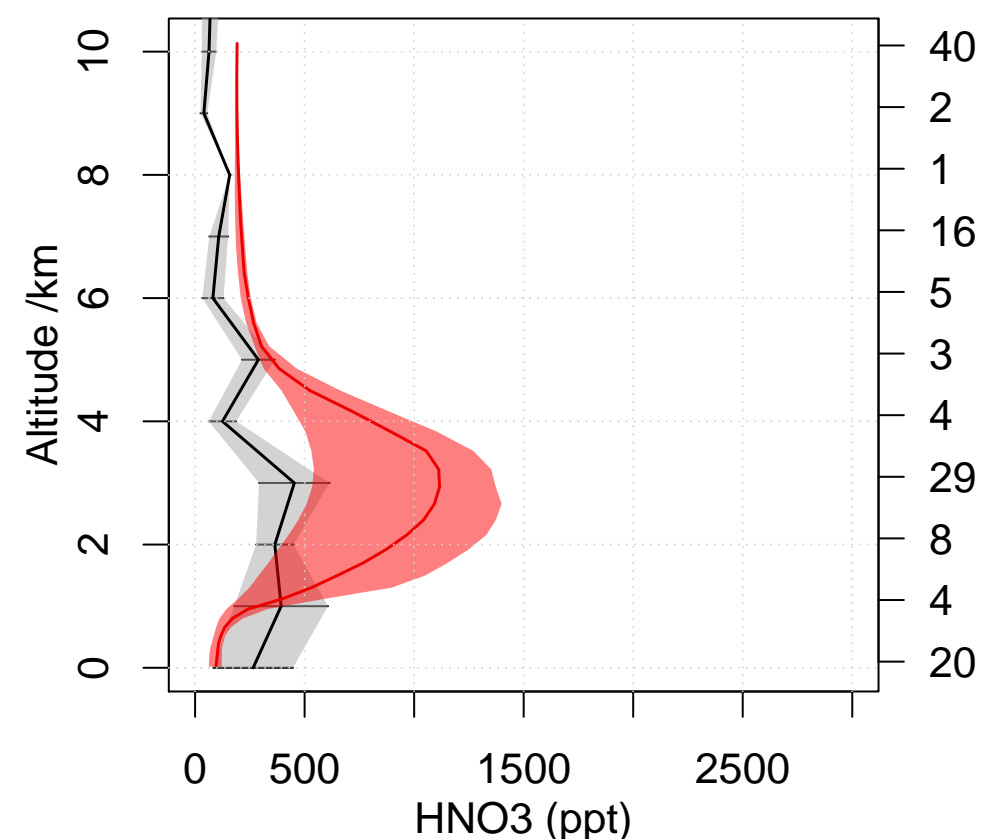
TRACE-A E-Brazil Coast 1992 09
Lat -35 – -25 Lon 310 – 320



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

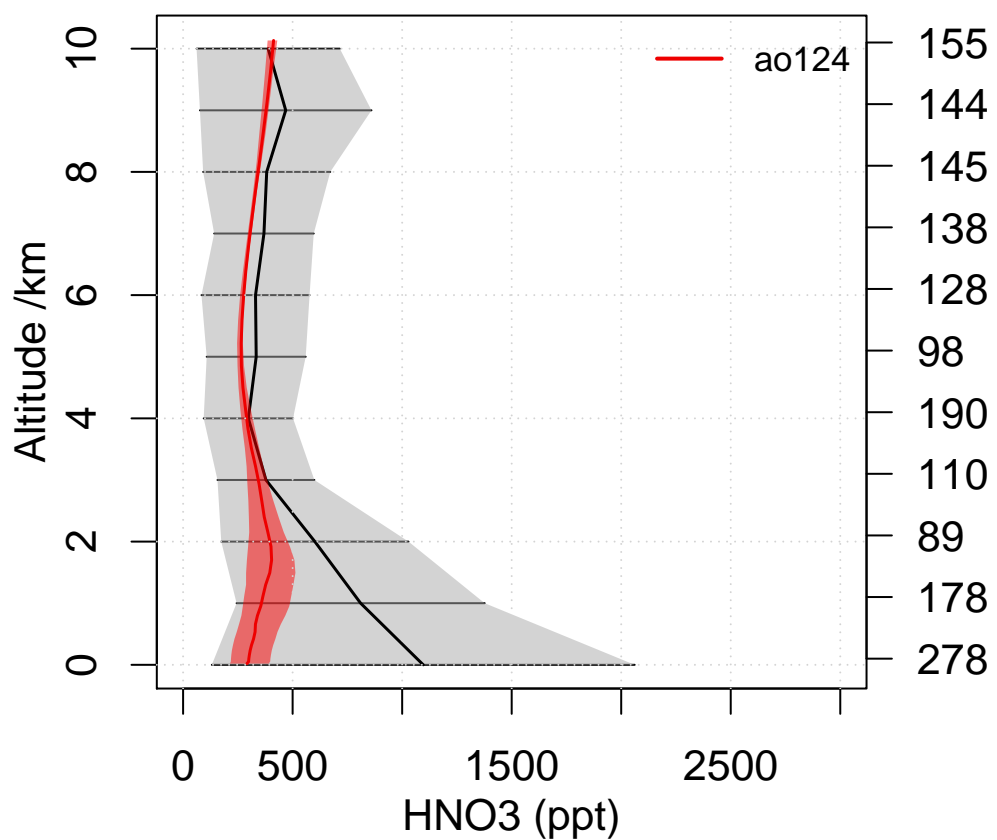


TRACE-A W-Africa Coast 1992 09
Lat -25 – -5 Lon 0 – 10

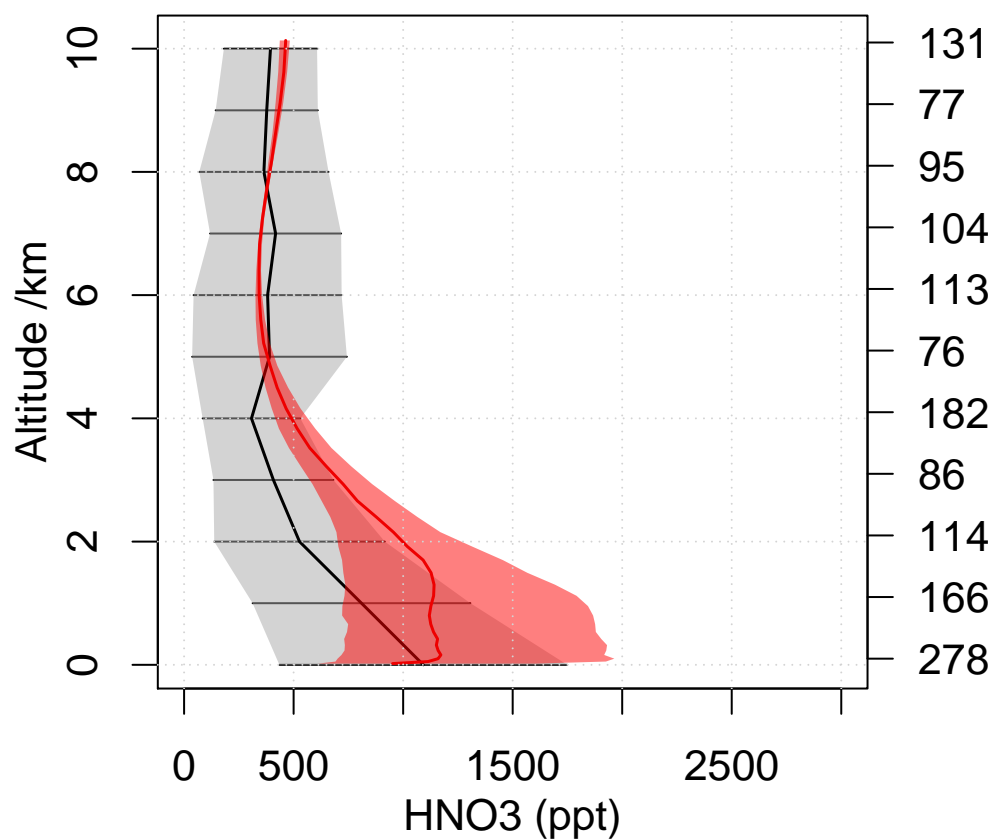


Emmons HNO3 comparison

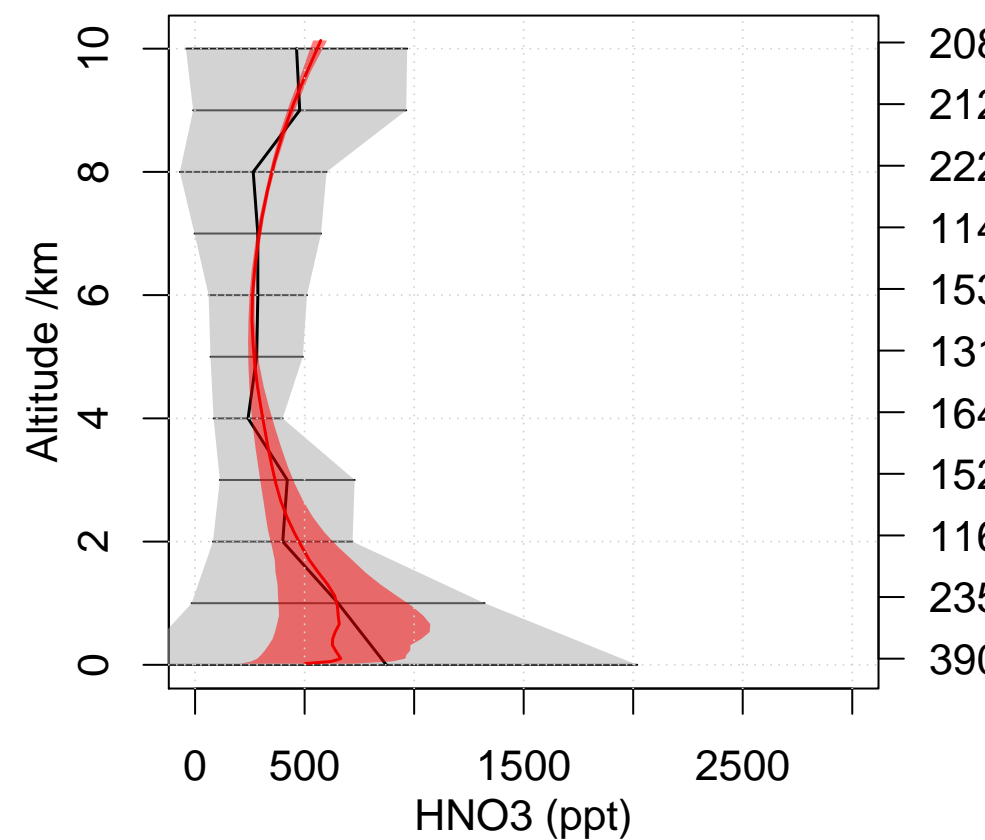
INTEX-NA East Coast 2004 07
Lat 32.5 – 40 Lon 296.5 – 307



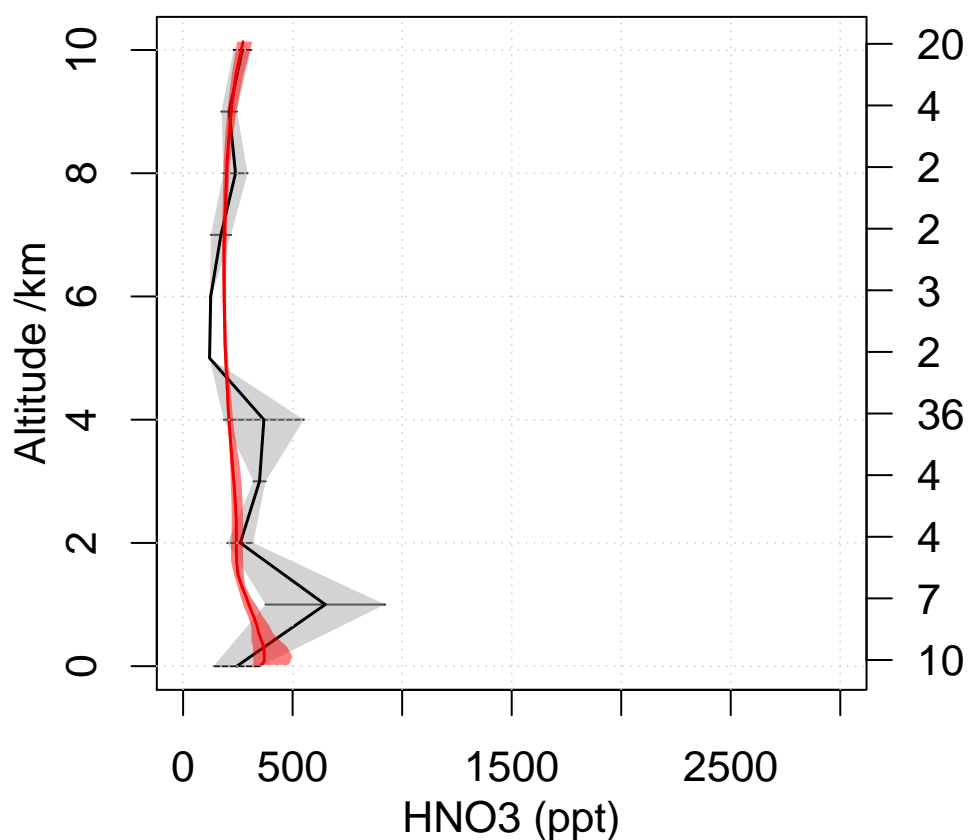
INTEX-NA Central 2004 07
Lat 30 – 40 Lon 259.5 – 285



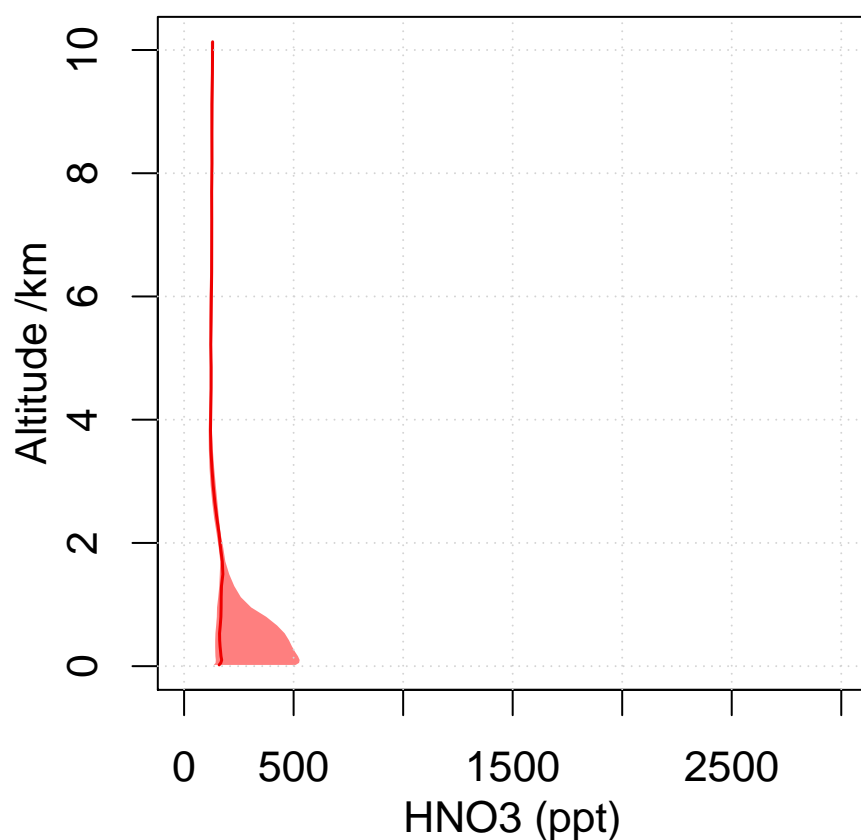
INTEX-NA North East 2004 07
Lat 42.5 – 52.5 Lon 285 – 310



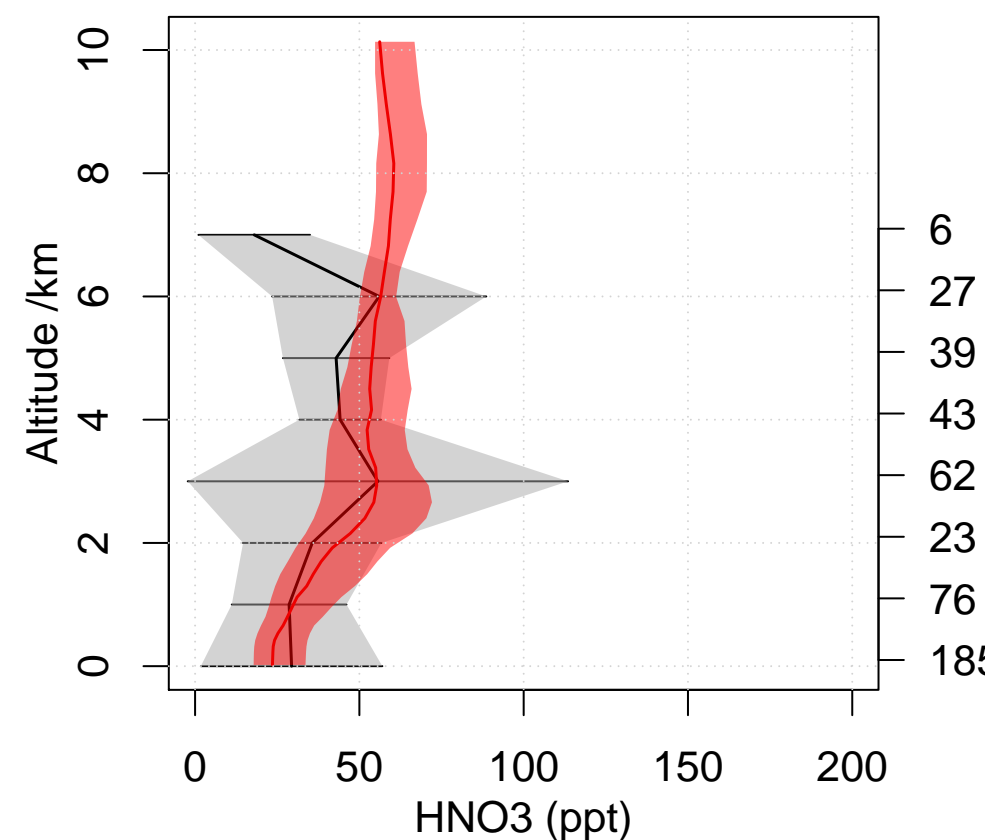
INTEX-NA West Coast 2004 07
Lat 32.5 – 45 Lon 217 – 240



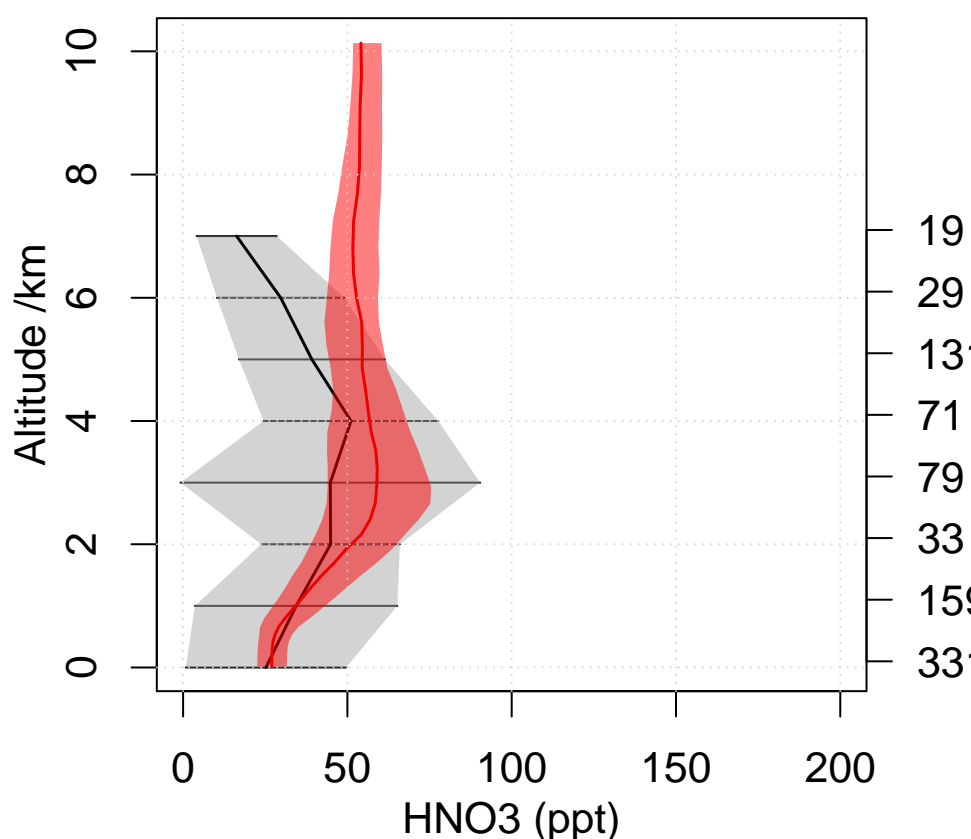
OP3 2008 07
Lat 2.5 – 7.5 Lon 112.5 – 120



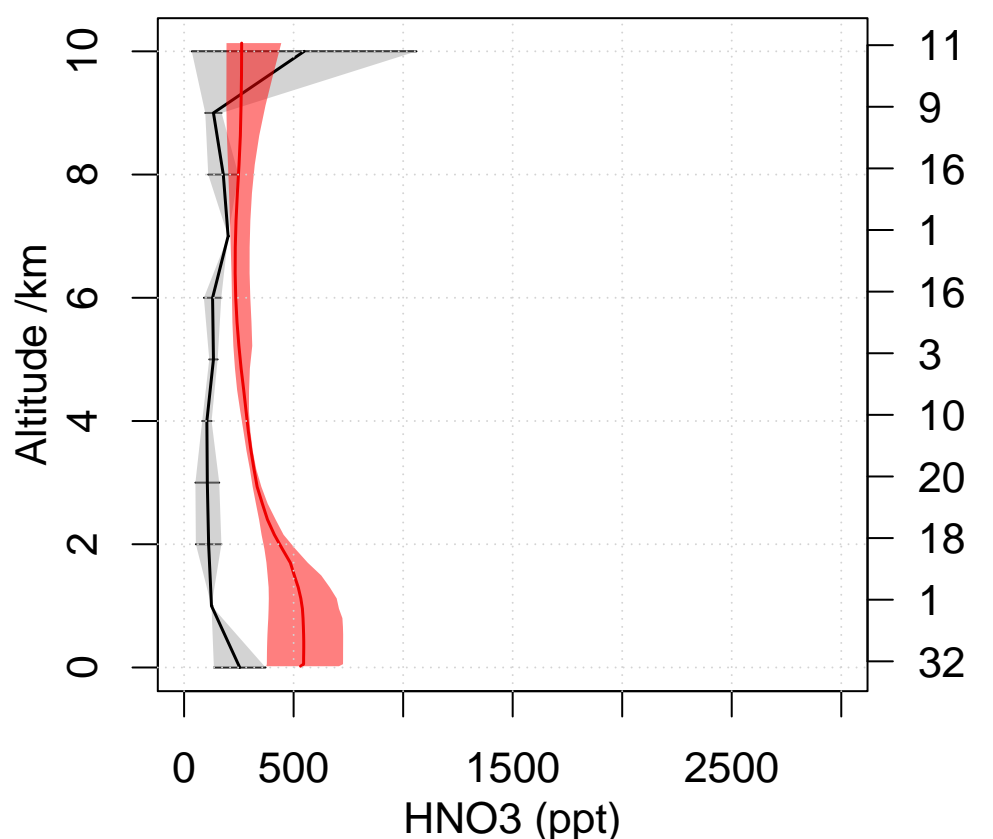
PEM-Tropics-B Christmas-Island 1999 07
Lat 0 – 10 Lon 200 – 220



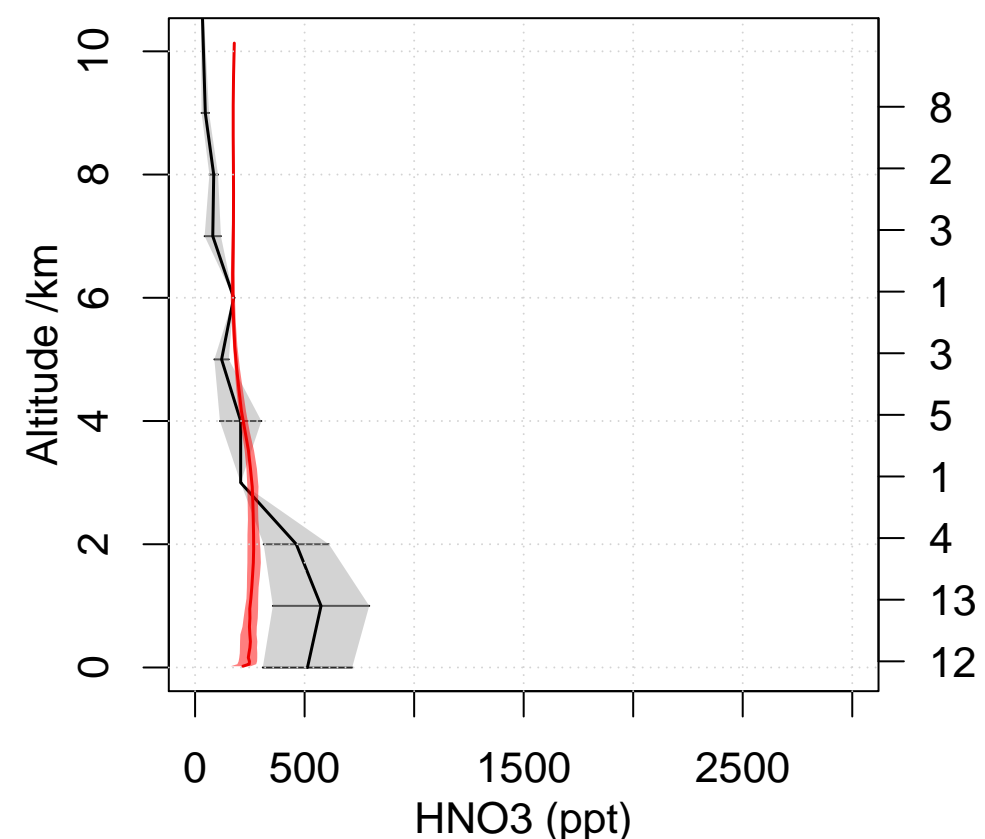
PEM-Tropics-B Tahiti 1999 03
Lat -20 – 0 Lon 200 – 230



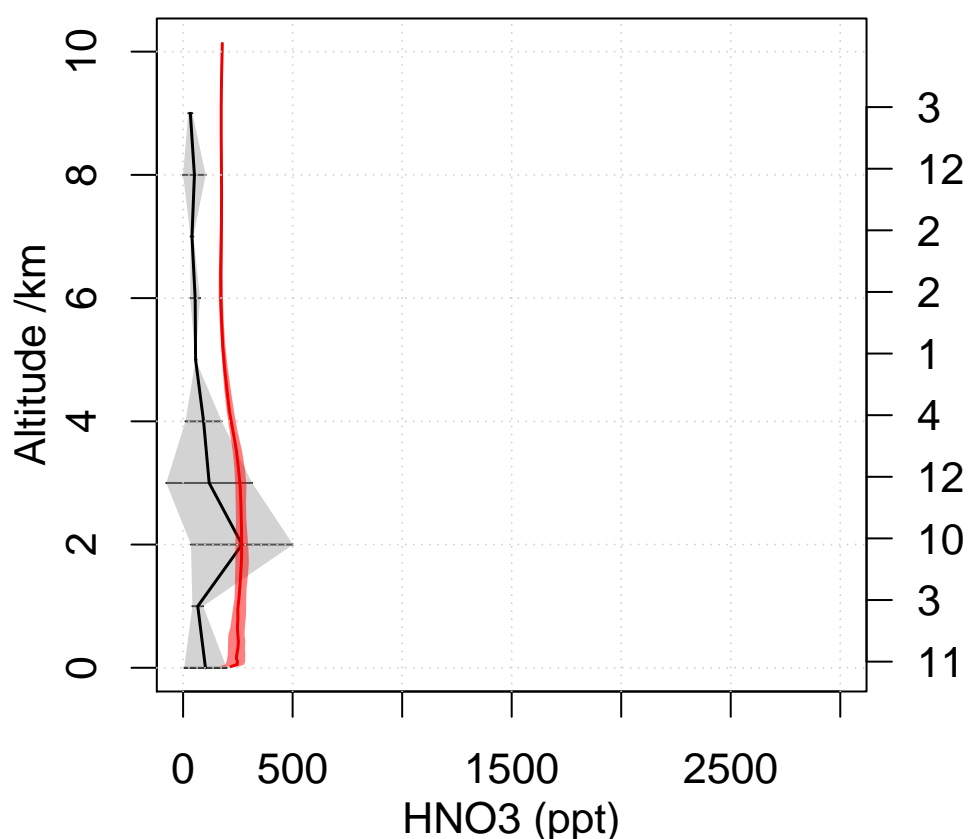
PEM-West-B Japan 1994 02
Lat 25 – 40 Lon 135 – 150



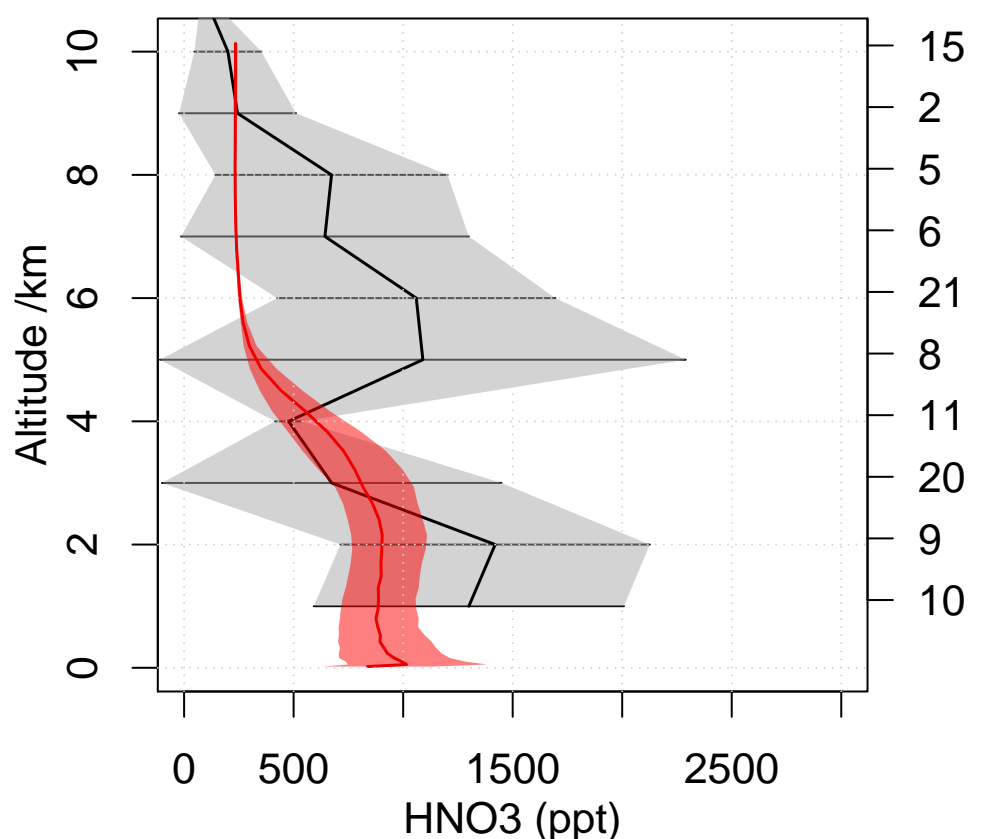
TRACE-A E-Brazil 1992 09
Lat -15 – -5 Lon 310 – 320



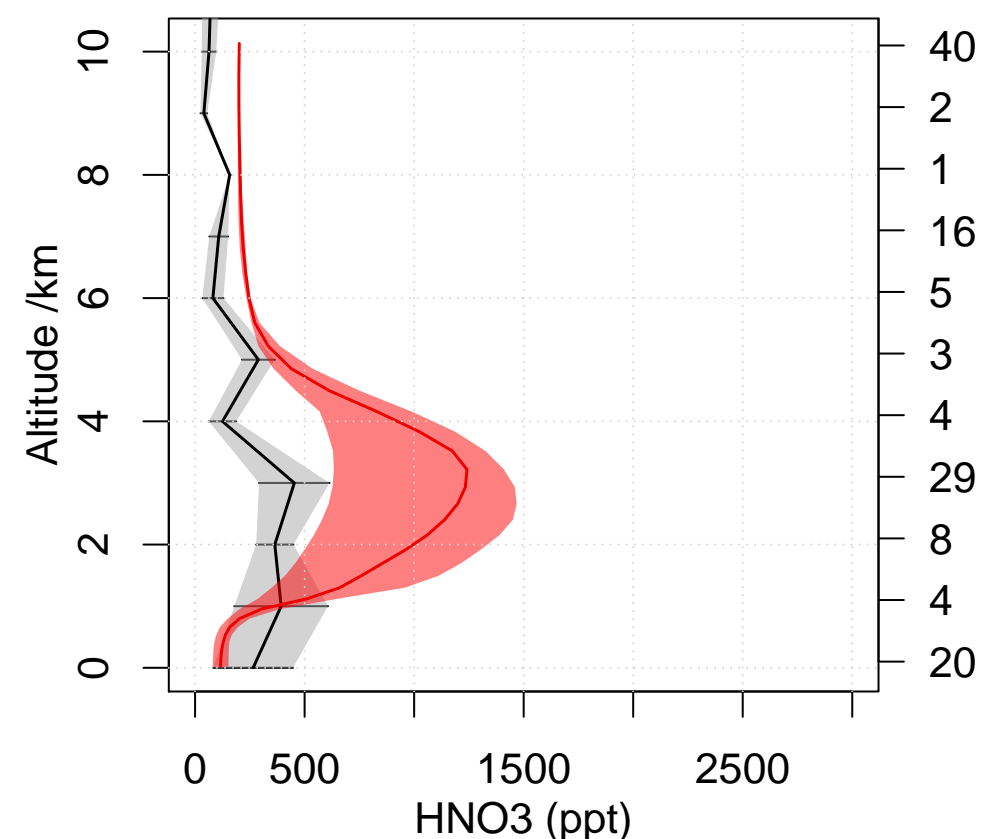
TRACE-A E-Brazil Coast 1992 09
Lat -35 – -25 Lon 310 – 320



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

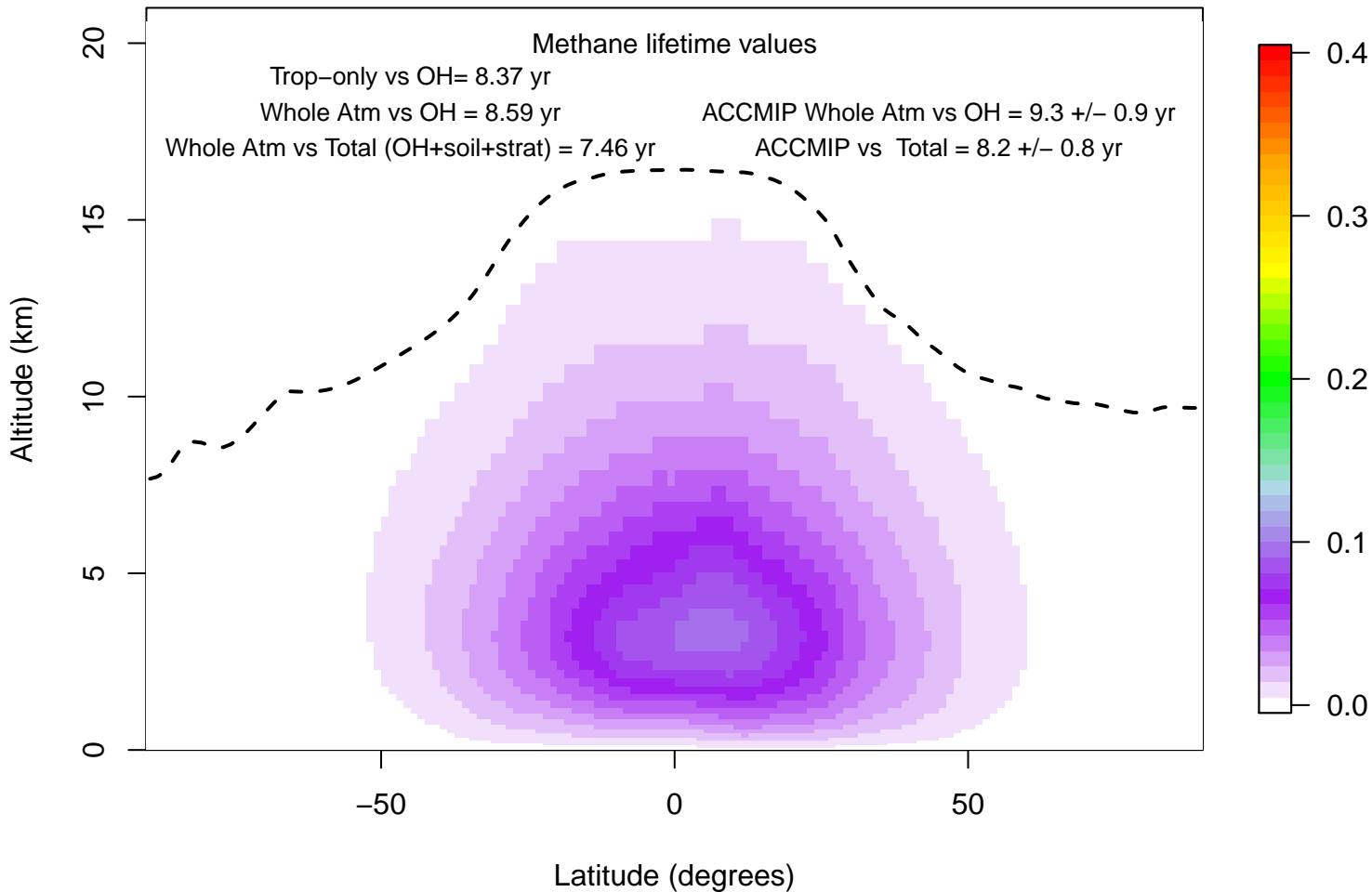


TRACE-A W-Africa Coast 1992 09
Lat -25 – -5 Lon 0 – 10



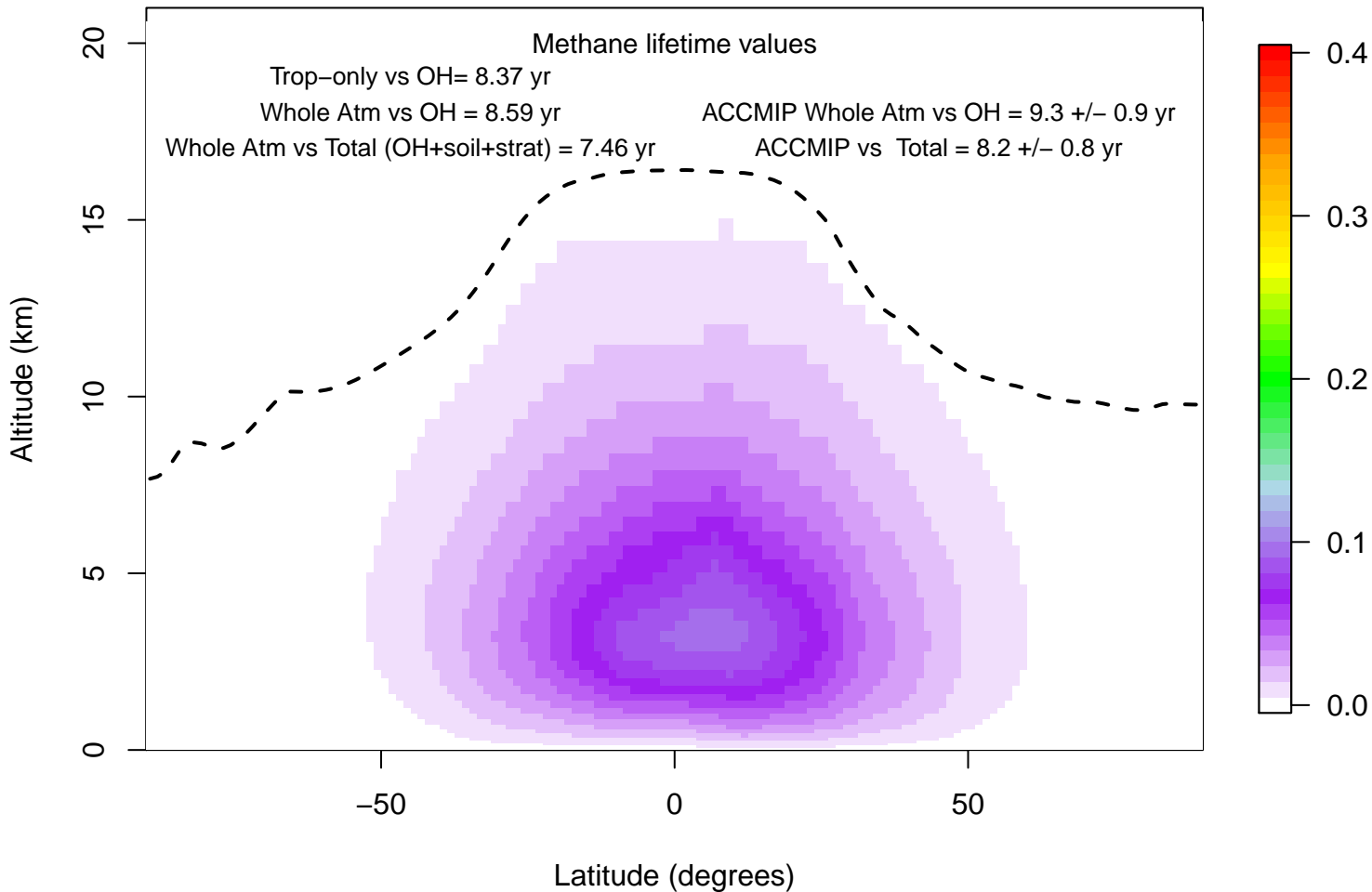
UKCA am124

% CH₄ + OH flux (moles cm⁻³ s⁻¹)



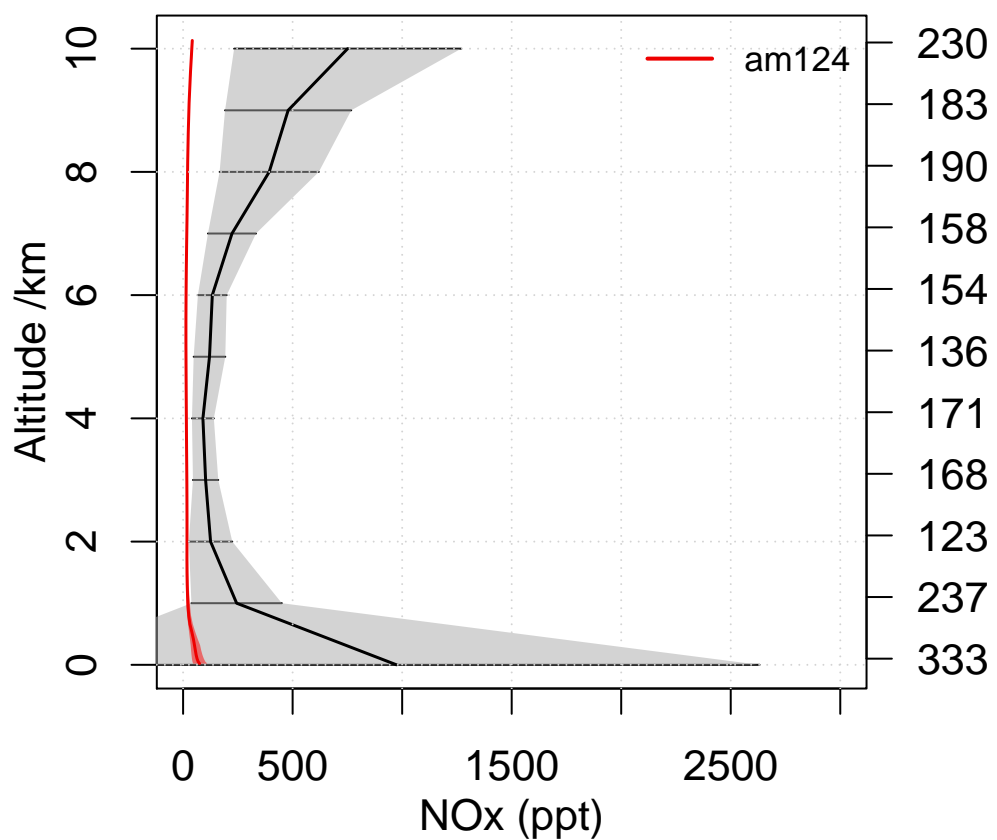
UKCA ao124

% CH₄ + OH flux (moles cm⁻³ s⁻¹)

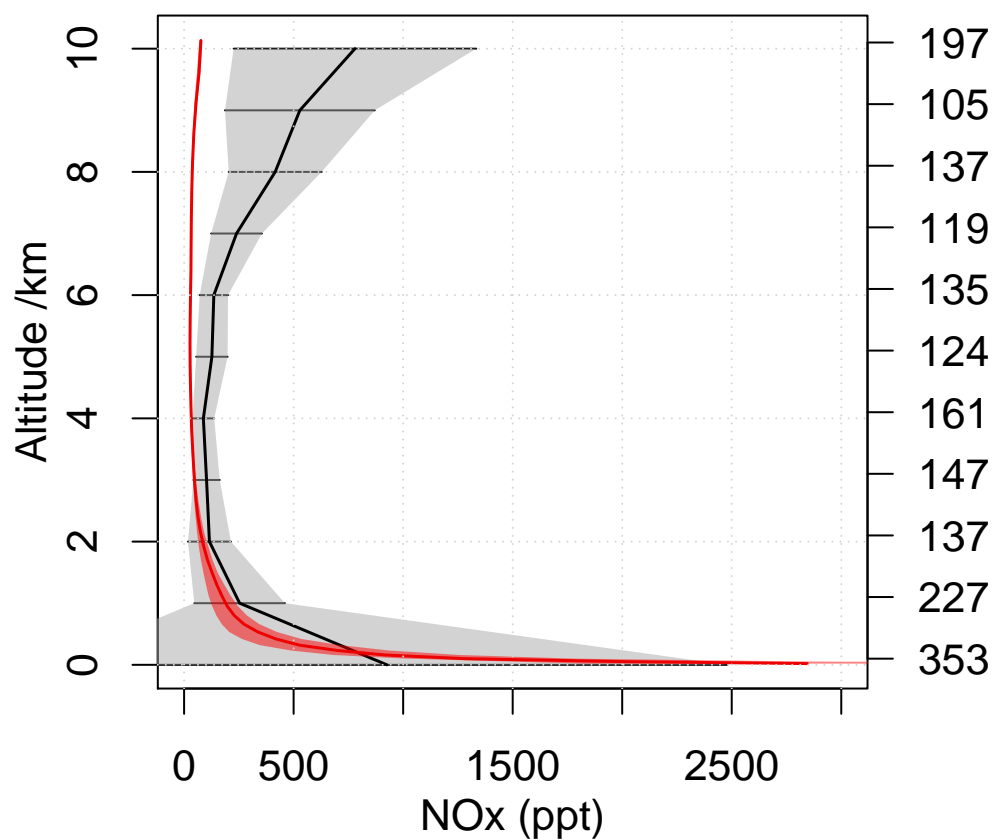


Emmons NOx comparison

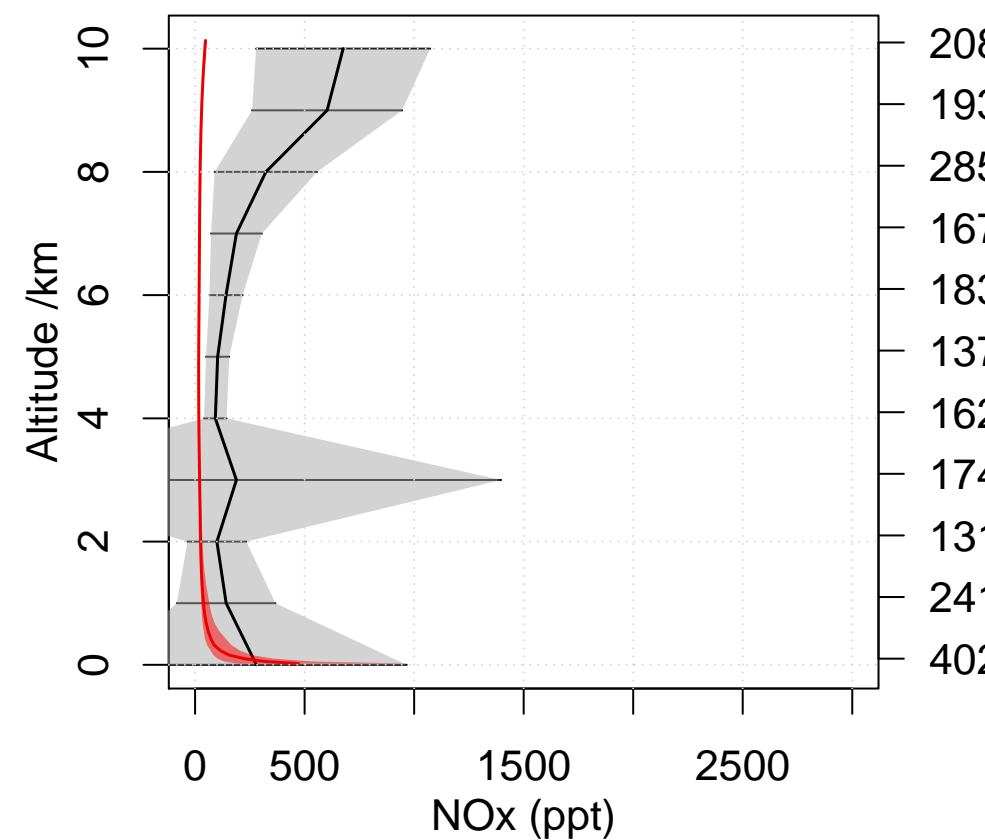
INTEX-NA East Coast 2004 07
Lat 32.5 – 40 Lon 296.5 – 307



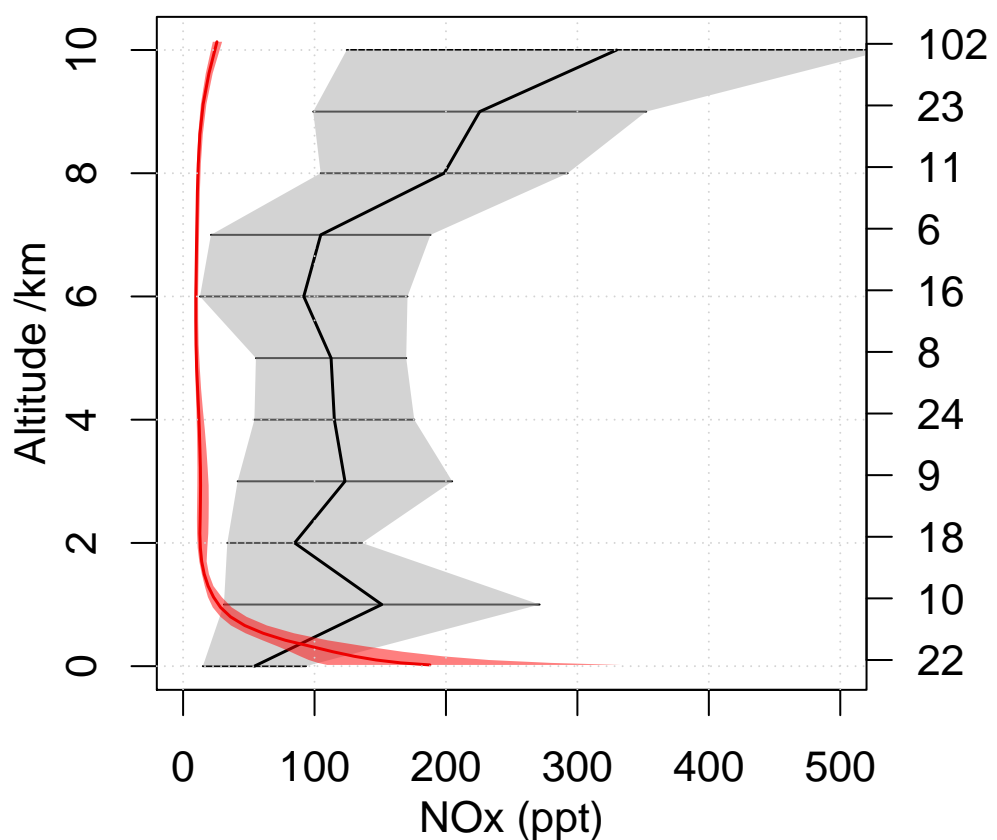
INTEX-NA Central 2004 07
Lat 30 – 40 Lon 259.5 – 285



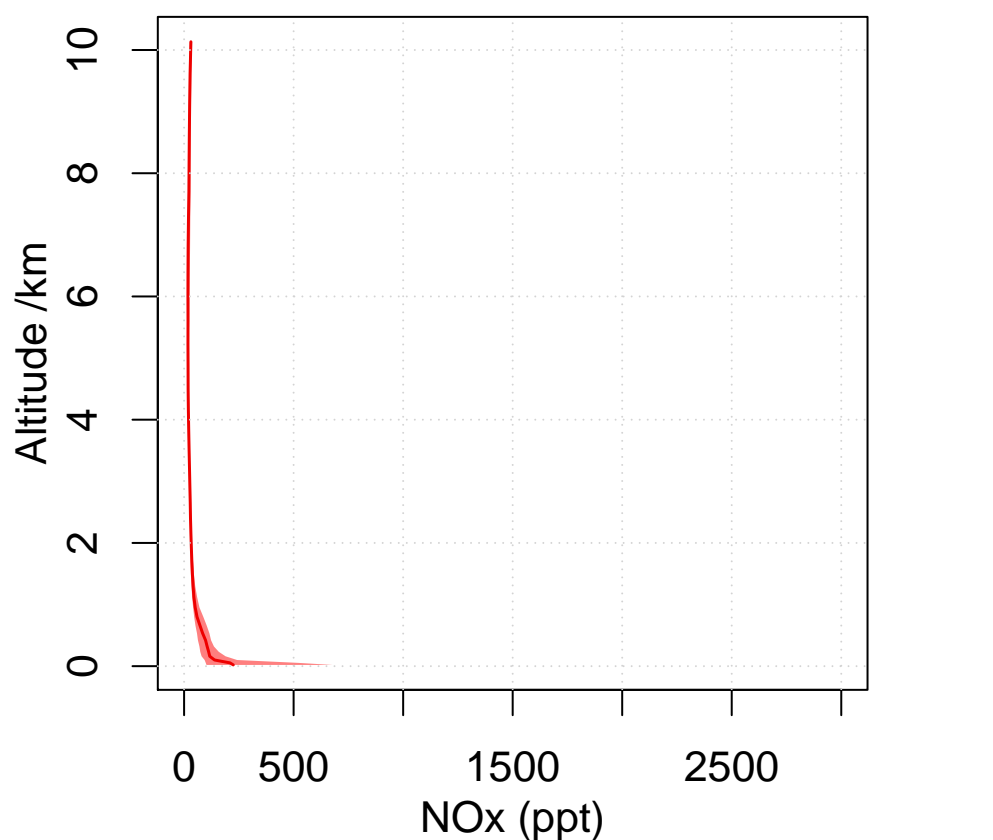
INTEX-NA North East 2004 07
Lat 42.5 – 52.5 Lon 285 – 310



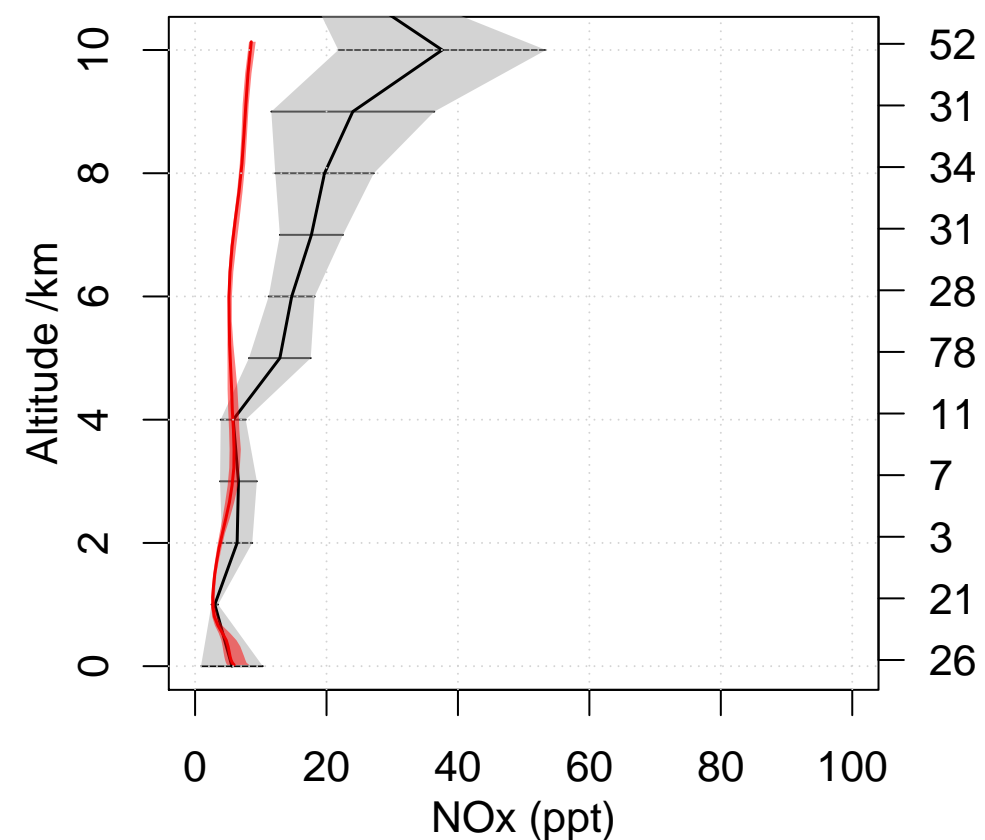
INTEX-NA West Coast 2004 07
Lat 32.5 – 45 Lon 217 – 240



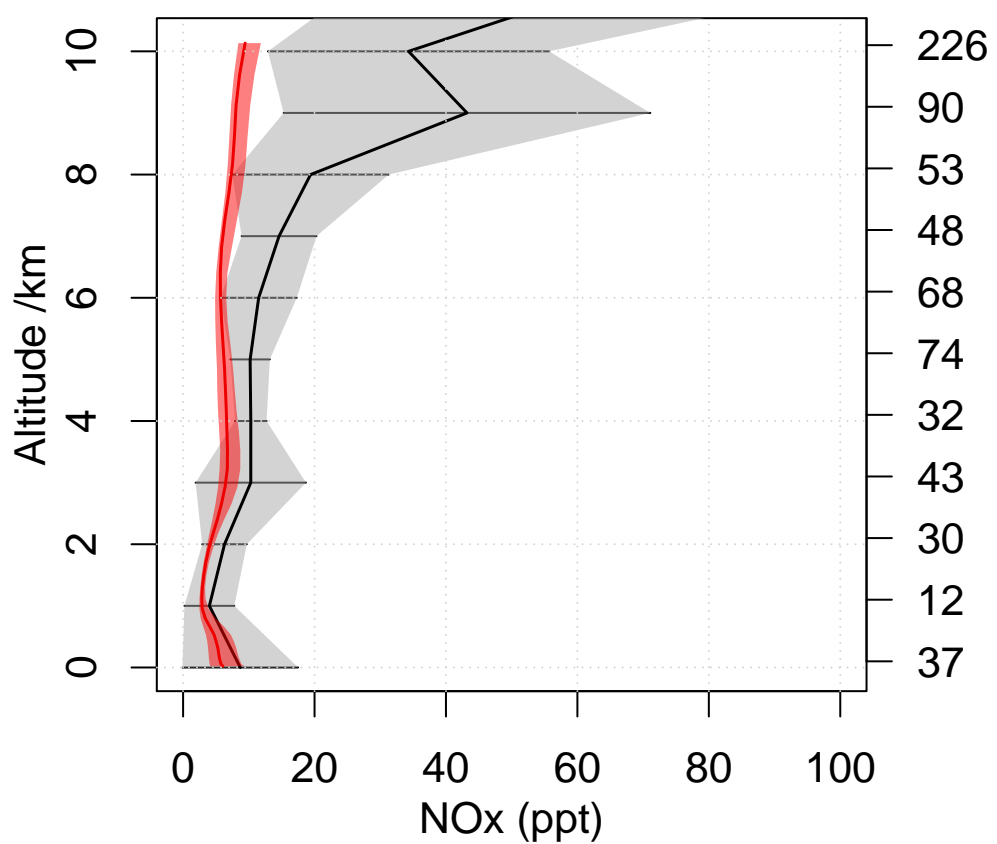
OP3 2008 07
Lat 2.5 – 7.5 Lon 112.5 – 120



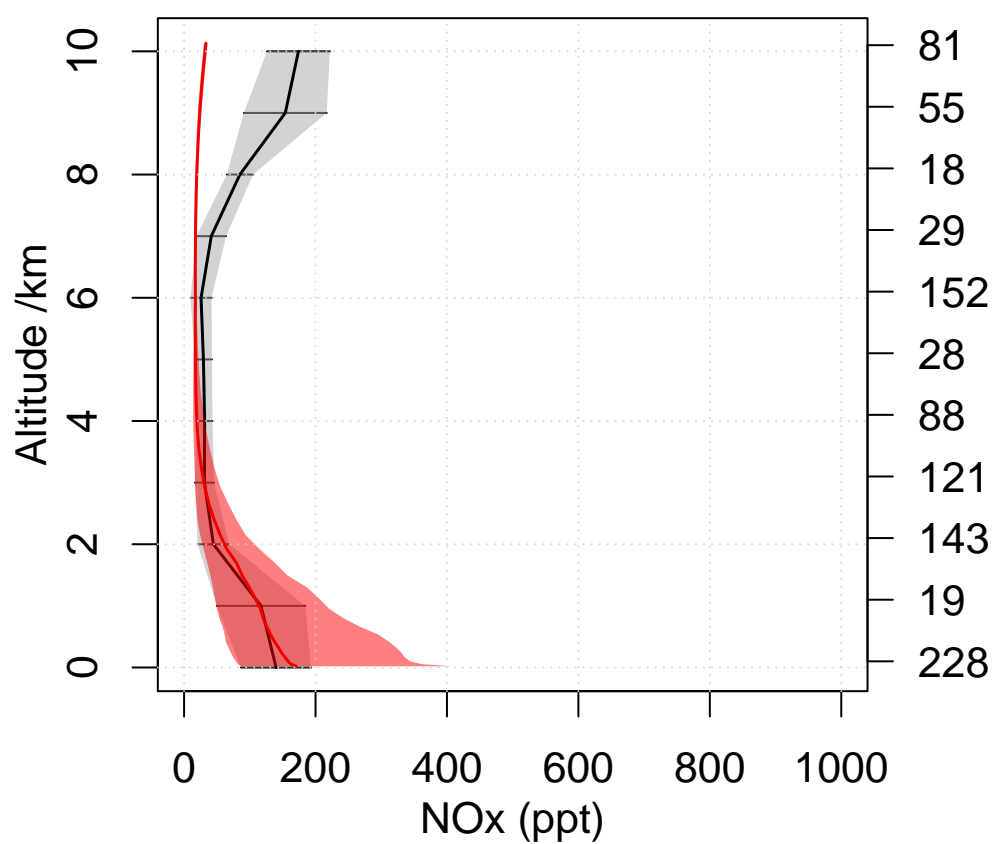
PEM-Tropics-B Christmas-Island 1999 07
Lat 0 – 10 Lon 200 – 220



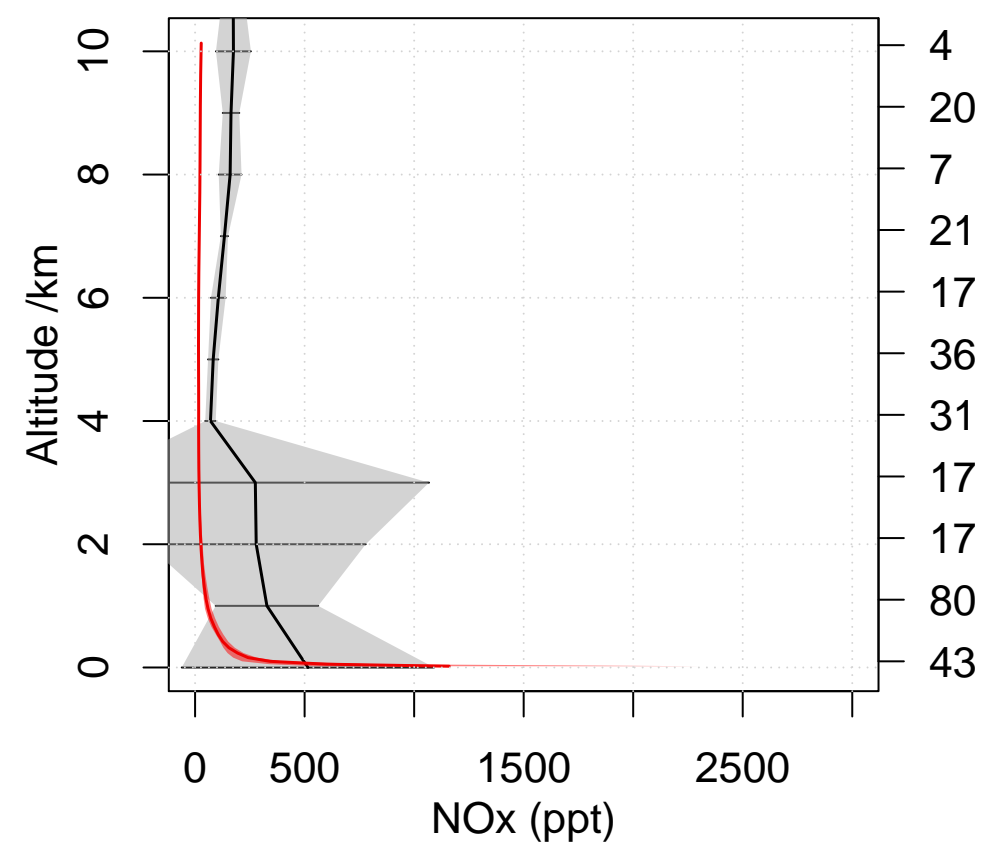
PEM-Tropics-B Tahiti 1999 03
Lat -20 – 0 Lon 200 – 230



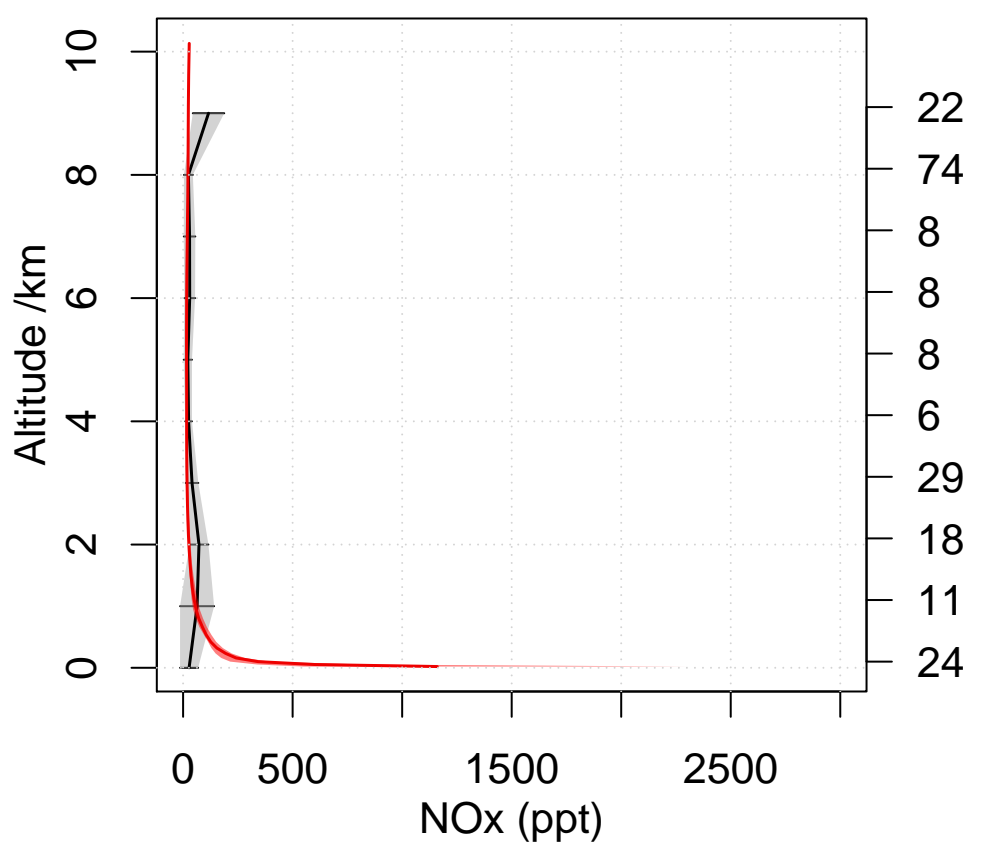
PEM-West-B Japan 1994 02
Lat 25 – 40 Lon 135 – 150



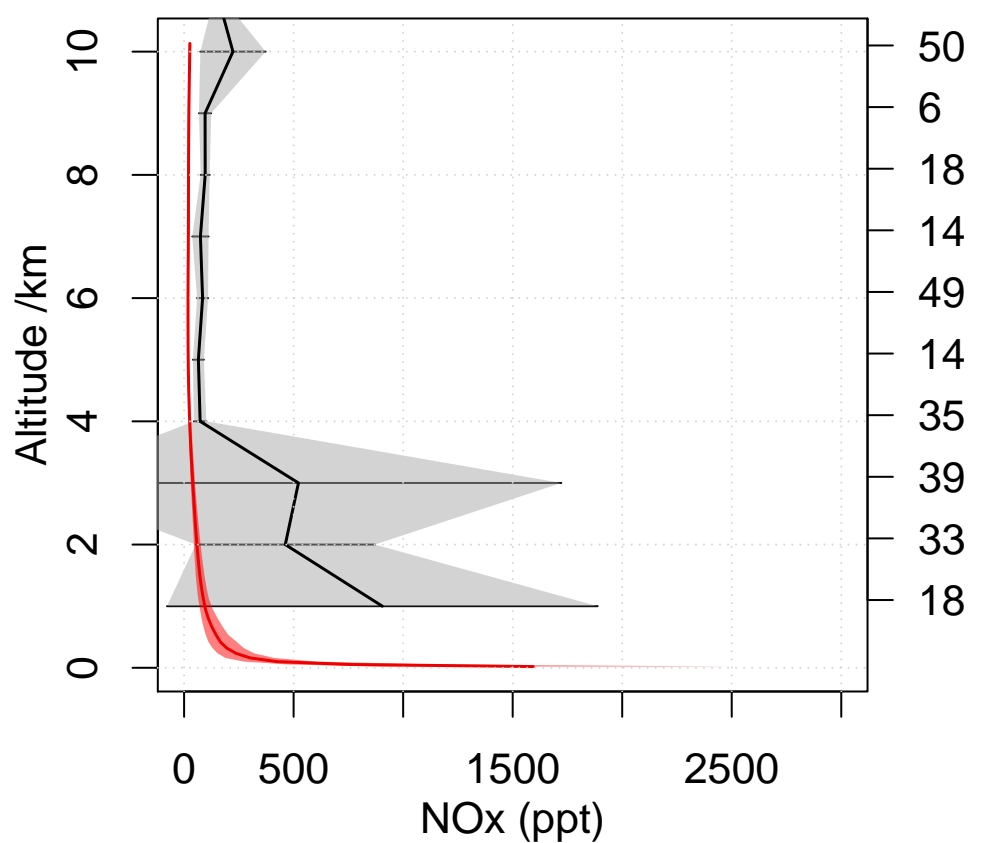
TRACE-A E-Brazil 1992 09
Lat -15 – -5 Lon 310 – 320



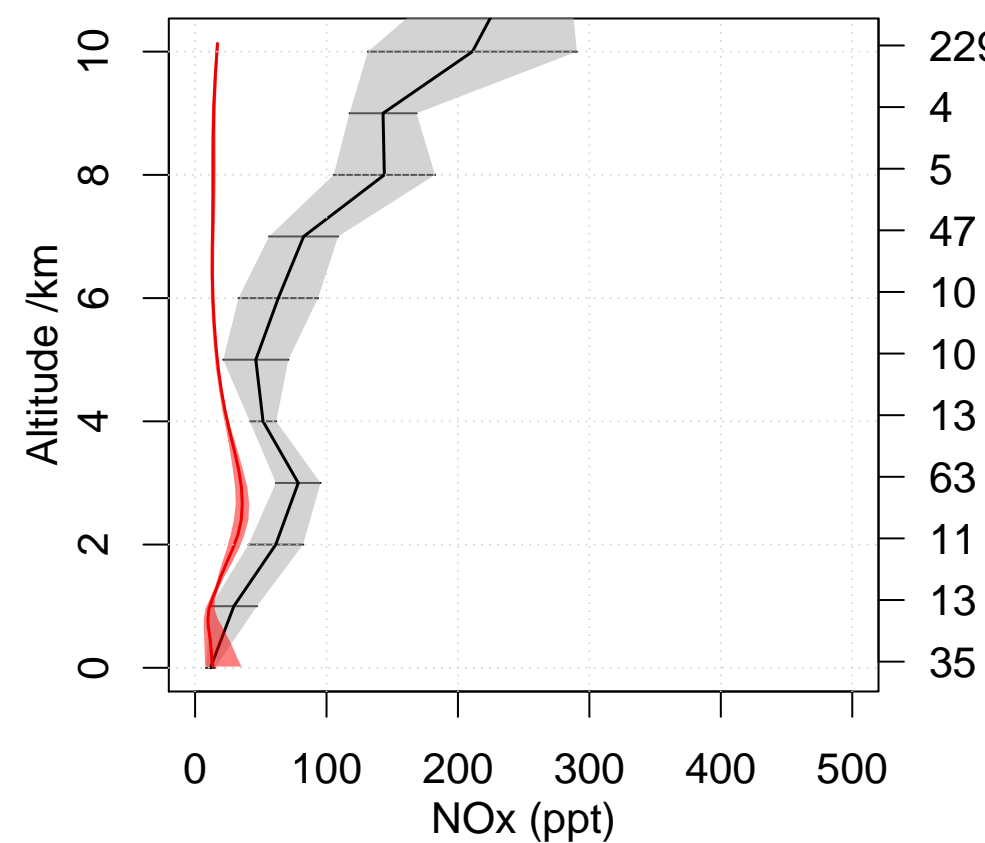
TRACE-A E-Brazil Coast 1992 09
Lat -35 – -25 Lon 310 – 320



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

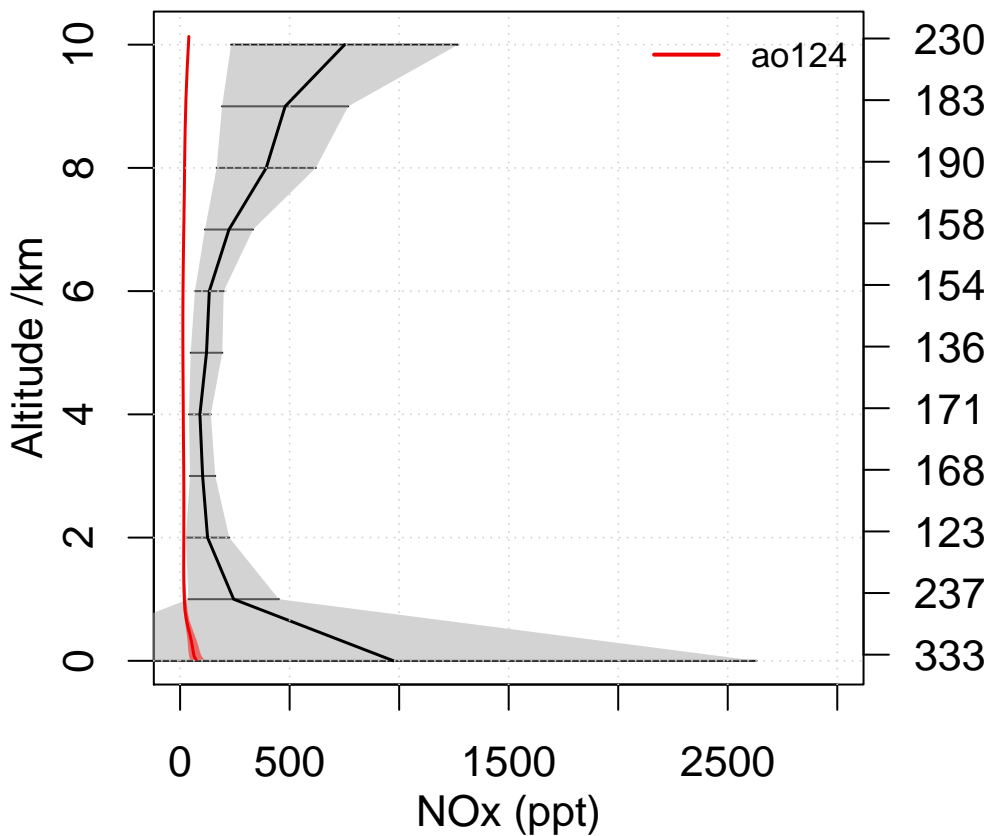


TRACE-A W-Africa Coast 1992 09
Lat -25 – -5 Lon 0 – 10

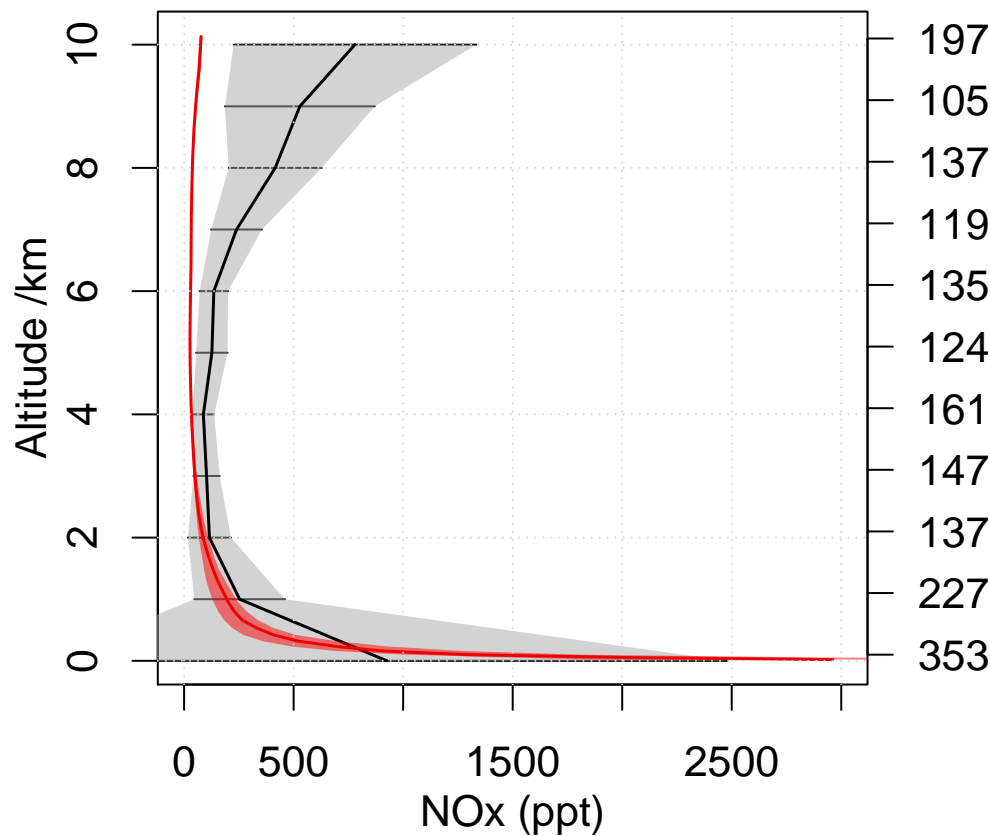


Emmons NOx comparison

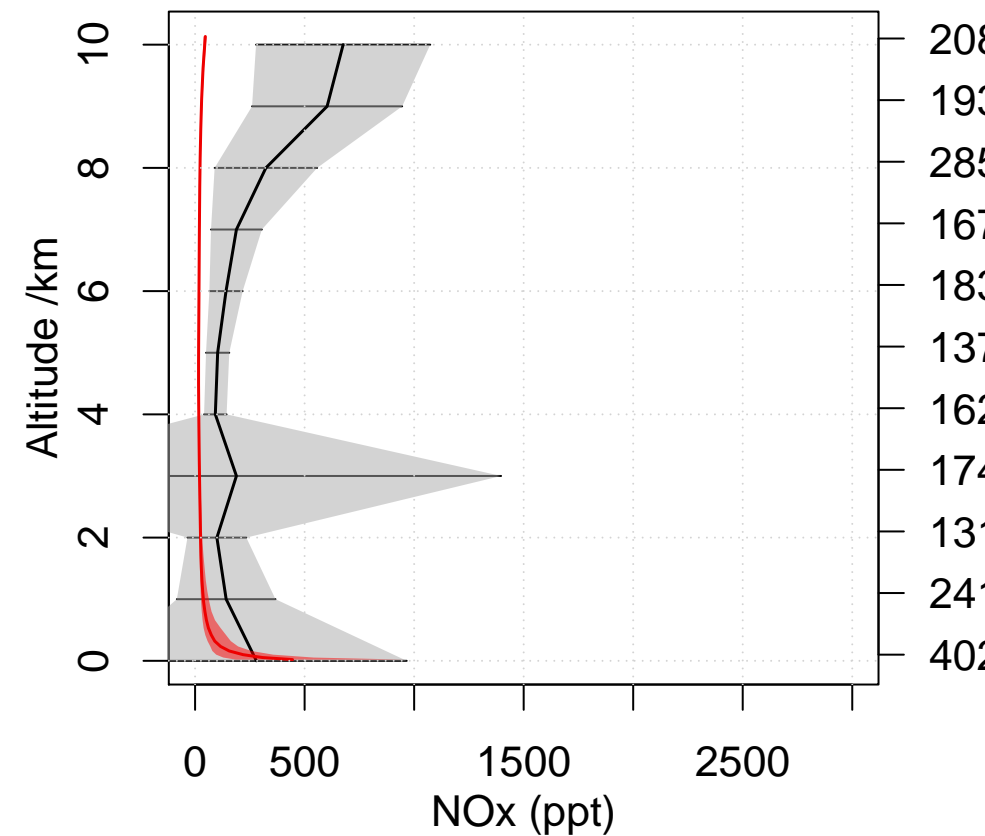
INTEX-NA East Coast 2004 07
Lat 32.5 – 40 Lon 296.5 – 307



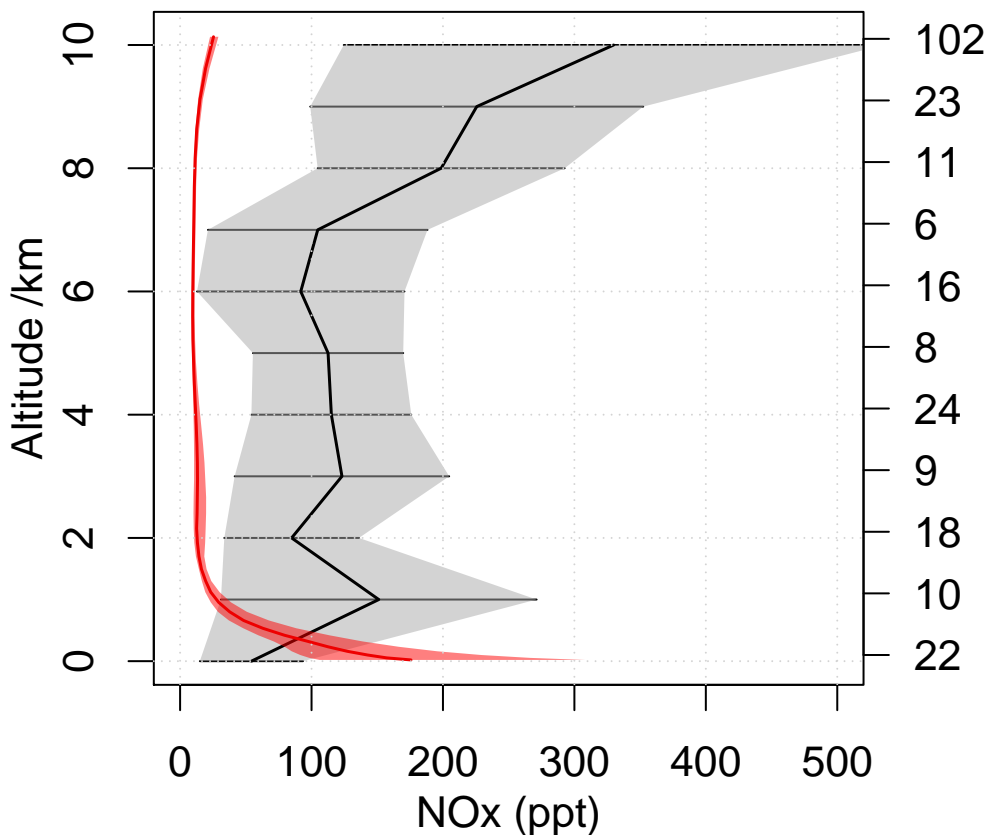
INTEX-NA Central 2004 07
Lat 30 – 40 Lon 259.5 – 285



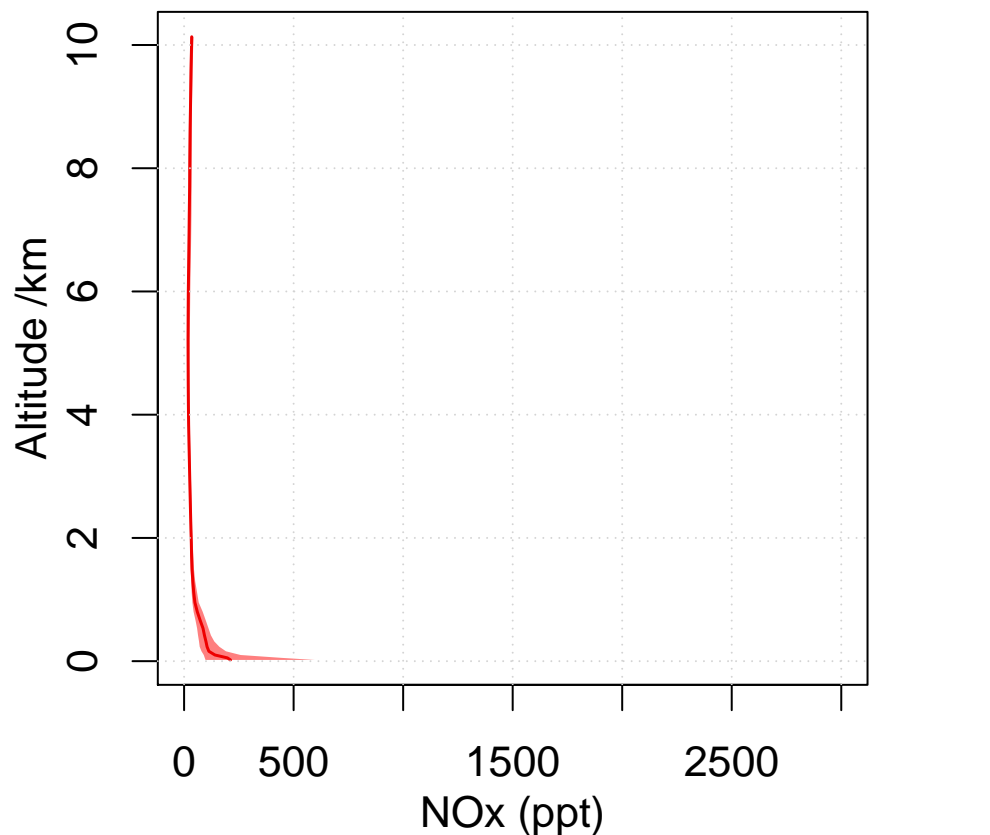
INTEX-NA North East 2004 07
Lat 42.5 – 52.5 Lon 285 – 310



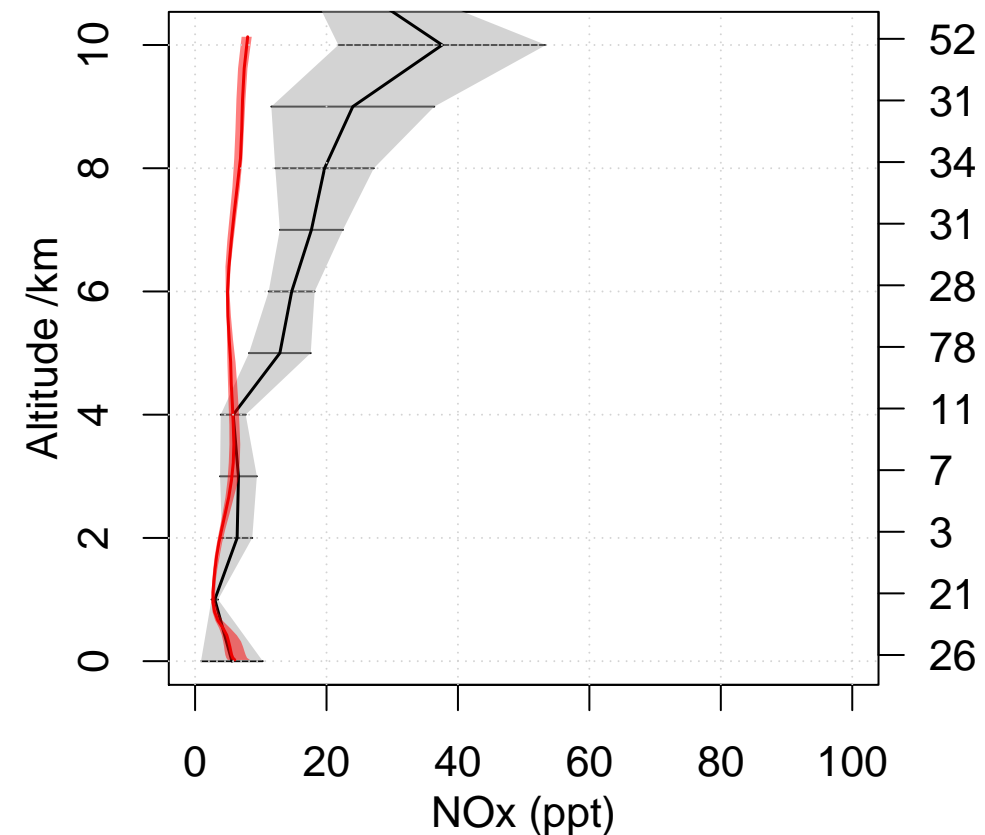
INTEX-NA West Coast 2004 07
Lat 32.5 – 45 Lon 217 – 240



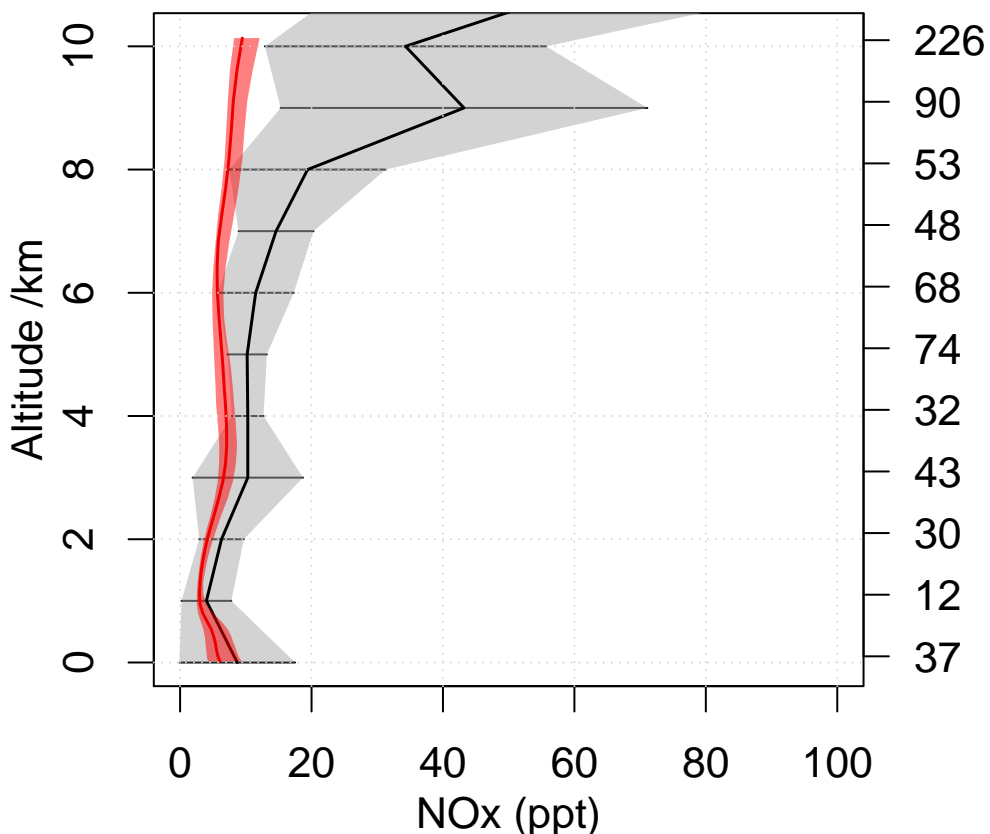
OP3 2008 07
Lat 2.5 – 7.5 Lon 112.5 – 120



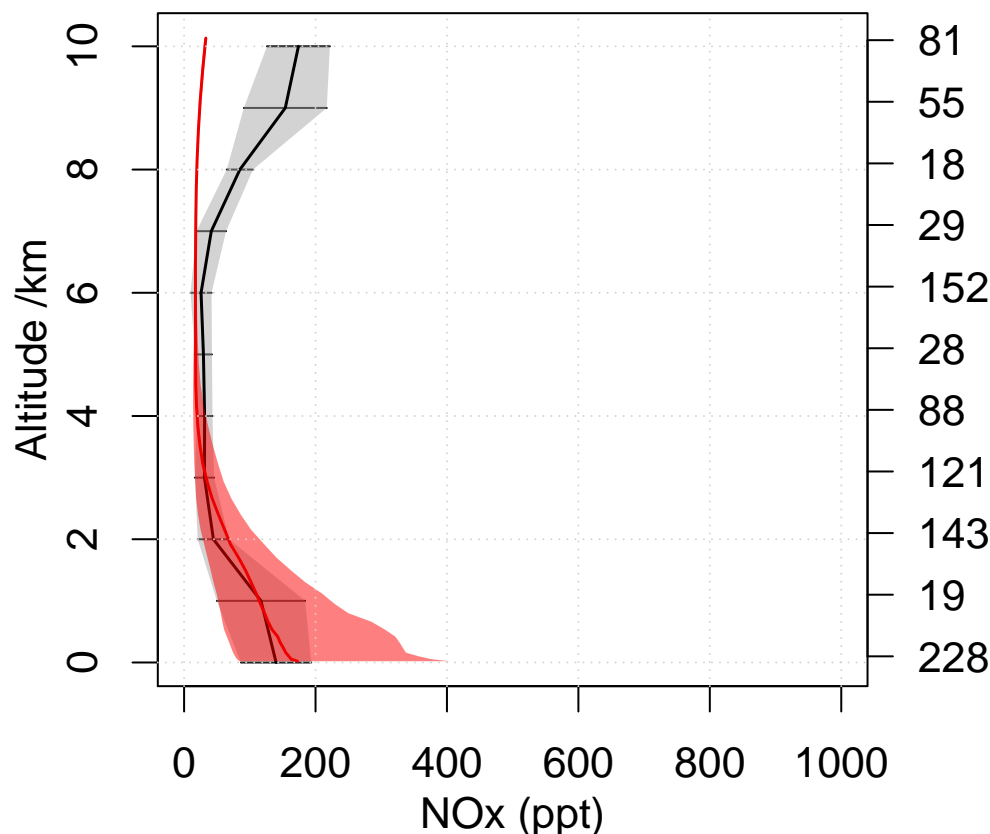
PEM-Tropics-B Christmas-Island 1999 07
Lat 0 – 10 Lon 200 – 220



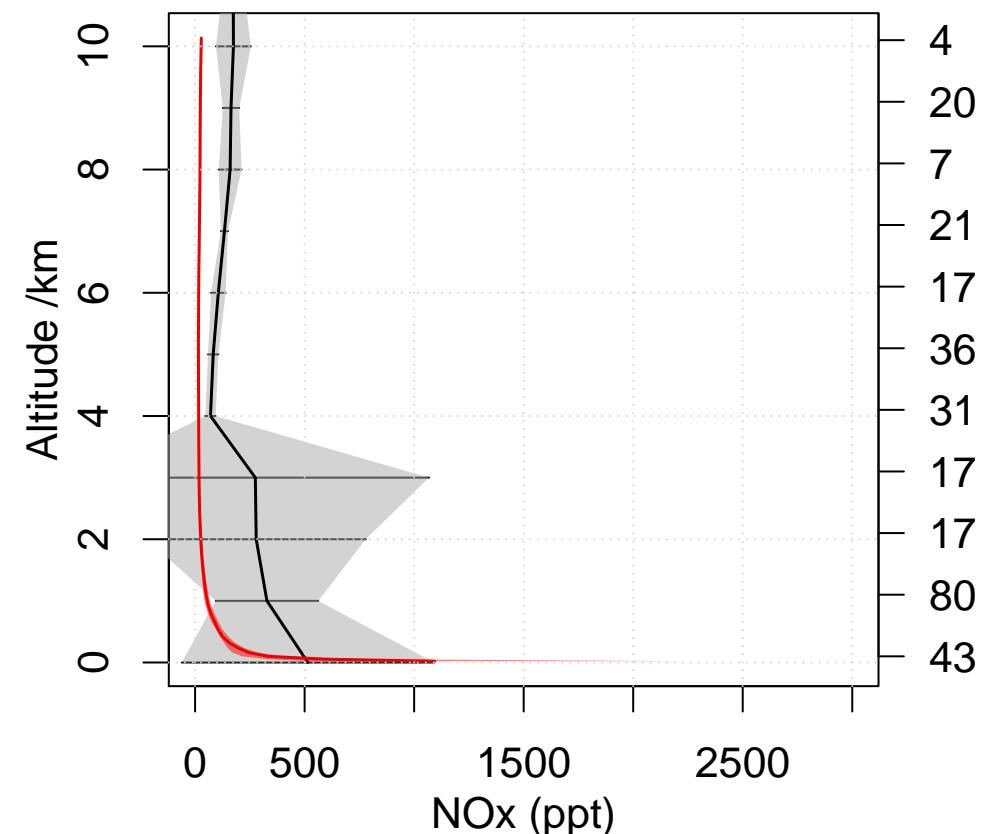
PEM-Tropics-B Tahiti 1999 03
Lat -20 – 0 Lon 200 – 230



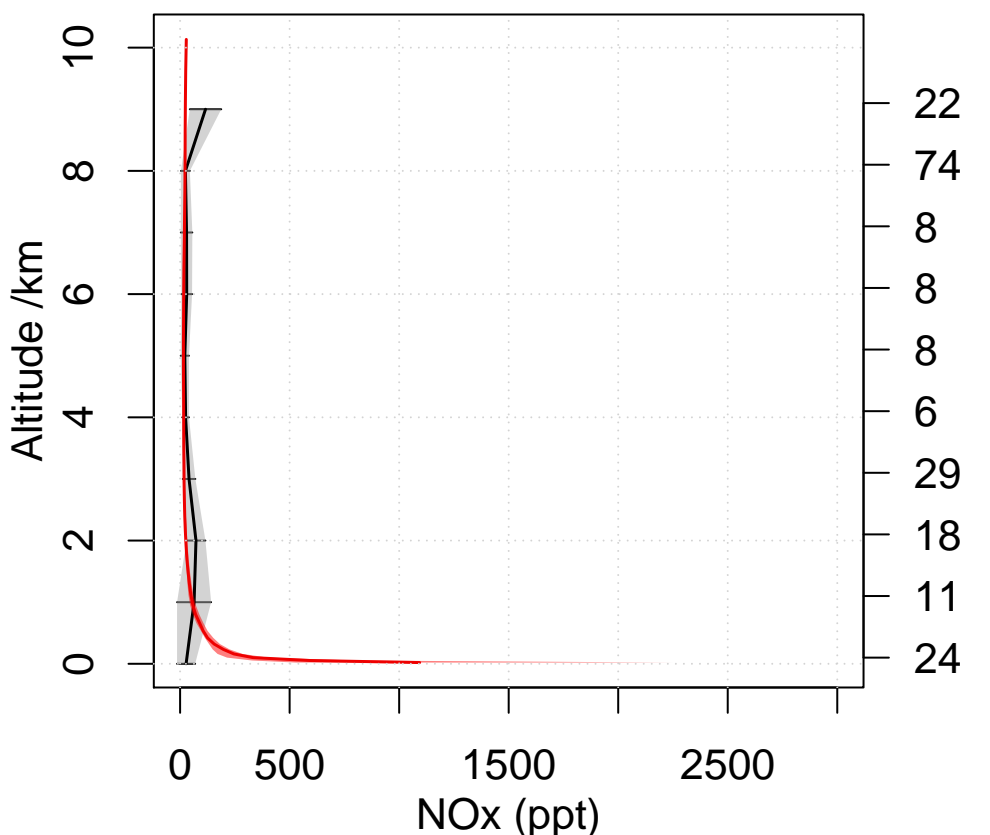
PEM-West-B Japan 1994 02
Lat 25 – 40 Lon 135 – 150



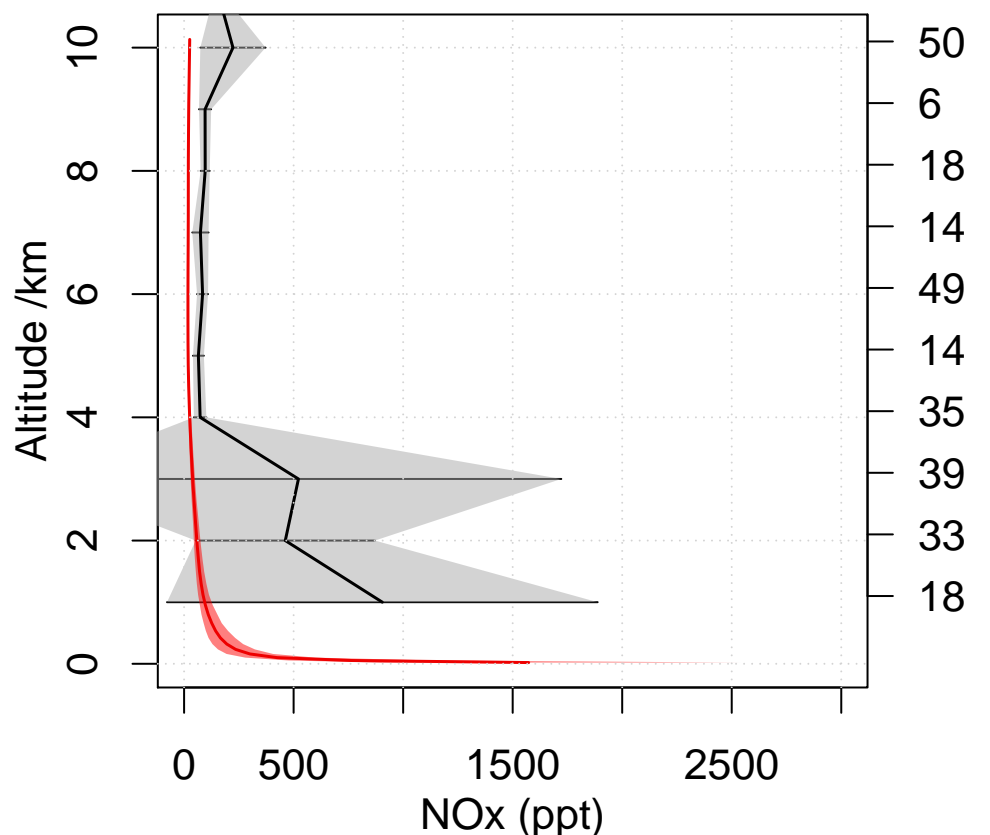
TRACE-A E-Brazil 1992 09
Lat -15 – -5 Lon 310 – 320



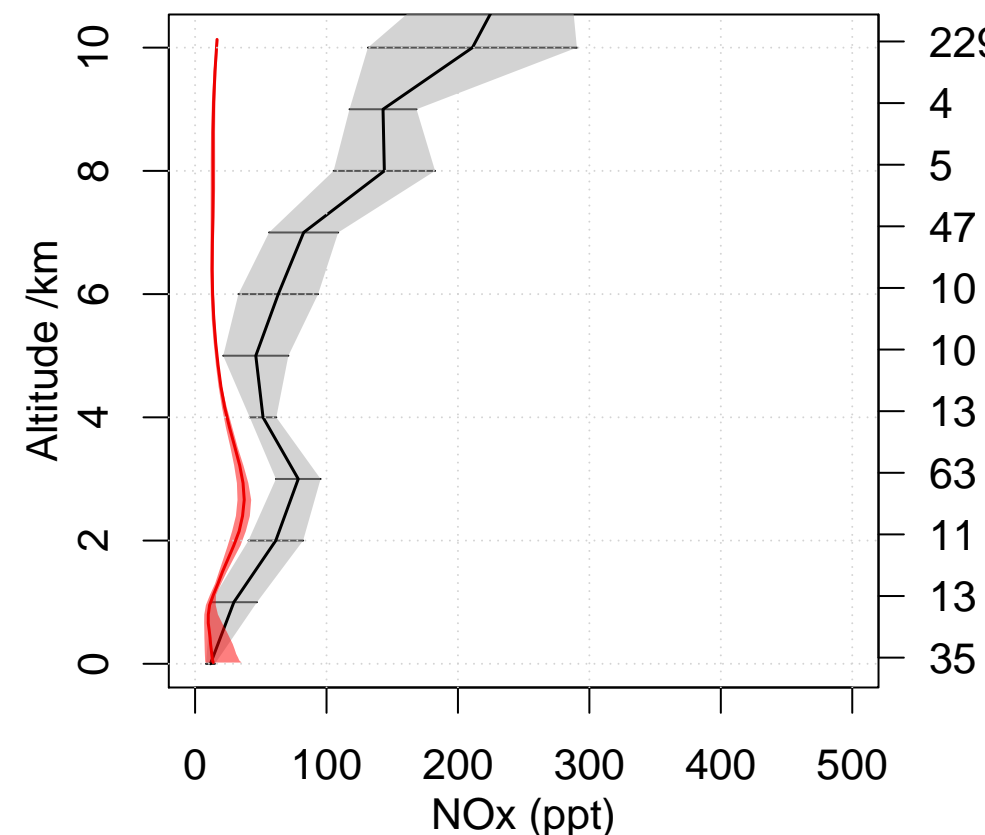
TRACE-A E-Brazil Coast 1992 09
Lat -35 – -25 Lon 310 – 320



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 am124

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

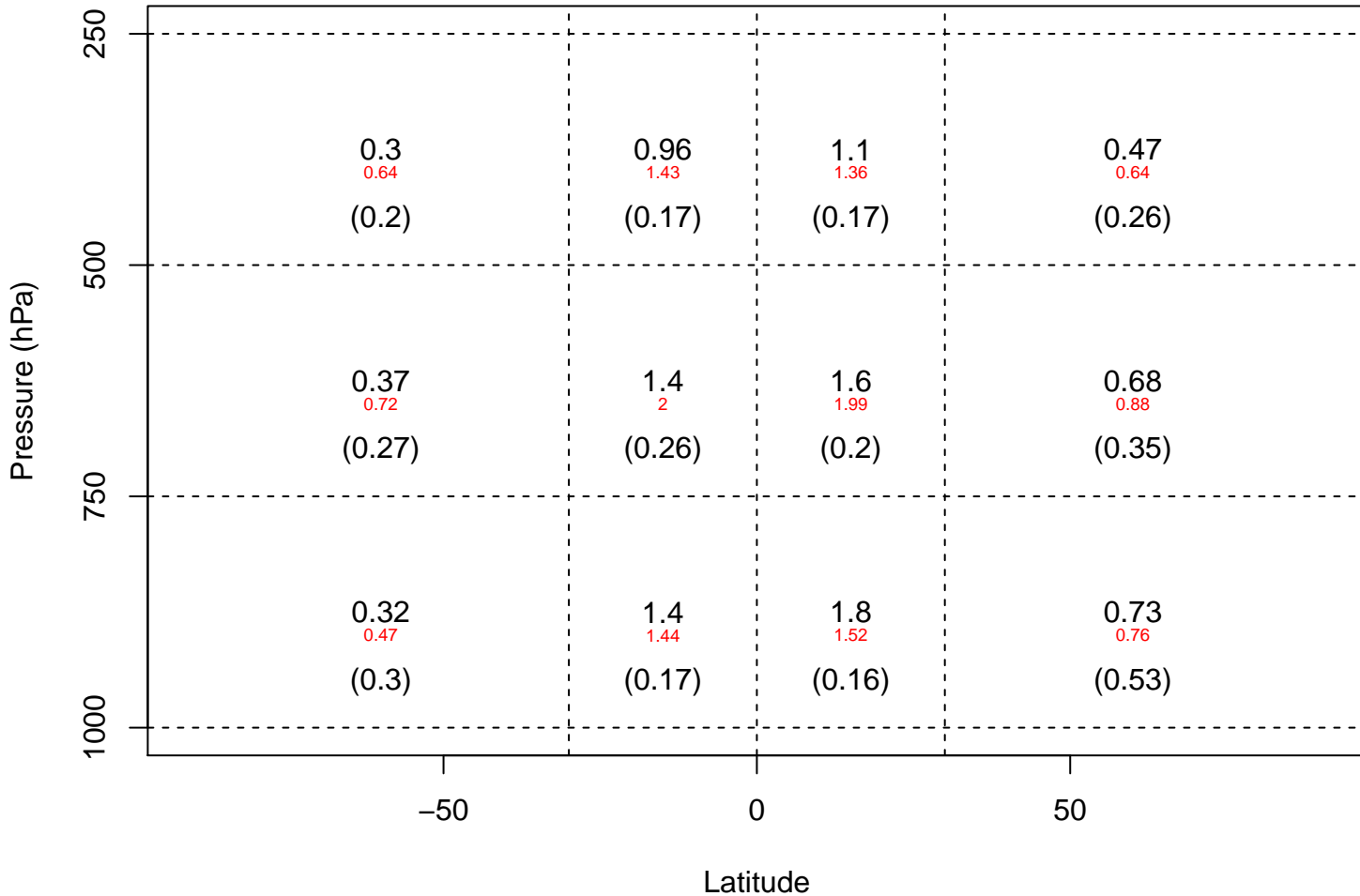
Mean OH= 9.21e+05 molec/cm³

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



UKCA ao124

[OH] Air mass weighted (10^6 molecules cm^{-3})

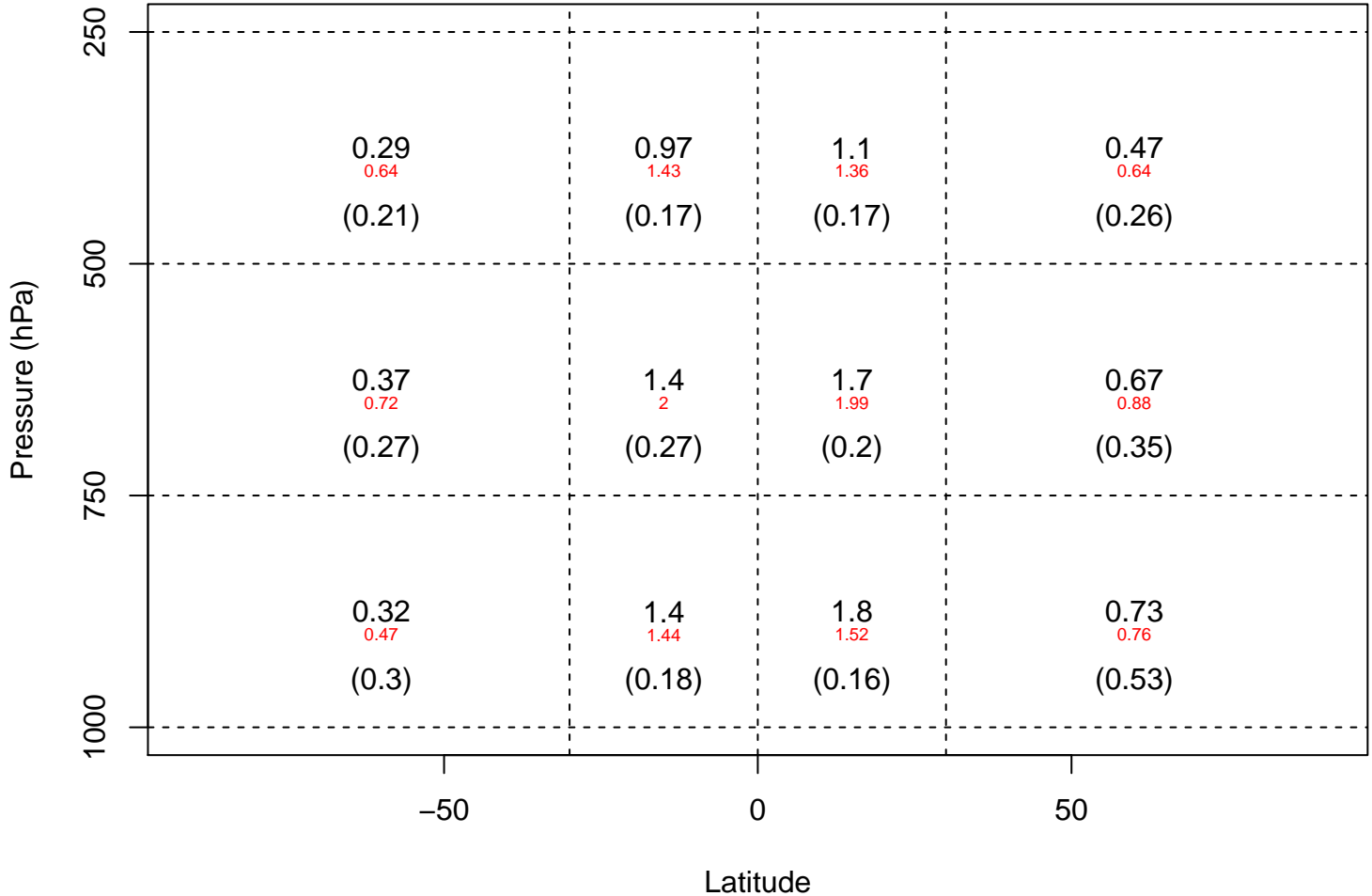
Mean OH= $9.23\text{e}+05$ molec/cm³

ACCMIP Multi-model Mean= $1.17 (+/- 0.1) \text{e}+06$ molec/cm³

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

Red: Spivakovsky values

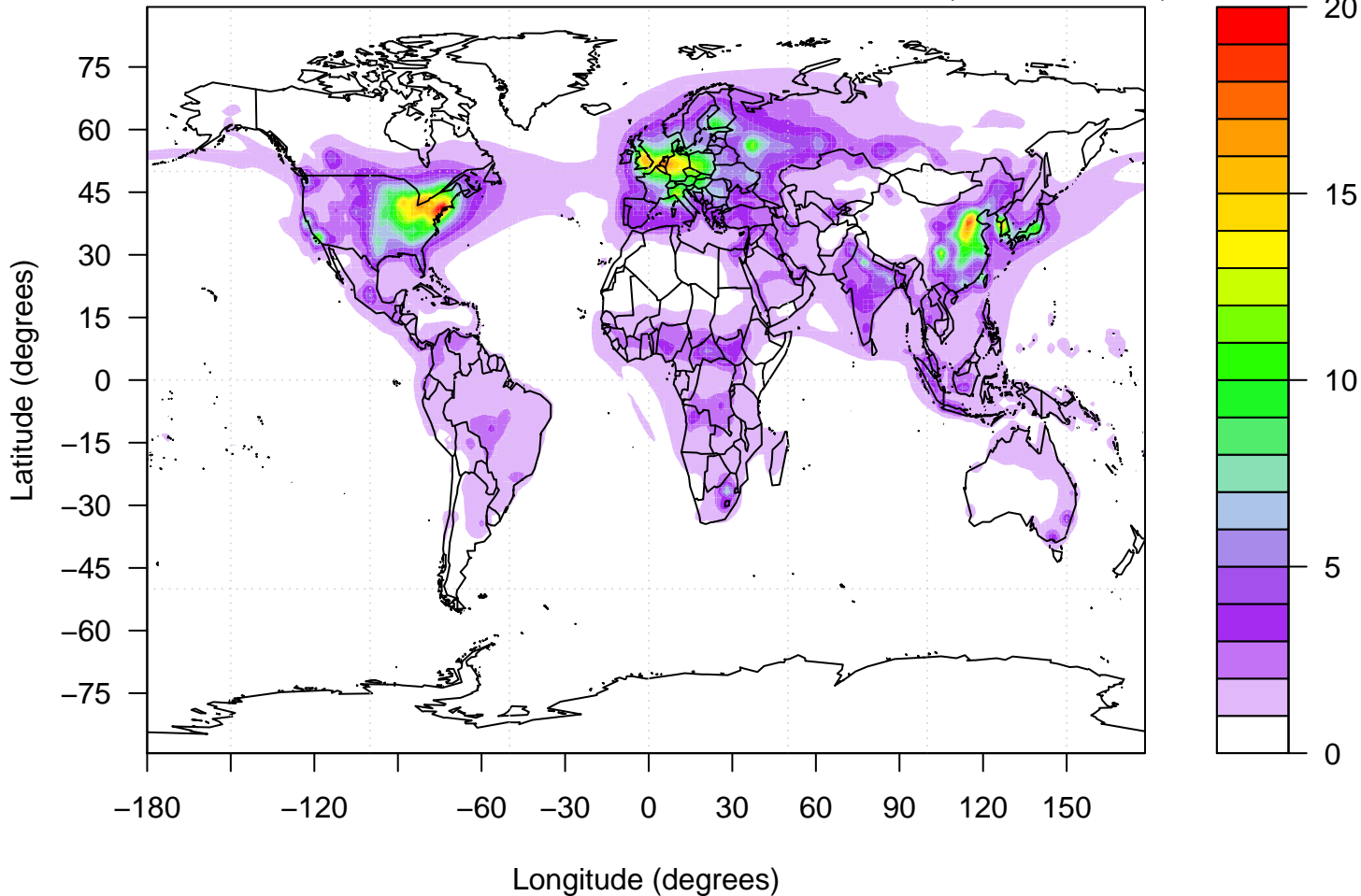
Values in (): Std dev



am124 tropospheric NO₂ column

Min = 0.00636 Mean = 0.895 Max = 22.3

10¹⁵ (molecules cm⁻²)



ao124 tropospheric NO₂ column

Min = 0.0058 Mean = 0.896 Max = 22.7

10¹⁵ (molecules cm⁻²)

