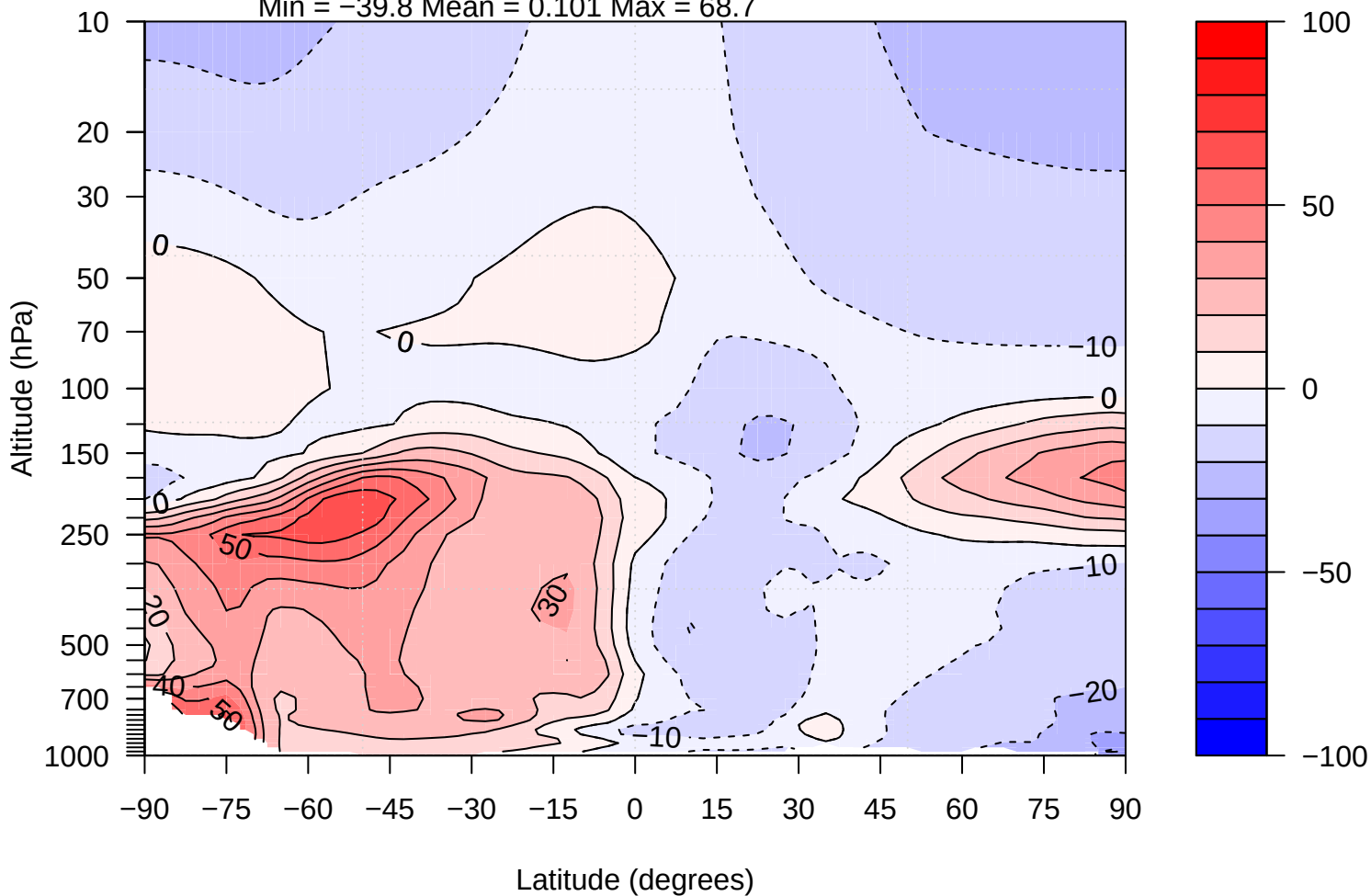


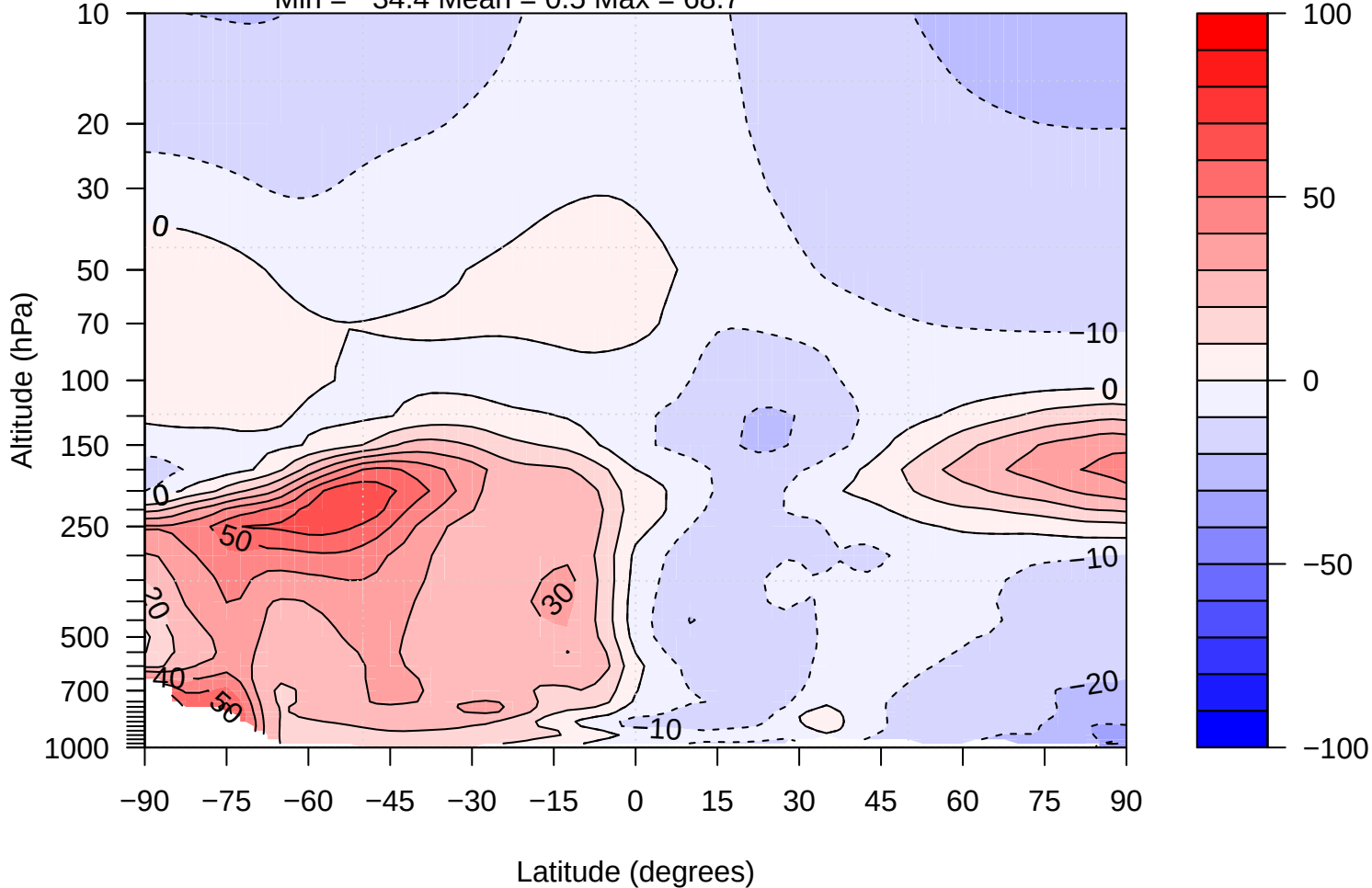
br633 – ERA Q bias

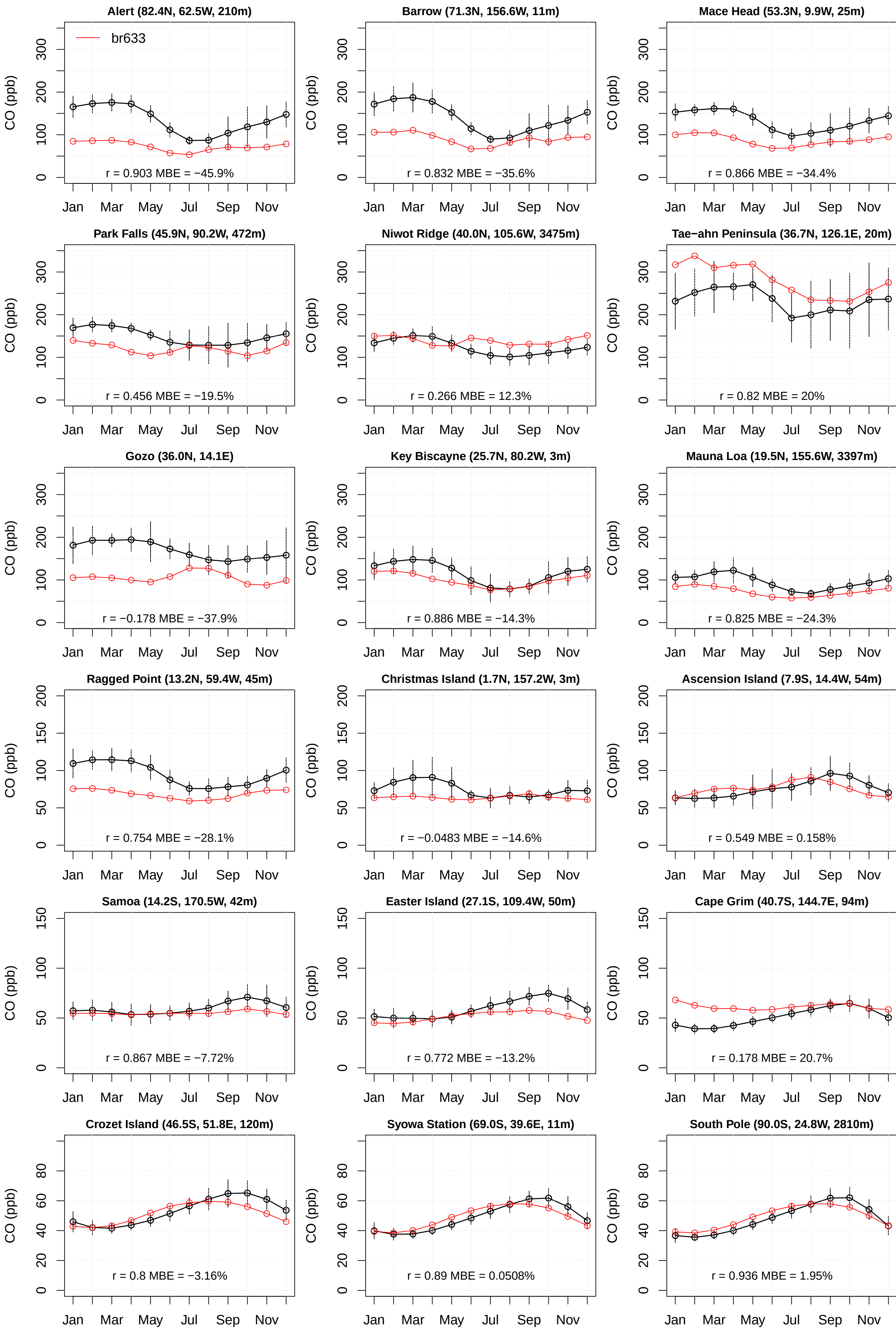
Min = -39.8 Mean = 0.101 Max = 68.7

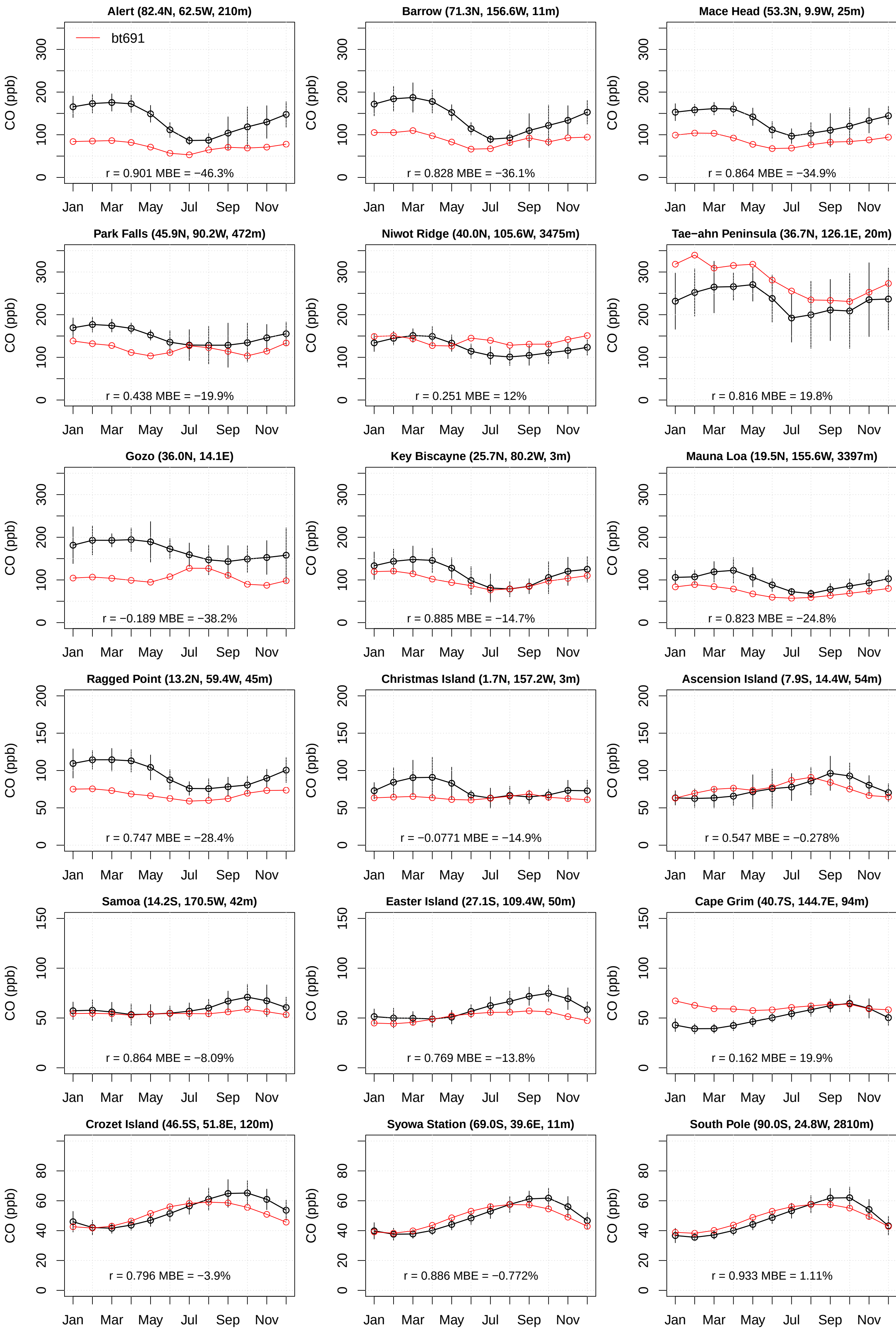


bt691 – ERA Q bias

Min = -34.4 Mean = 0.5 Max = 68.7

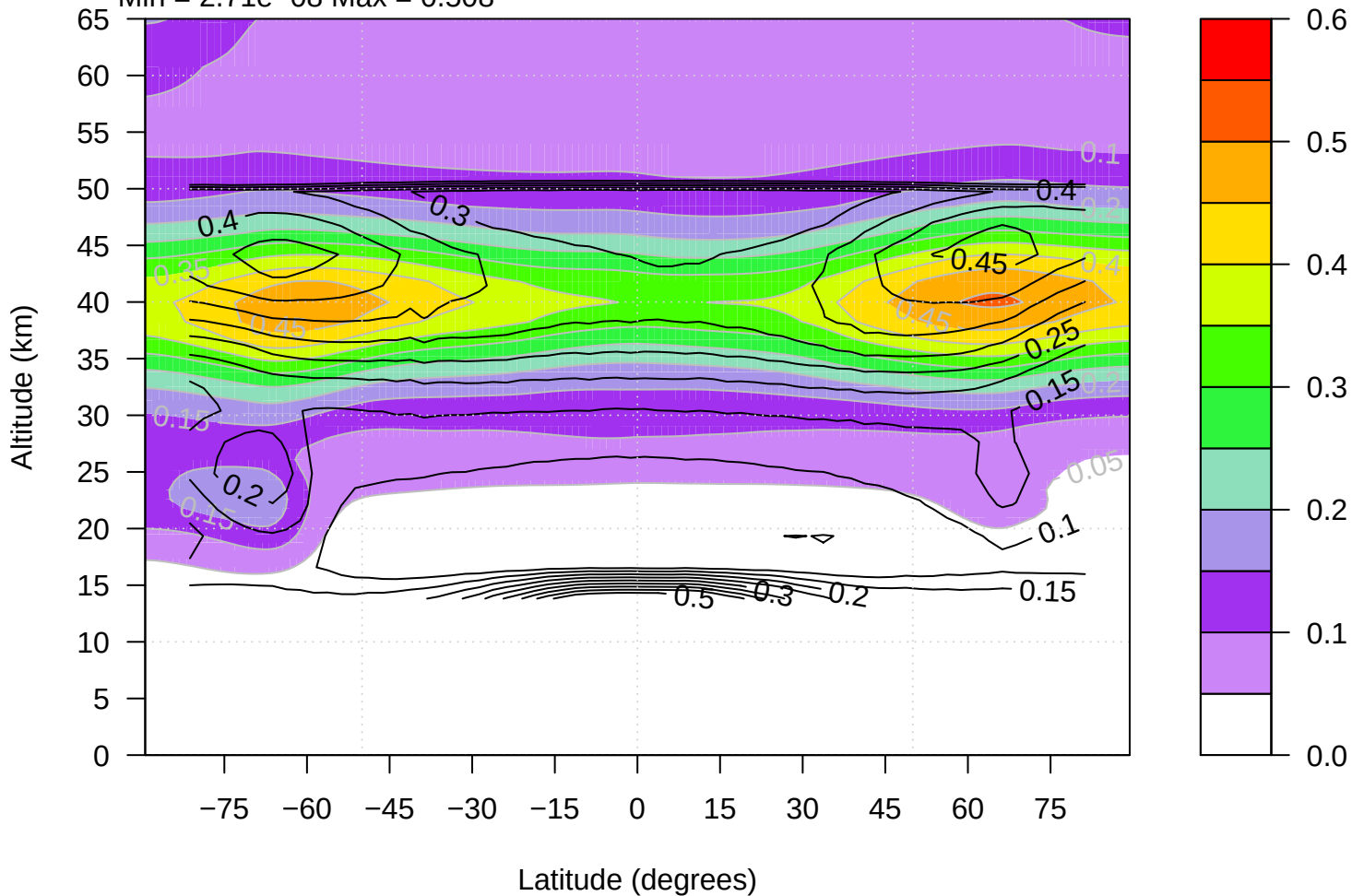






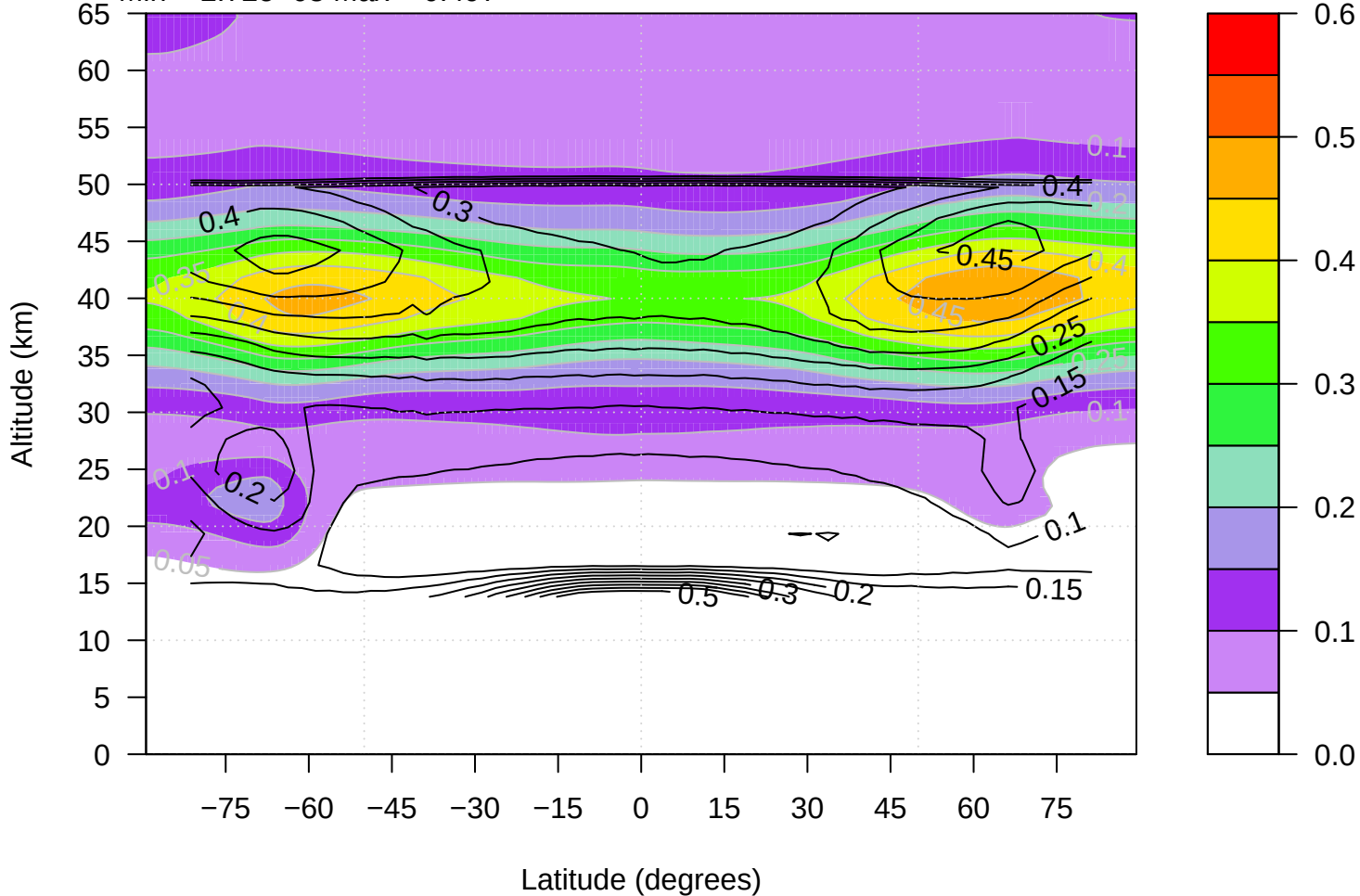
ppm

0.6

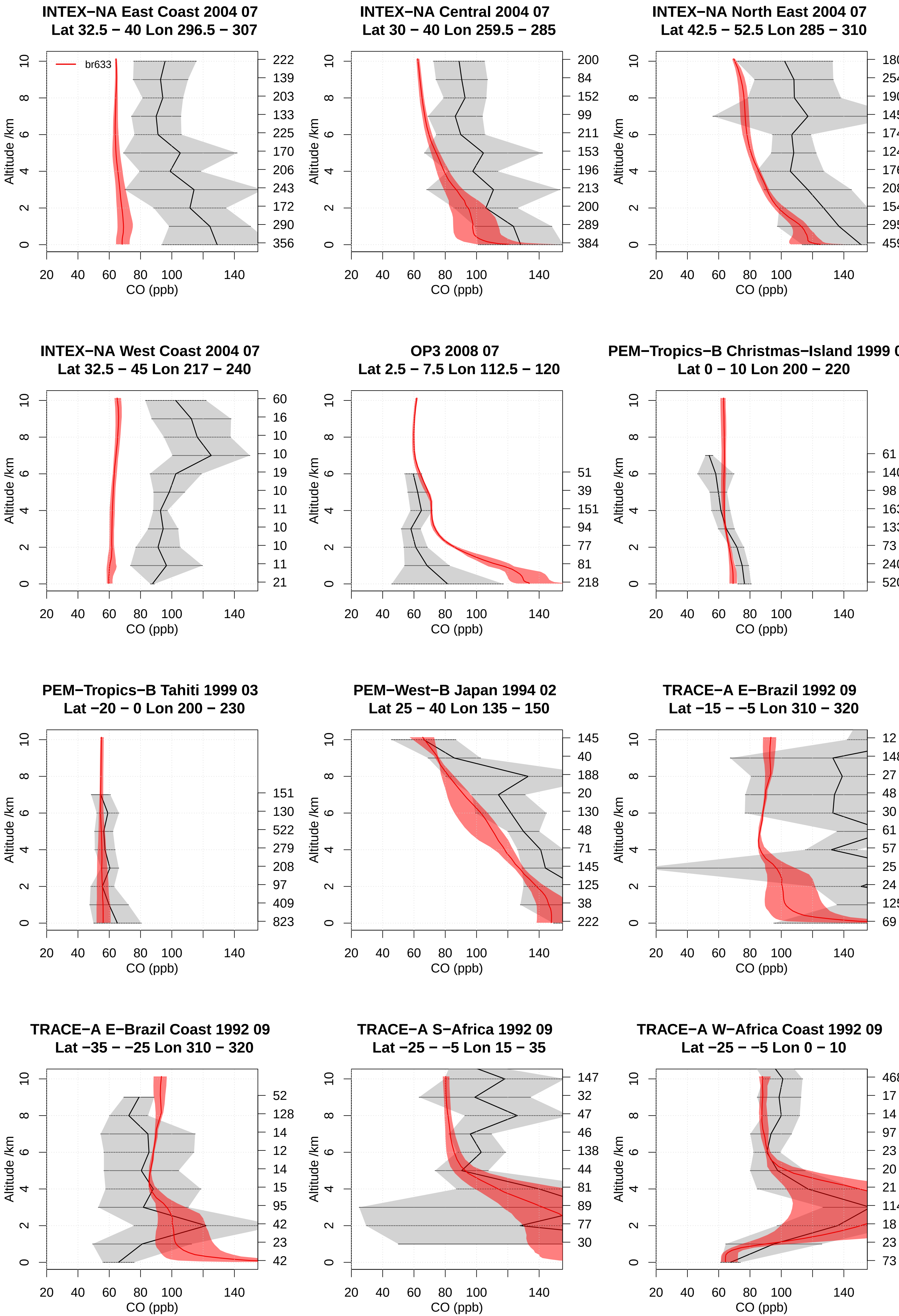


MLS – UKCA bt691 ClO comparison

Min = 2.72e-08 Max = 0.497

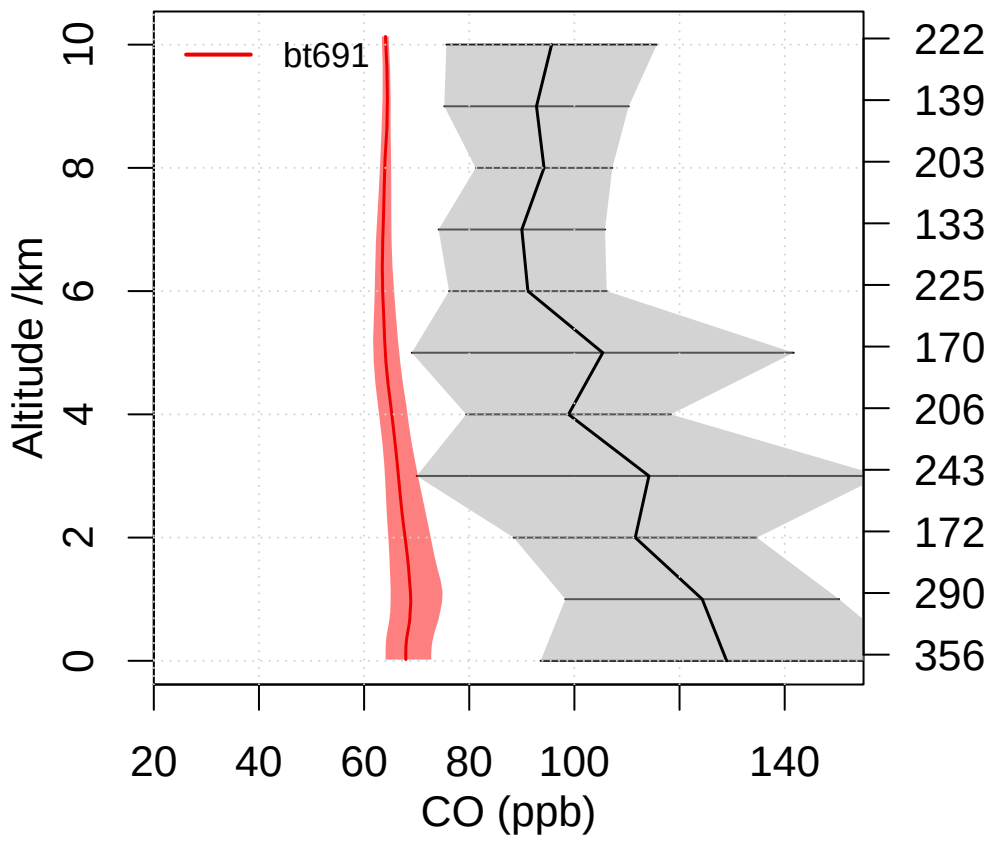


Emmons CO comparison

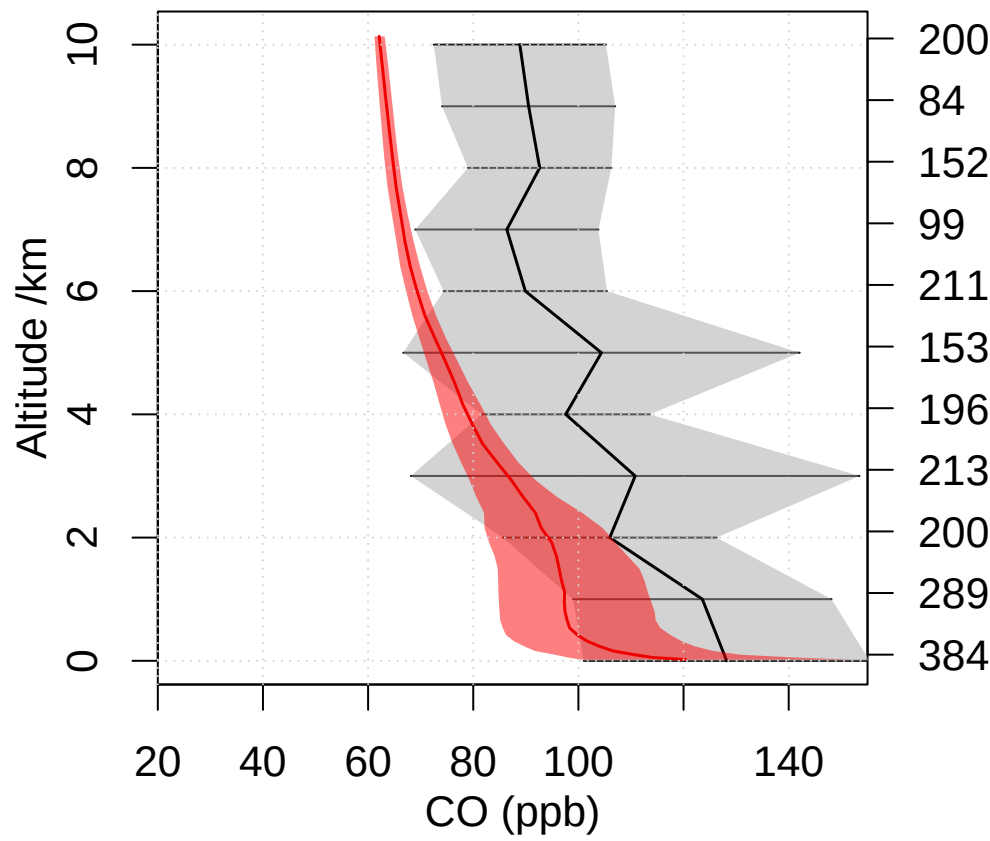


Emmons CO comparison

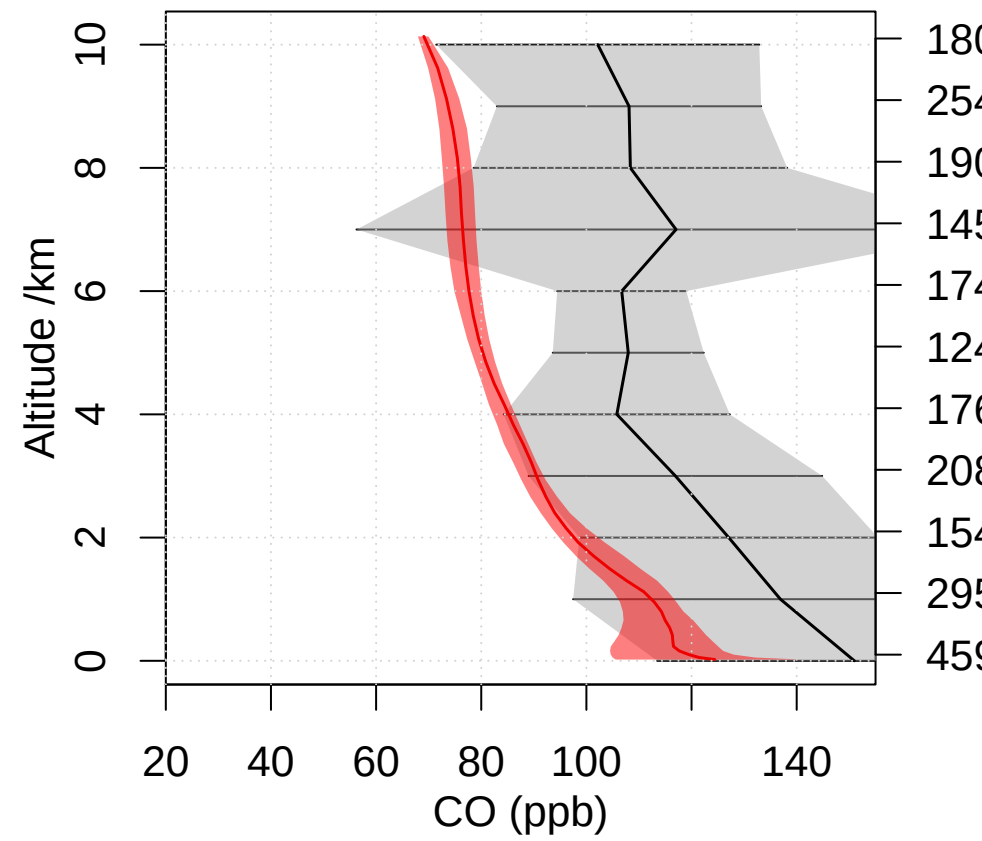
INTEX-NA East Coast 2004 07
Lat 32.5 – 40 Lon 296.5 – 307



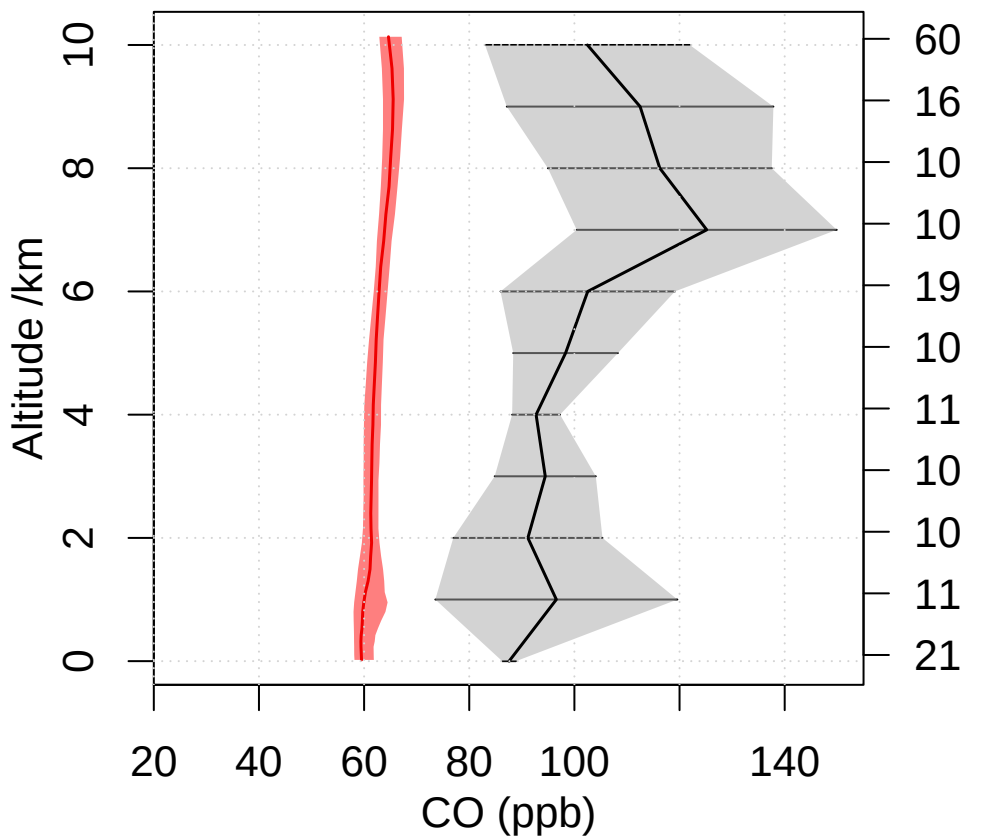
INTEX-NA Central 2004 07
Lat 30 – 40 Lon 259.5 – 285



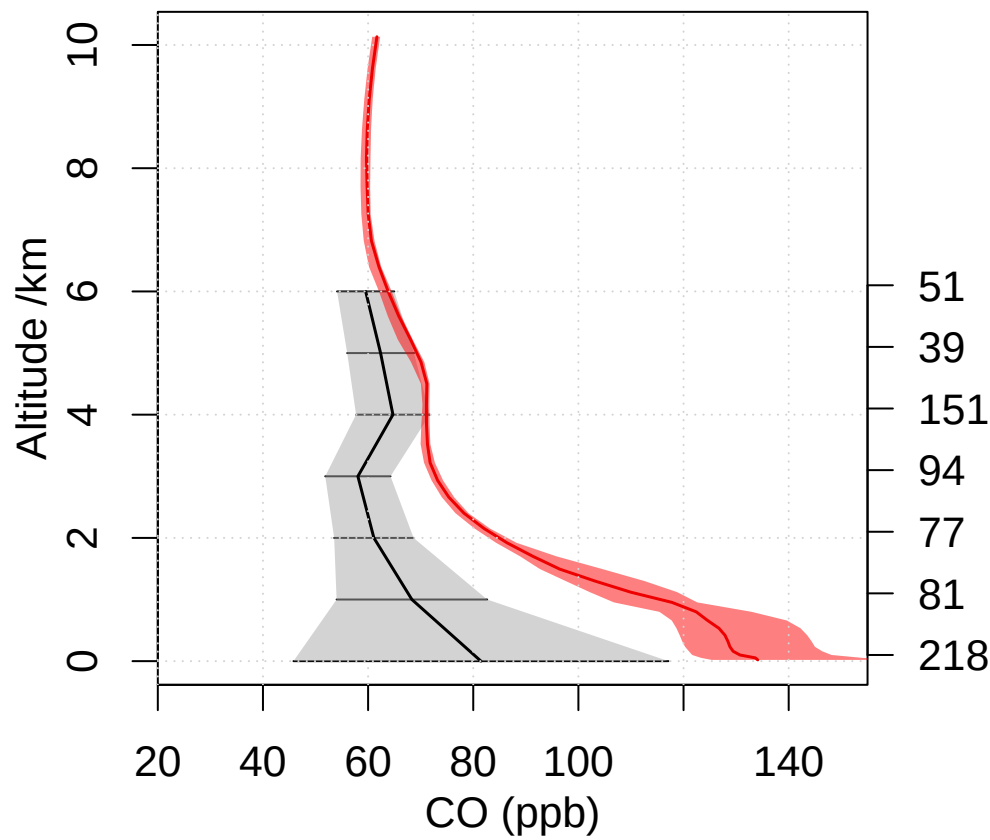
INTEX-NA North East 2004 07
Lat 42.5 – 52.5 Lon 285 – 310



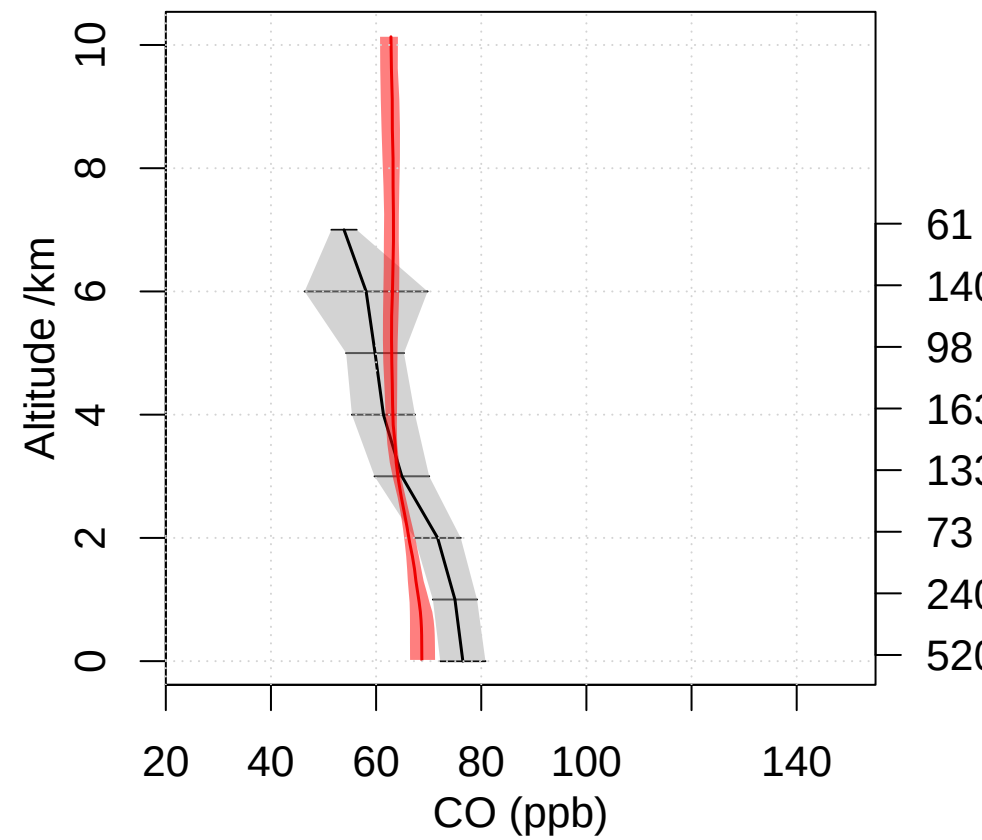
INTEX-NA West Coast 2004 07
Lat 32.5 – 45 Lon 217 – 240



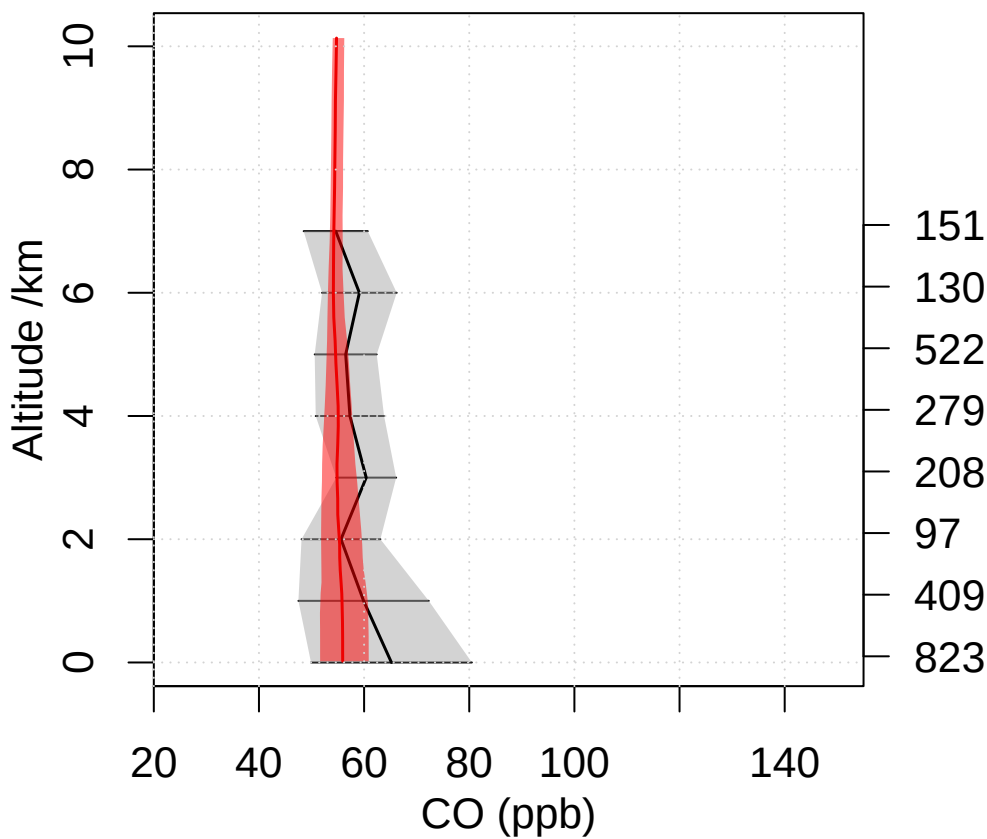
OP3 2008 07
Lat 2.5 – 7.5 Lon 112.5 – 120



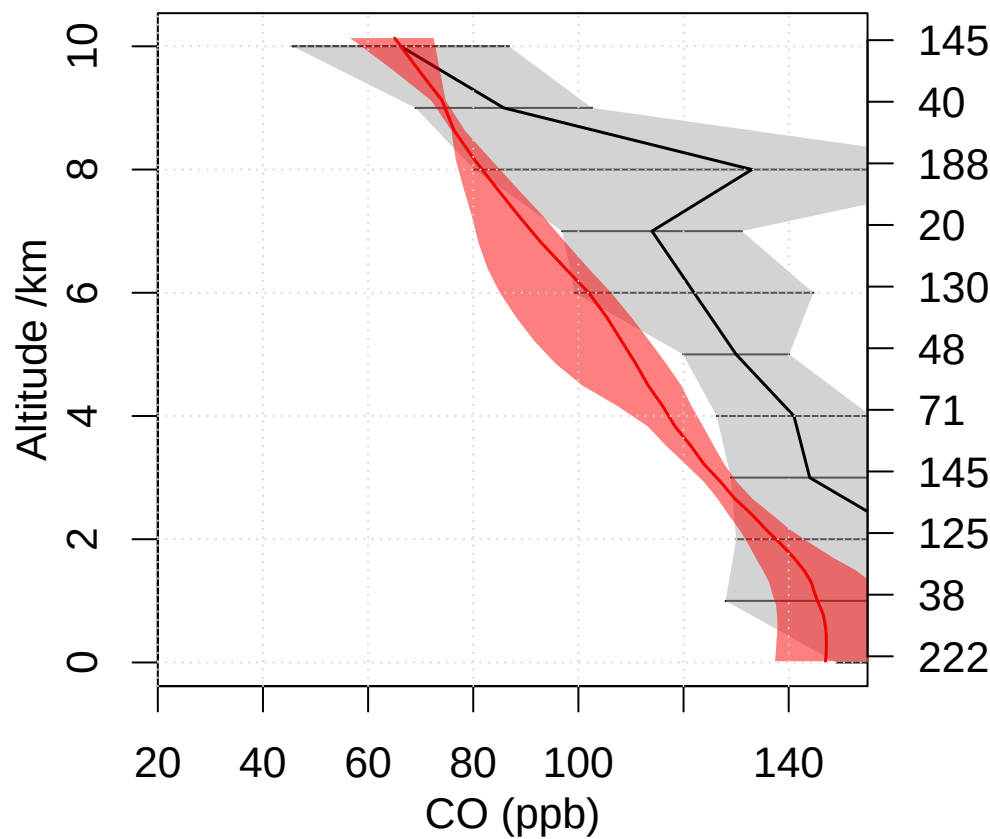
PEM-Tropics-B Christmas-Island 1999 0
Lat 0 – 10 Lon 200 – 220



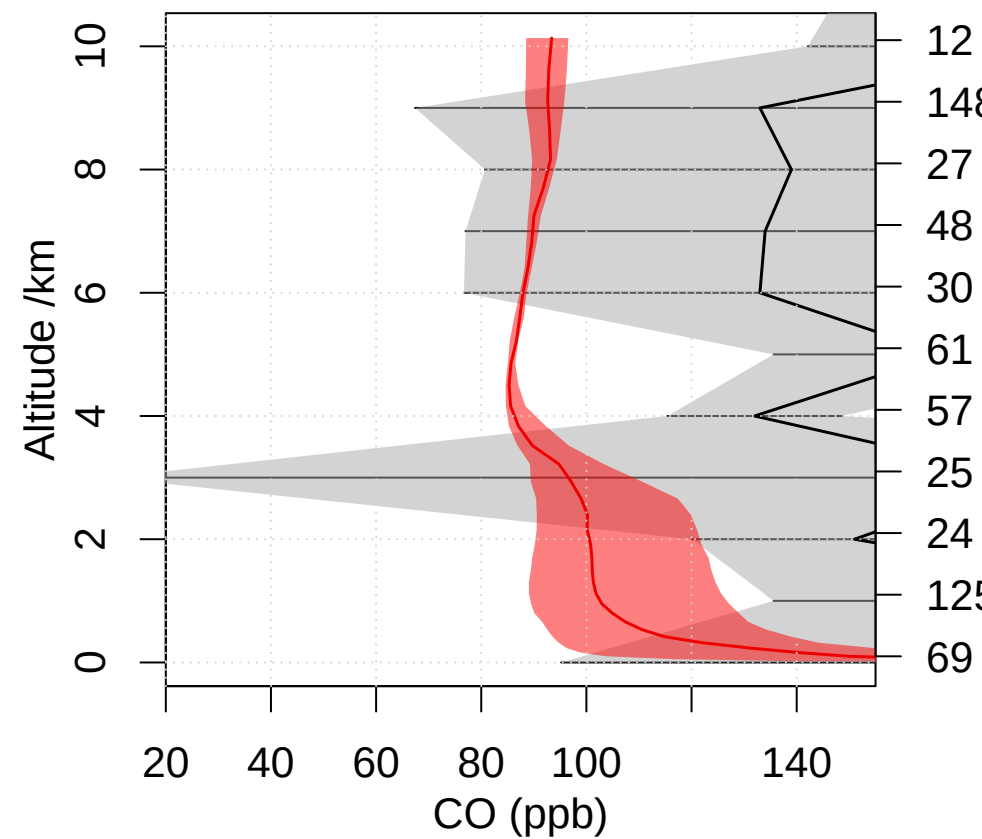
PEM-Tropics-B Tahiti 1999 03
Lat -20 – 0 Lon 200 – 230



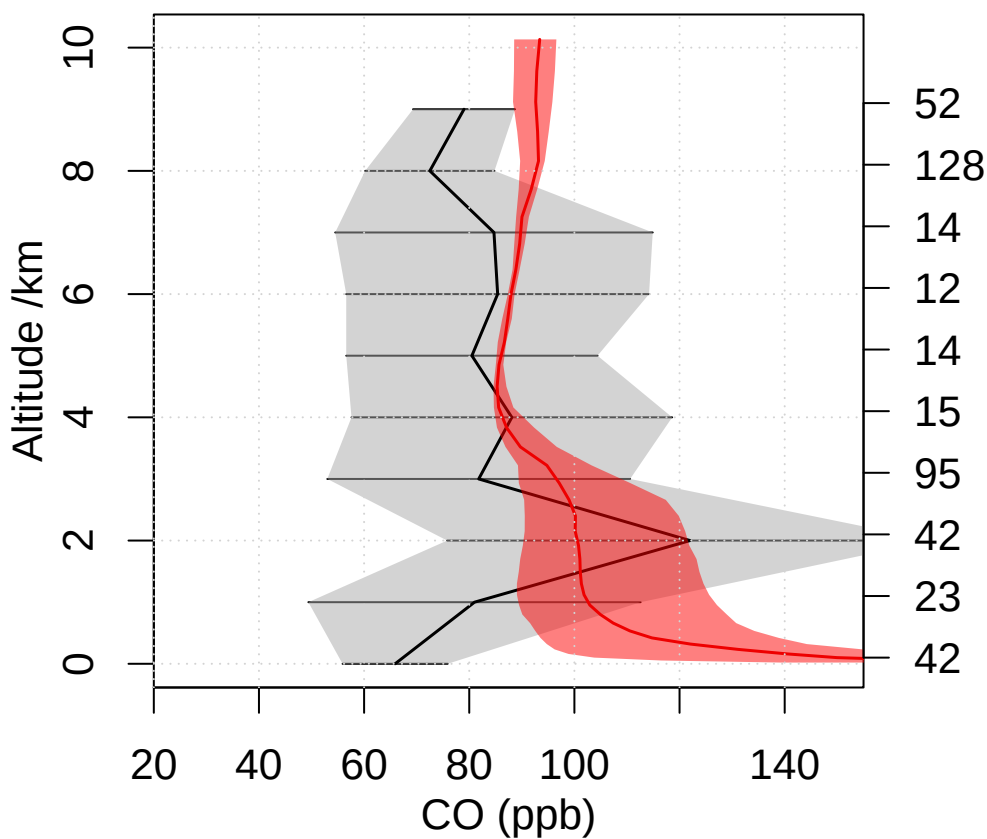
PEM-West-B Japan 1994 02
Lat 25 – 40 Lon 135 – 150



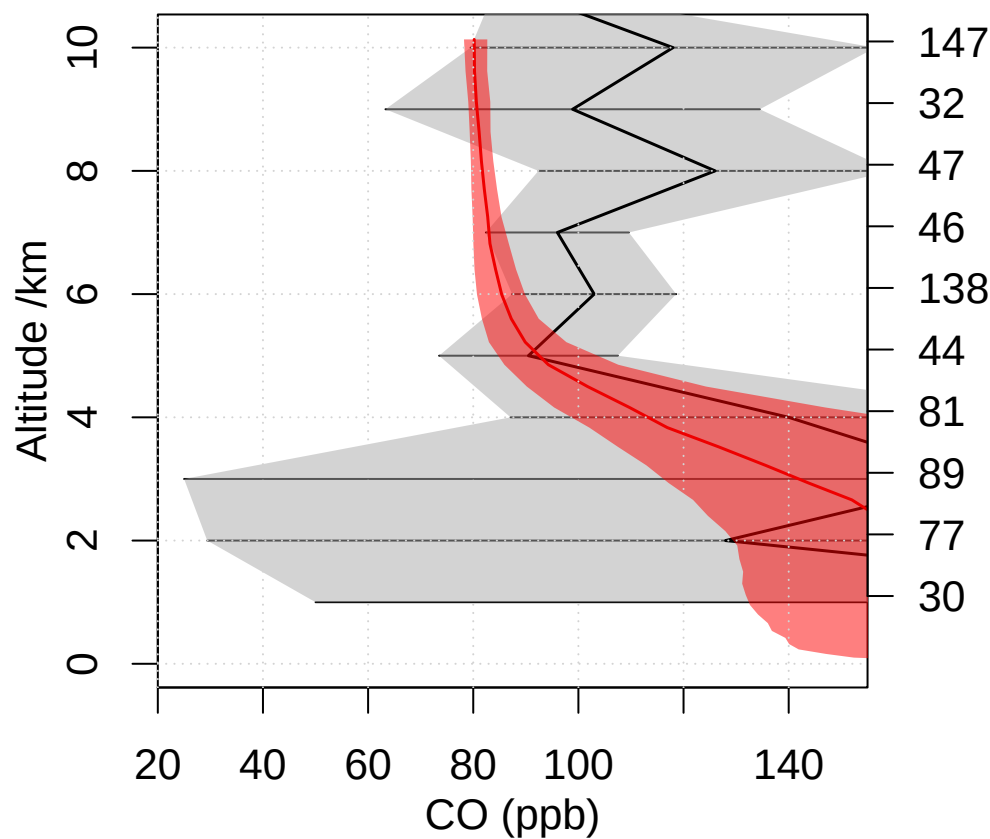
TRACE-A E-Brazil 1992 09
Lat -15 – -5 Lon 310 – 320



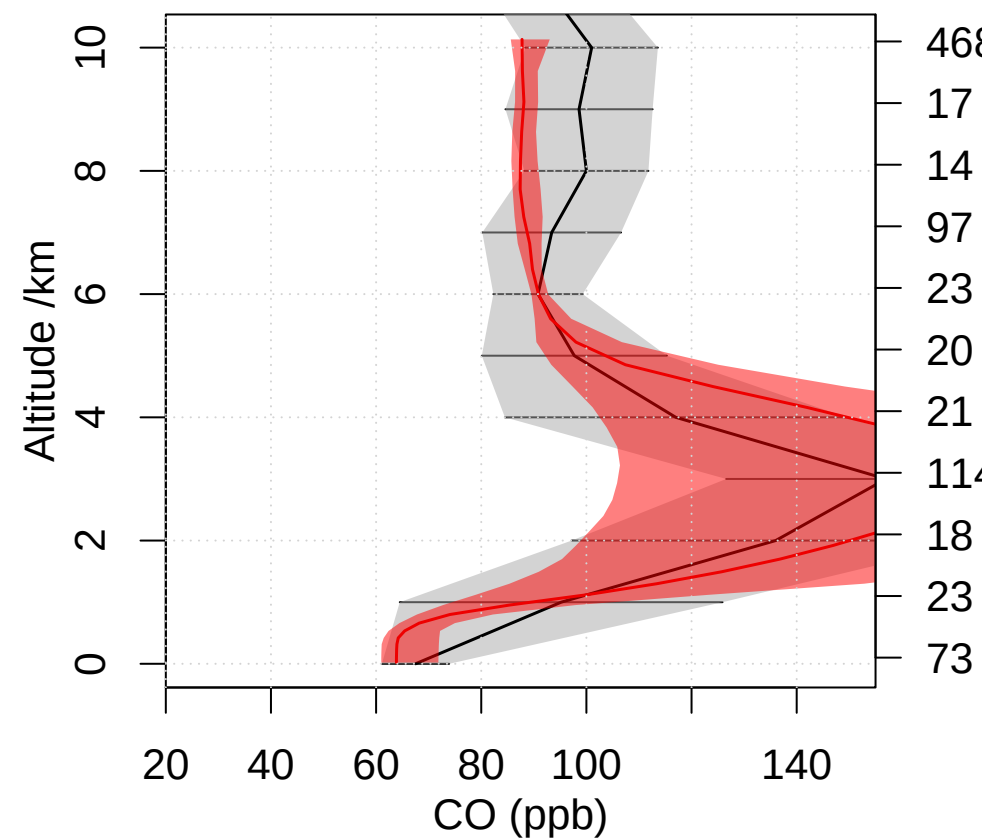
TRACE-A E-Brazil Coast 1992 09
Lat -35 – -25 Lon 310 – 320



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

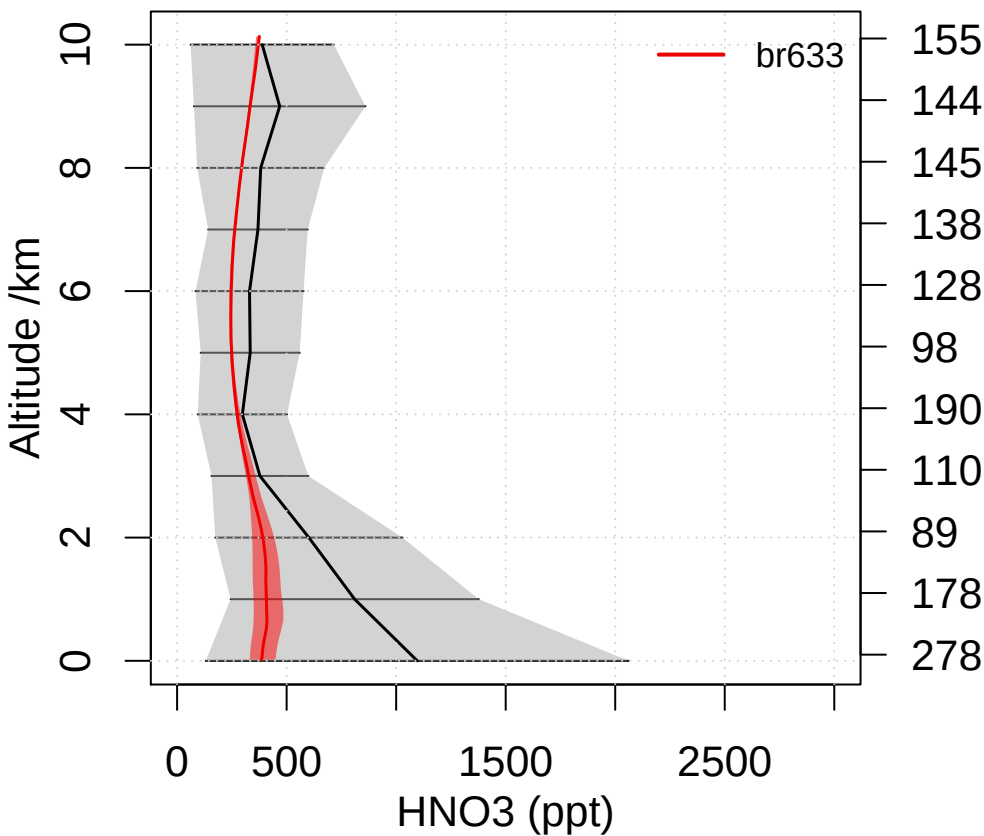


TRACE-A W-Africa Coast 1992 09
Lat -25 – -5 Lon 0 – 10

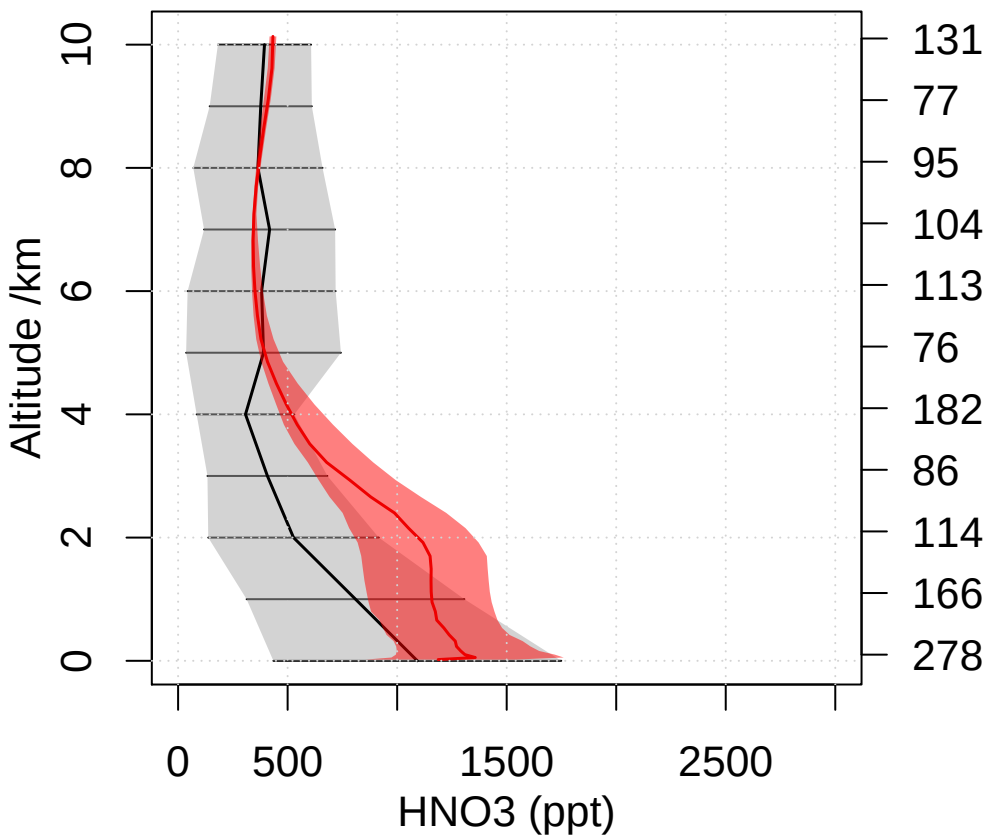


Emmons HNO3 comparison

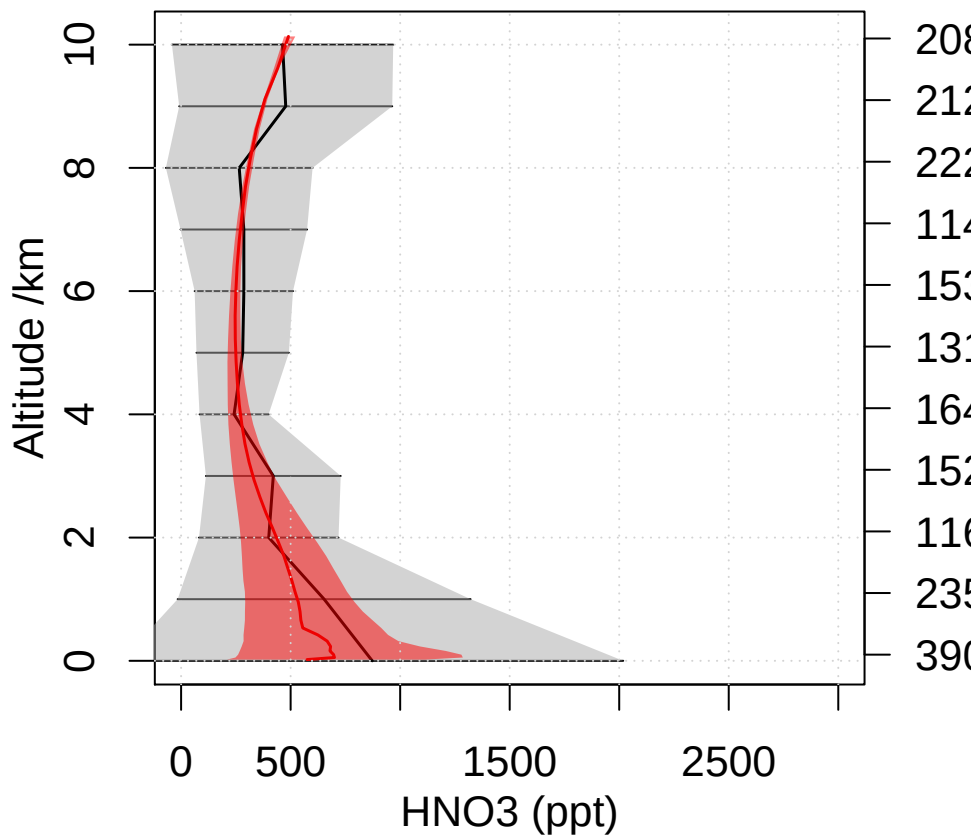
INTEX-NA East Coast 2004 07
Lat 32.5 – 40 Lon 296.5 – 307



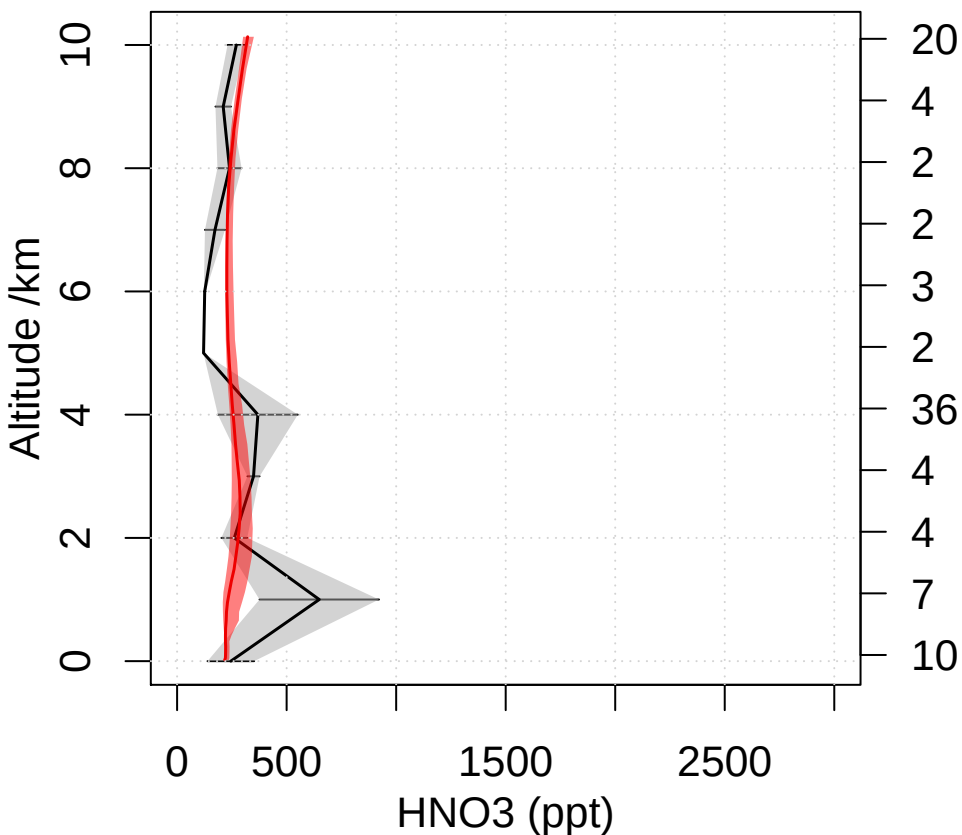
INTEX-NA Central 2004 07
Lat 30 – 40 Lon 259.5 – 285



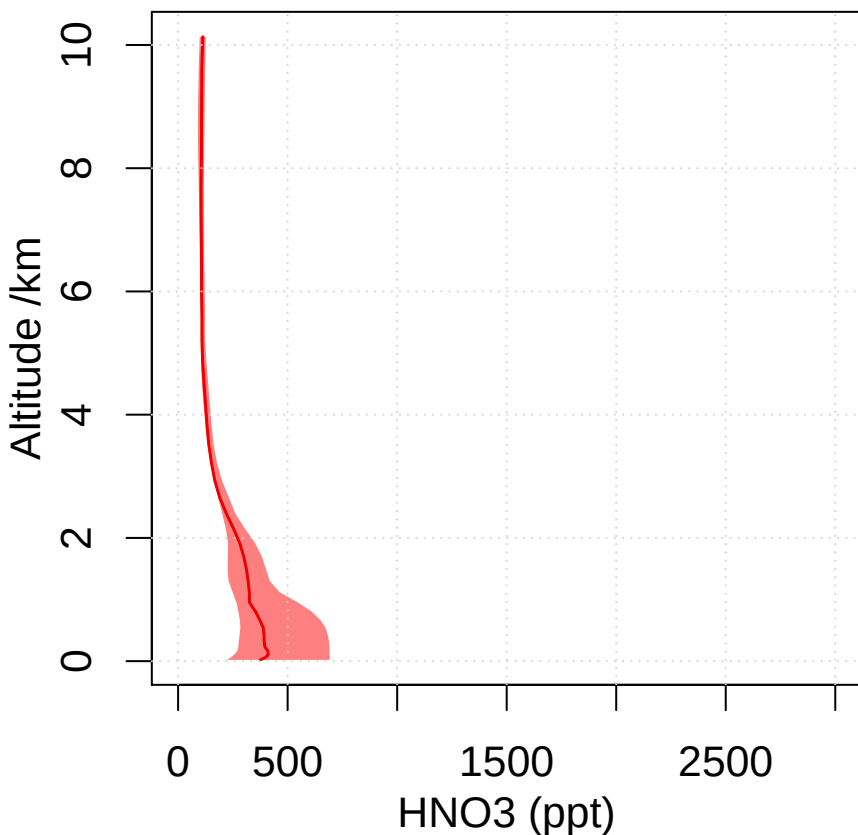
INTEX-NA North East 2004 07
Lat 42.5 – 52.5 Lon 285 – 310



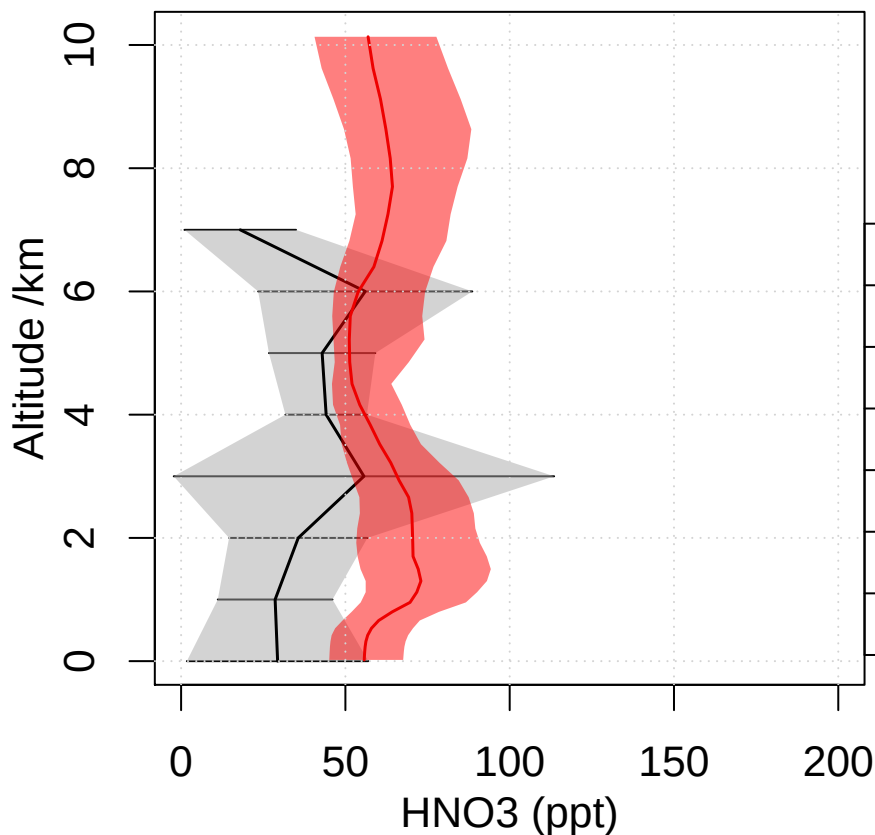
INTEX-NA West Coast 2004 07
Lat 32.5 – 45 Lon 217 – 240



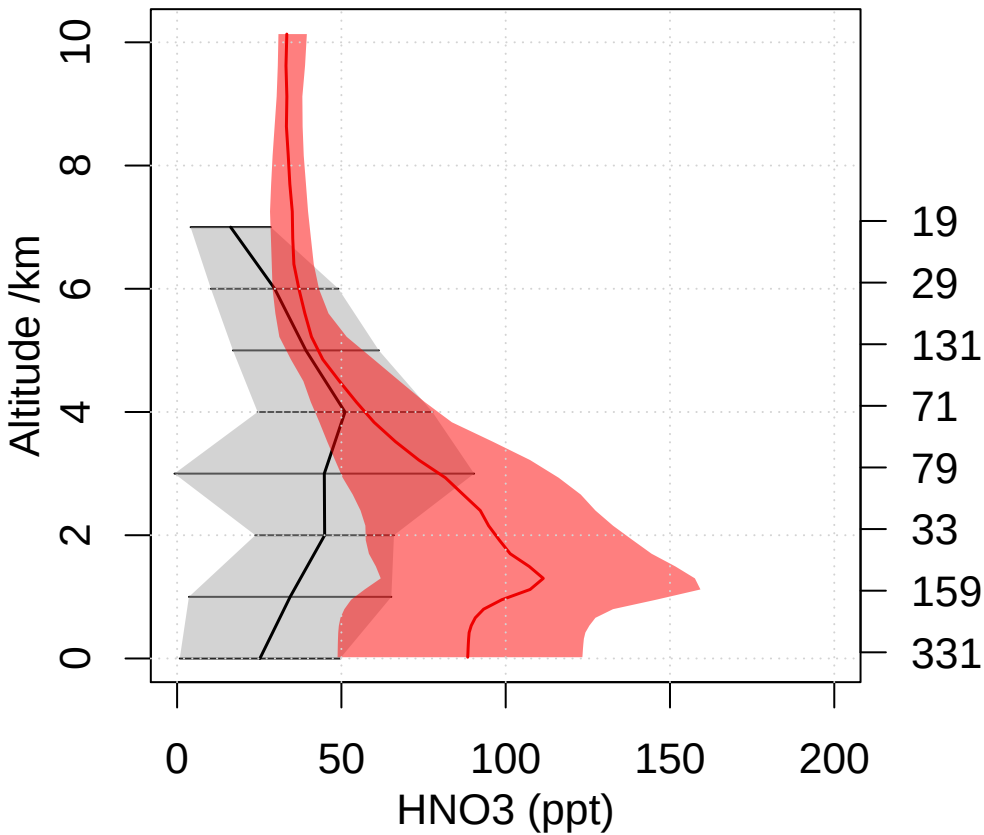
OP3 2008 07
Lat 2.5 – 7.5 Lon 112.5 – 120



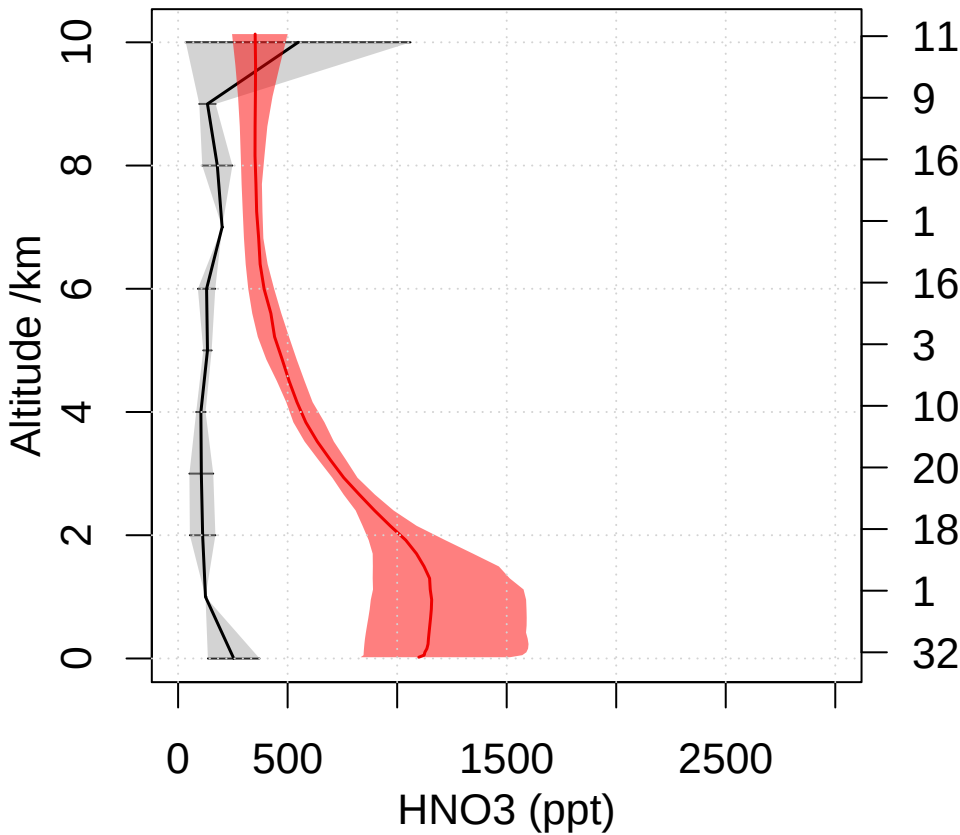
PEM-Tropics-B Christmas-Island 1999 07
Lat 0 – 10 Lon 200 – 220



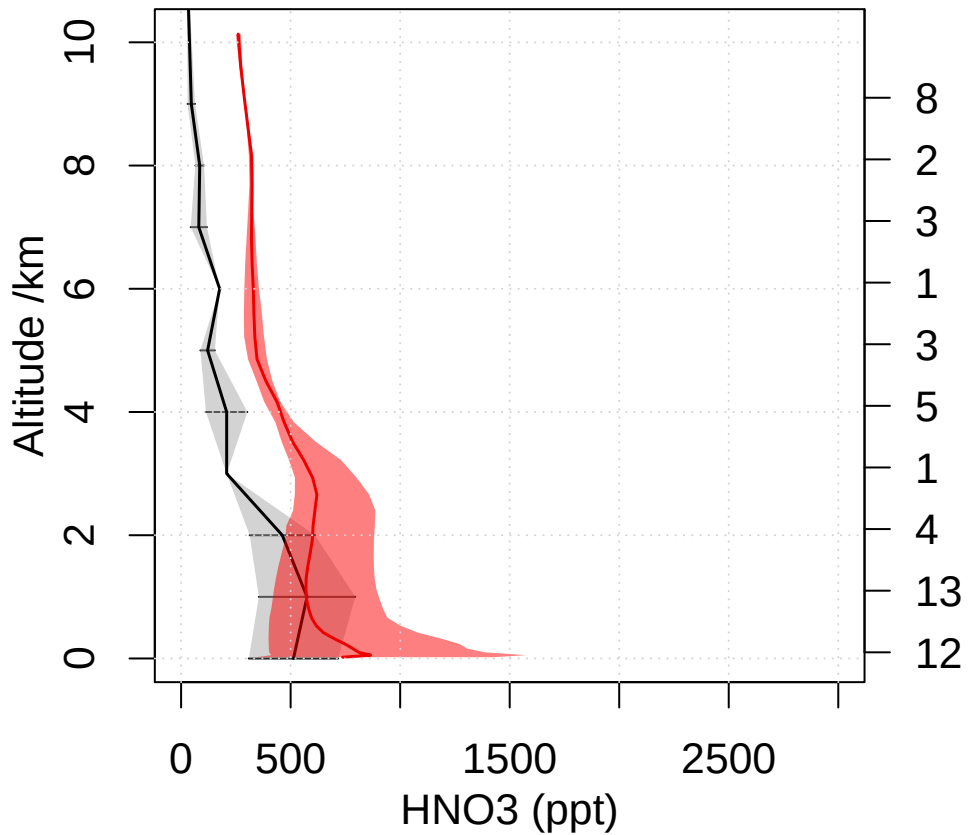
PEM-Tropics-B Tahiti 1999 03
Lat -20 – 0 Lon 200 – 230



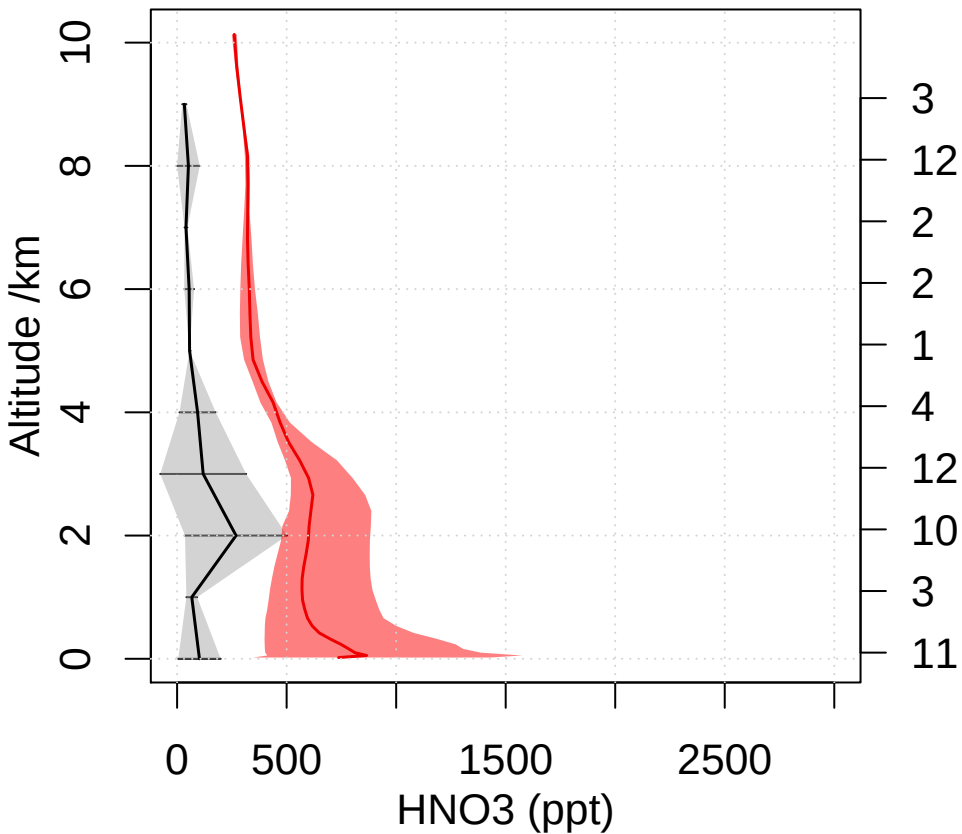
PEM-West-B Japan 1994 02
Lat 25 – 40 Lon 135 – 150



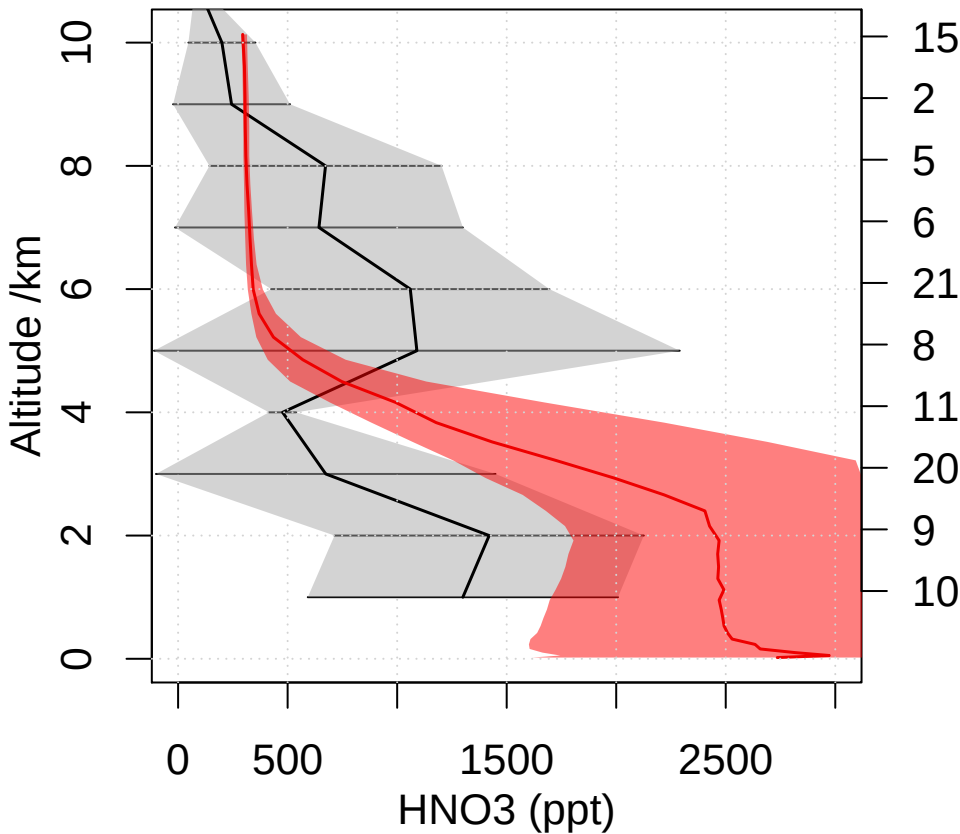
TRACE-A E-Brazil 1992 09
Lat -15 – -5 Lon 310 – 320



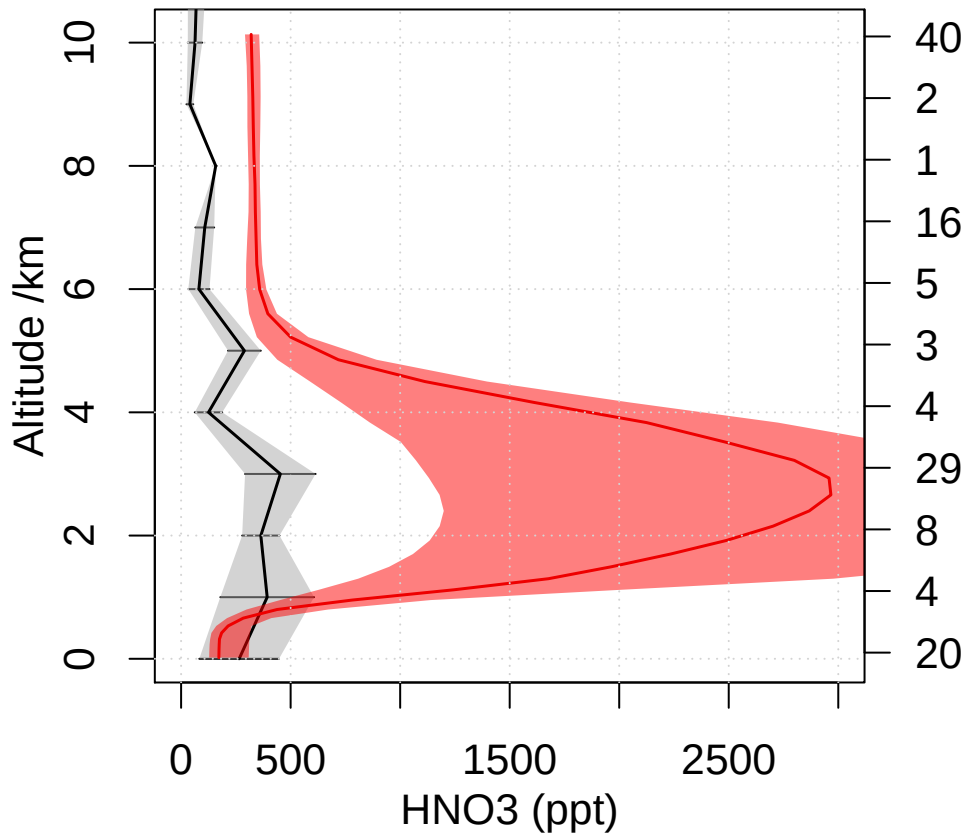
TRACE-A E-Brazil Coast 1992 09
Lat -35 – -25 Lon 310 – 320



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

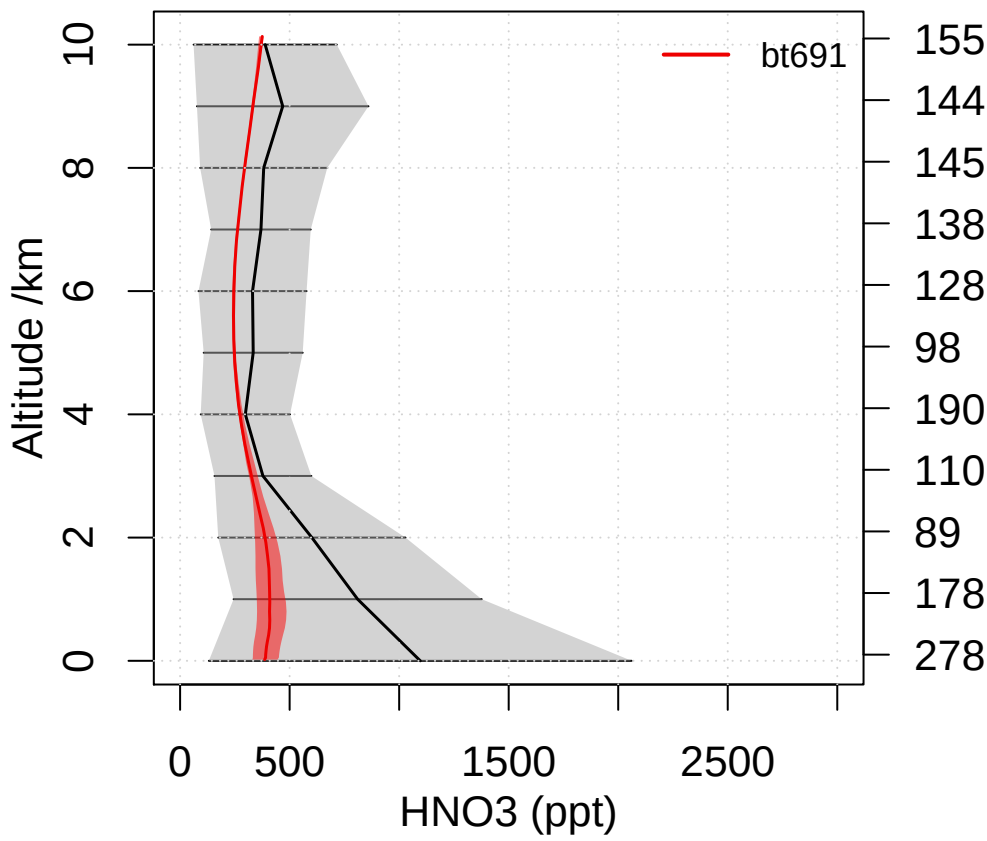


TRACE-A W-Africa Coast 1992 09
Lat -25 – -5 Lon 0 – 10

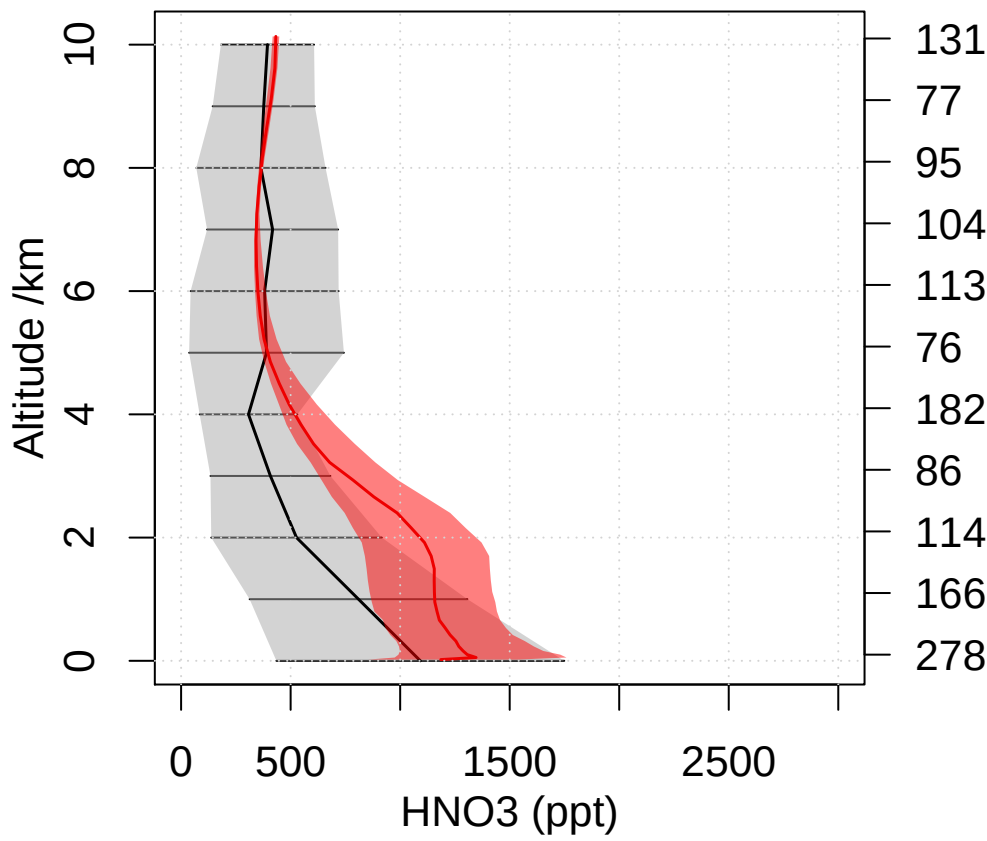


Emmons HNO3 comparison

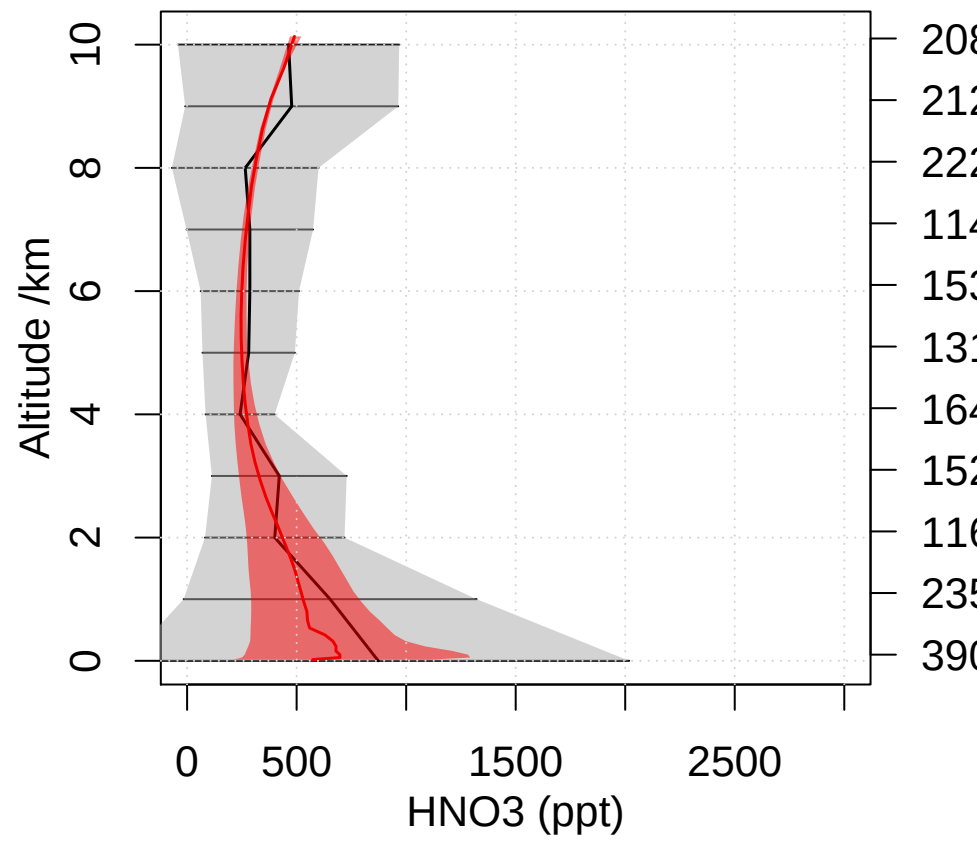
INTEX-NA East Coast 2004 07
Lat 32.5 – 40 Lon 296.5 – 307



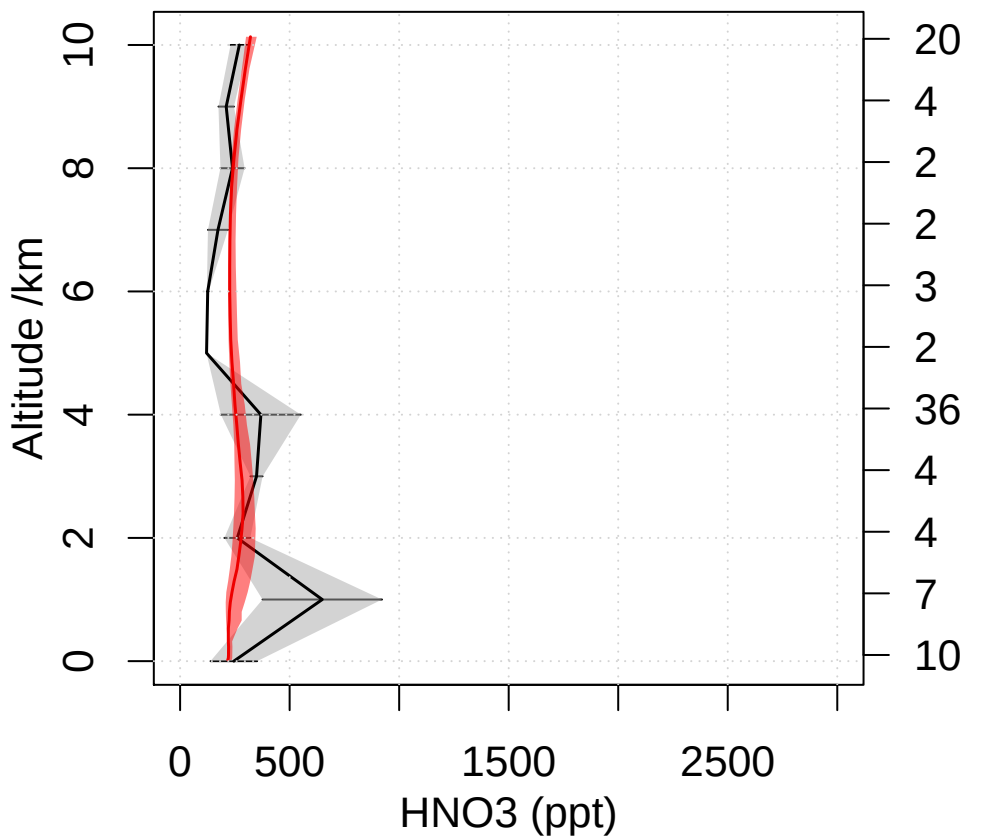
INTEX-NA Central 2004 07
Lat 30 – 40 Lon 259.5 – 285



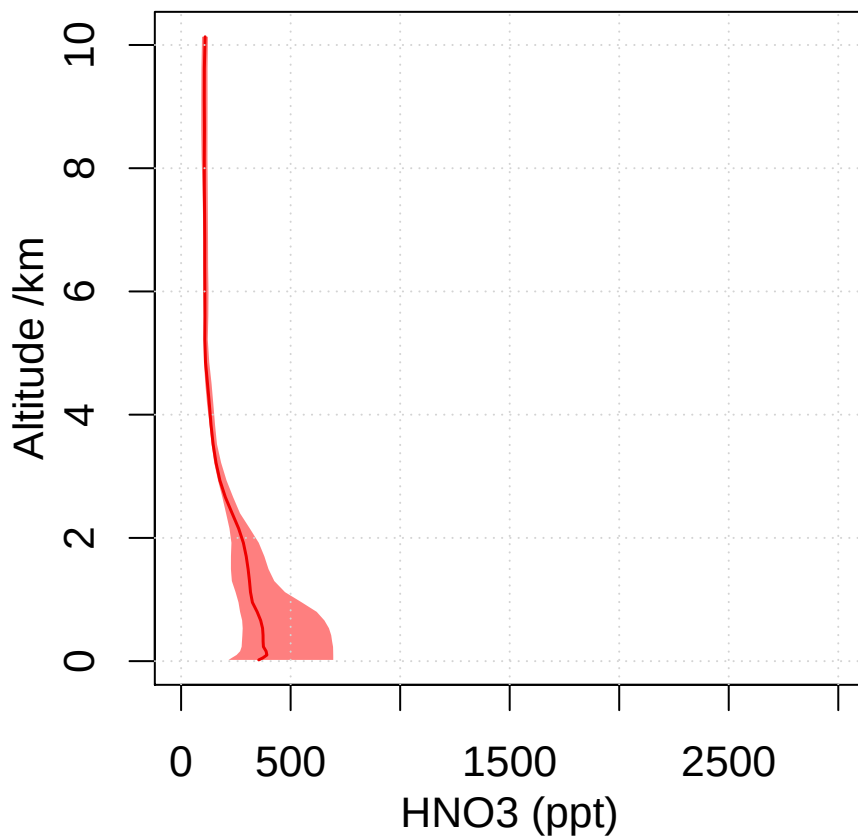
INTEX-NA North East 2004 07
Lat 42.5 – 52.5 Lon 285 – 310



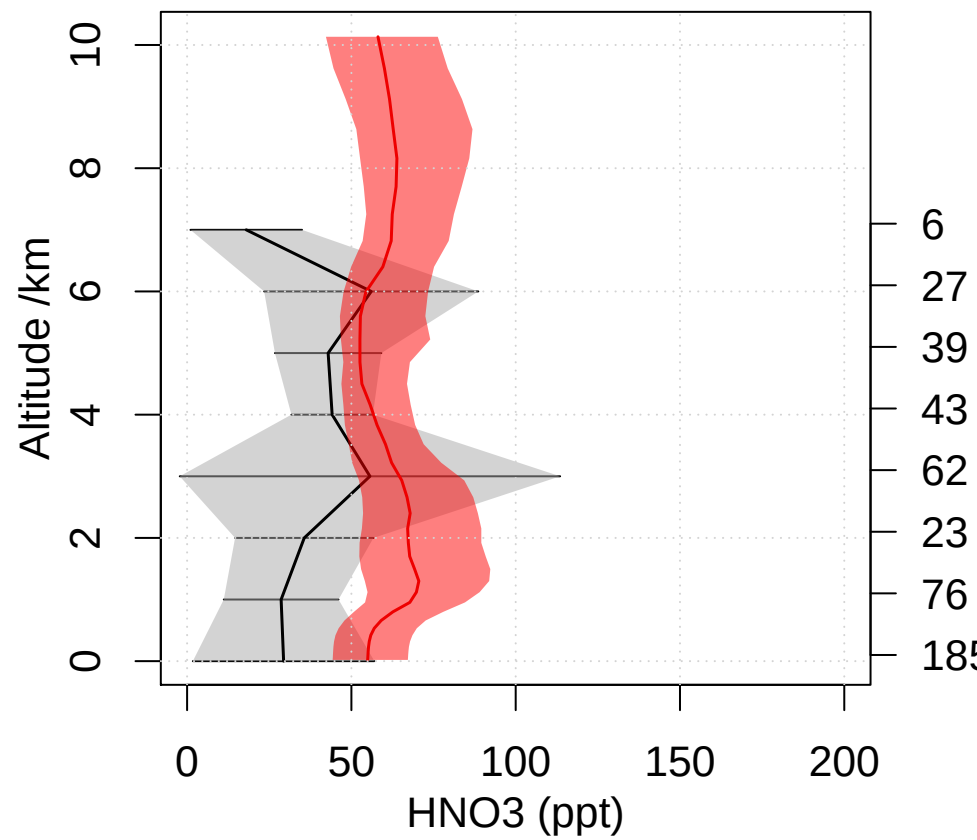
INTEX-NA West Coast 2004 07
Lat 32.5 – 45 Lon 217 – 240



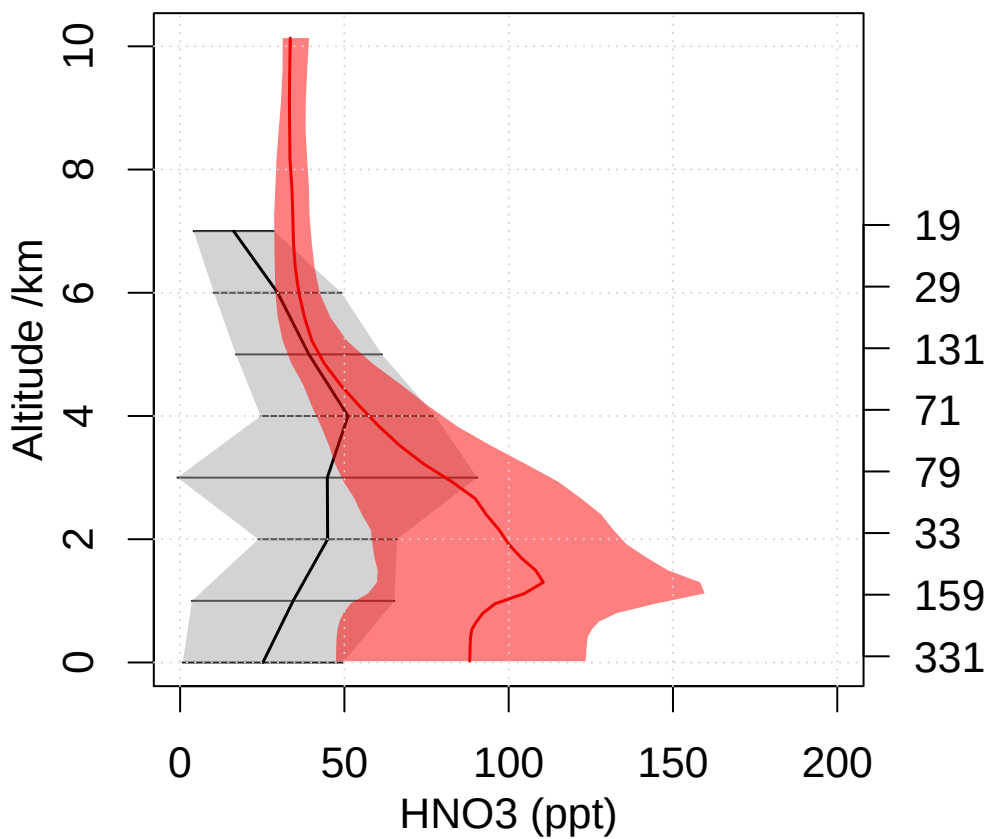
OP3 2008 07
Lat 2.5 – 7.5 Lon 112.5 – 120



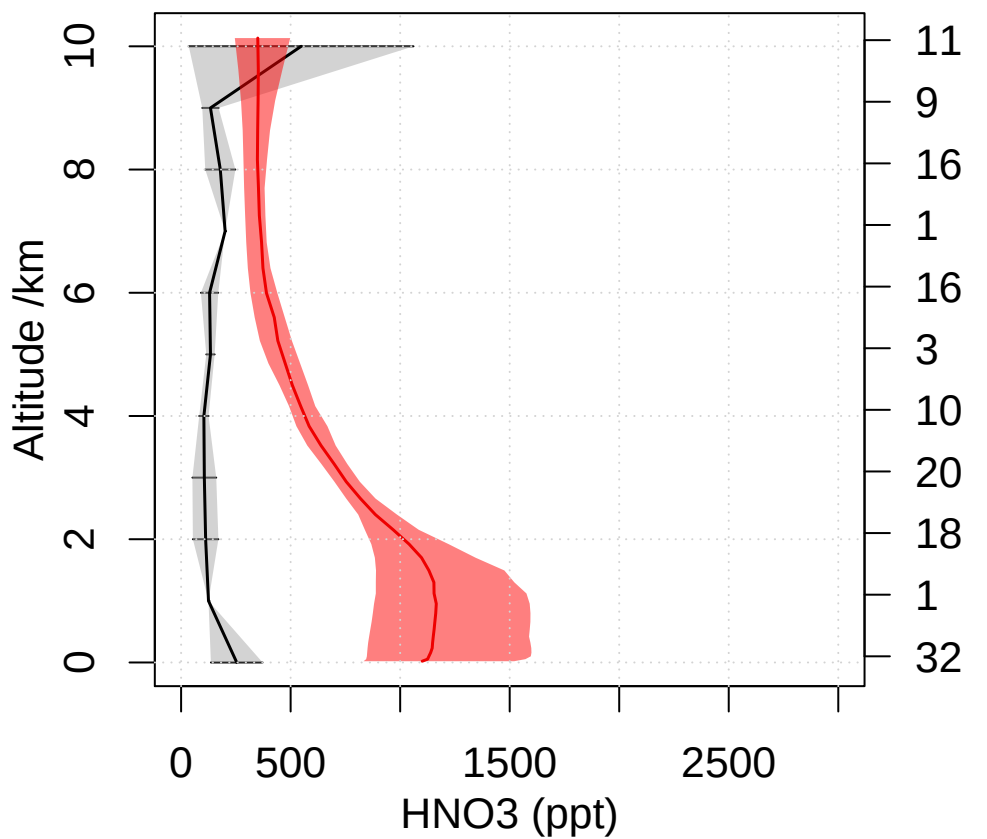
PEM-Tropics-B Christmas-Island 1999 07
Lat 0 – 10 Lon 200 – 220



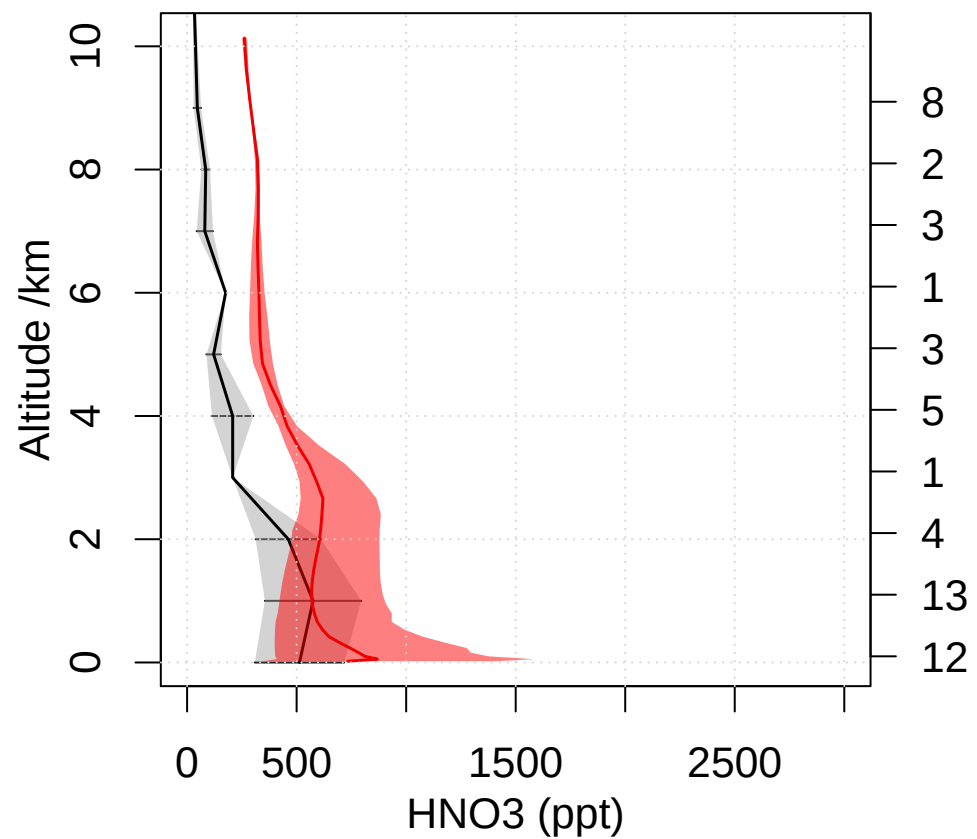
PEM-Tropics-B Tahiti 1999 03
Lat -20 – 0 Lon 200 – 230



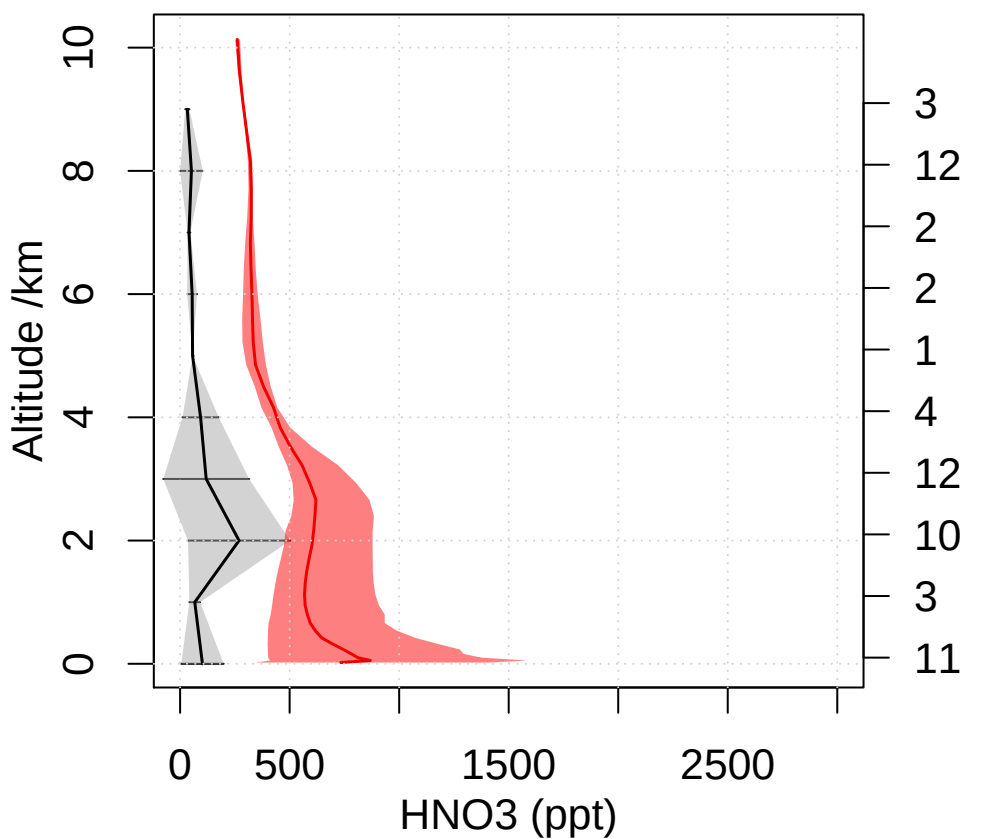
PEM-West-B Japan 1994 02
Lat 25 – 40 Lon 135 – 150



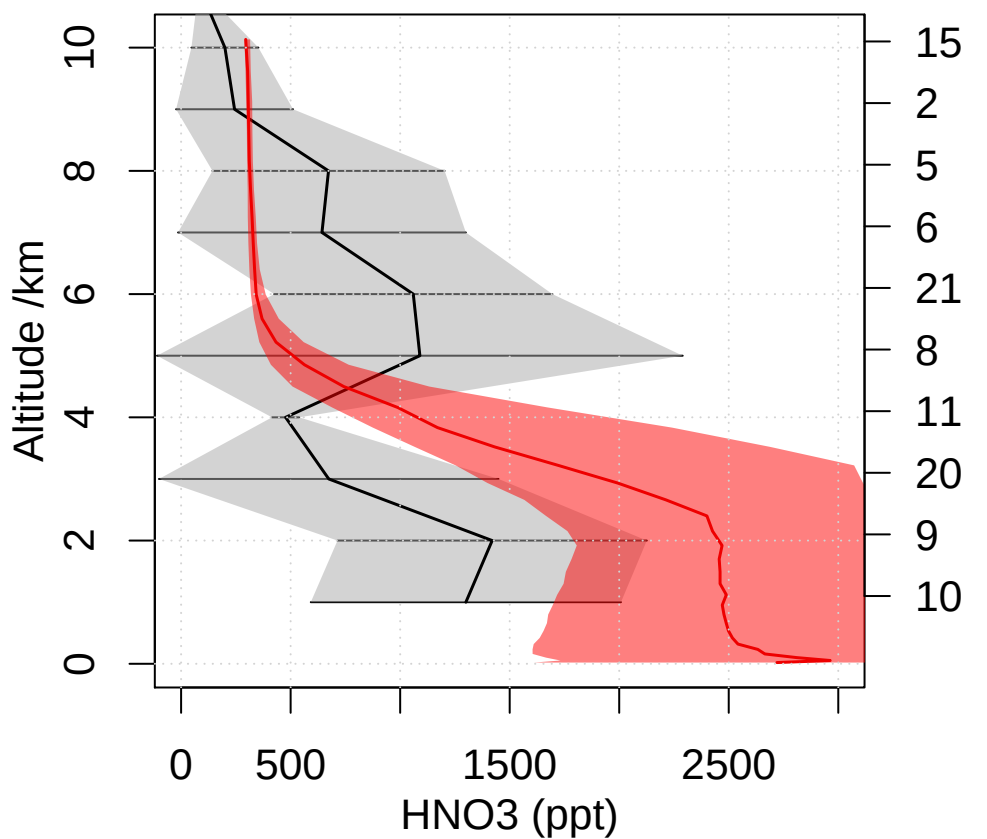
TRACE-A E-Brazil 1992 09
Lat -15 – -5 Lon 310 – 320



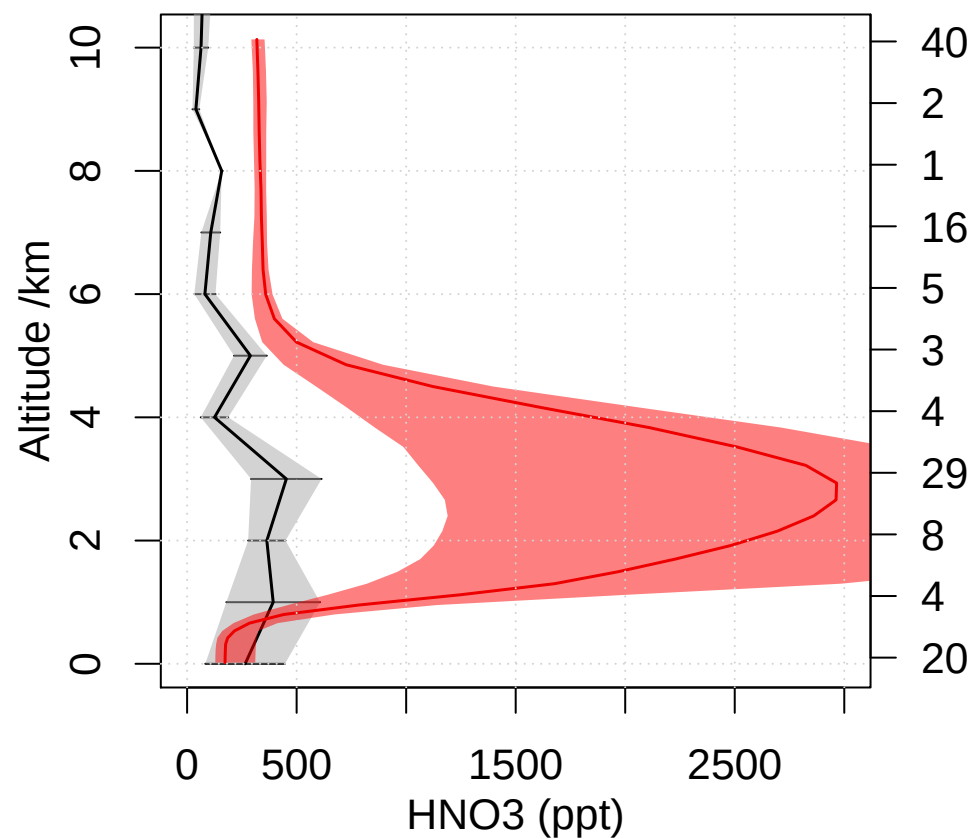
TRACE-A E-Brazil Coast 1992 09
Lat -35 – -25 Lon 310 – 320



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

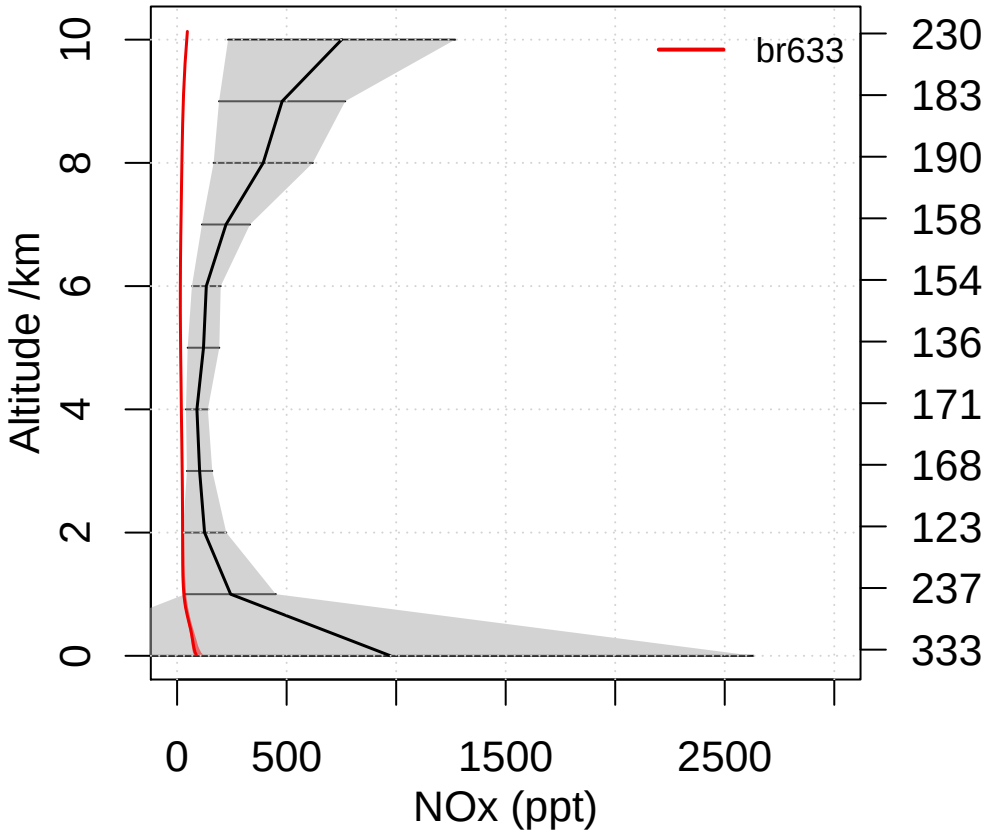


TRACE-A W-Africa Coast 1992 09
Lat -25 – -5 Lon 0 – 10

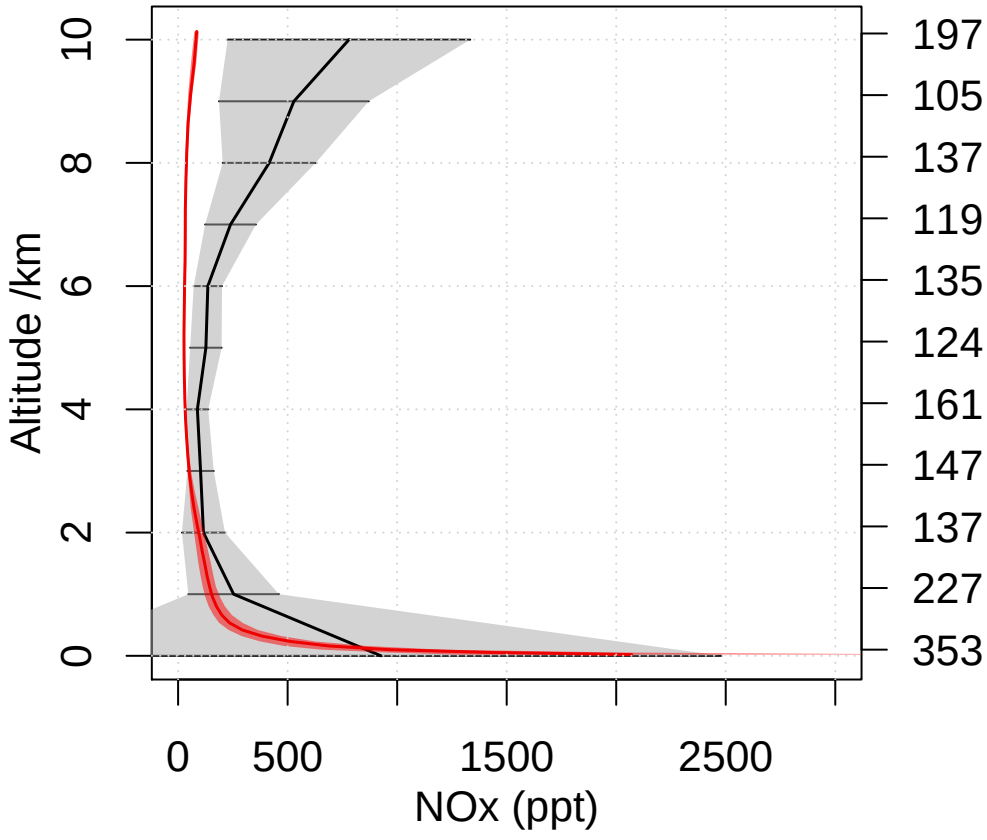


Emmons NOx comparison

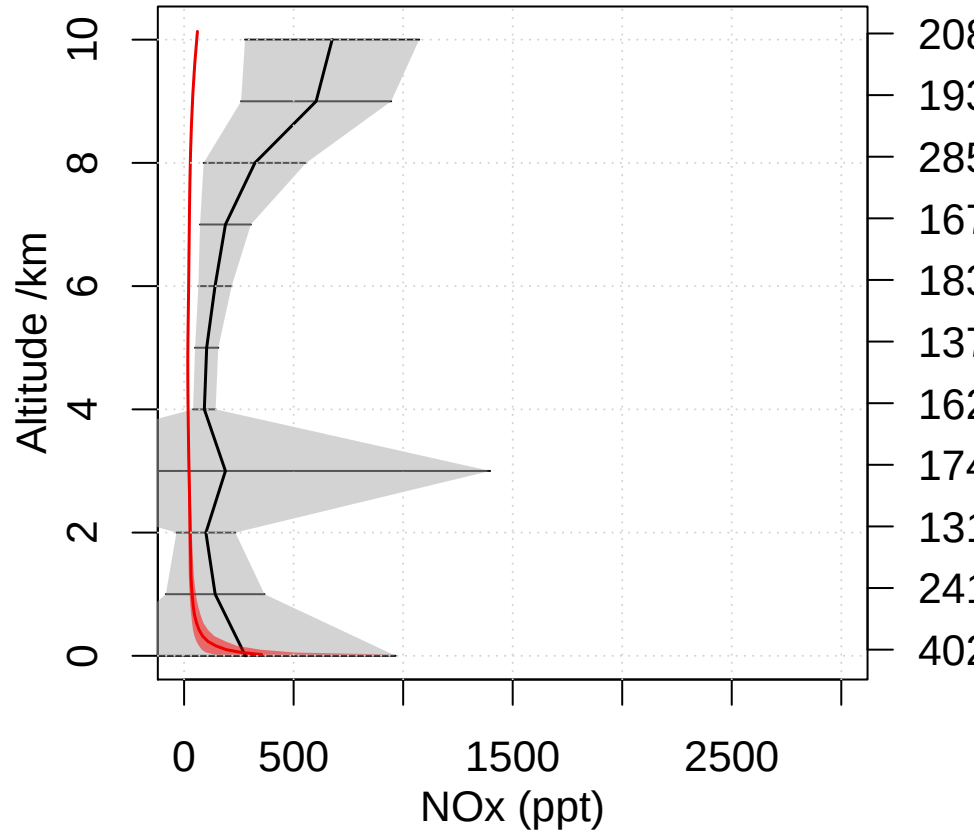
INTEX-NA East Coast 2004 07
Lat 32.5 – 40 Lon 296.5 – 307



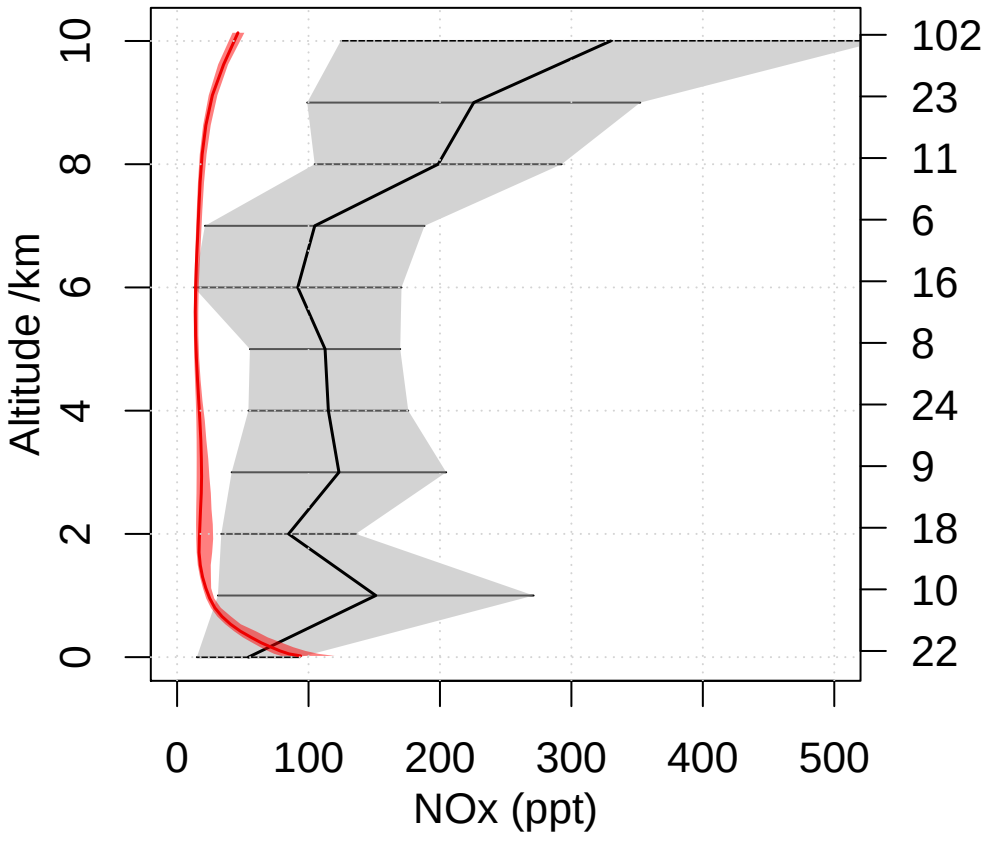
INTEX-NA Central 2004 07
Lat 30 – 40 Lon 259.5 – 285



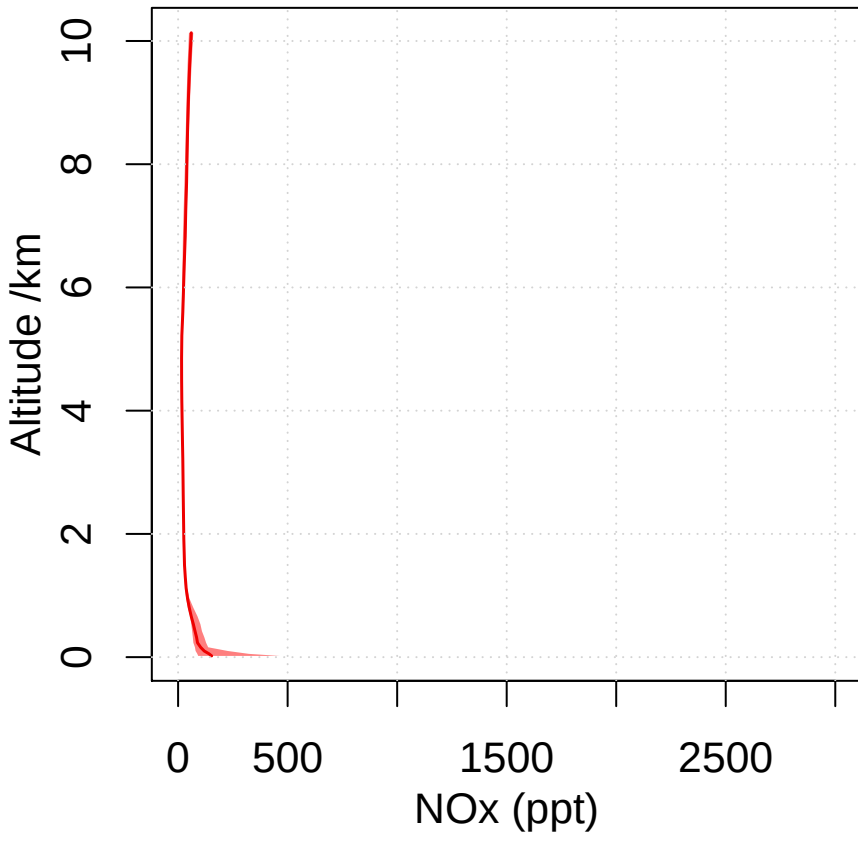
INTEX-NA North East 2004 07
Lat 42.5 – 52.5 Lon 285 – 310



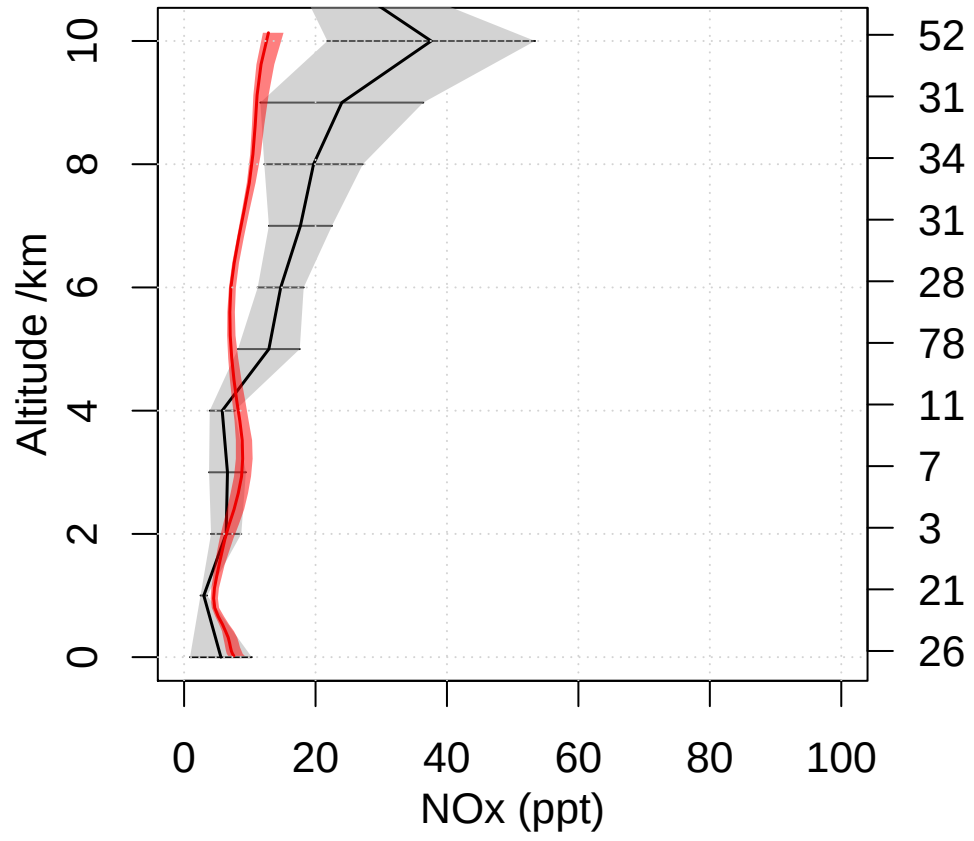
INTEX-NA West Coast 2004 07
Lat 32.5 – 45 Lon 217 – 240



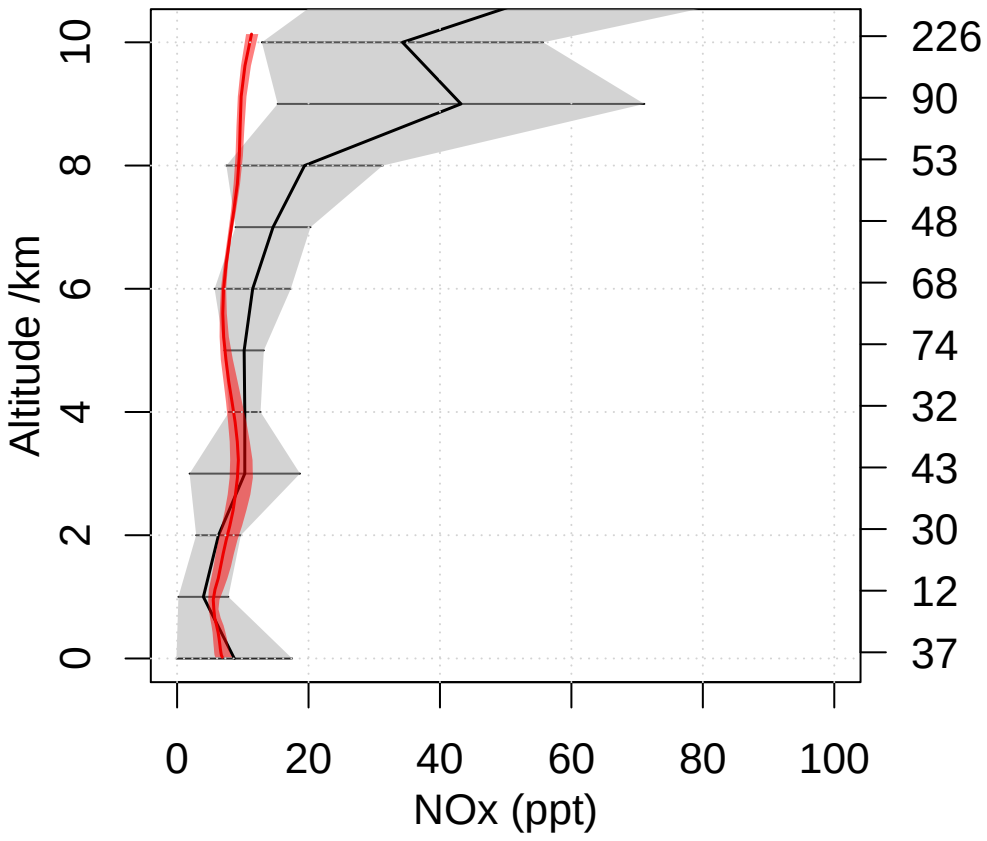
OP3 2008 07
Lat 2.5 – 7.5 Lon 112.5 – 120



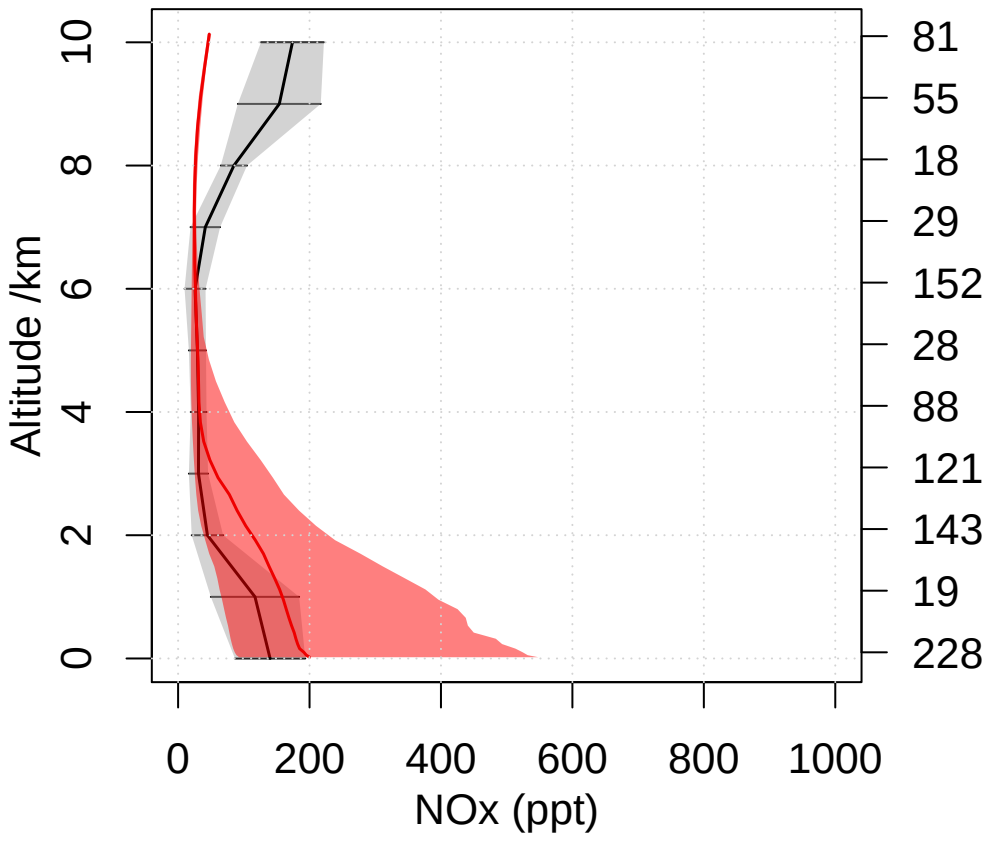
PEM-Tropics-B Christmas-Island 1999 07
Lat 0 – 10 Lon 200 – 220



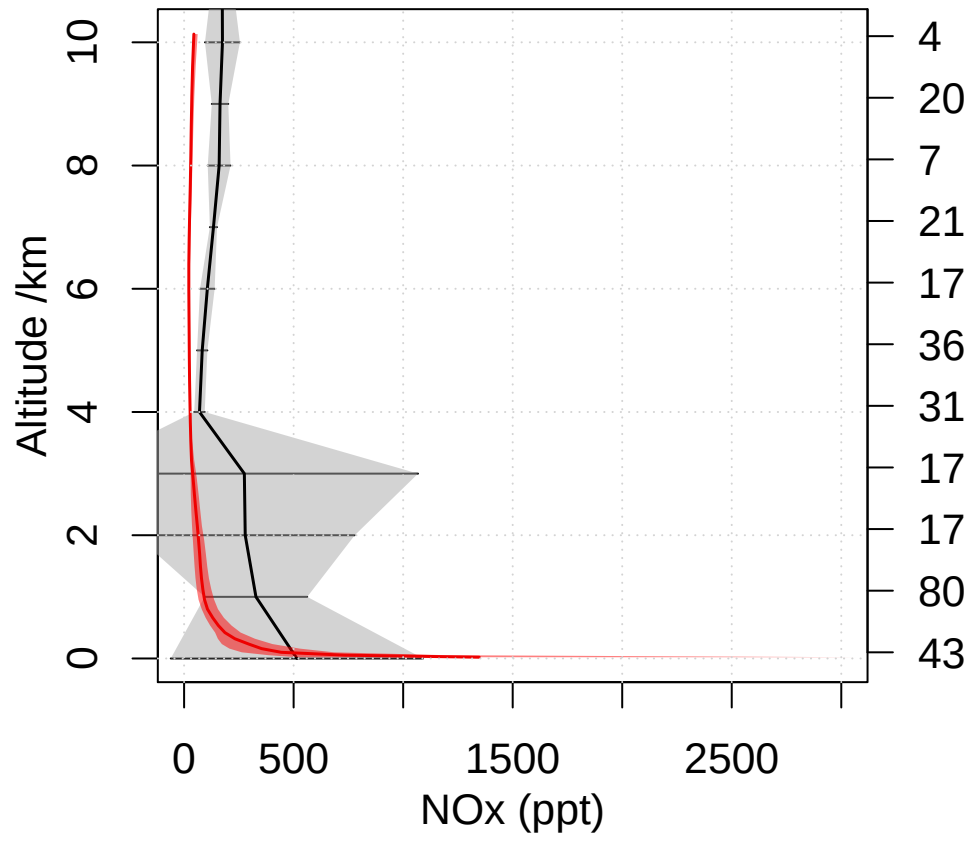
PEM-Tropics-B Tahiti 1999 03
Lat -20 – 0 Lon 200 – 230



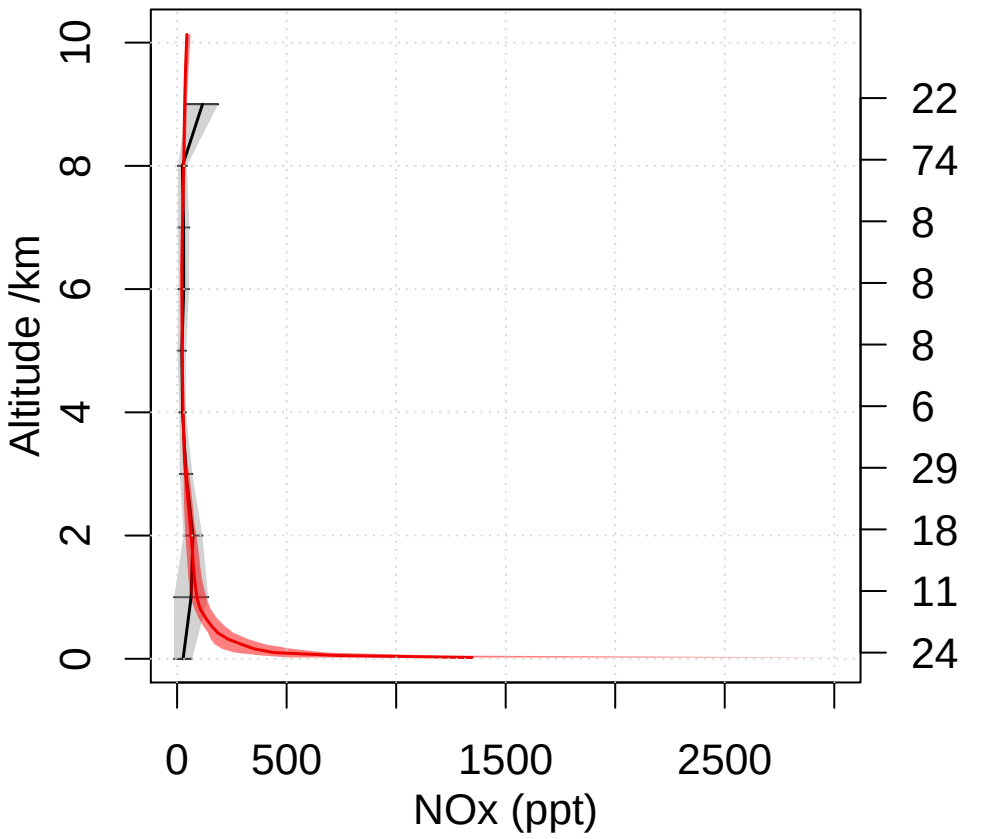
PEM-West-B Japan 1994 02
Lat 25 – 40 Lon 135 – 150



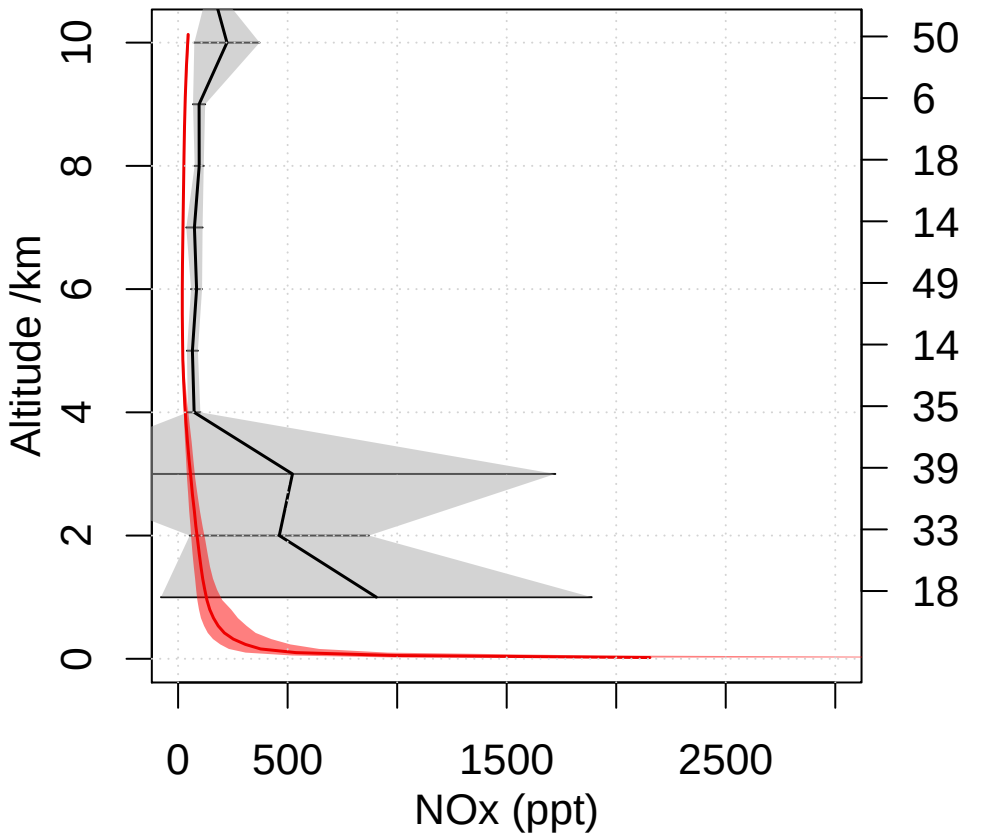
TRACE-A E-Brazil 1992 09
Lat -15 – -5 Lon 310 – 320



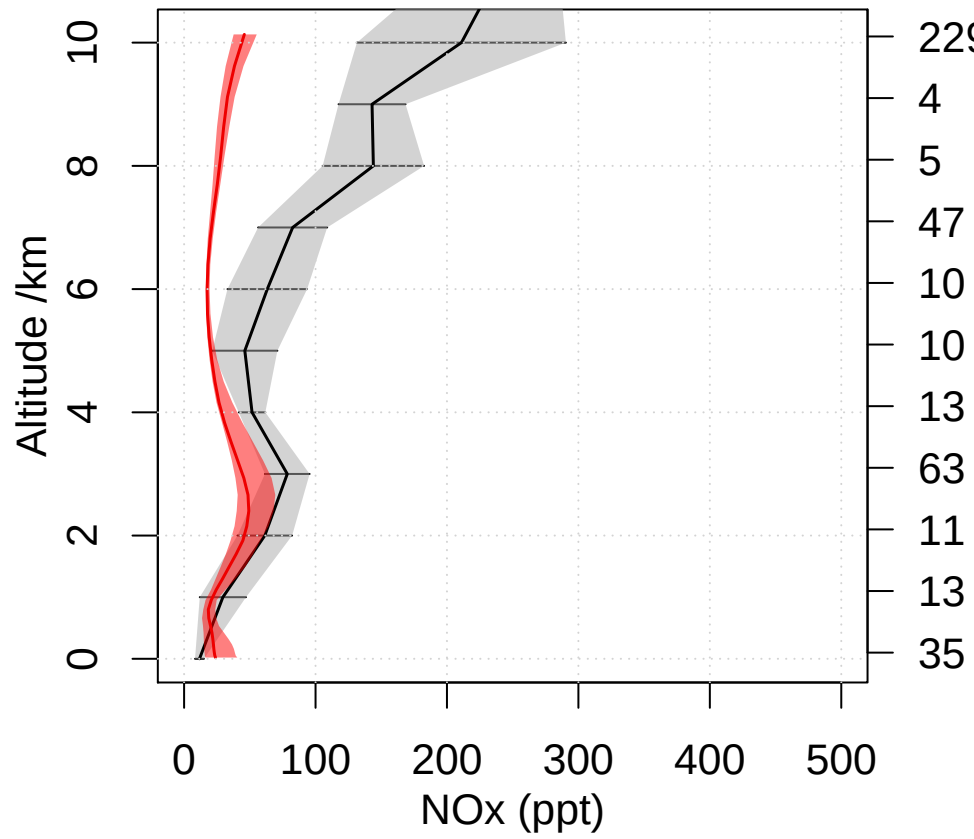
TRACE-A E-Brazil Coast 1992 09
Lat -35 – -25 Lon 310 – 320



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

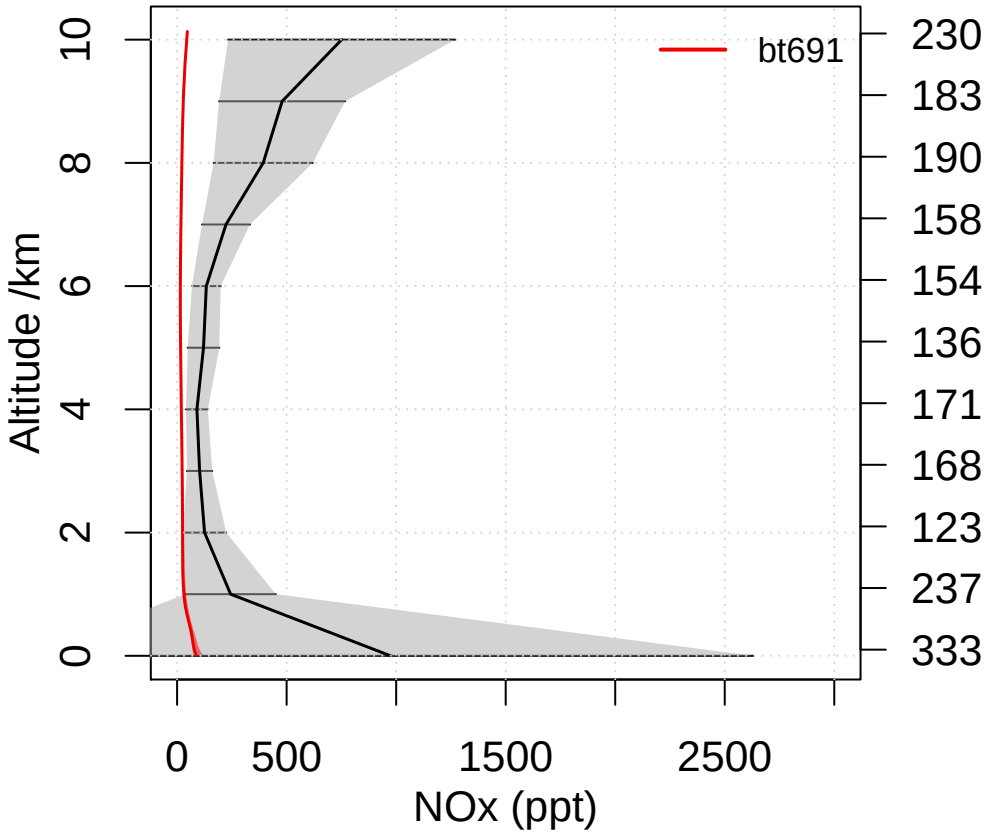


TRACE-A W-Africa Coast 1992 09
Lat -25 – -5 Lon 0 – 10

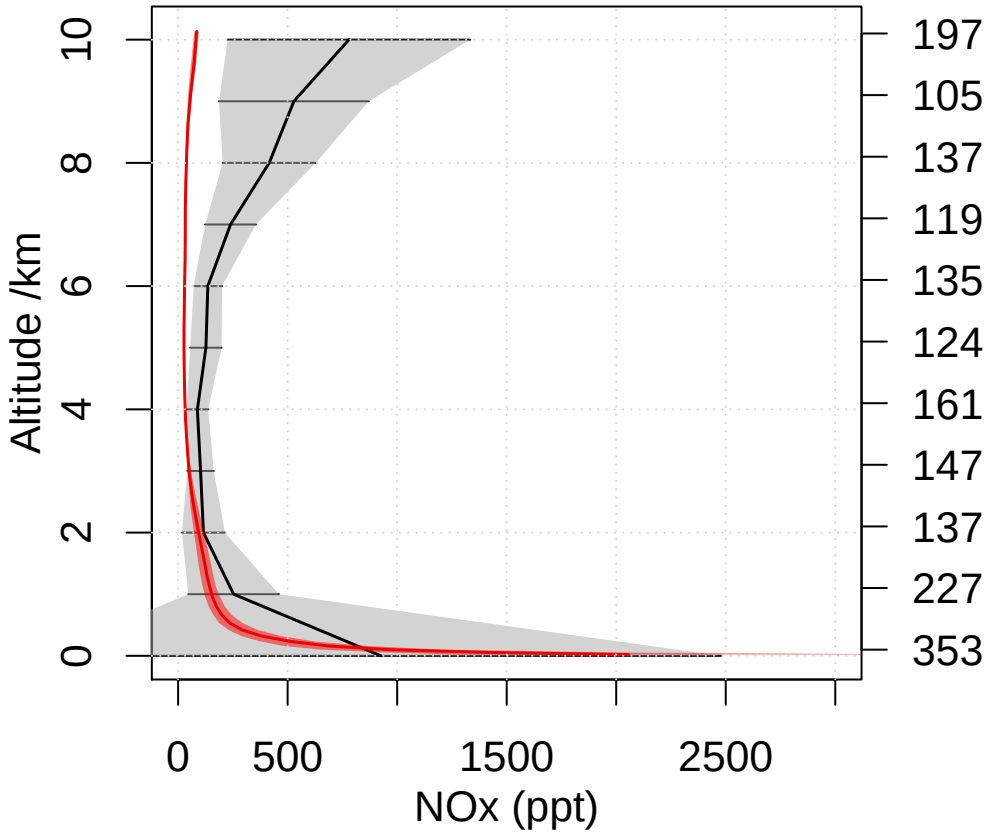


Emmons NOx comparison

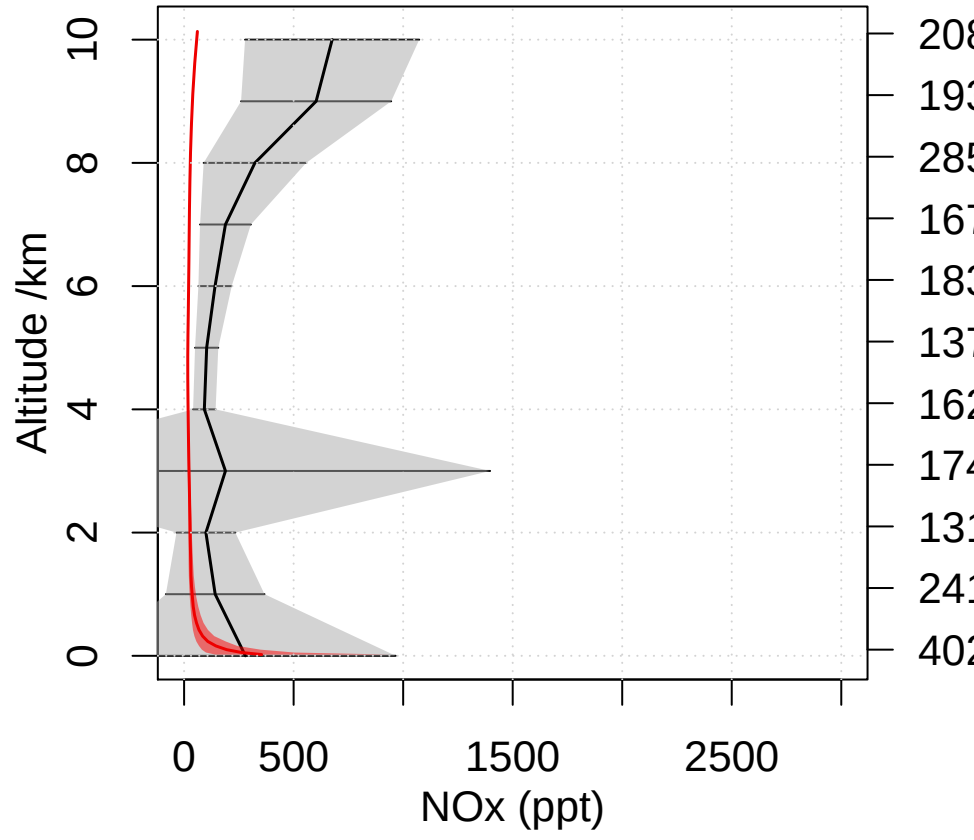
INTEX-NA East Coast 2004 07
Lat 32.5 – 40 Lon 296.5 – 307



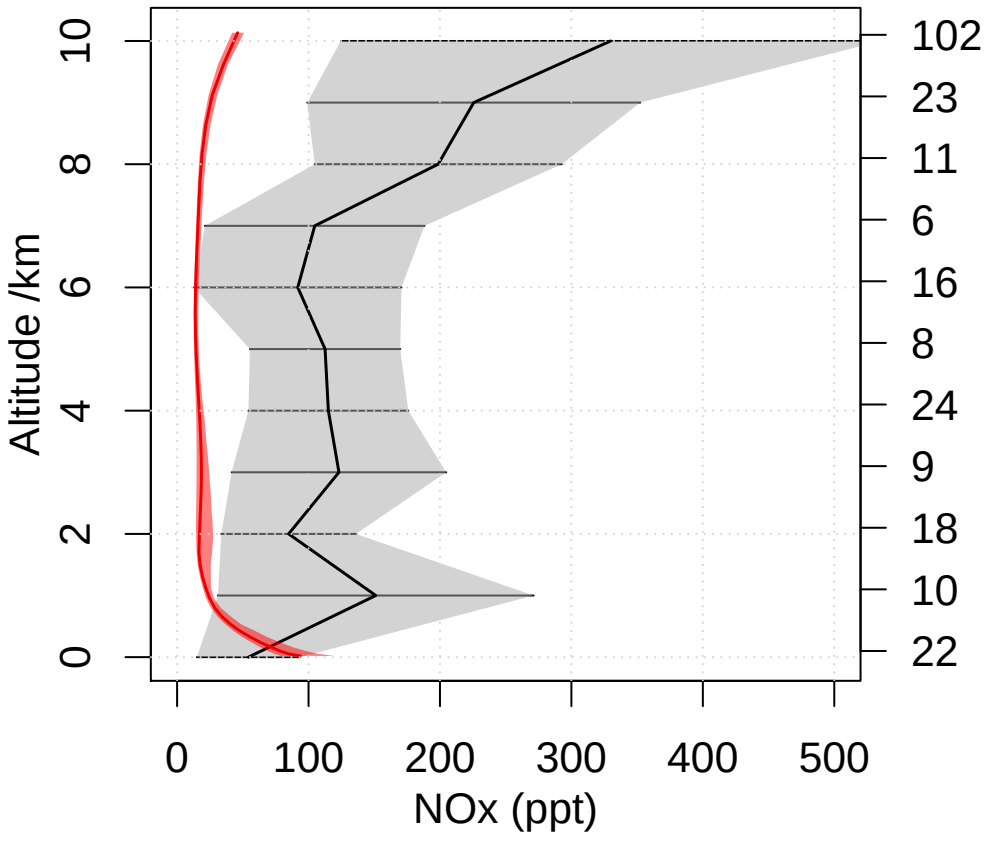
INTEX-NA Central 2004 07
Lat 30 – 40 Lon 259.5 – 285



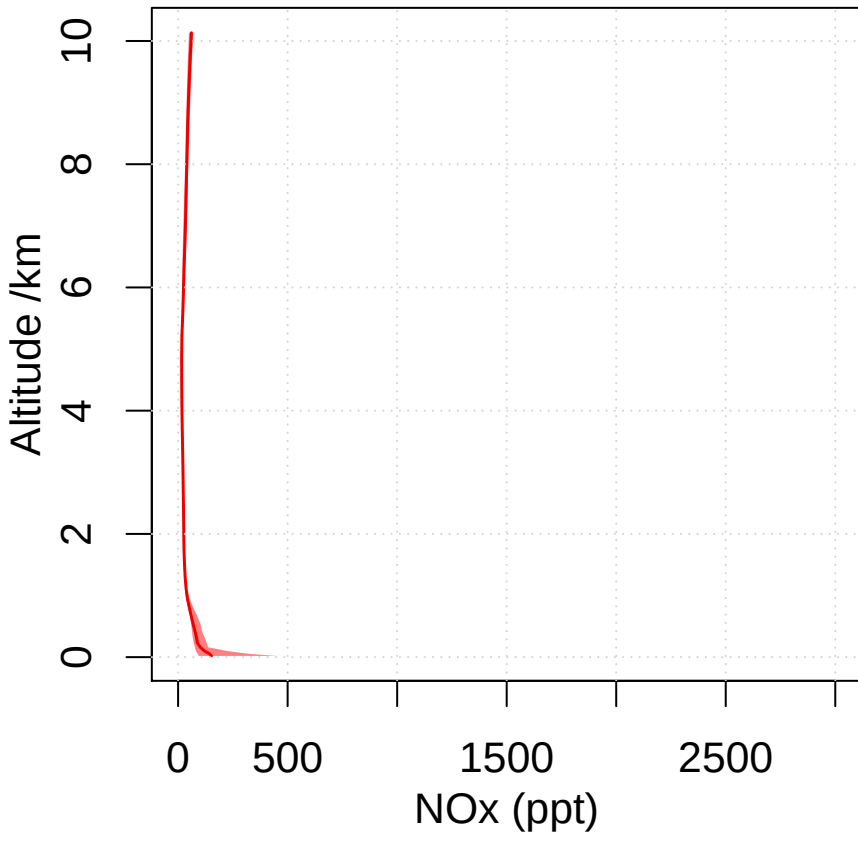
INTEX-NA North East 2004 07
Lat 42.5 – 52.5 Lon 285 – 310



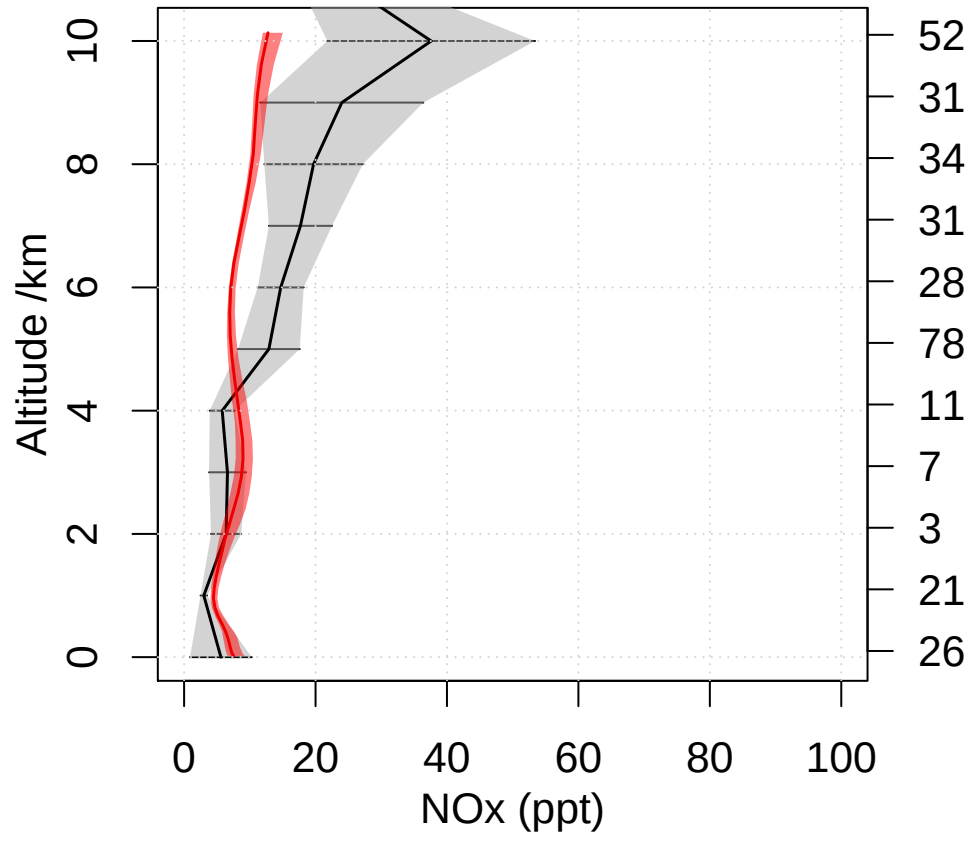
INTEX-NA West Coast 2004 07
Lat 32.5 – 45 Lon 217 – 240



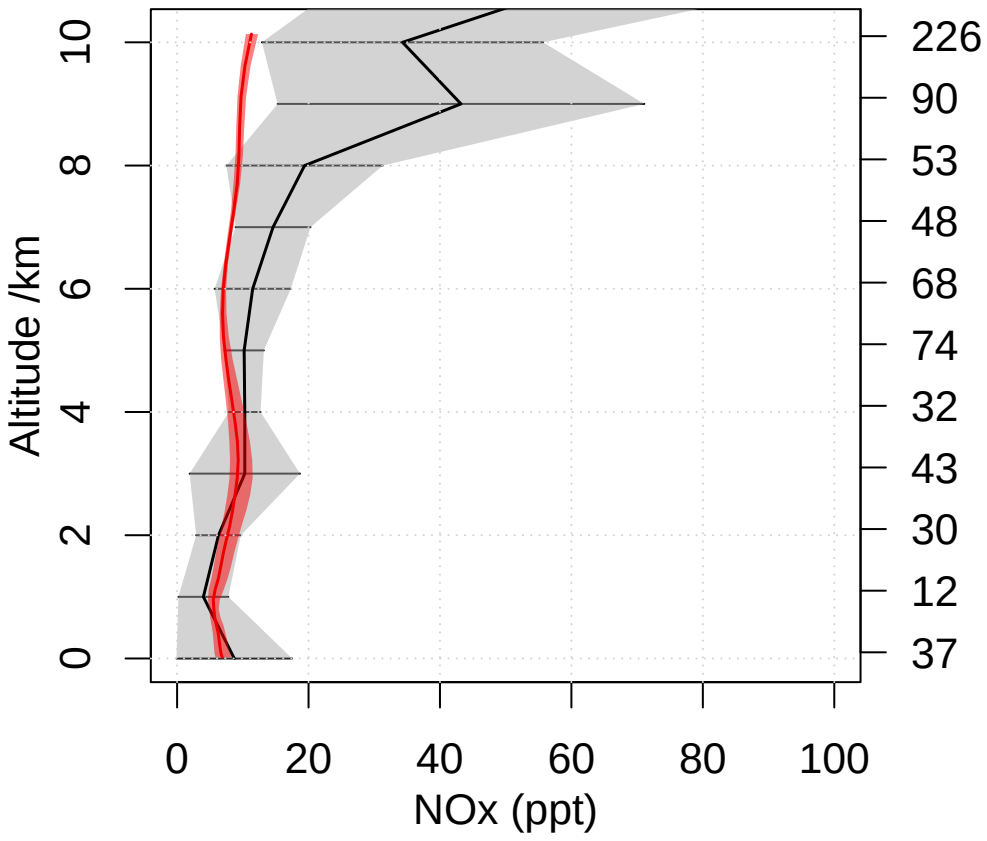
OP3 2008 07
Lat 2.5 – 7.5 Lon 112.5 – 120



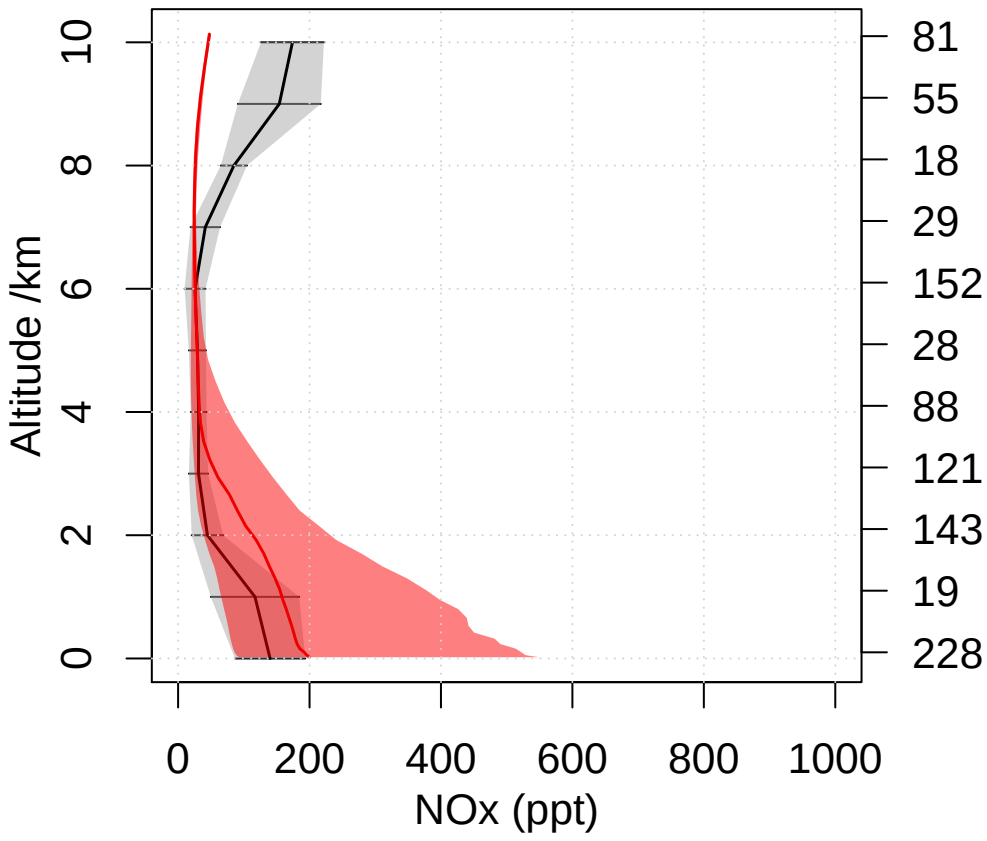
PEM-Tropics-B Christmas-Island 1999 07
Lat 0 – 10 Lon 200 – 220



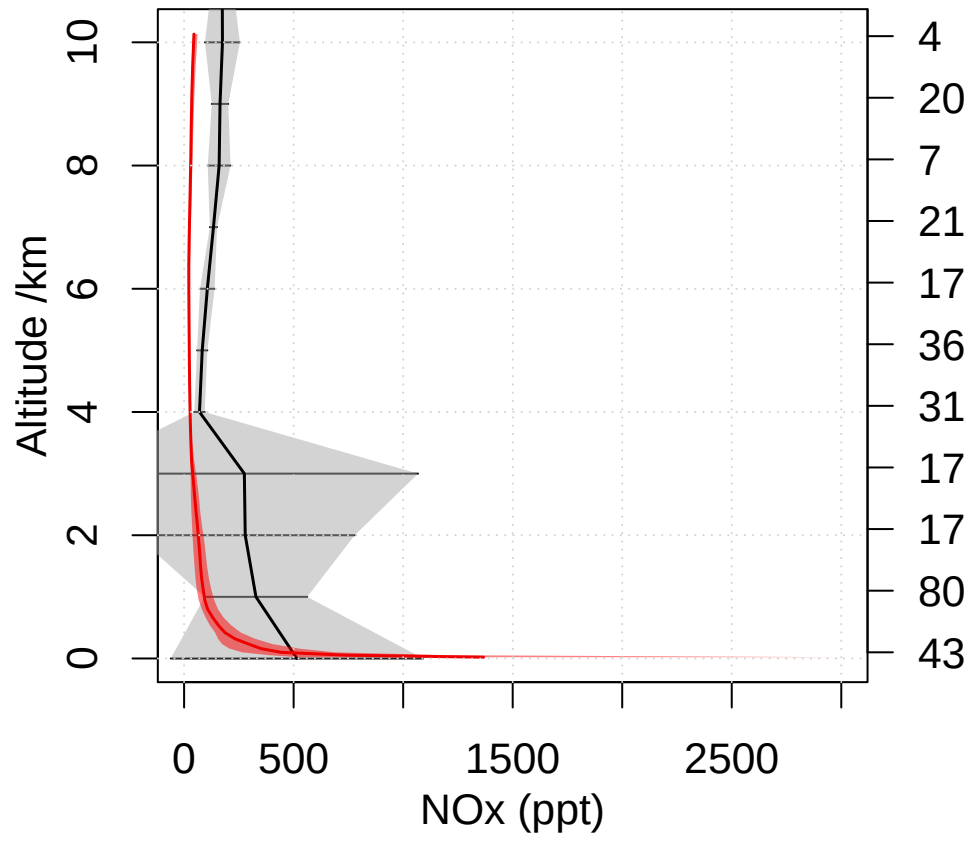
PEM-Tropics-B Tahiti 1999 03
Lat -20 – 0 Lon 200 – 230



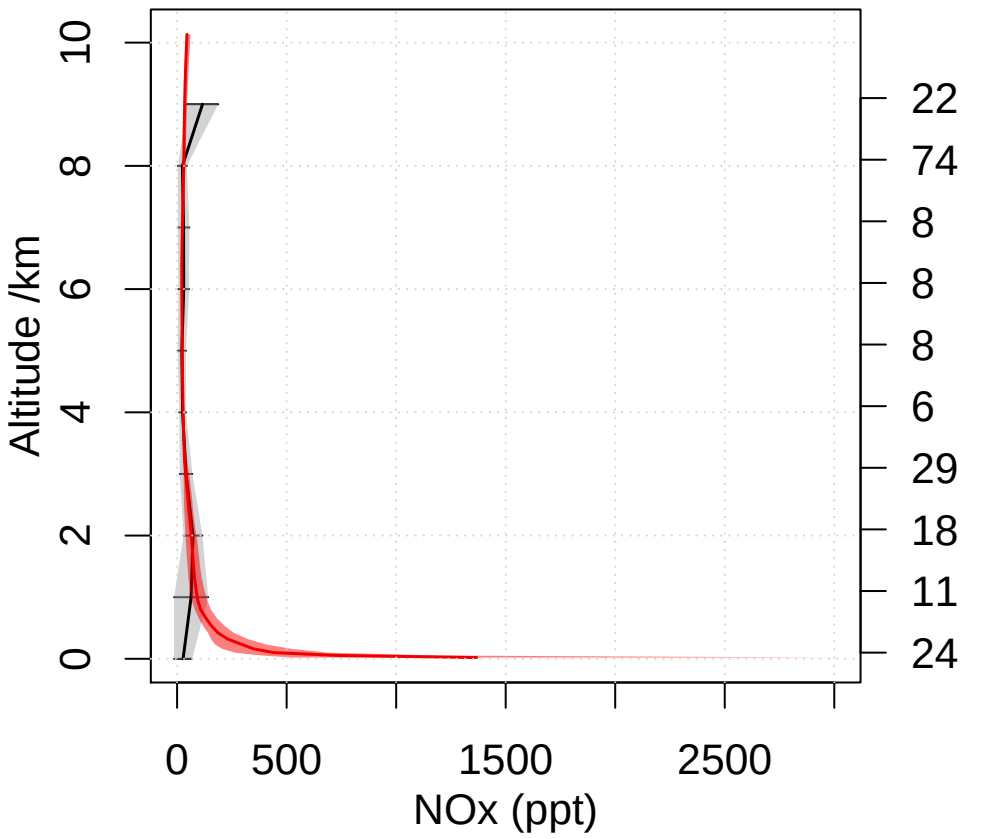
PEM-West-B Japan 1994 02
Lat 25 – 40 Lon 135 – 150



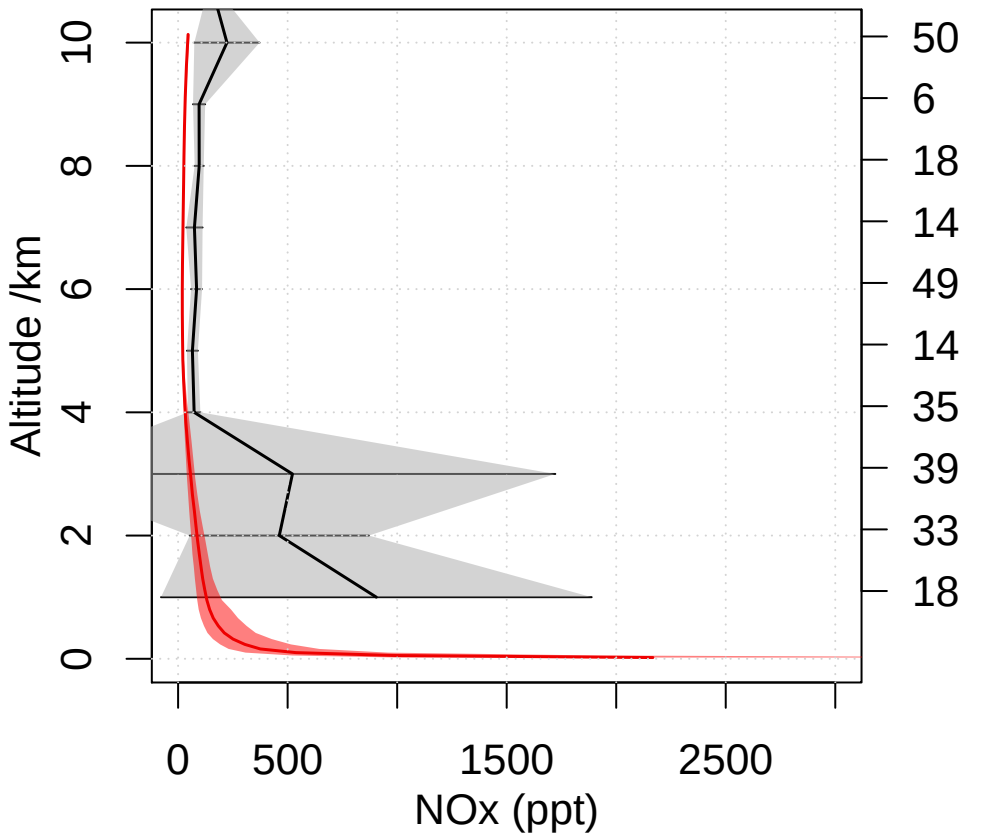
TRACE-A E-Brazil 1992 09
Lat -15 – -5 Lon 310 – 320



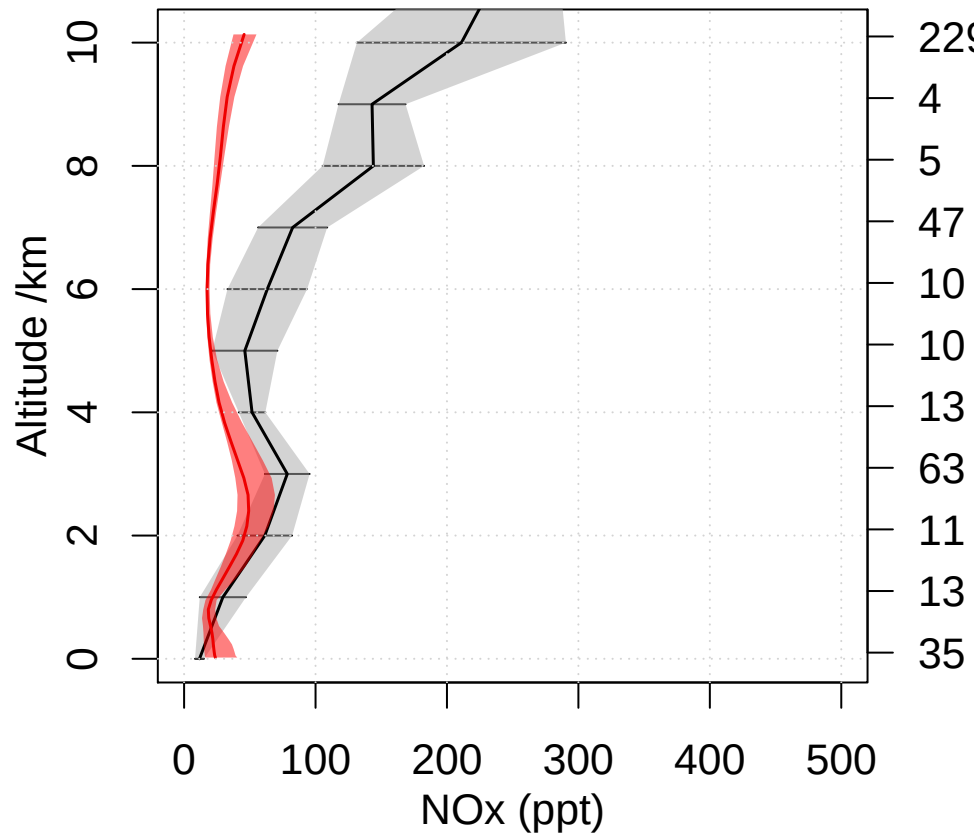
TRACE-A E-Brazil Coast 1992 09
Lat -35 – -25 Lon 310 – 320



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 br633

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

Red: Spivakovsky values

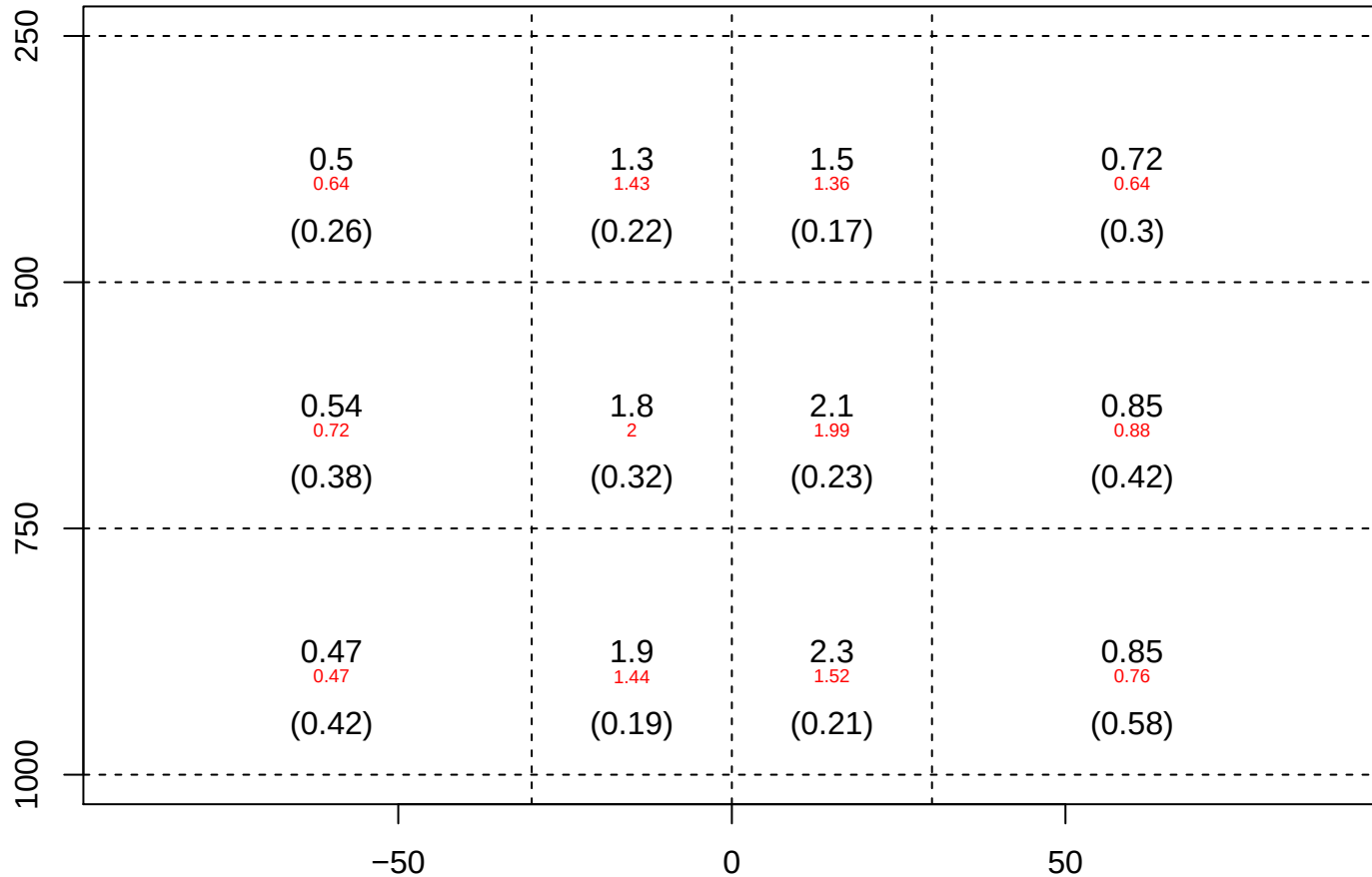
Mean OH= 1.29e+06 molec/cm3

Values in (): Std dev

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

NH:SH ratio= 1.33 Patra et al 2014: 0.97 +/- 0.12

Pressure (hPa)



Latitude

UKCA bt691

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

Red: Spivakovsky values

Mean OH= 1.29e+06 molec/cm³

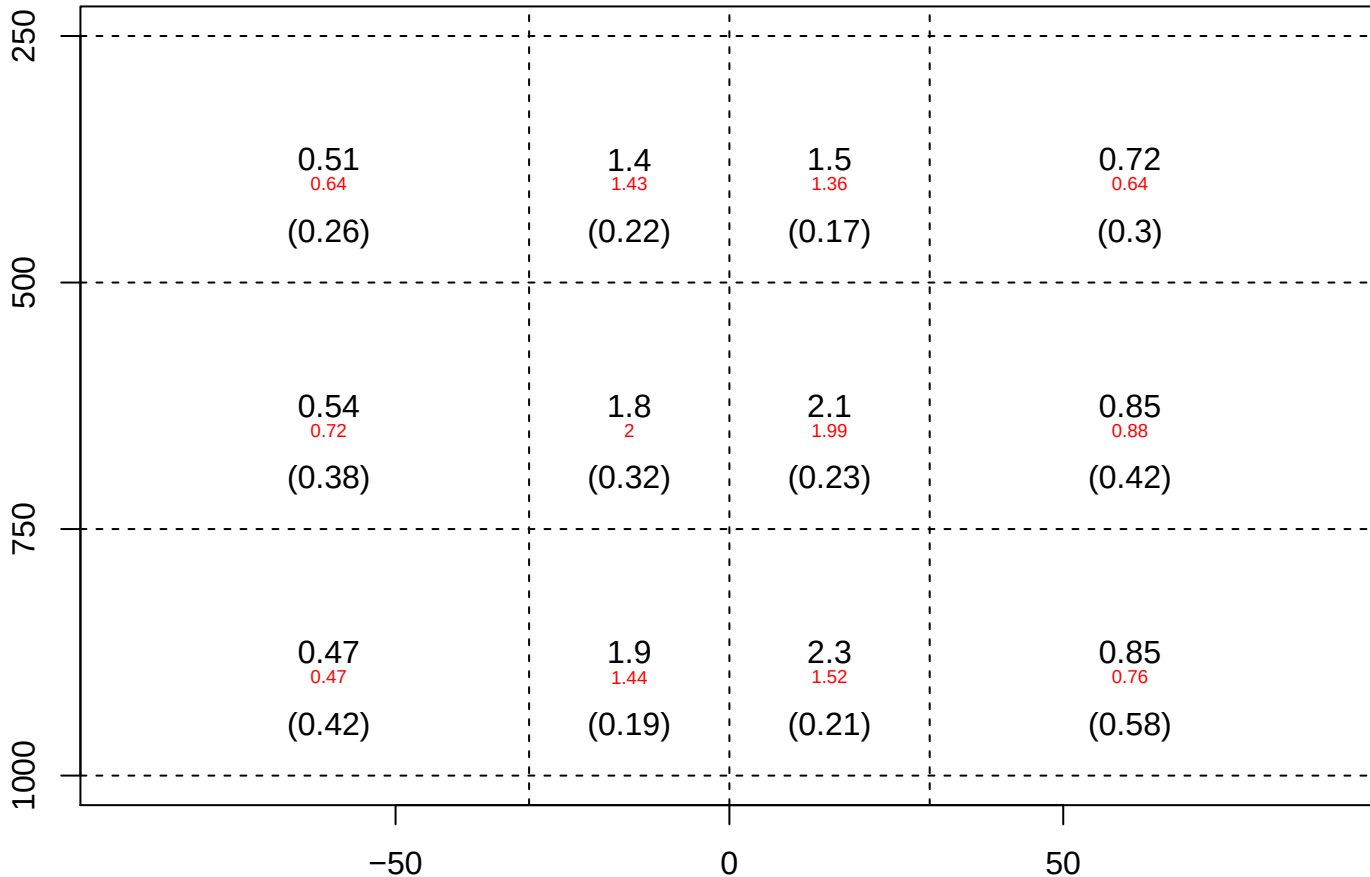
Values in (): Std dev

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

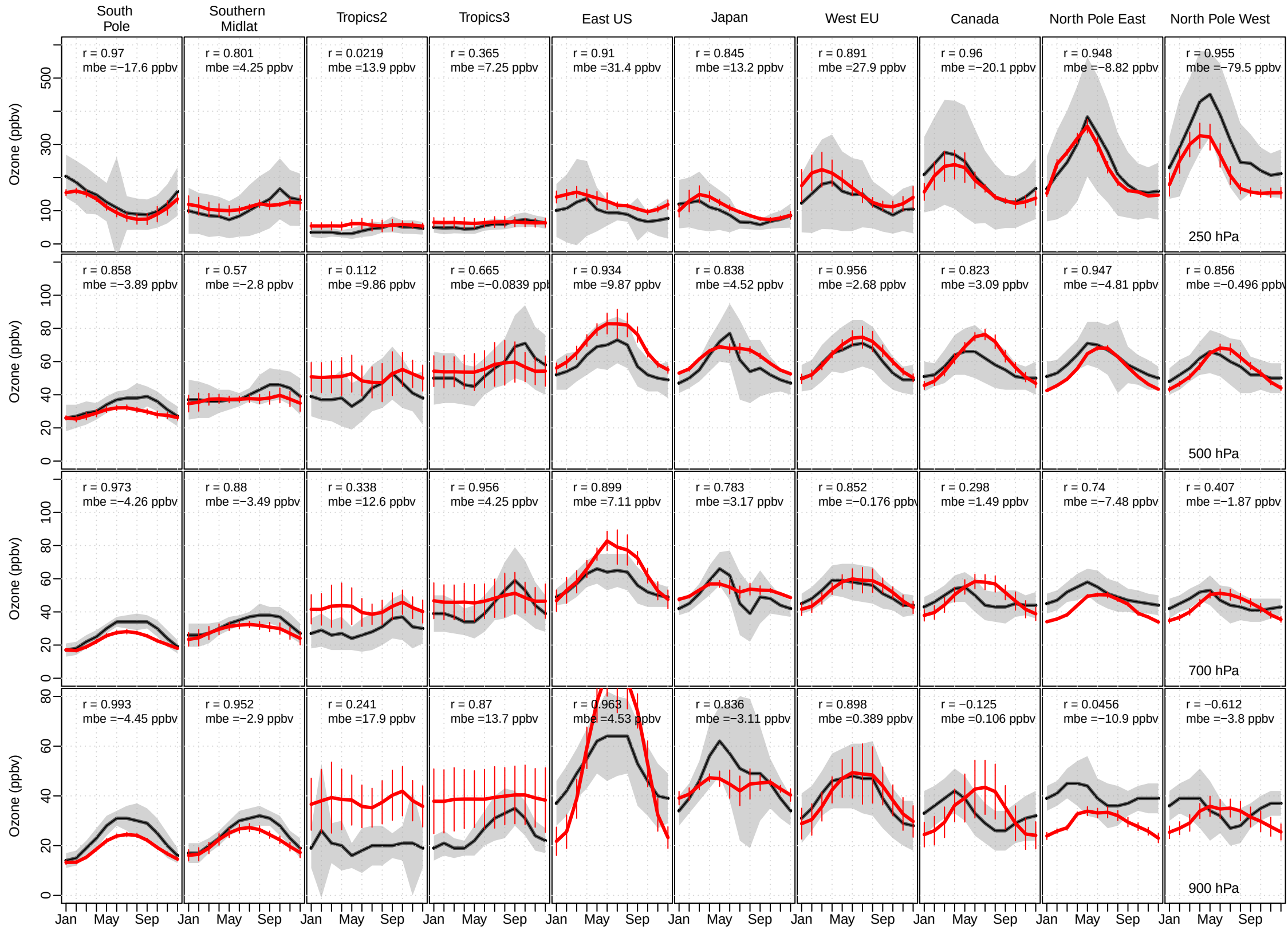
NH:SH ratio= 1.33 Patra et al 2014: 0.97 +/- 0.12

Pressure (hPa)

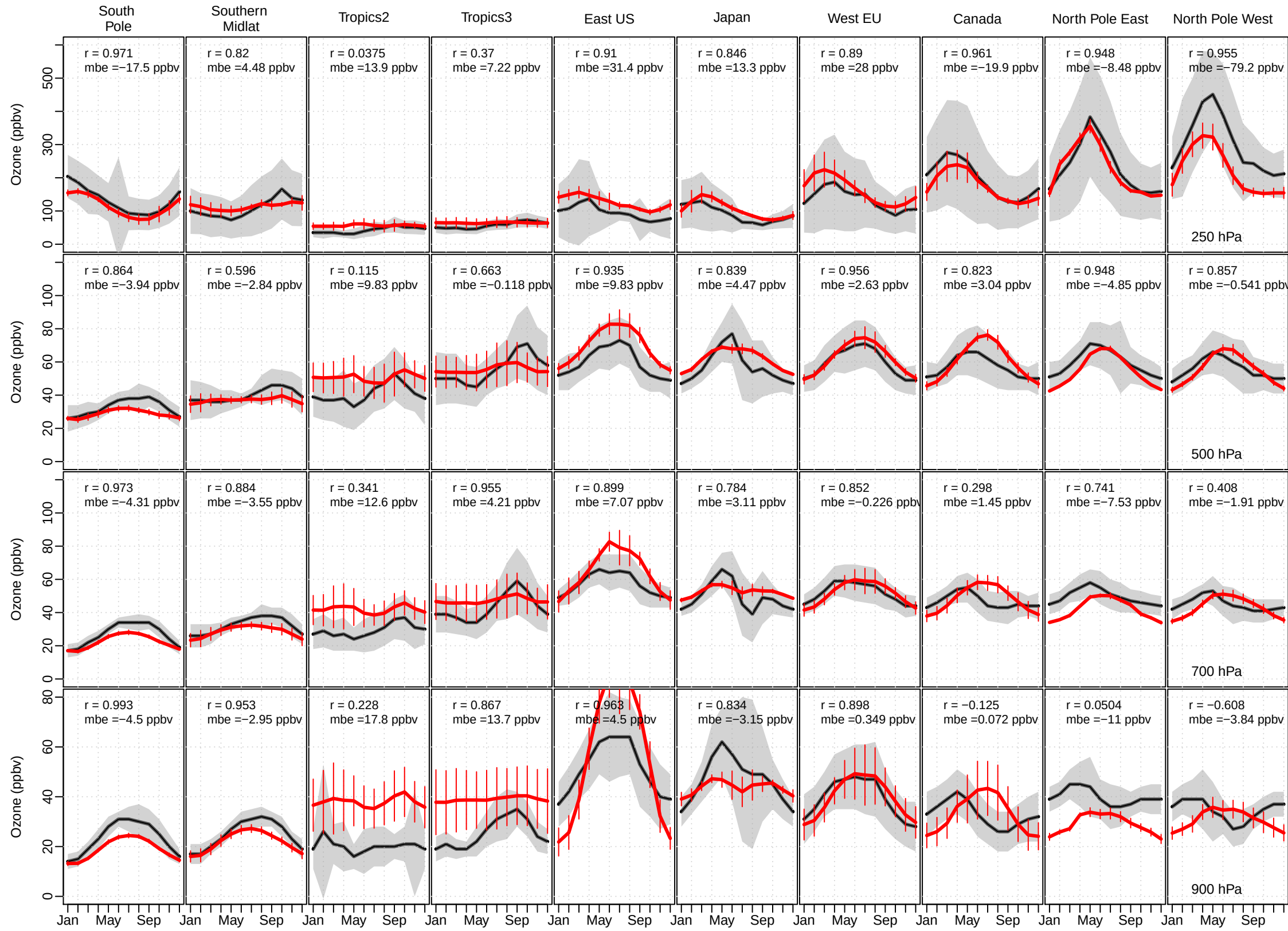
Latitude



br633 Tilmes ozone sonde comparison



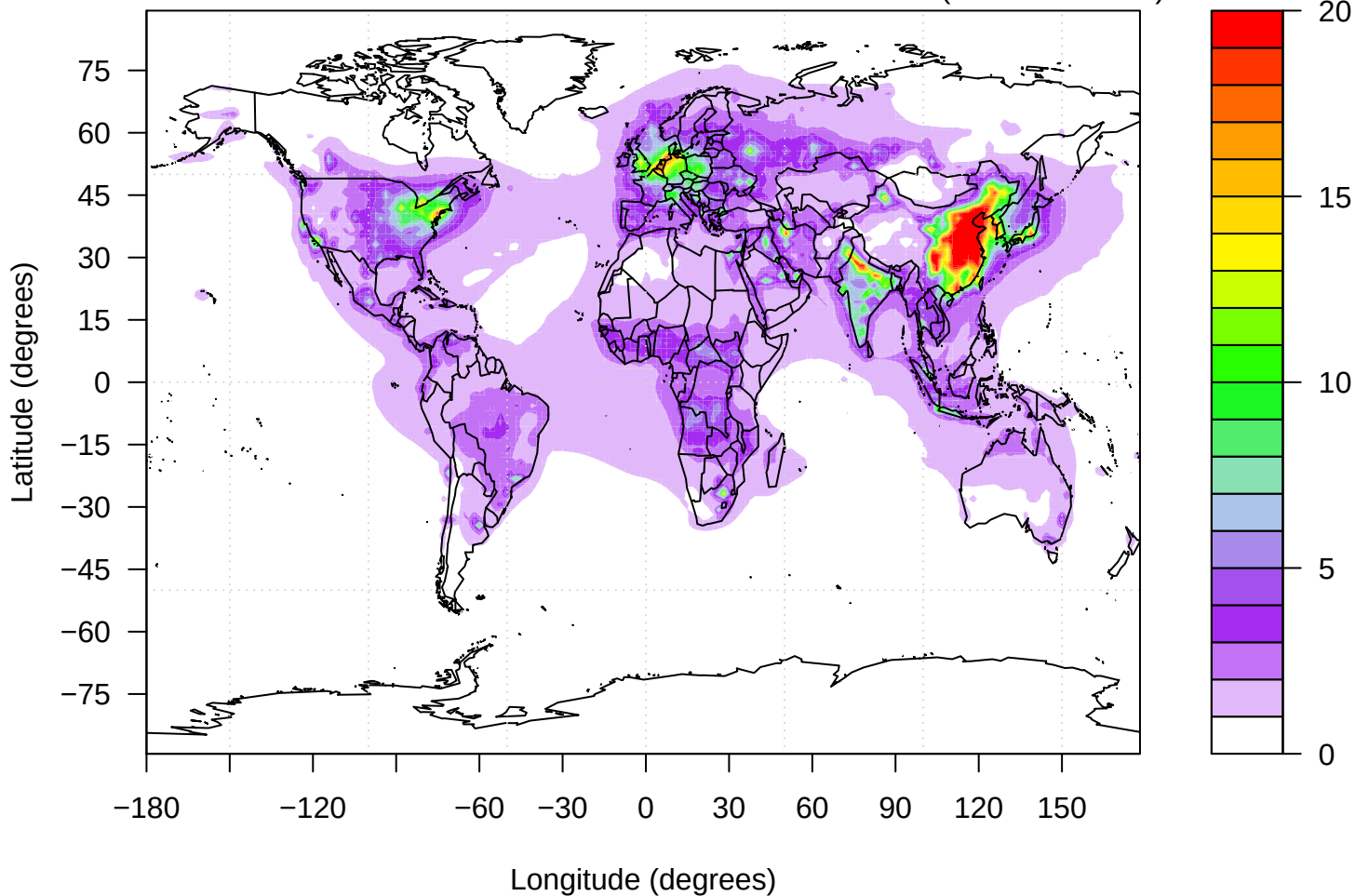
bt691 Tilmes ozone sonde comparison



br633 tropospheric NO₂ column

Min = 0.015 Mean = 1.17 Max = 80.8

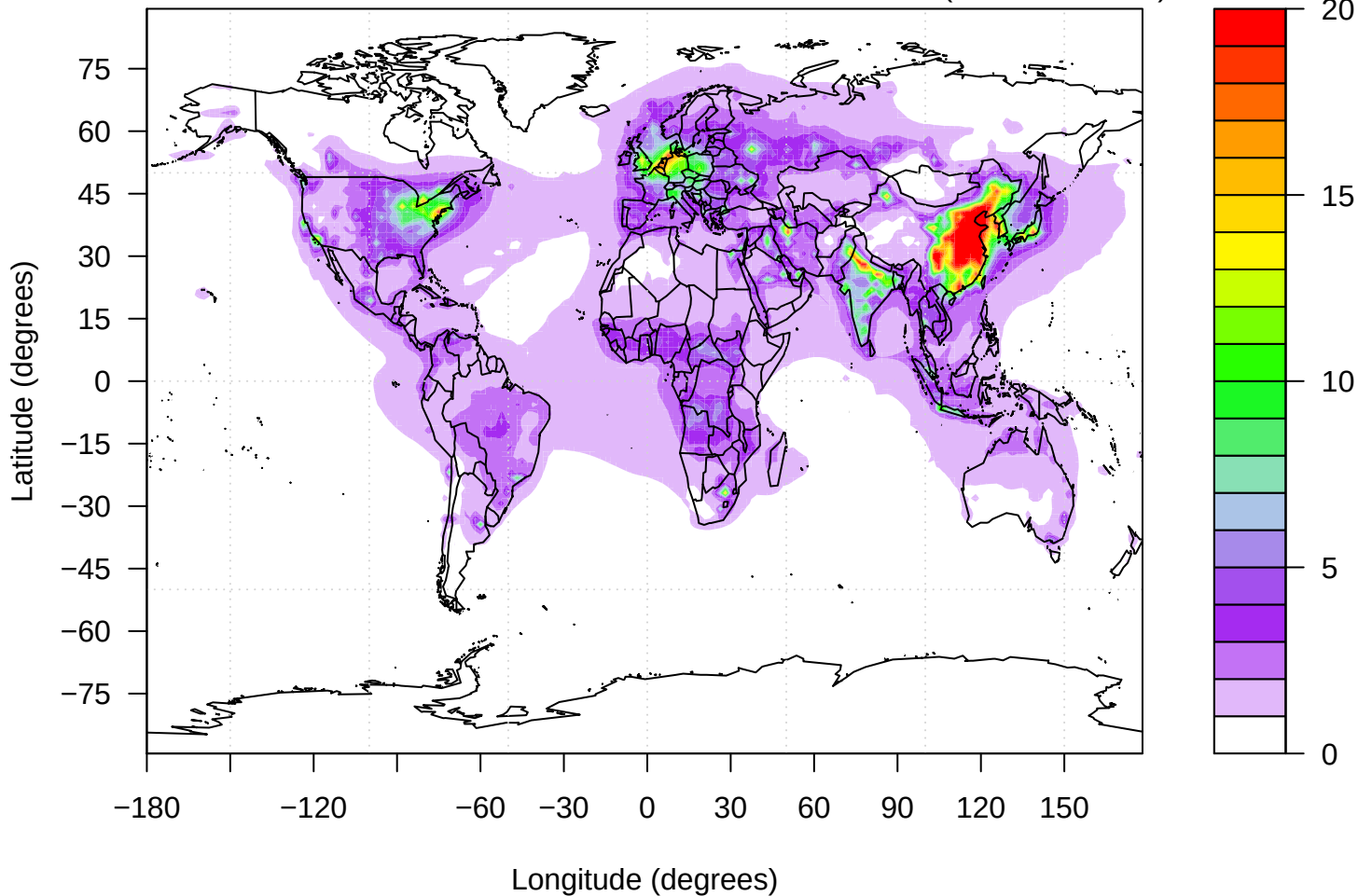
10¹⁵ (molecules cm⁻²)



bt691 tropospheric NO₂ column

Min = 0.0149 Mean = 1.17 Max = 80.8

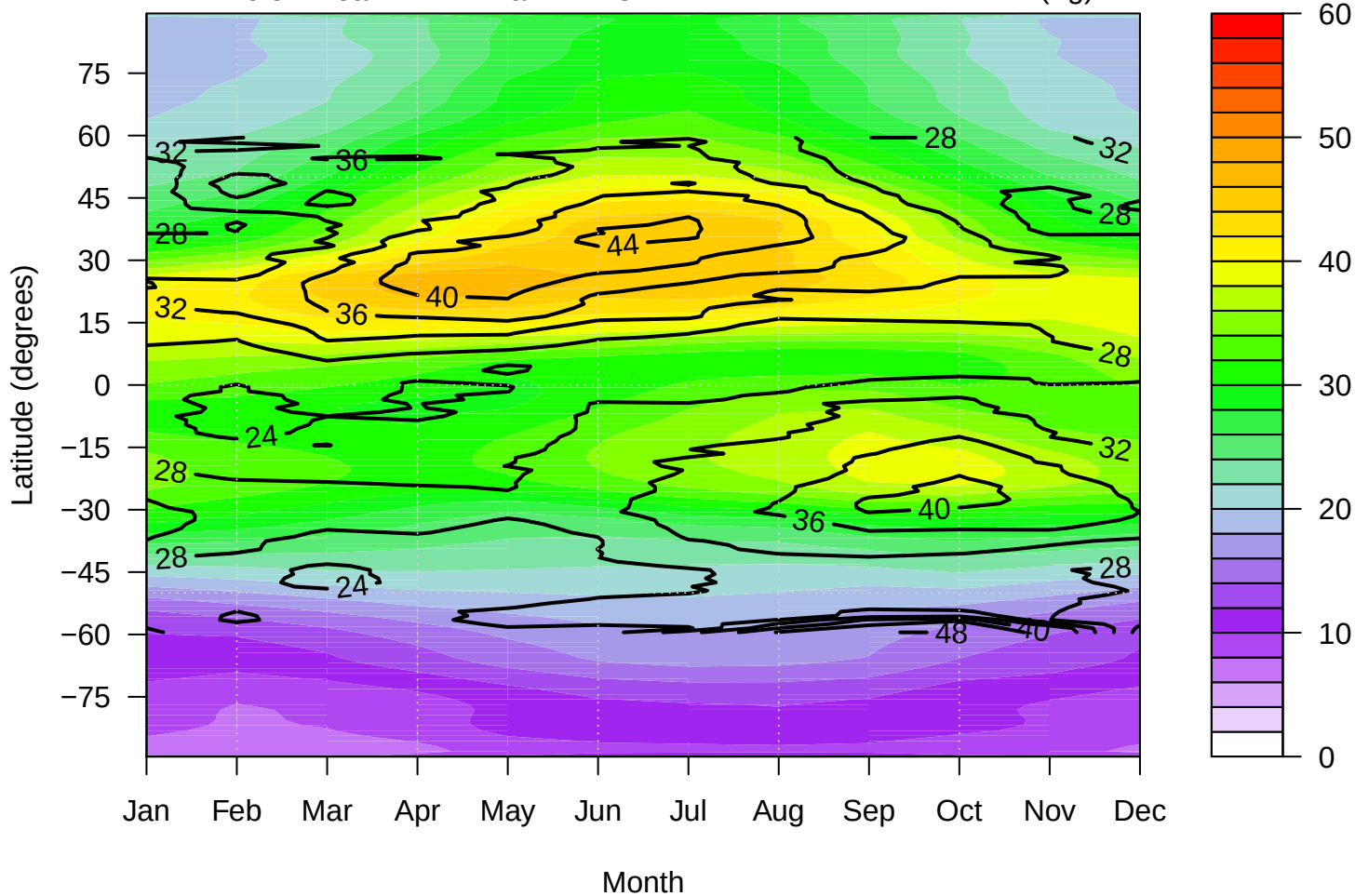
10¹⁵ (molecules cm⁻²)



br633 tropospheric O₃ column

Min = 6.51 Mean = 27.1 Max = 47.8

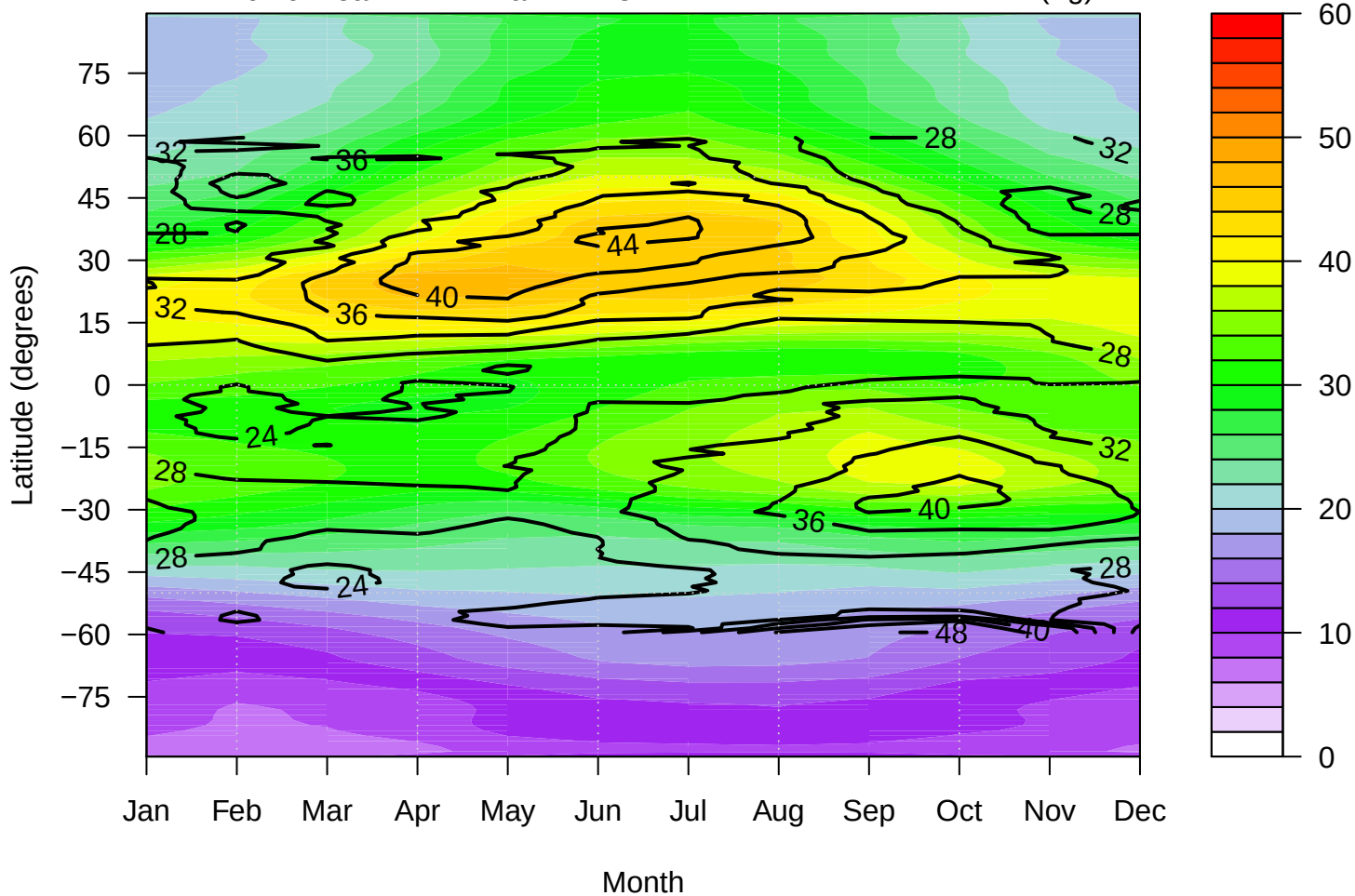
Burden (Tg) = 336



bt691 tropospheric O₃ column

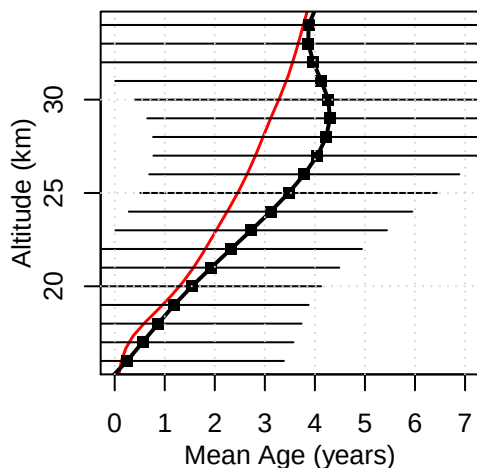
Min = 6.49 Mean = 27.1 Max = 47.8

Burden (Tg) = 335

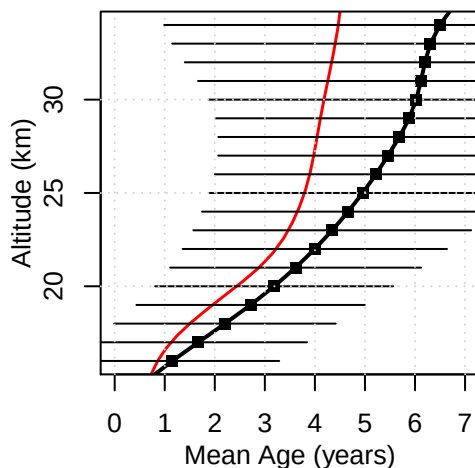


UKCA br633 Mean Age of Air

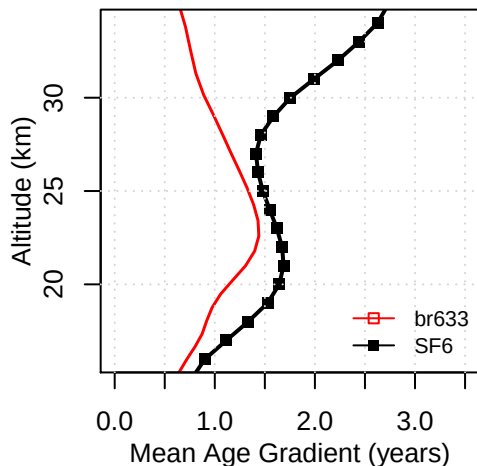
Tropical Mean Age Profile



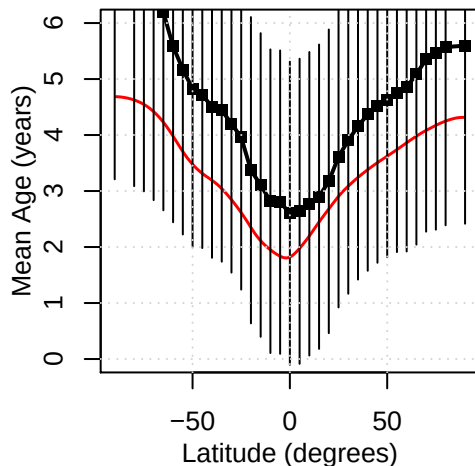
Midlatitude Mean Age Profile



Trop-Midlat Mean Age Gradient Prof

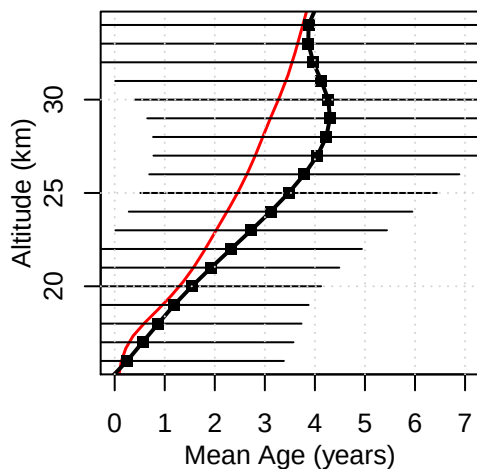


Mean Age, 23km (~50hPa)

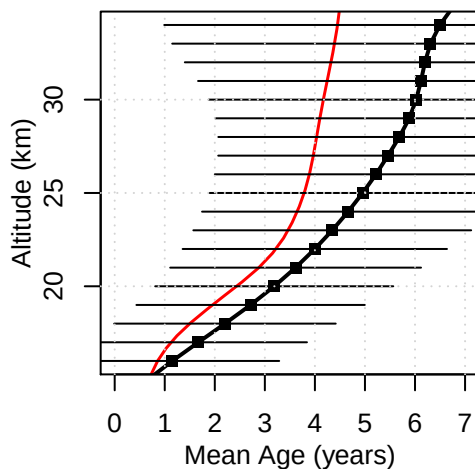


UKCA bt691 Mean Age of Air

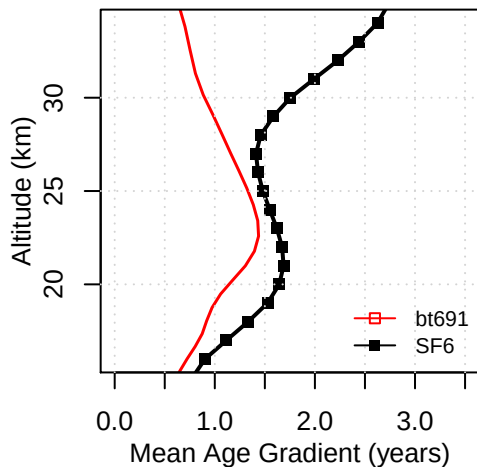
Tropical Mean Age Profile



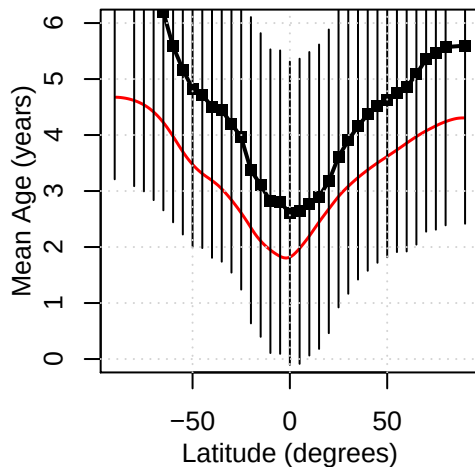
Midlatitude Mean Age Profile



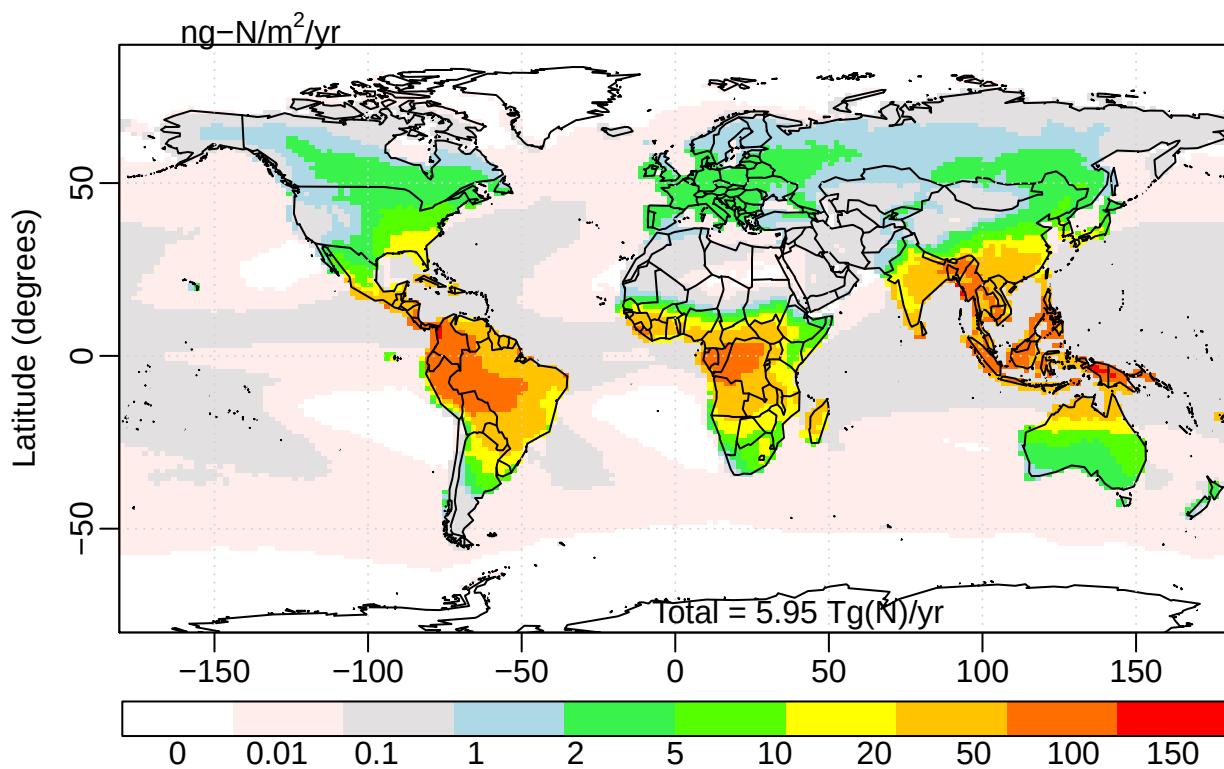
Trop-Midlat Mean Age Gradient Prof



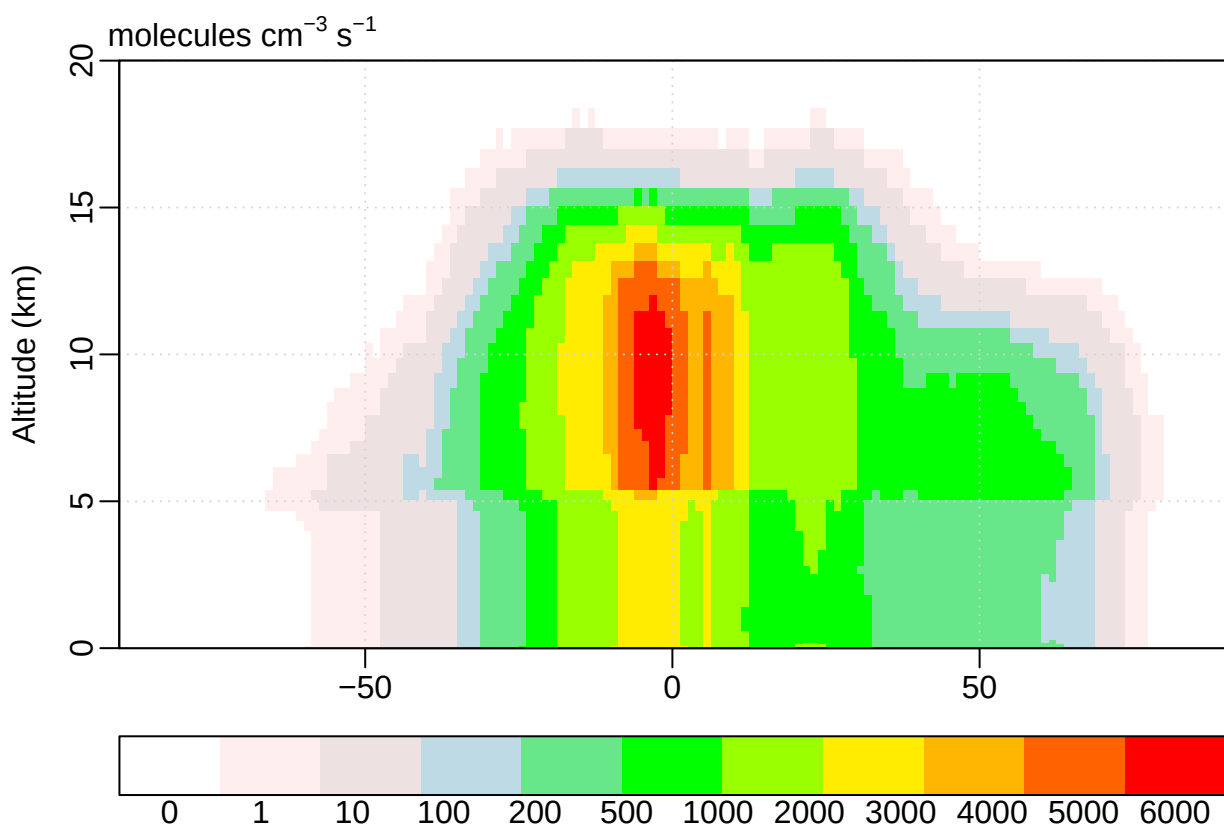
Mean Age, 23km (~50hPa)



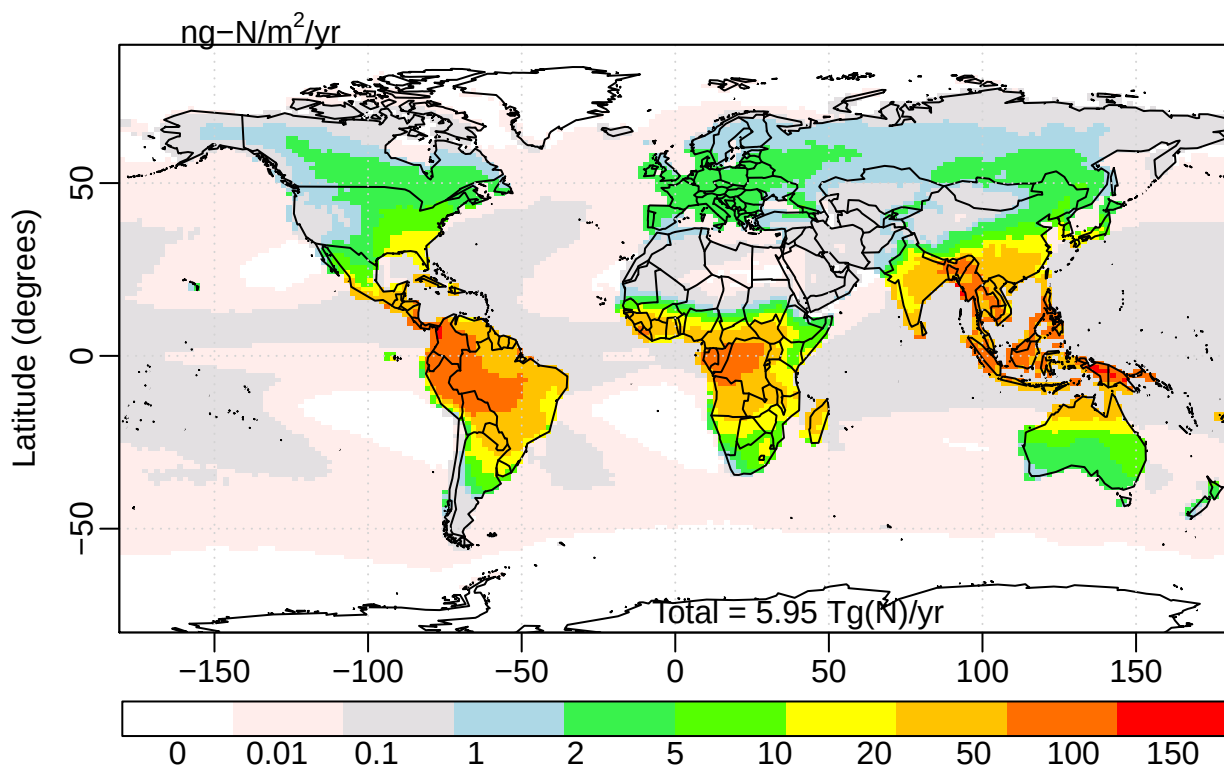
br633 total column



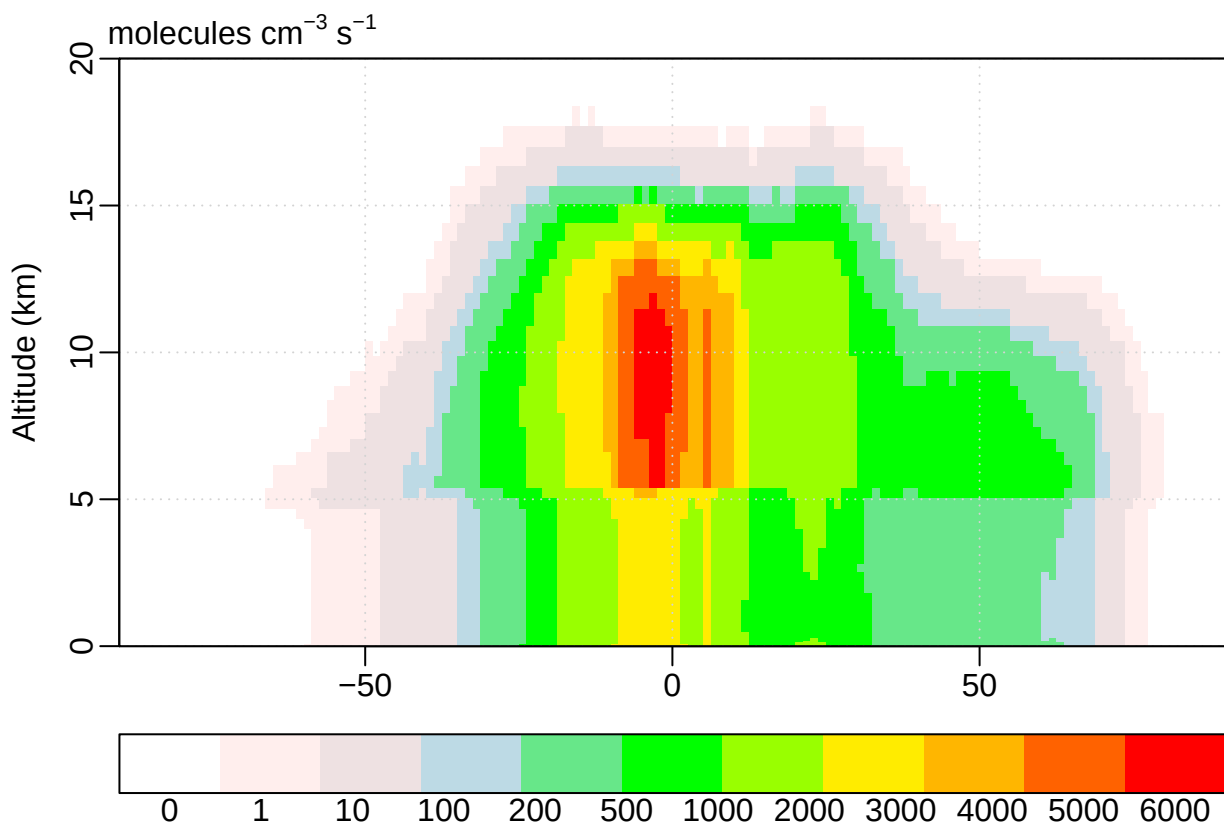
br633 zonal mean



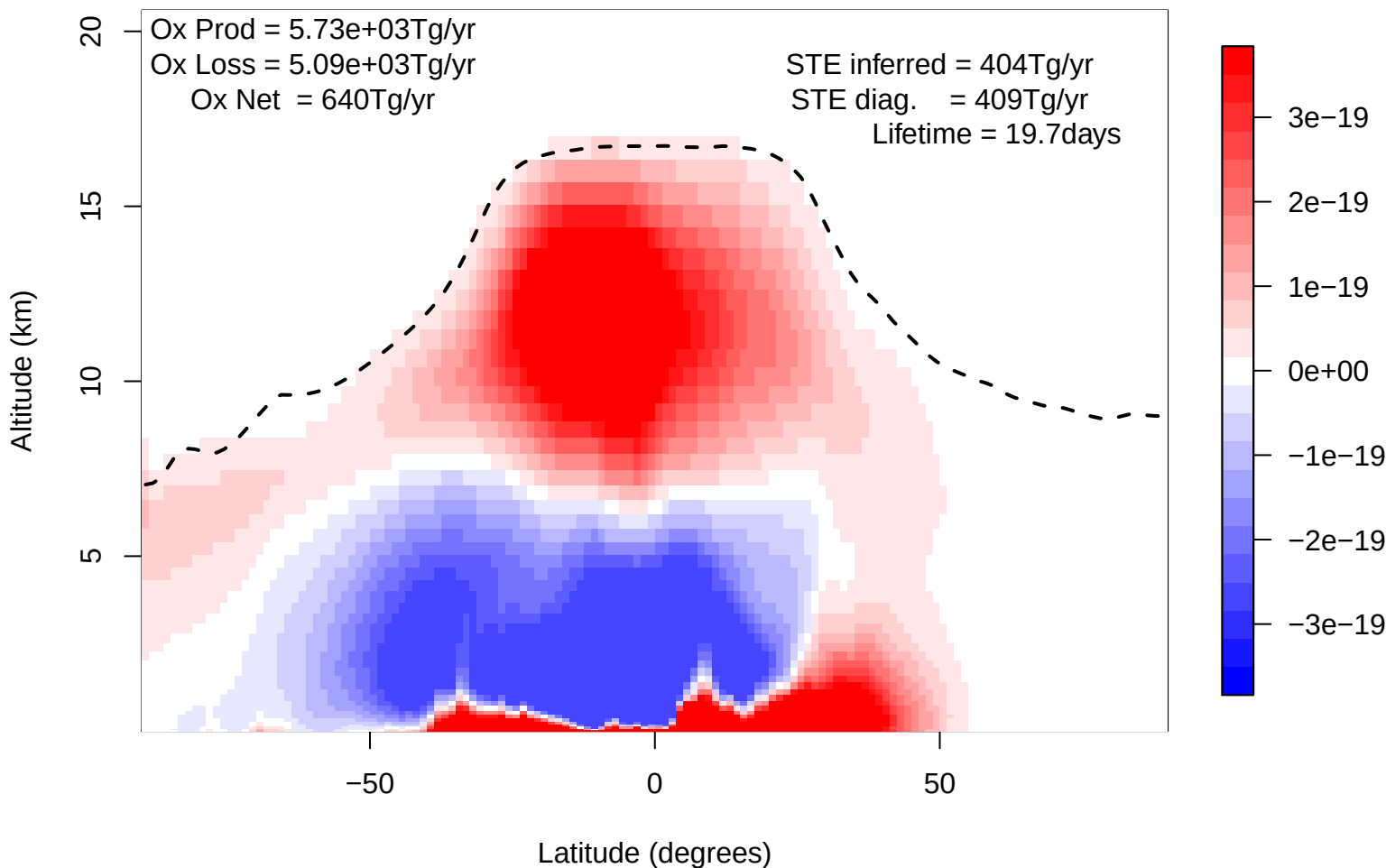
bt691 total column



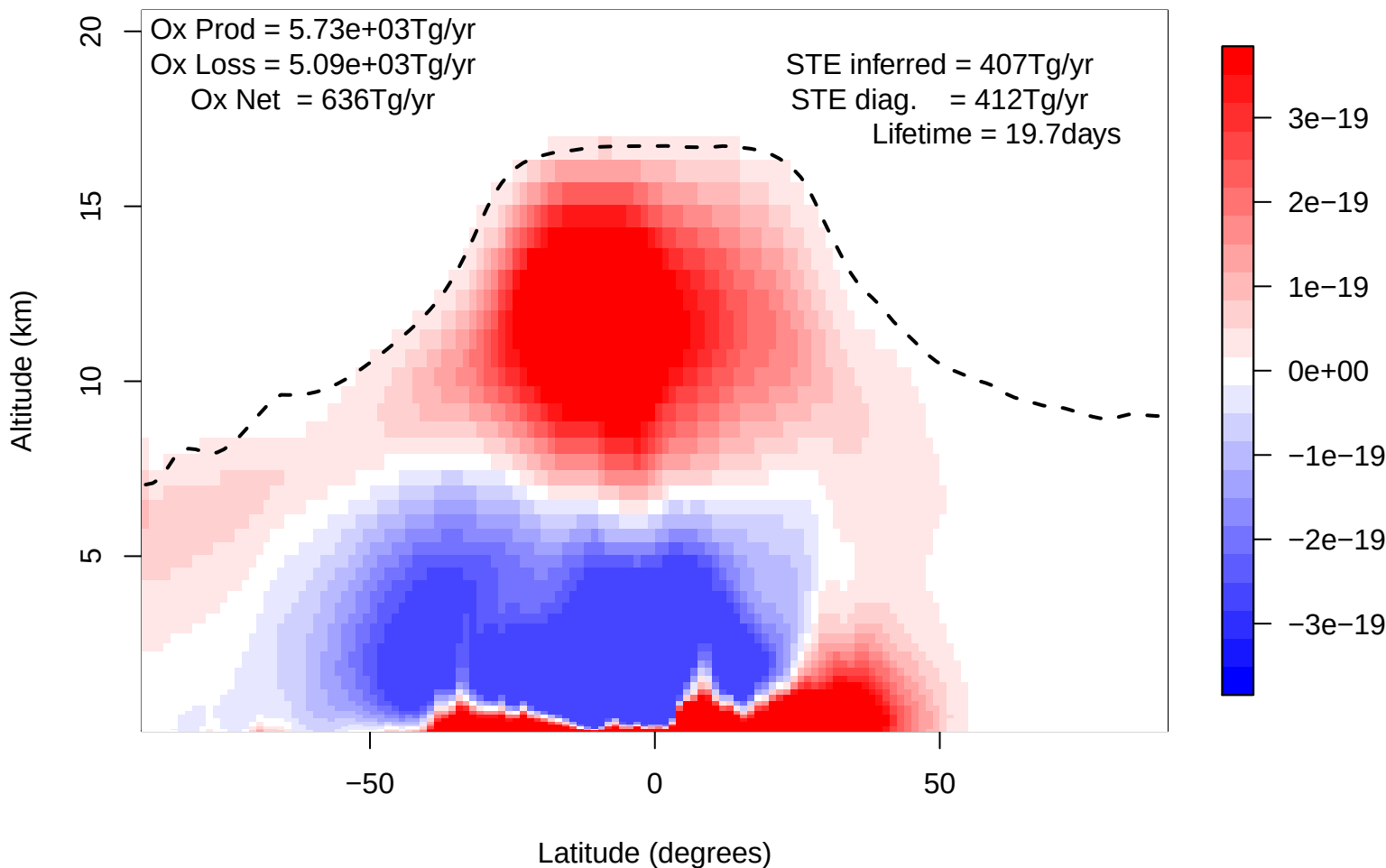
bt691 zonal mean



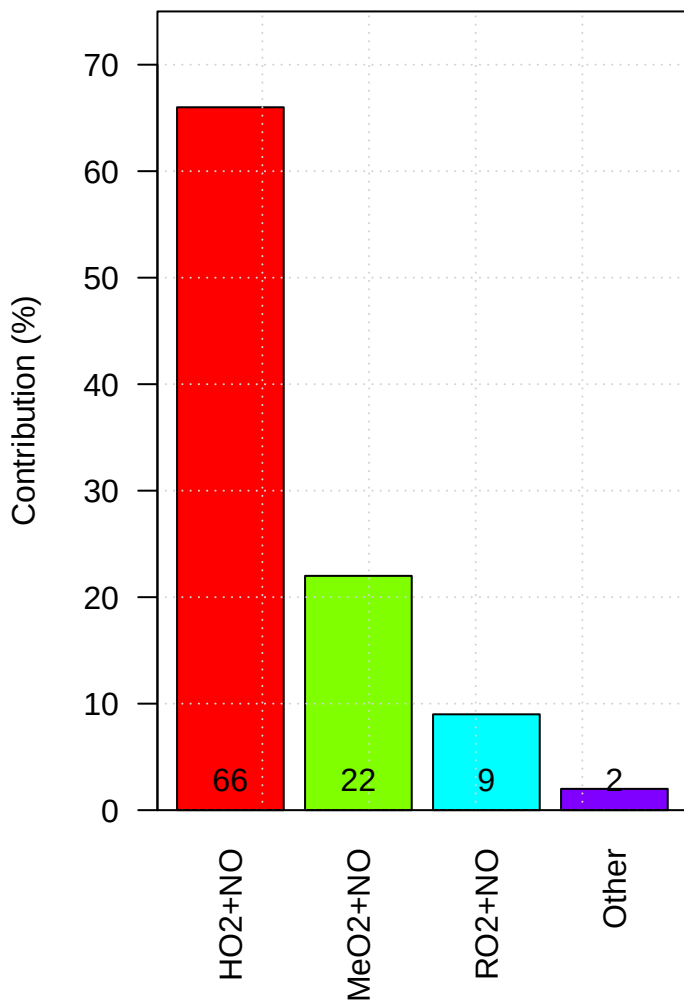
UKCA br633 Ox Net Chemical Production



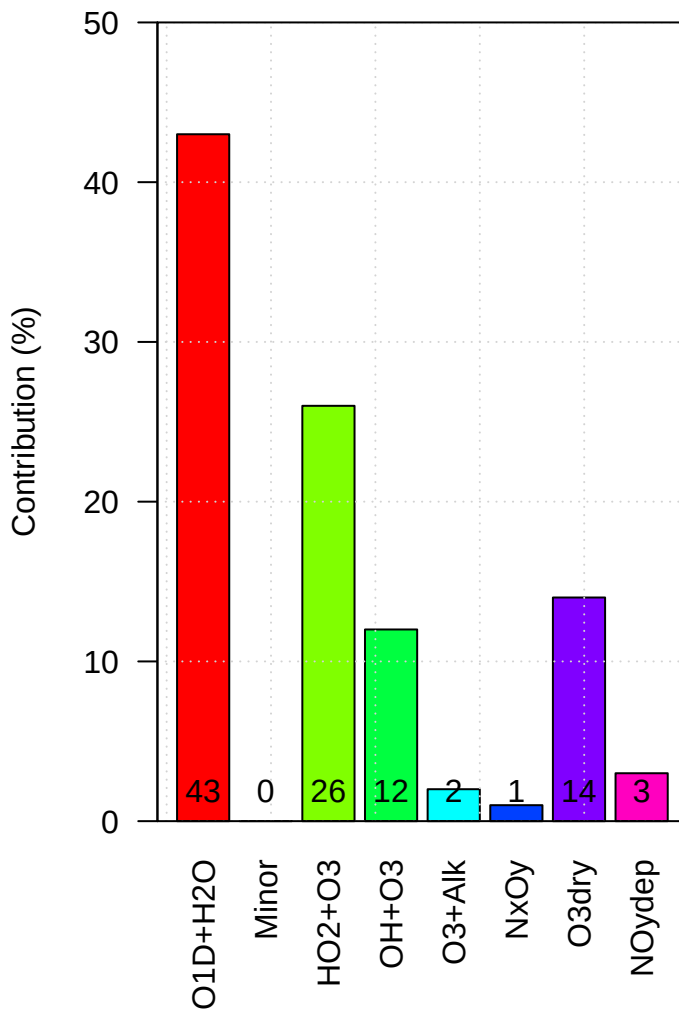
UKCA bt691 Ox Net Chemical Production



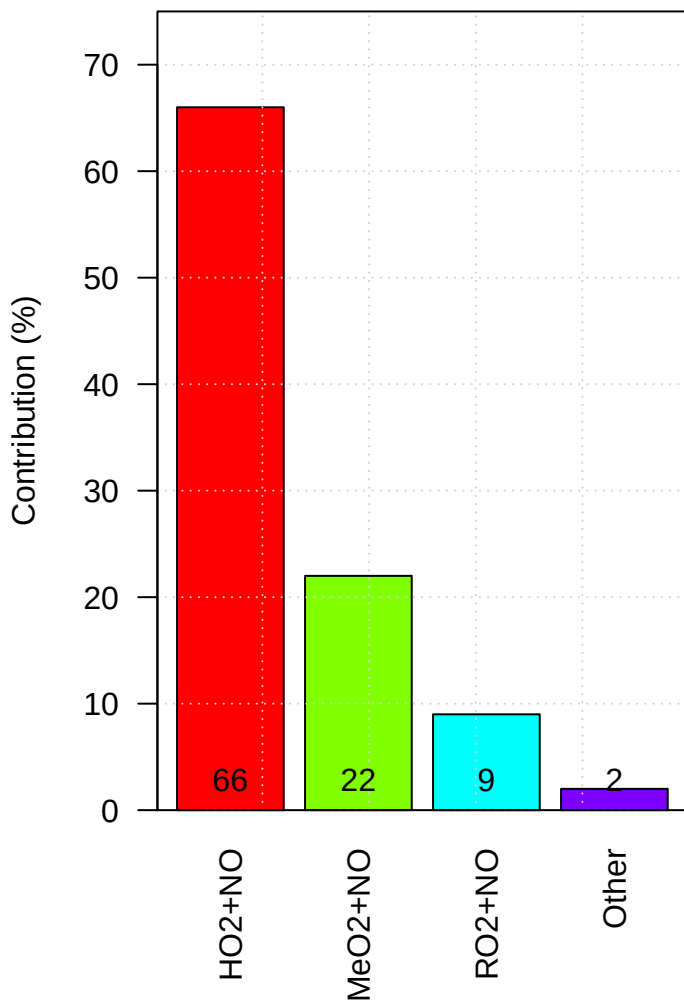
br633 Production of Tropospheric Ox



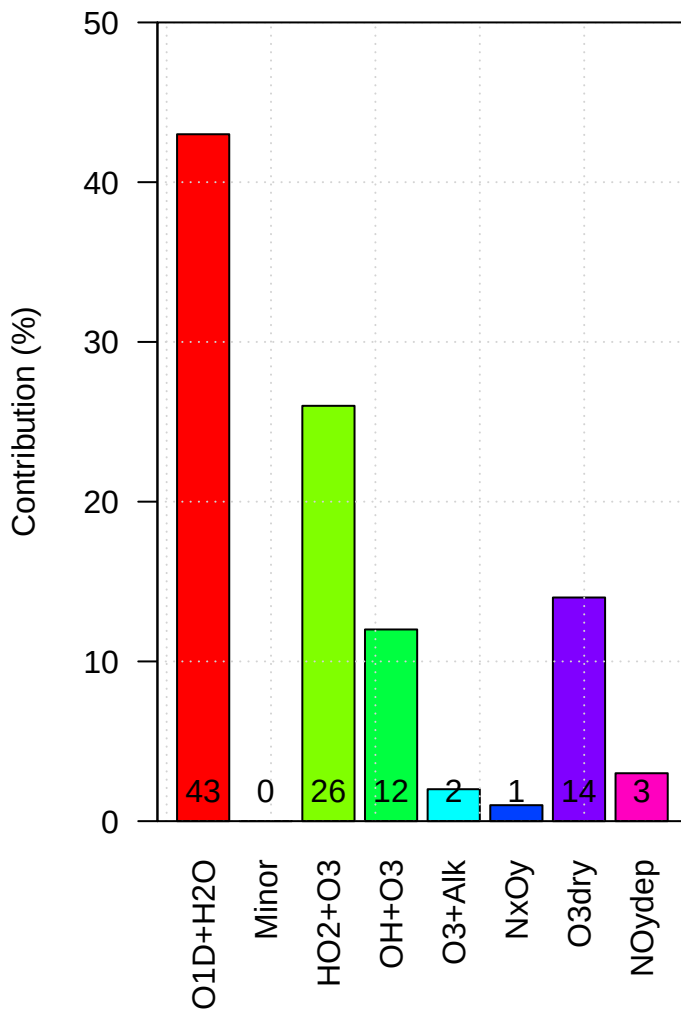
br633 Loss of Tropospheric Ox



bt691 Production of Tropospheric Ox

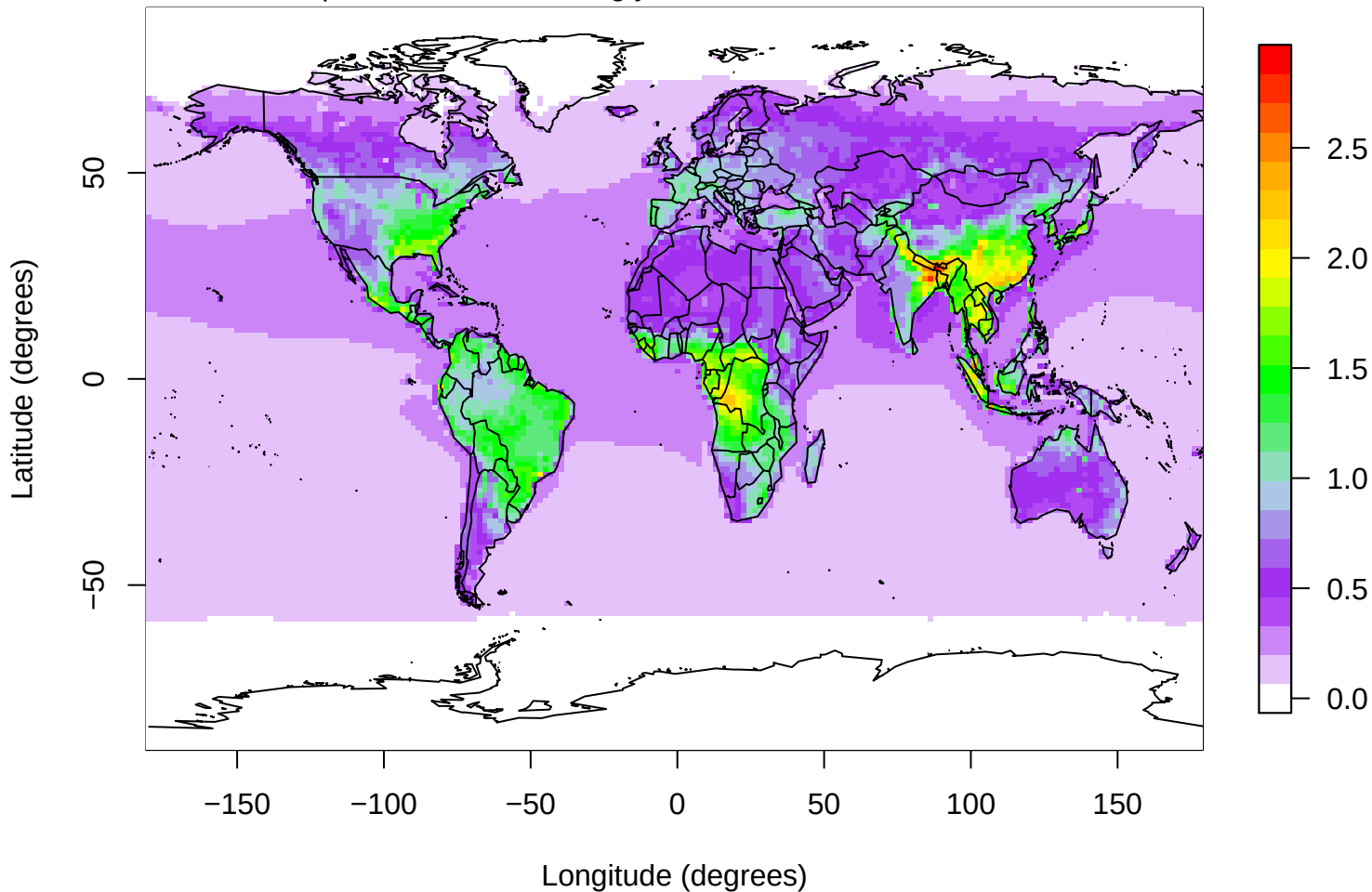


bt691 Loss of Tropospheric Ox



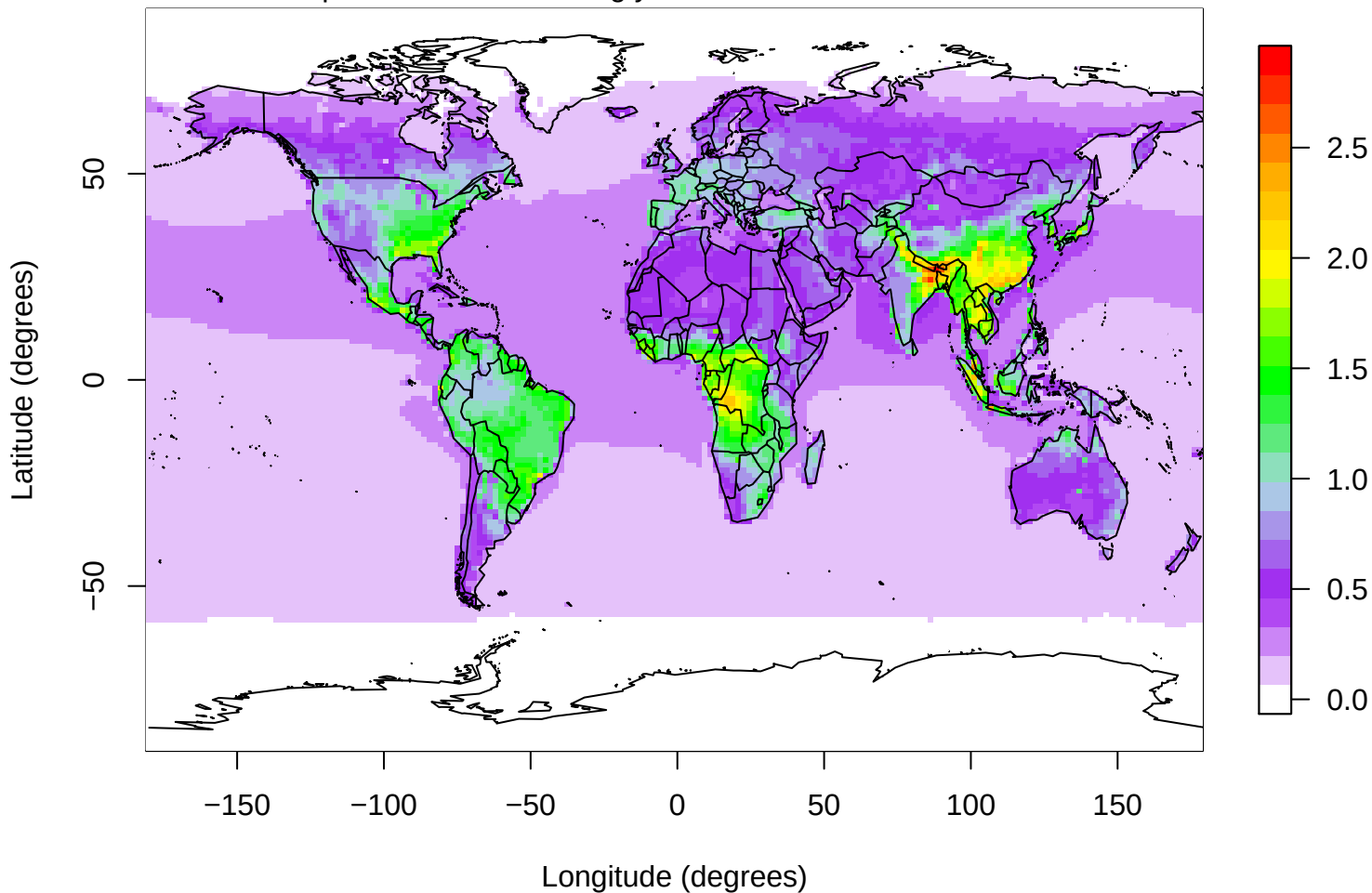
UKCA Ox deposition br633

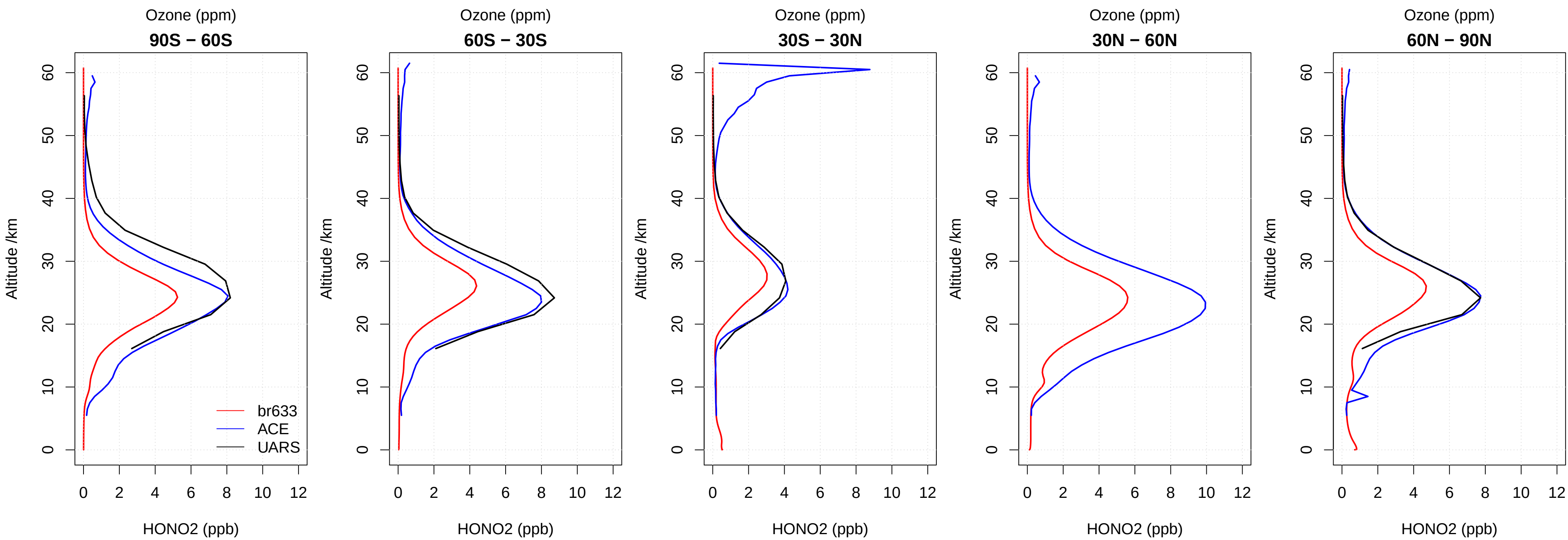
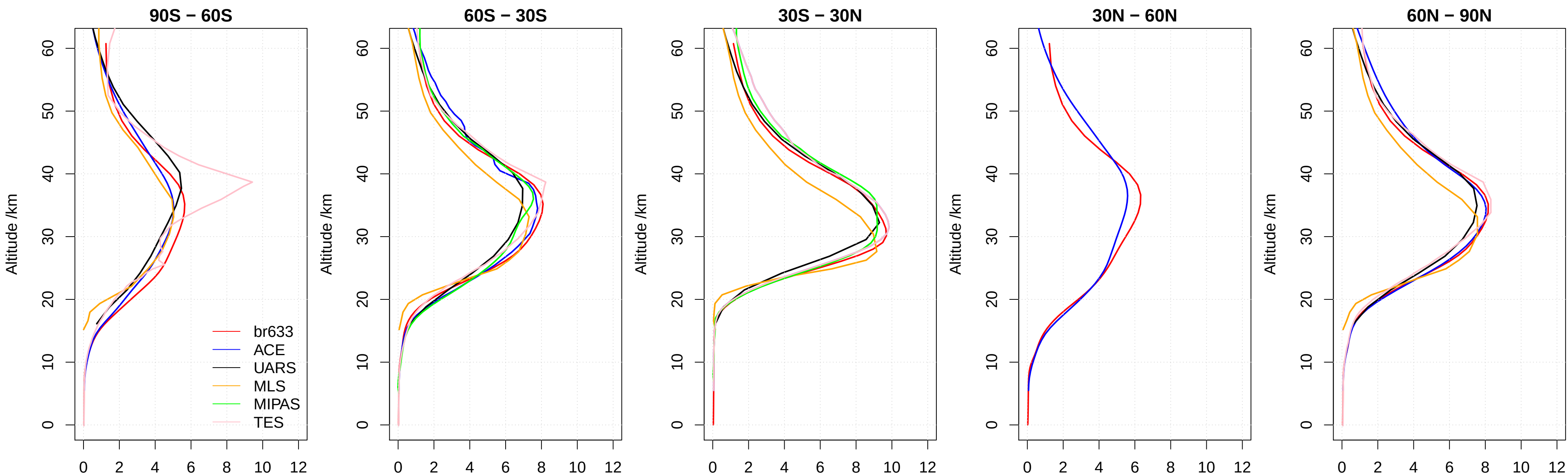
Total Ox Deposition = 1.04×10^3 Tg/yr

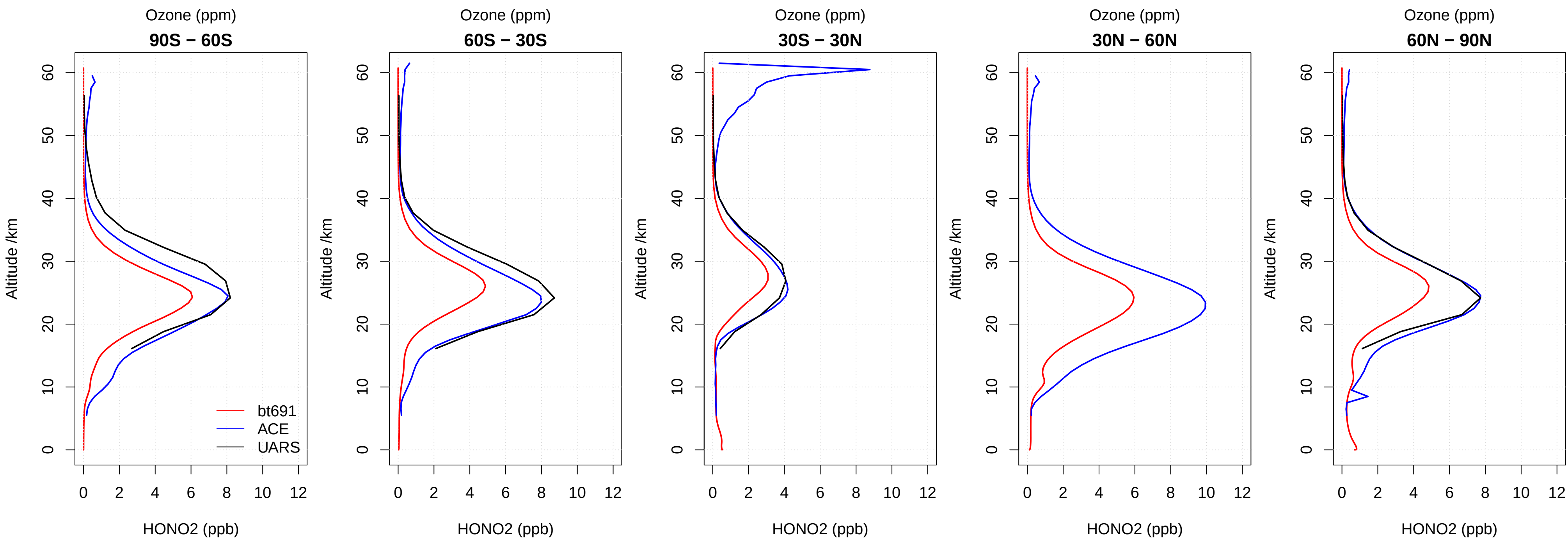
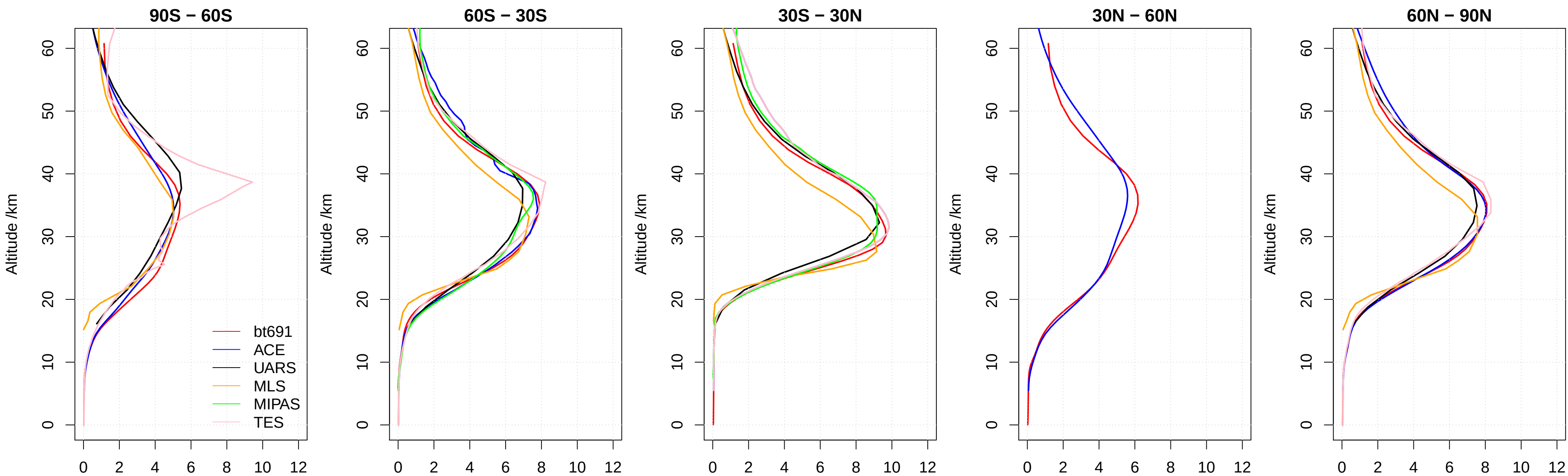


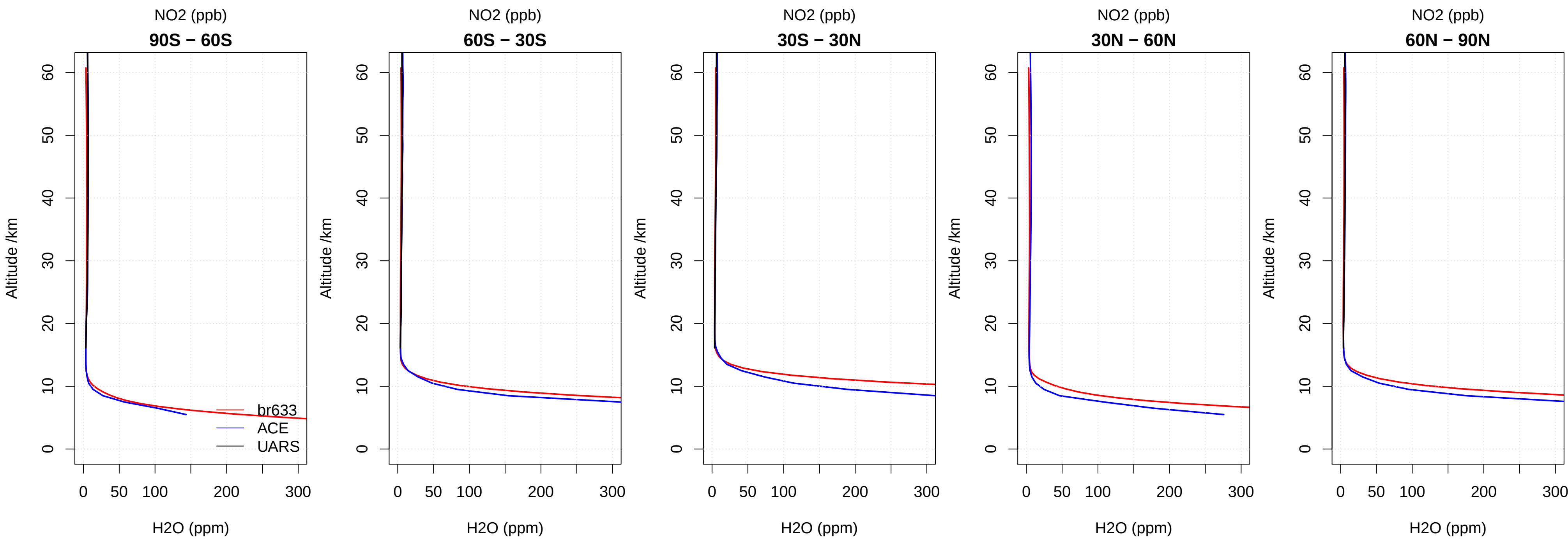
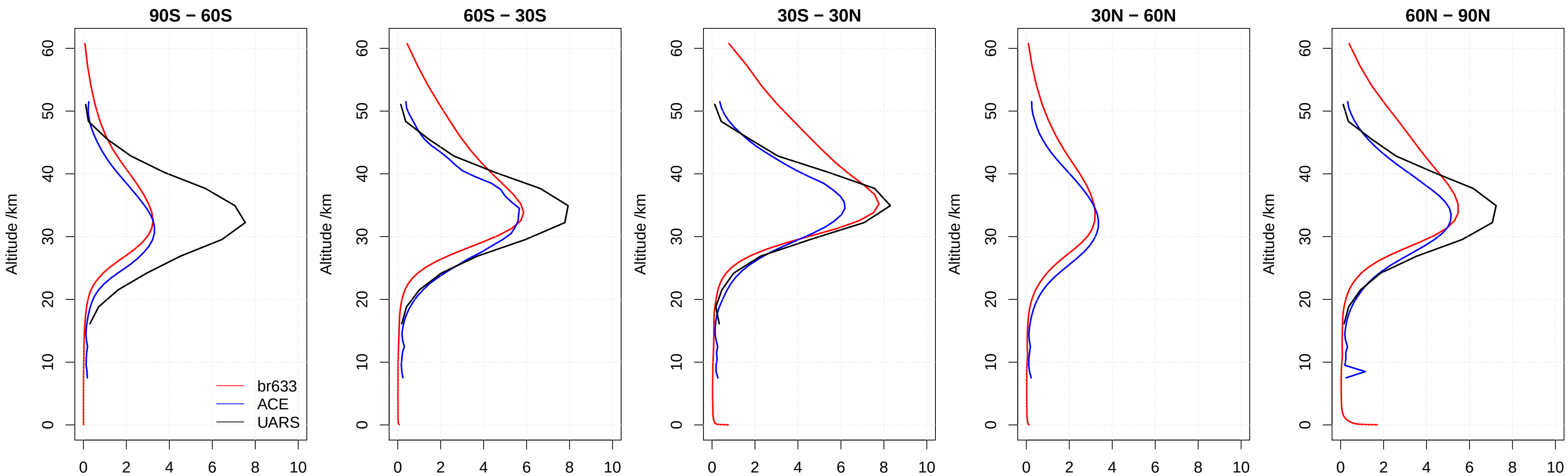
UKCA Ox deposition bt691

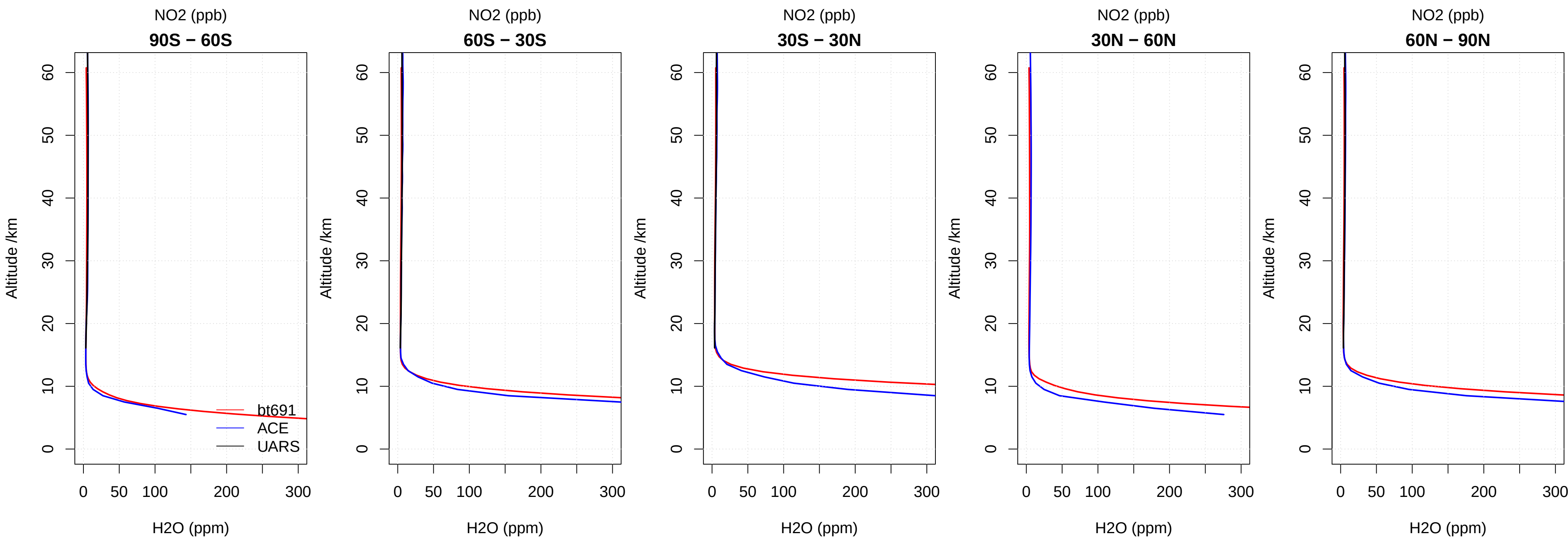
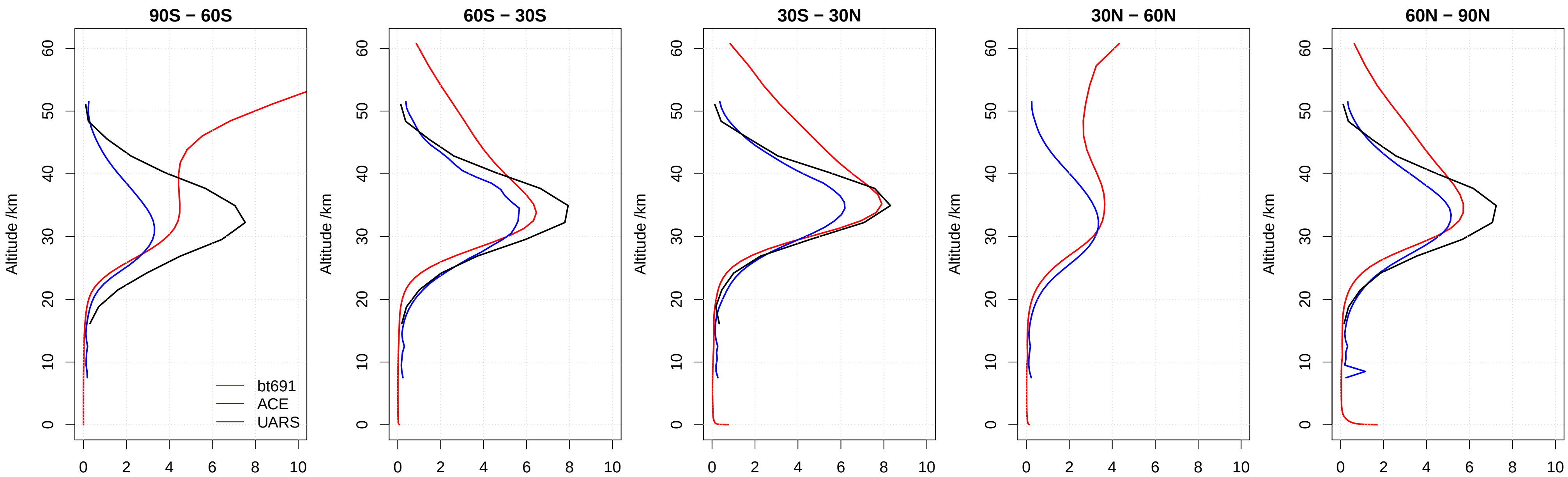
Total Ox Deposition = 1.04×10^3 Tg/yr

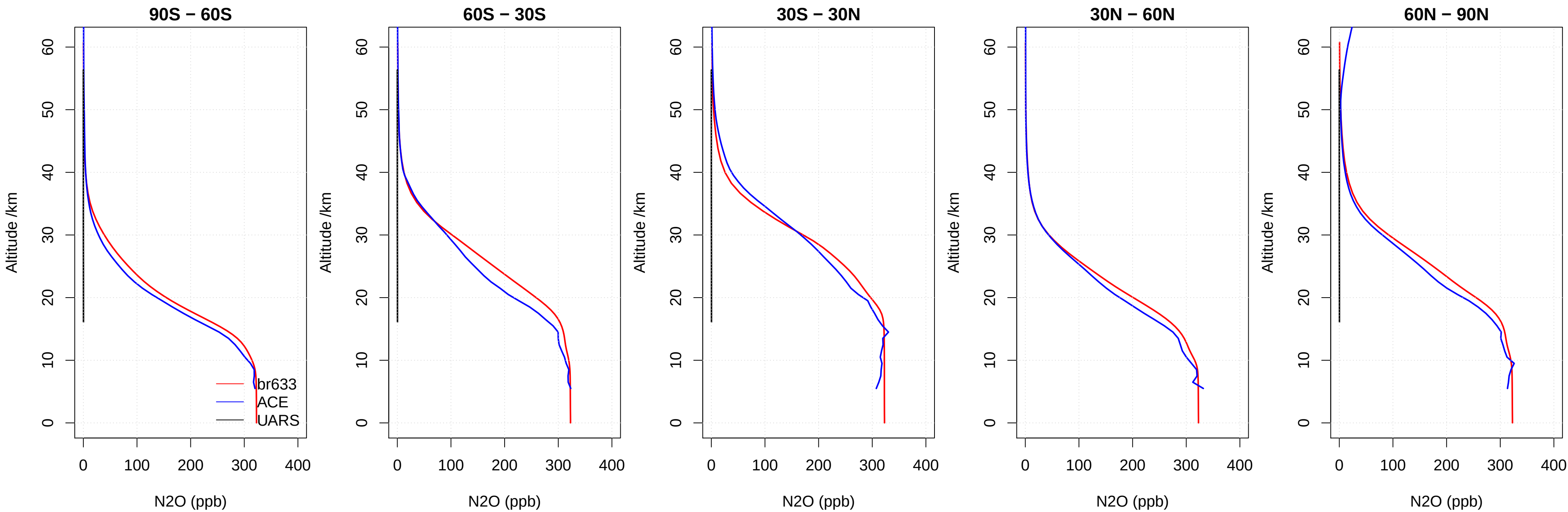


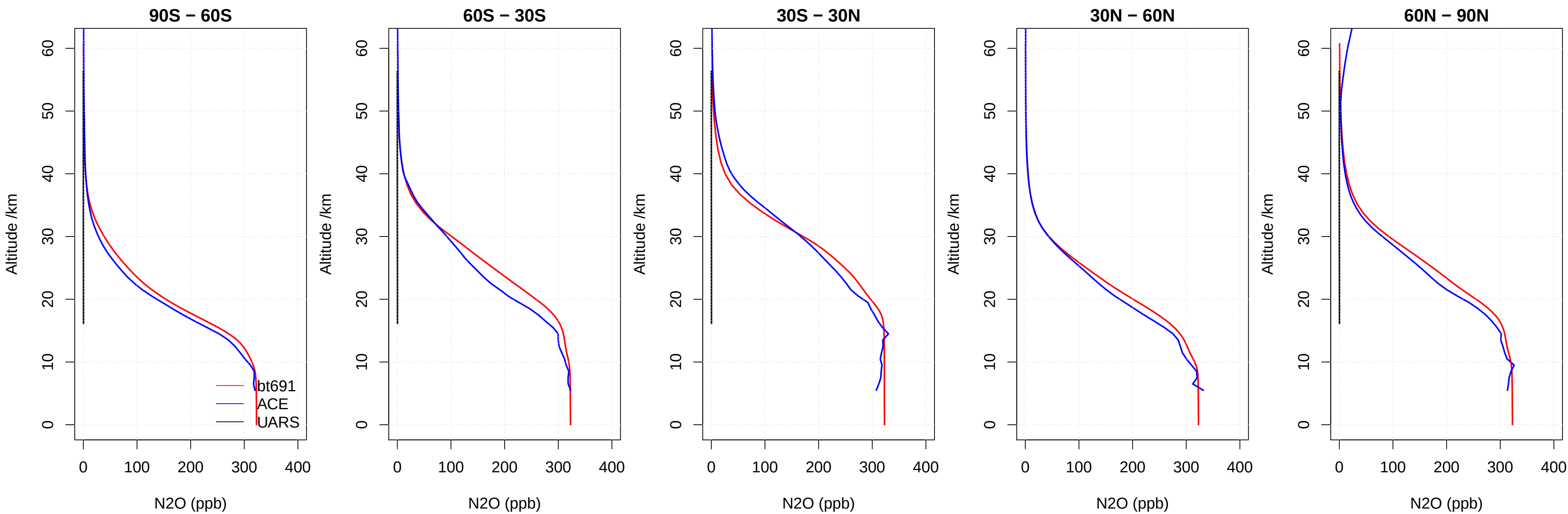






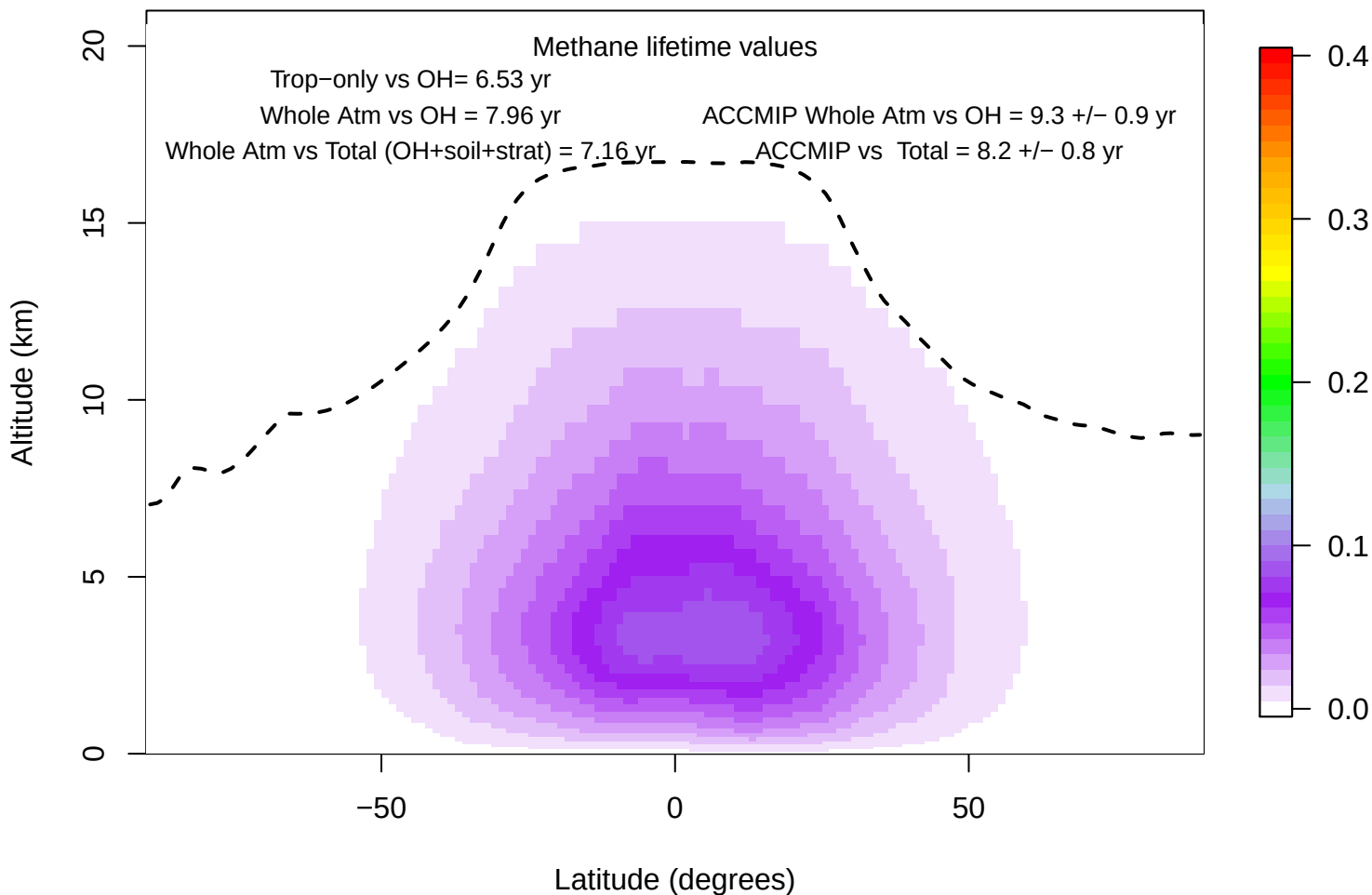






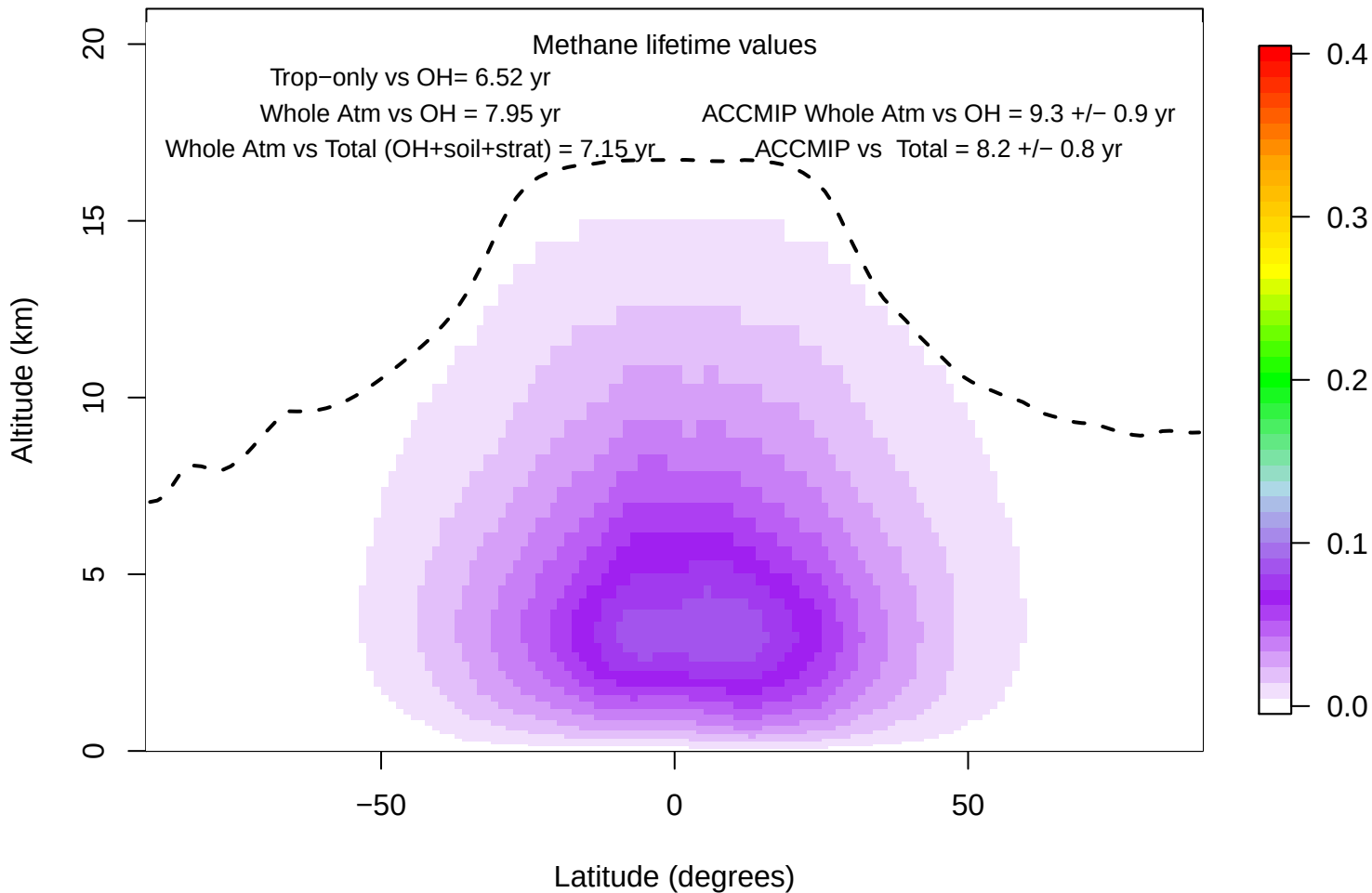
UKCA br633

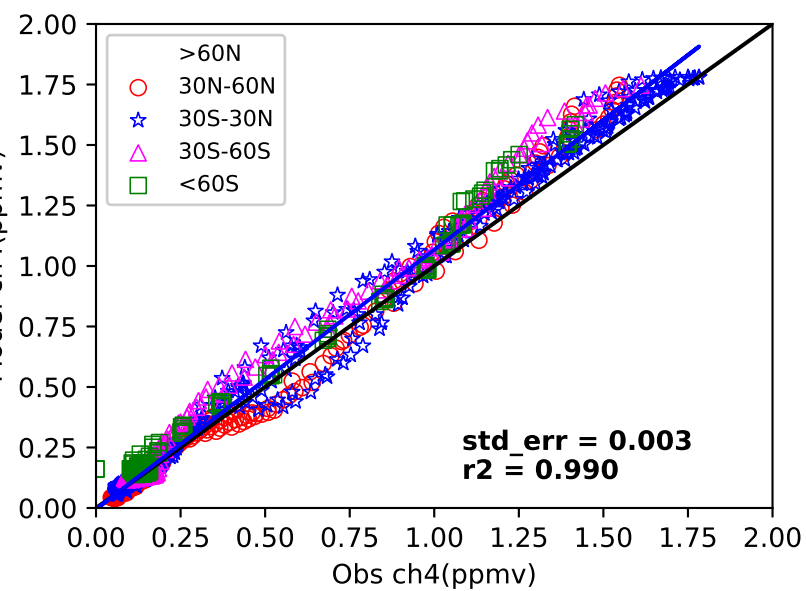
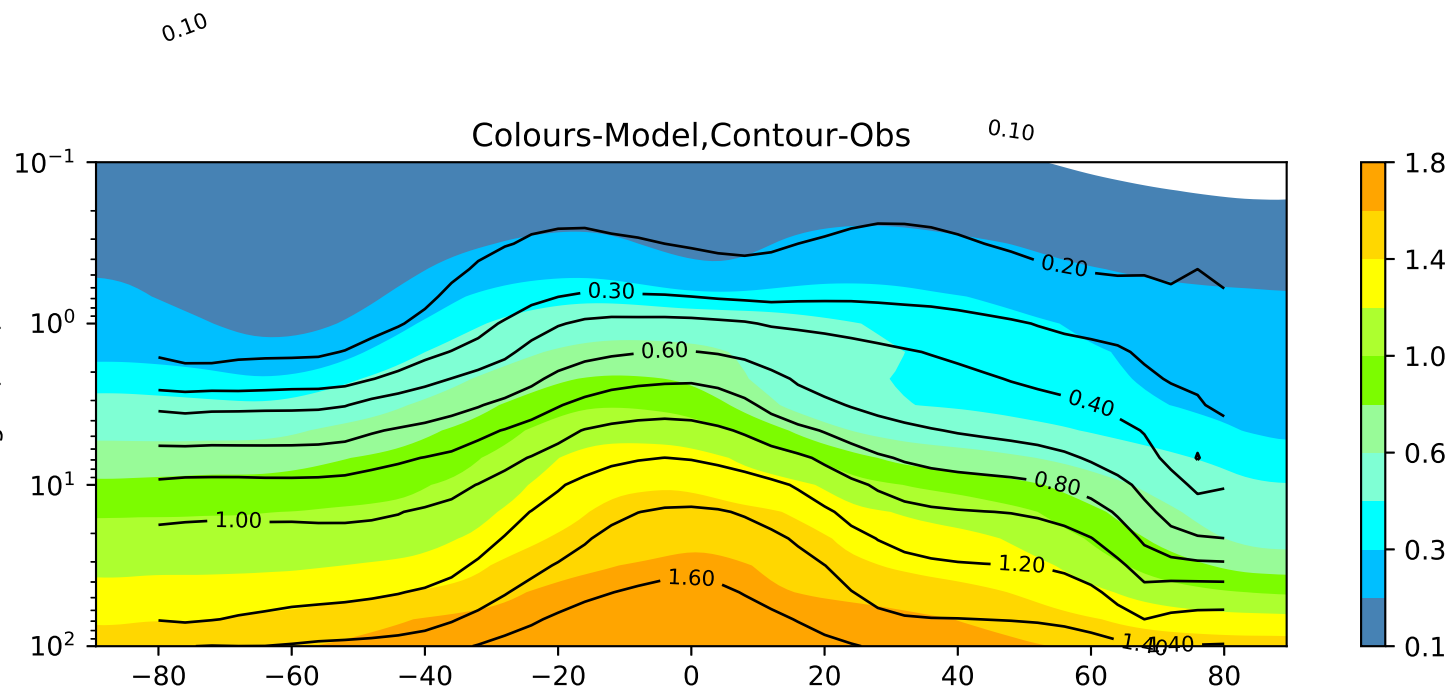
% CH₄ + OH flux (moles cm⁻³ s⁻¹)



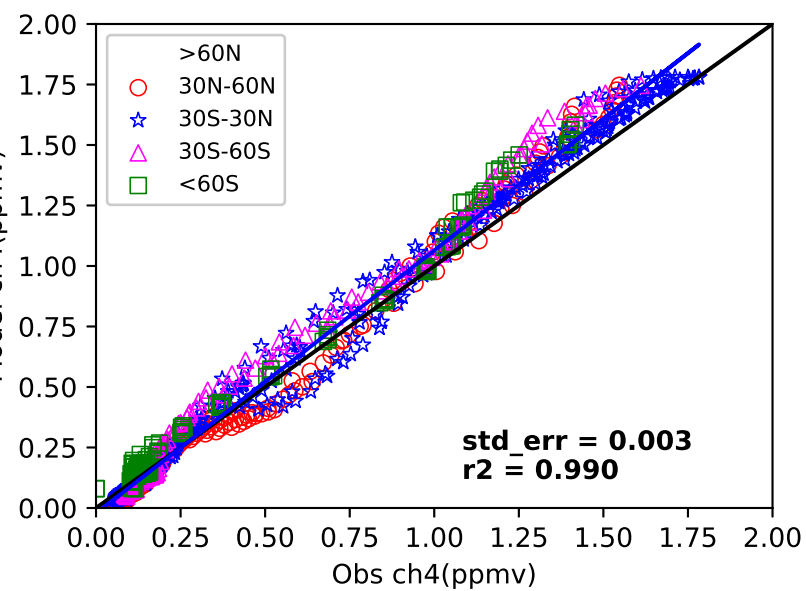
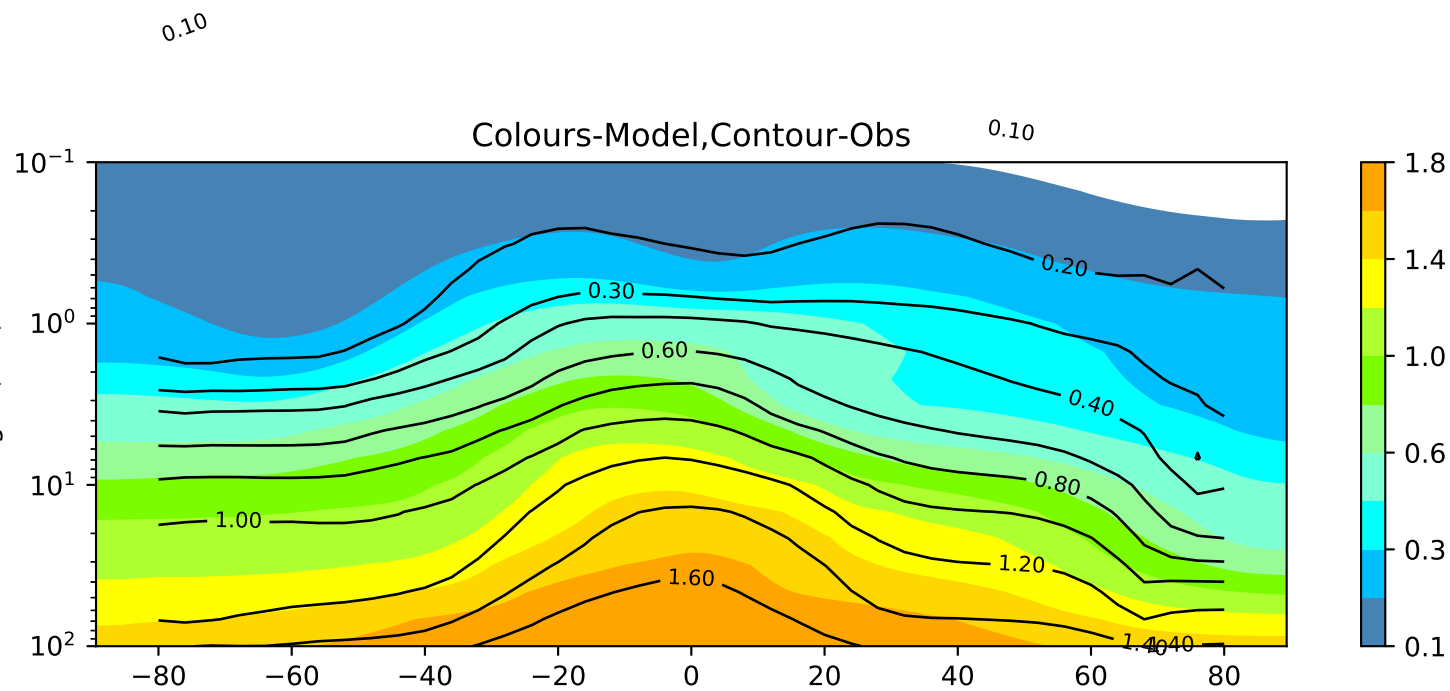
UKCA bt691

% CH₄ + OH flux (moles cm⁻³ s⁻¹)

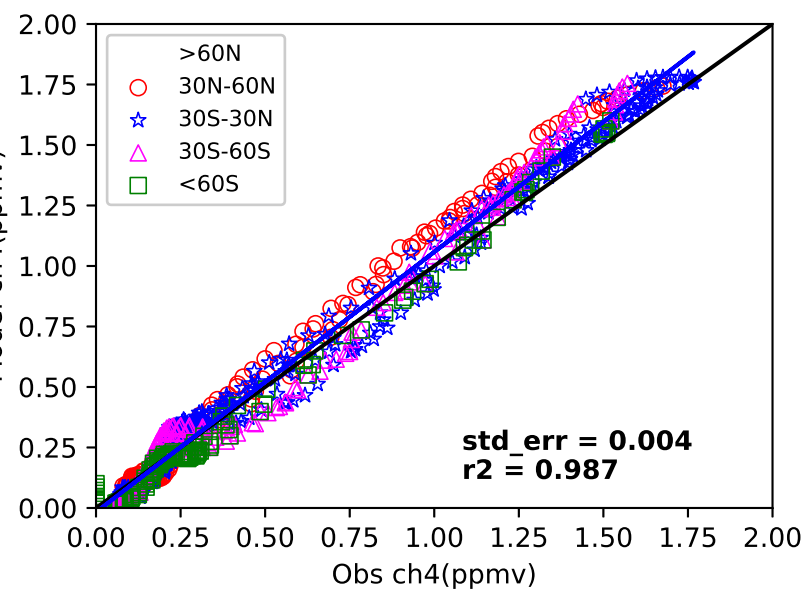
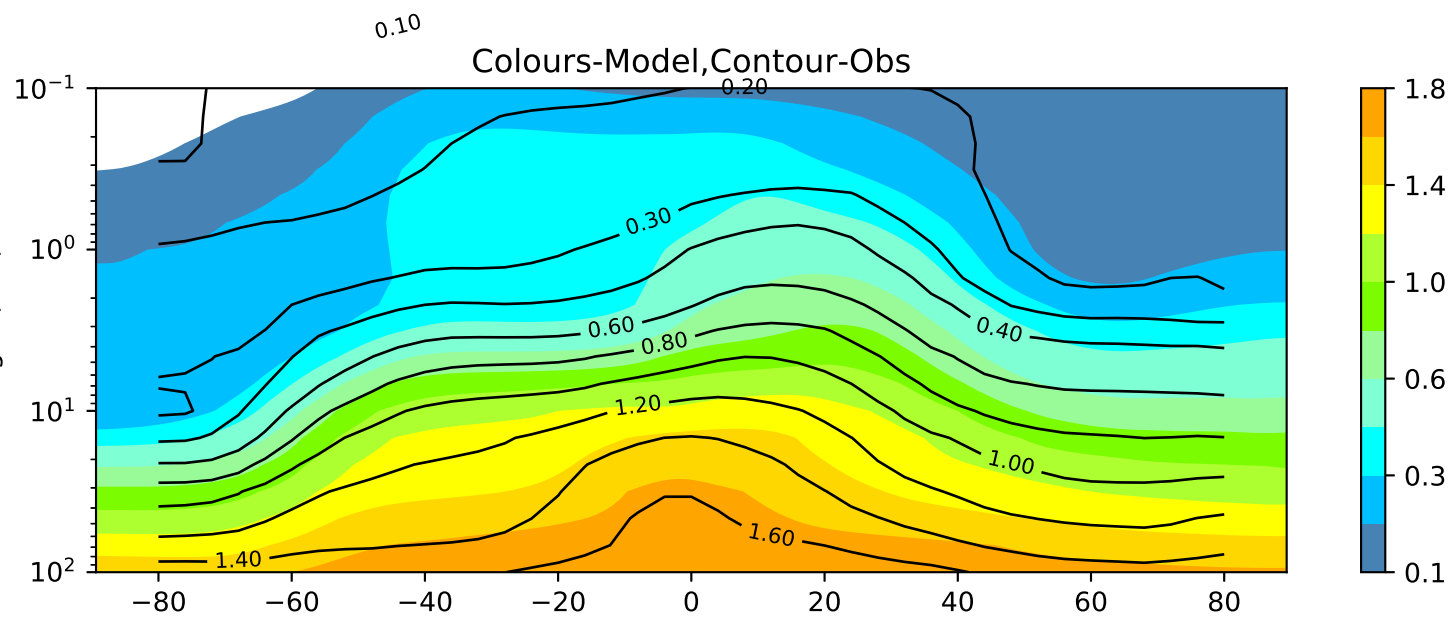




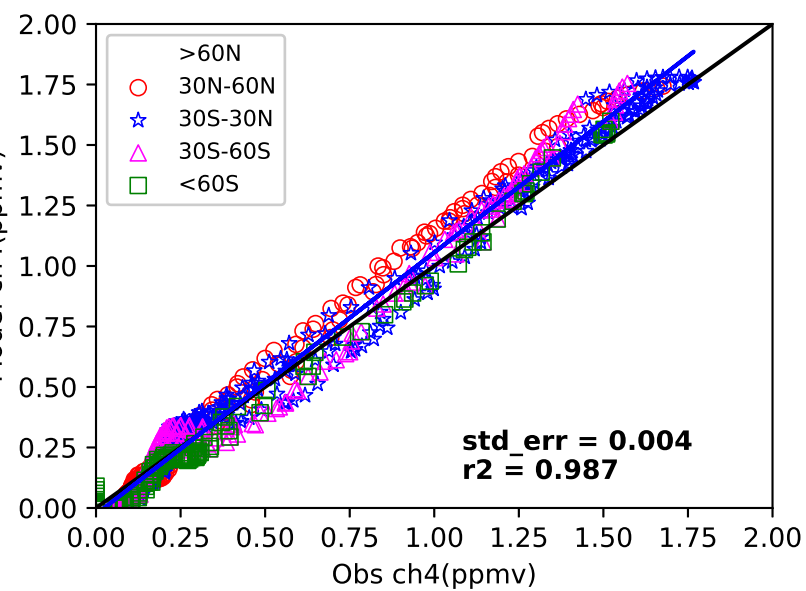
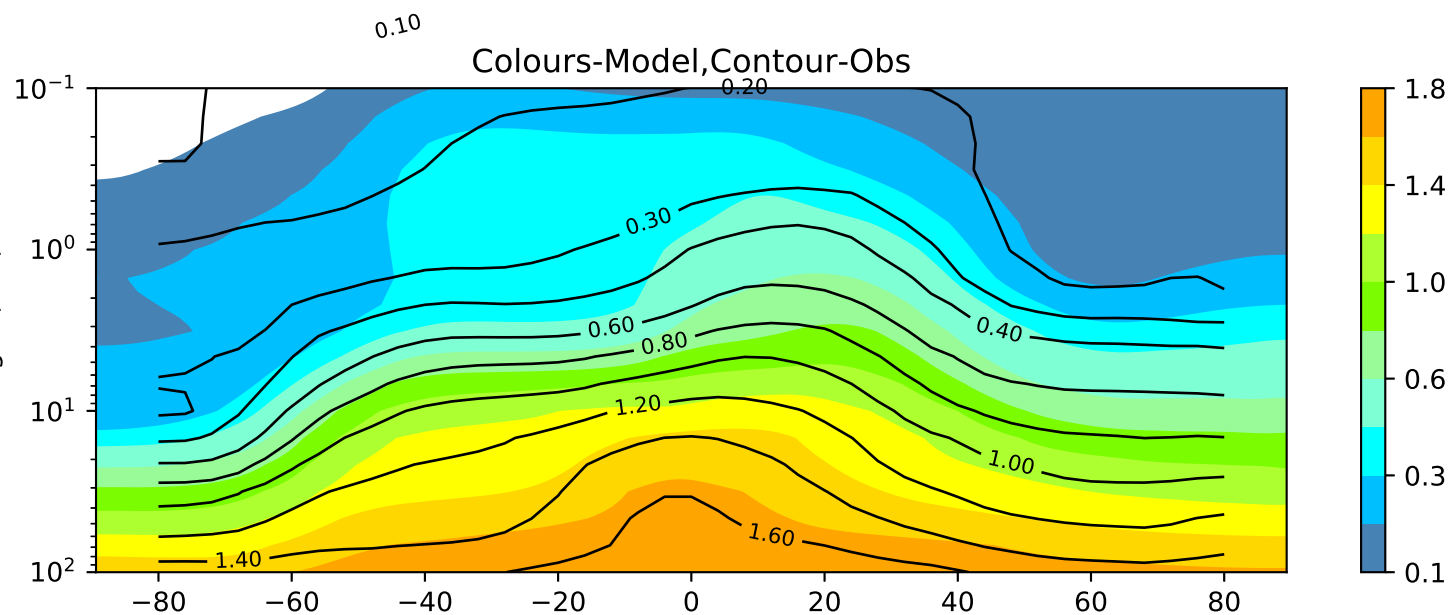
UKCA br633 vs HALOE:
CH₄ (ppmv) Jan



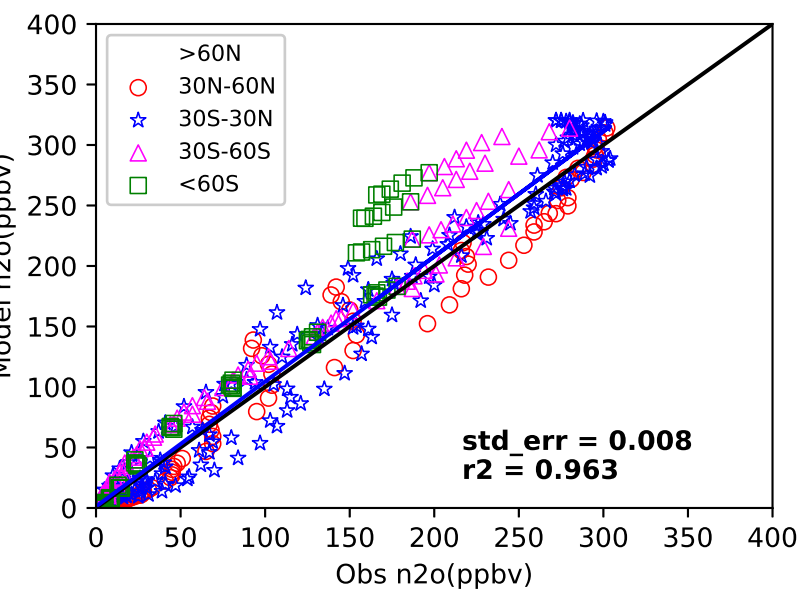
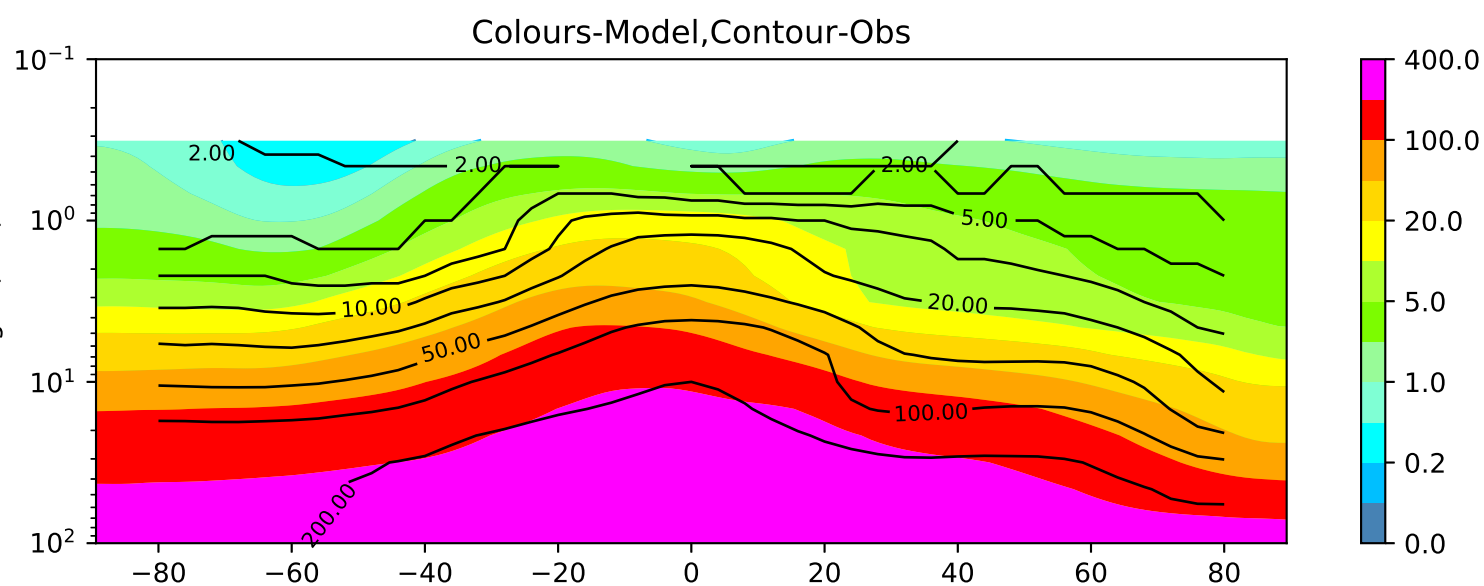
UKCA bt691 vs HALOE:
CH4 (ppmv) Jan



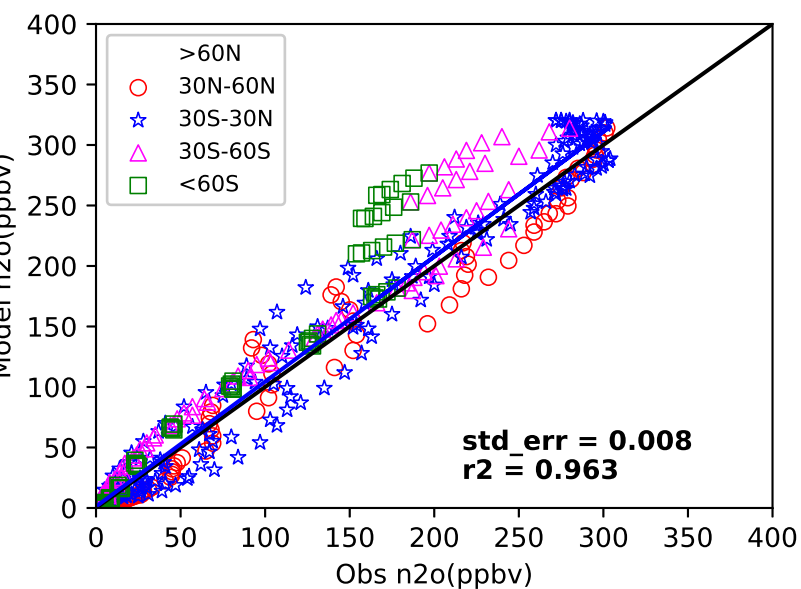
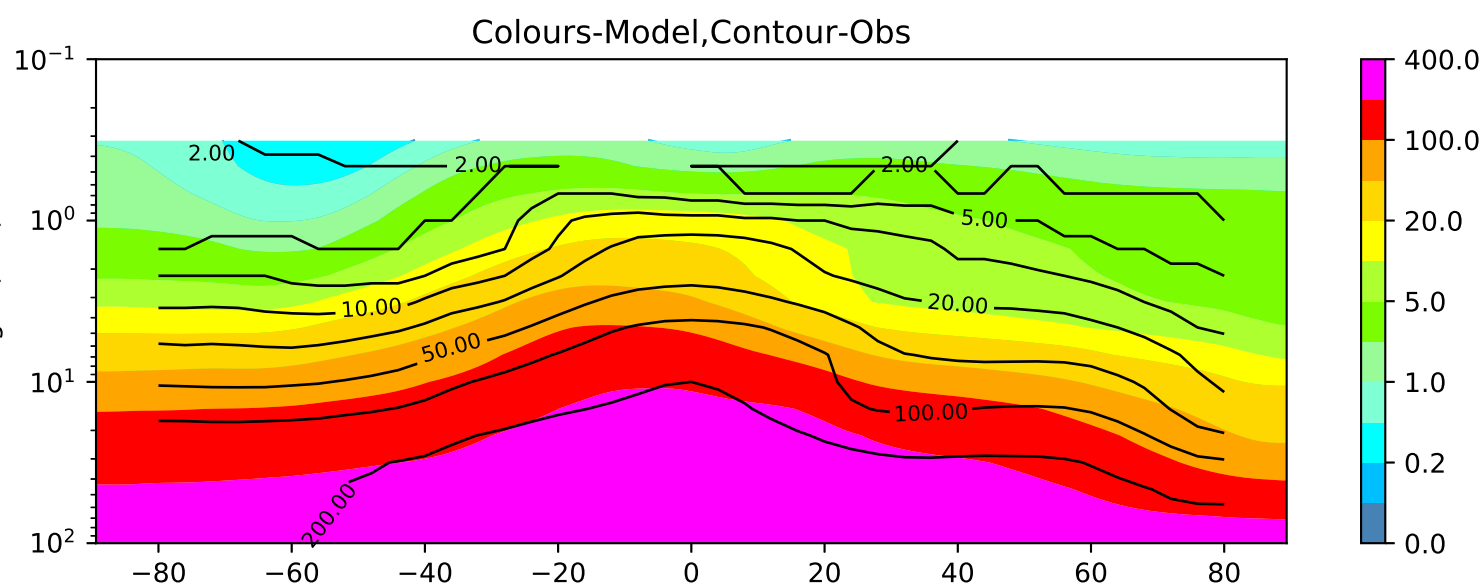
UKCA br633 vs HALOE:
CH4 (ppmv) Jul



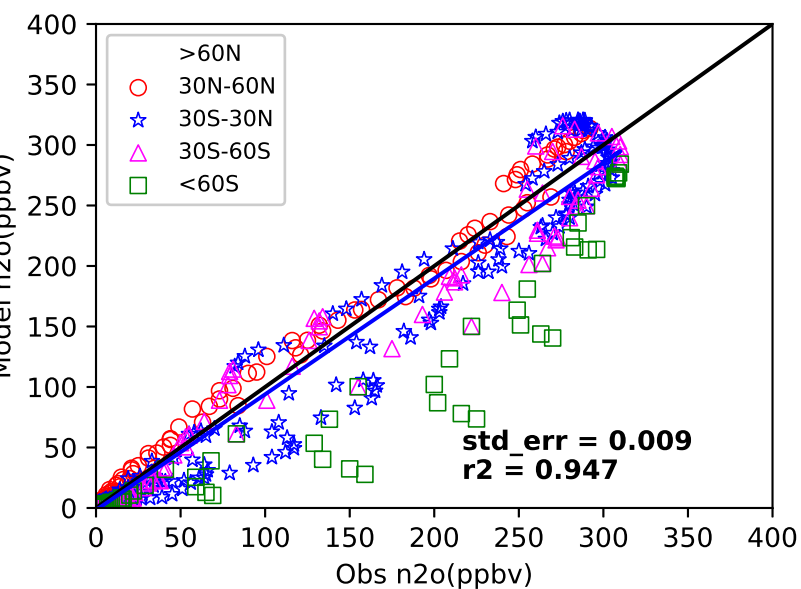
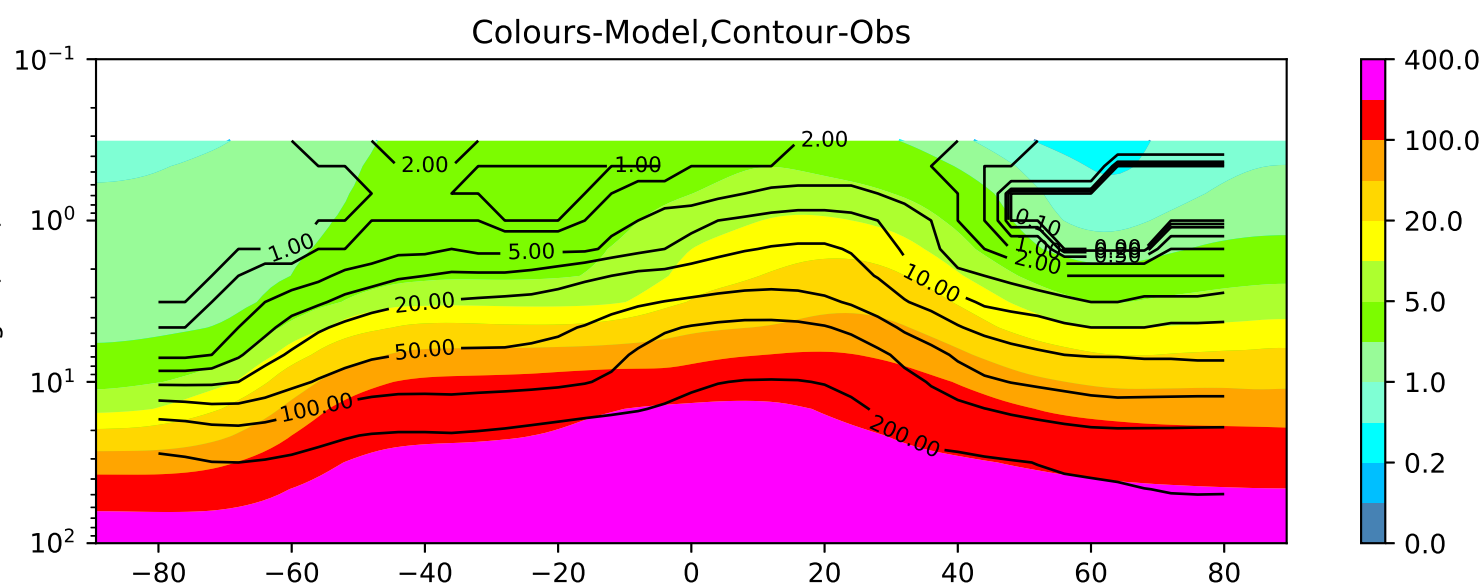
UKCA bt691 vs HALOE:
CH4 (ppmv) Jul



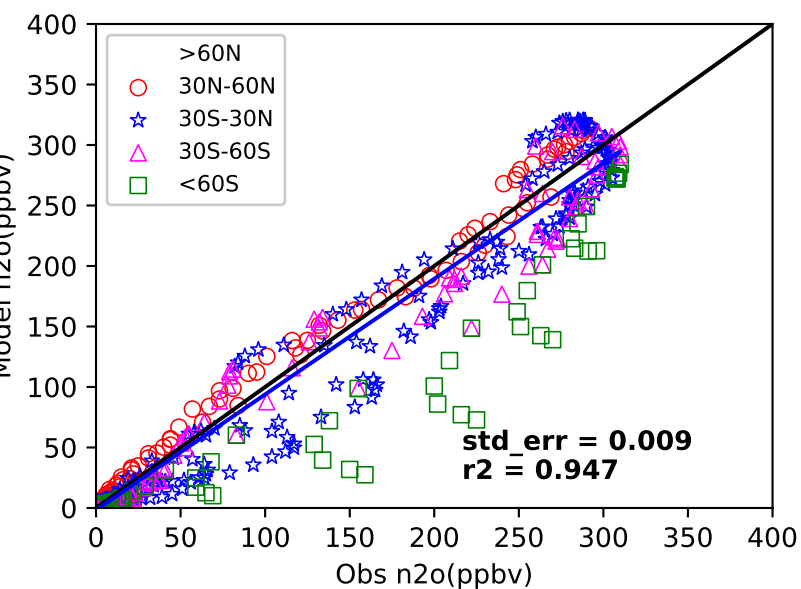
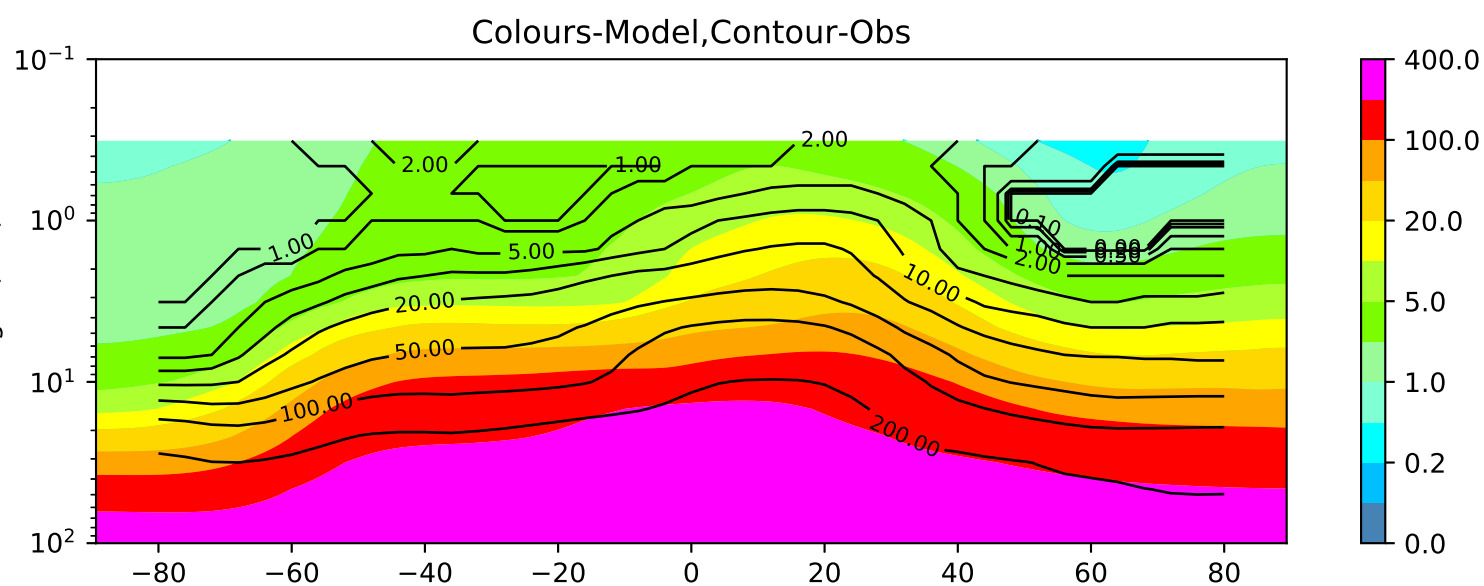
UKCA br633 vs HALOE:
N2O (ppmv) Jan



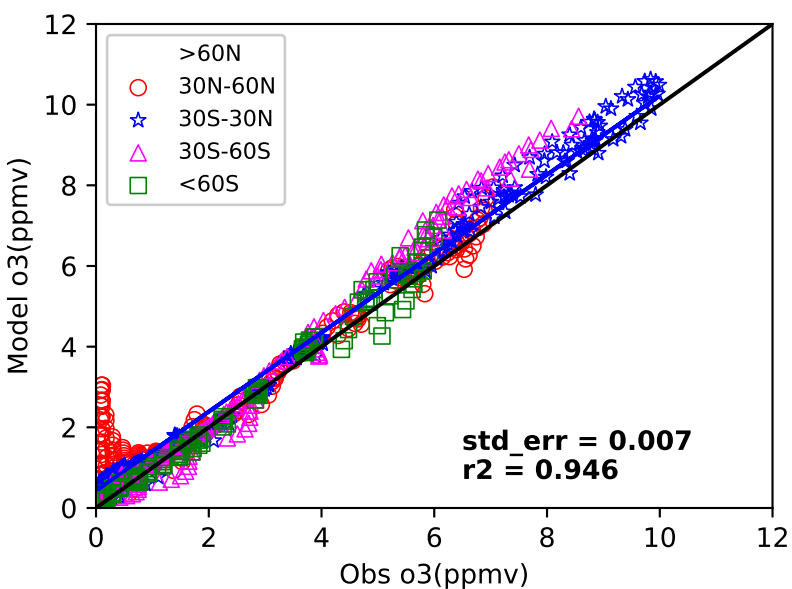
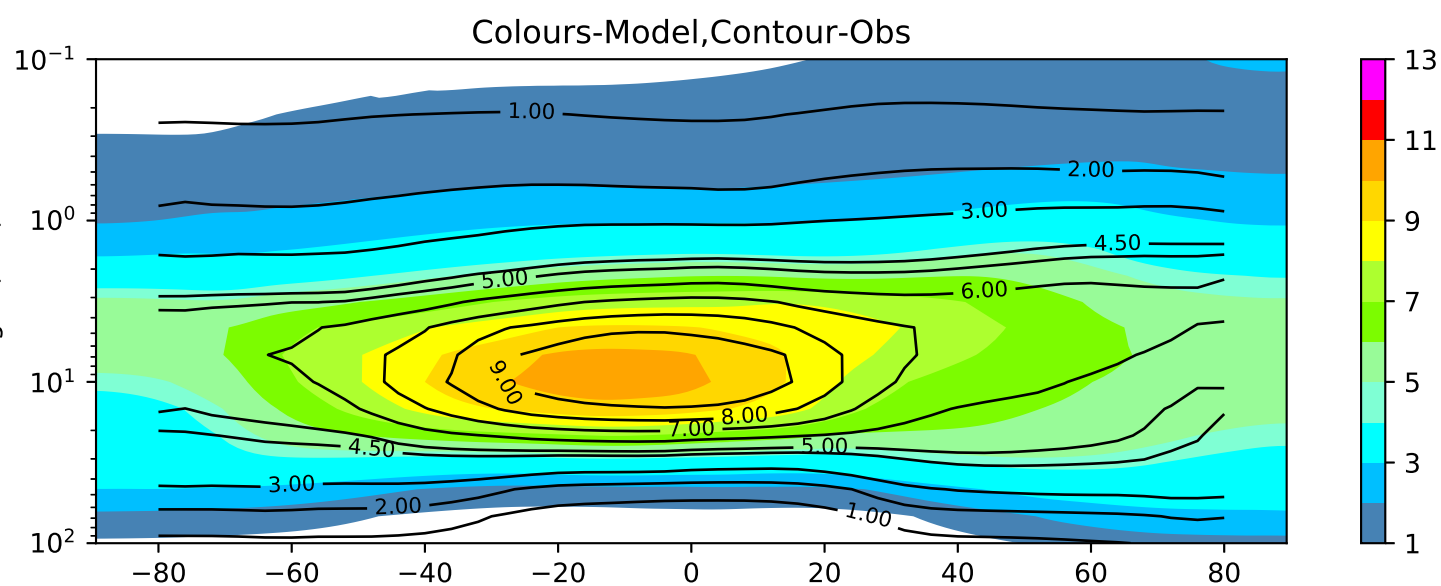
UKCA bt691 vs HALOE:
N2O (ppmv) Jan



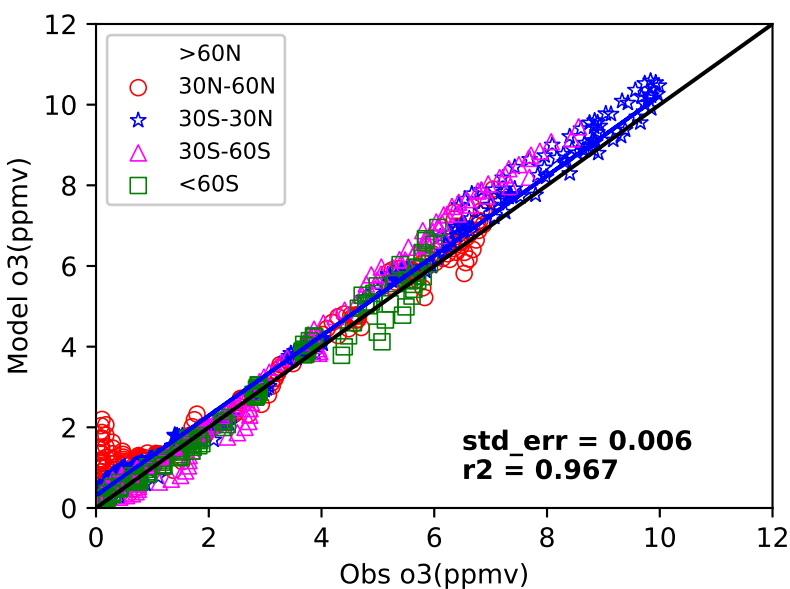
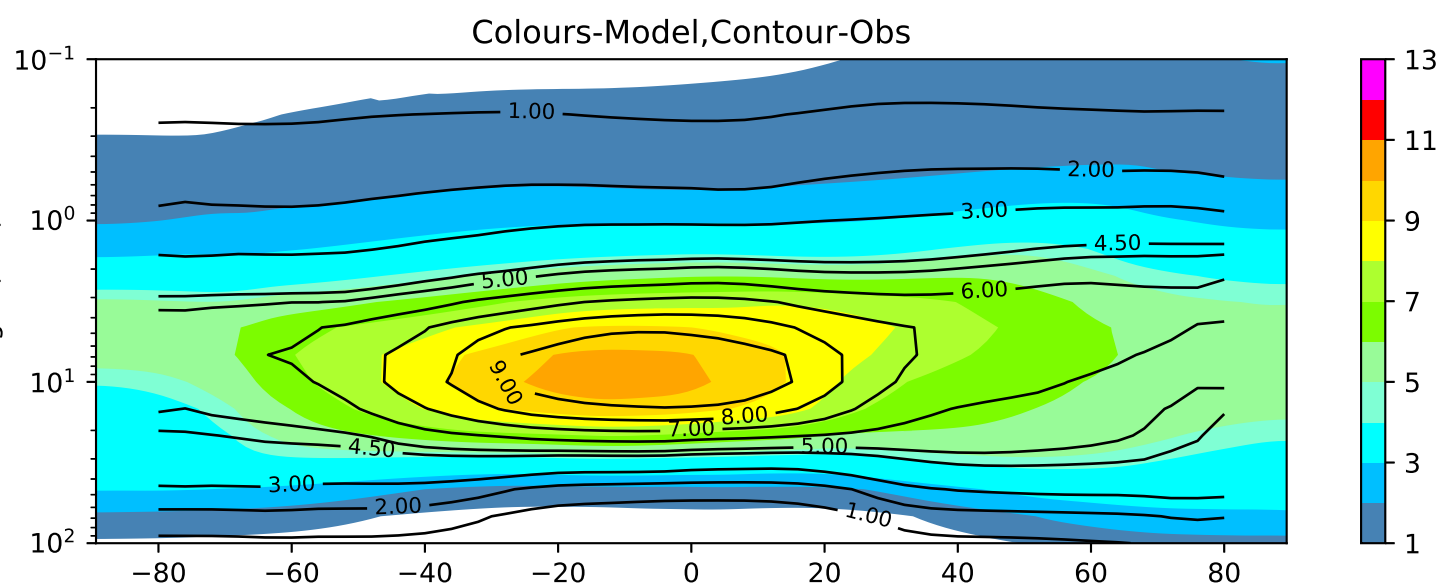
UKCA br633 vs HALOE:
N2O (ppmv) Jul



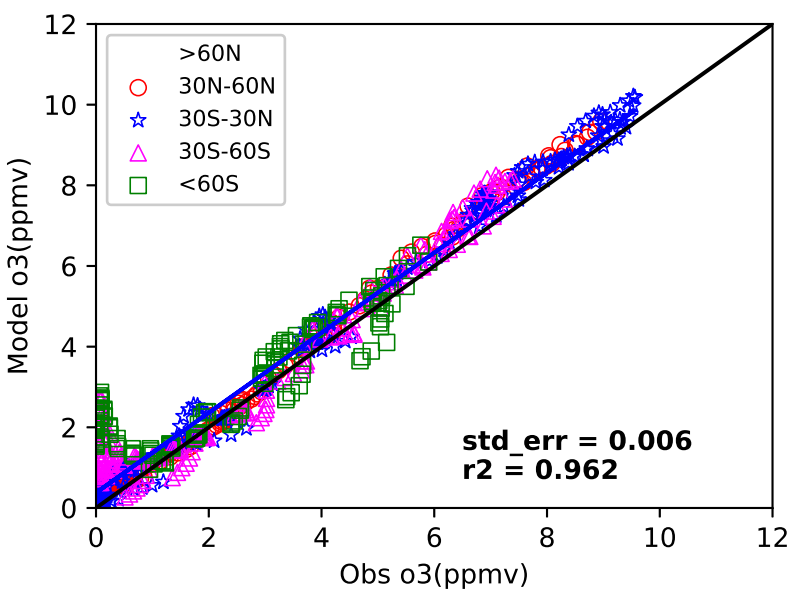
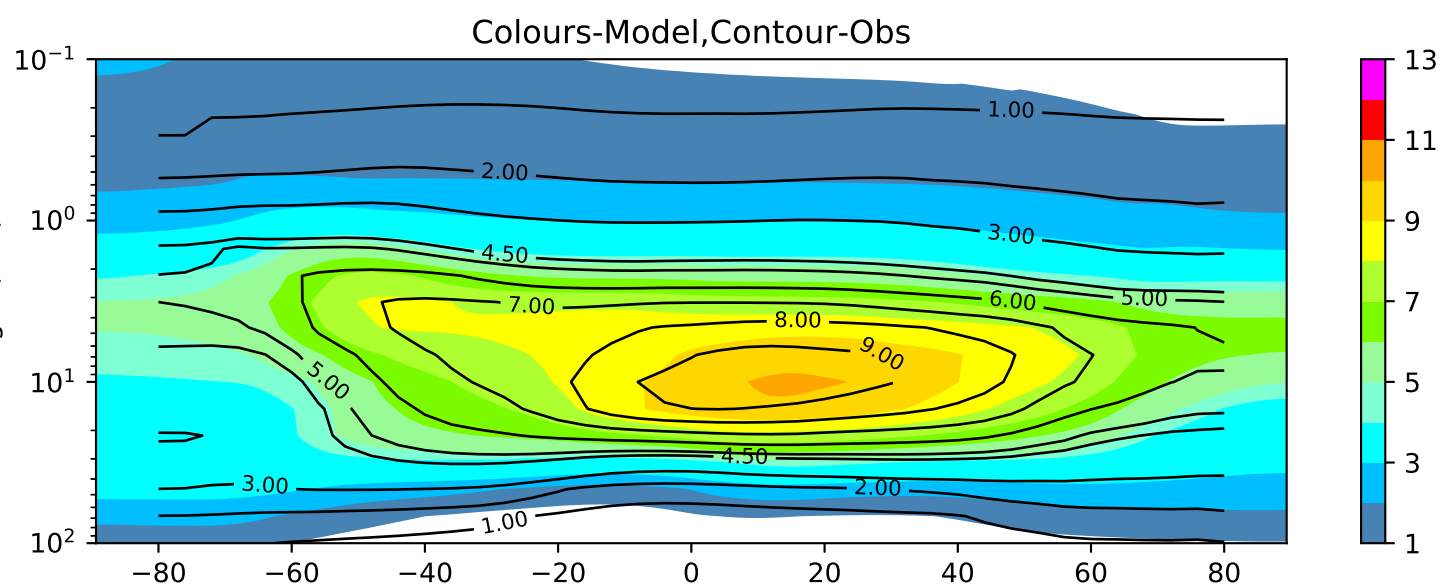
UKCA bt691 vs HALOE:
N2O (ppmv) Jul



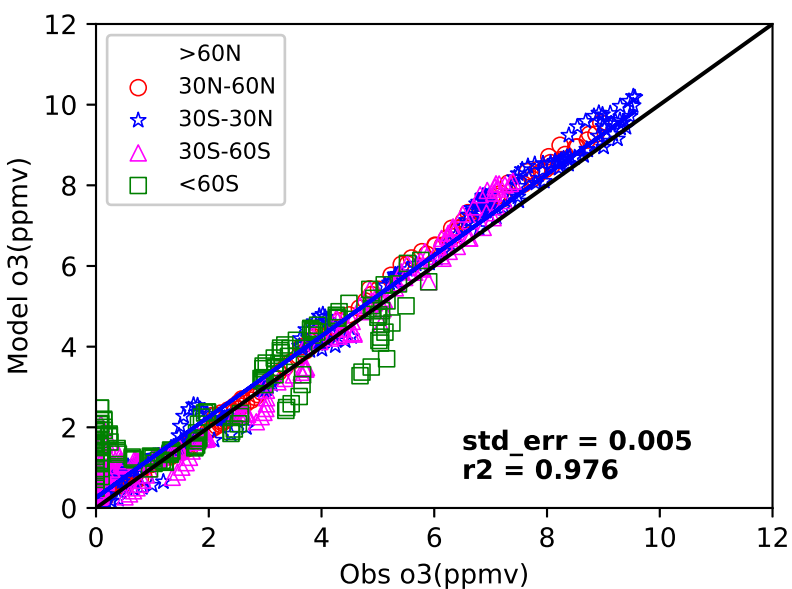
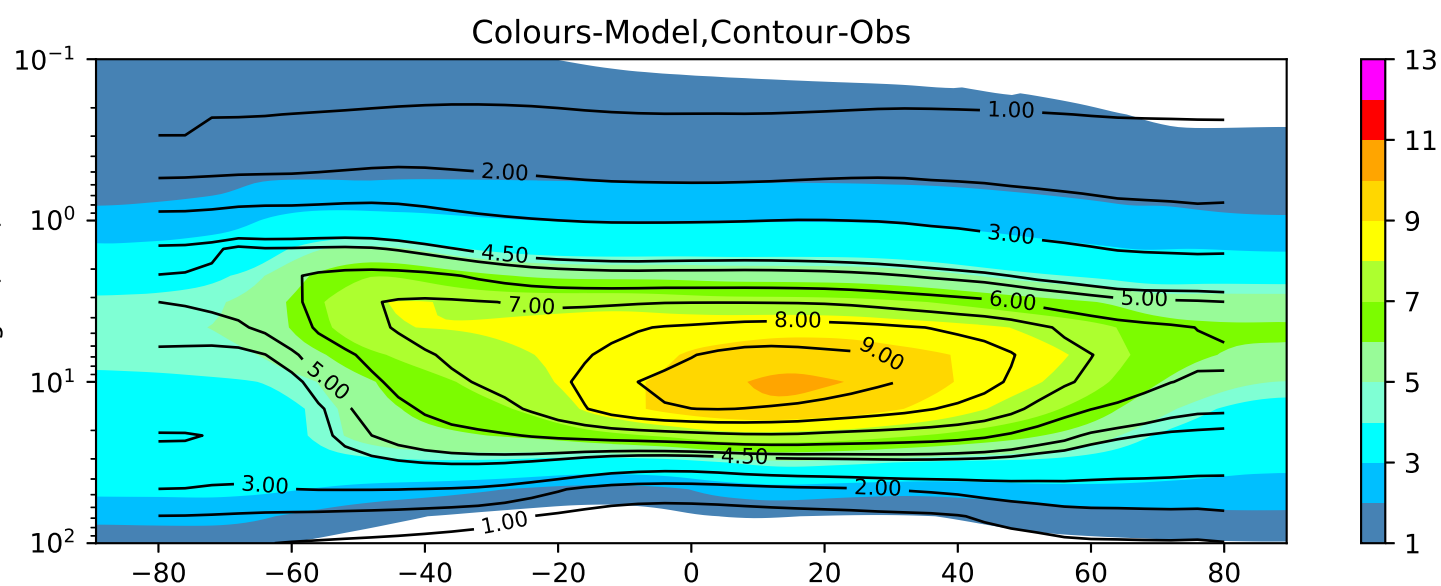
UKCA br633 vs HALOE:
O₃ (ppmv) Jan



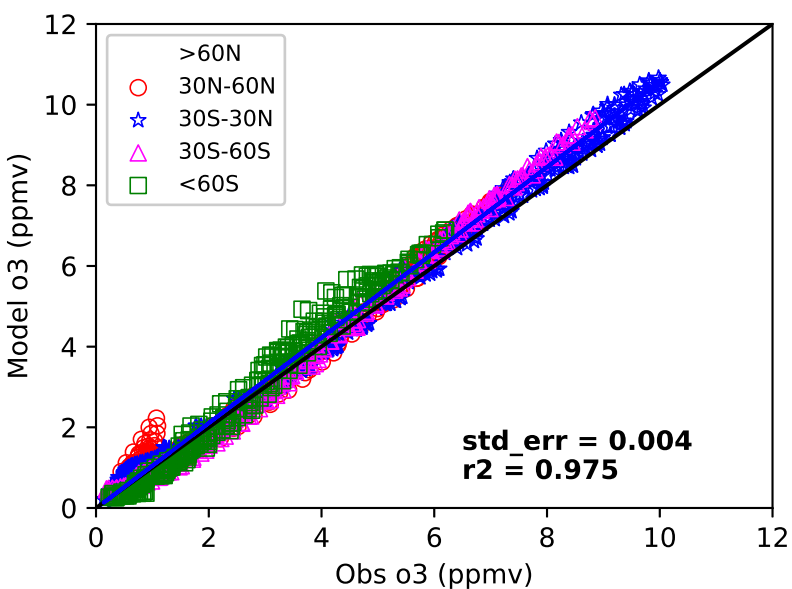
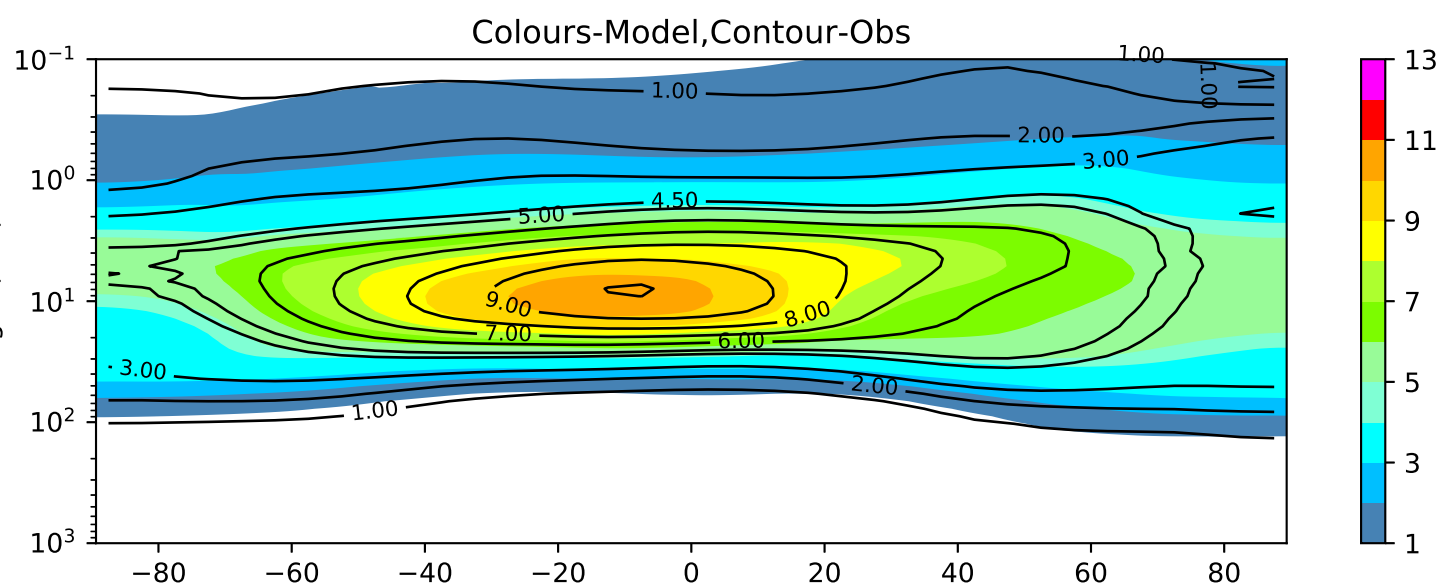
UKCA bt691 vs HALOE:
O₃ (ppmv) Jan



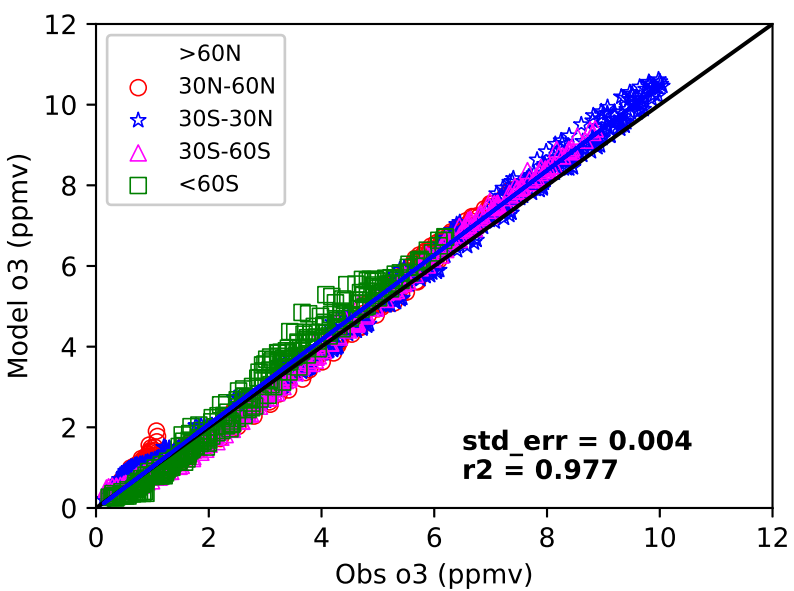
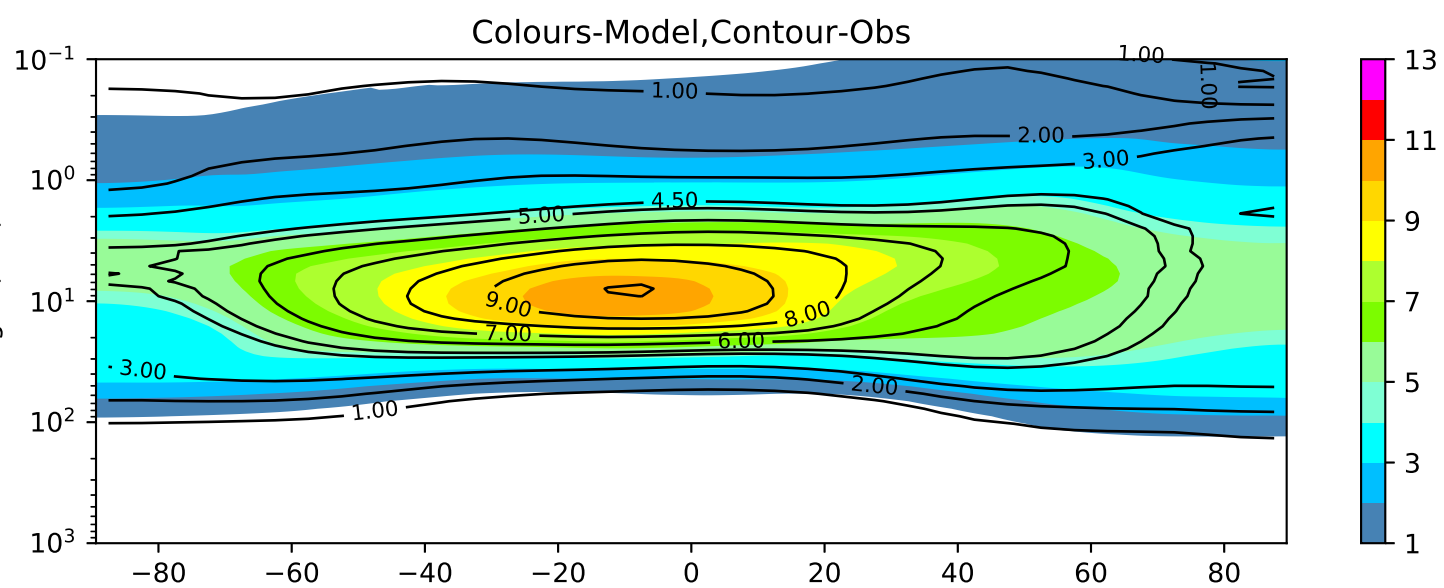
UKCA br633 vs HALOE:
O₃ (ppmv) Jul



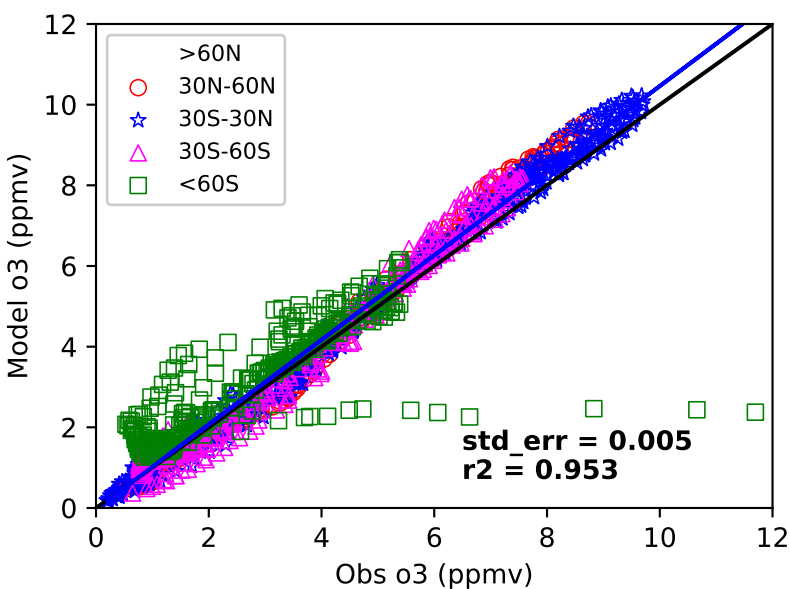
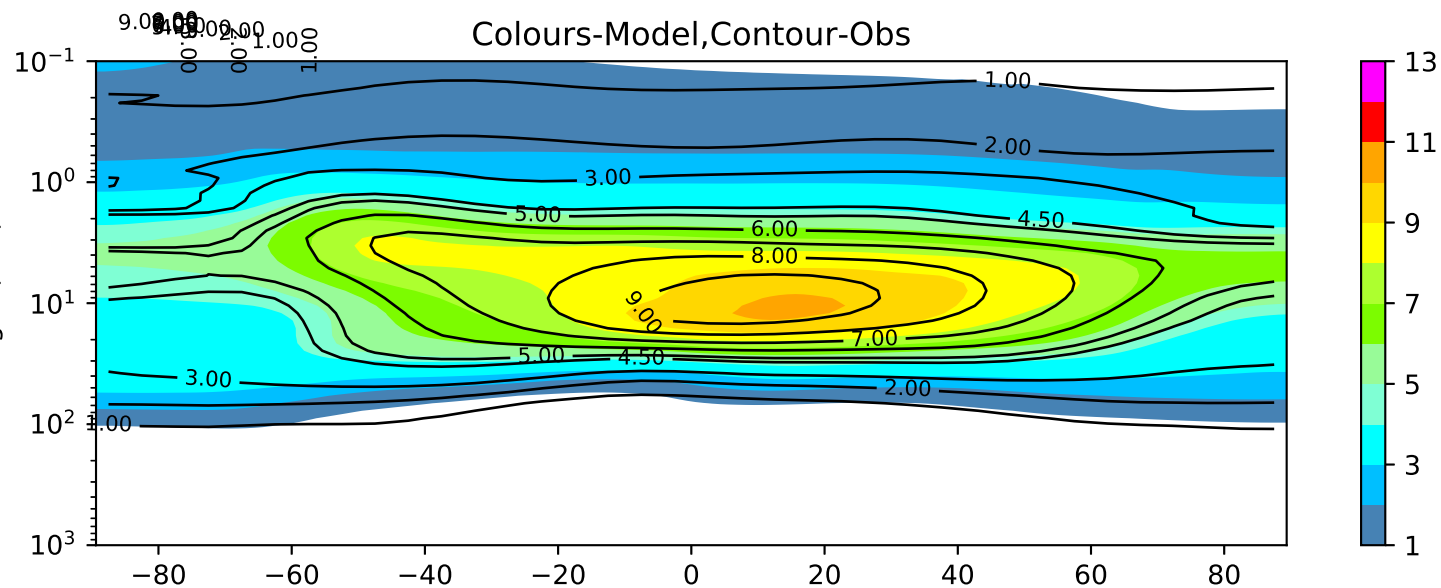
UKCA bt691 vs HALOE:
O₃ (ppmv) Jul



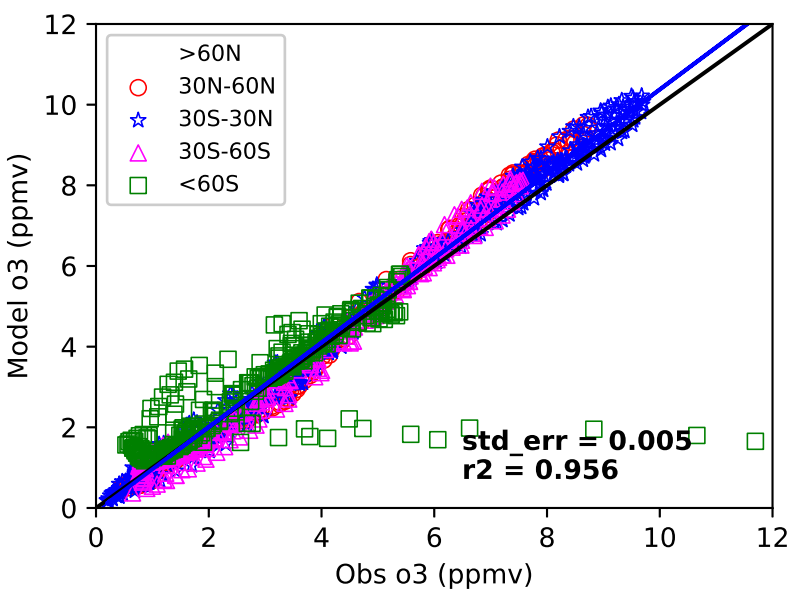
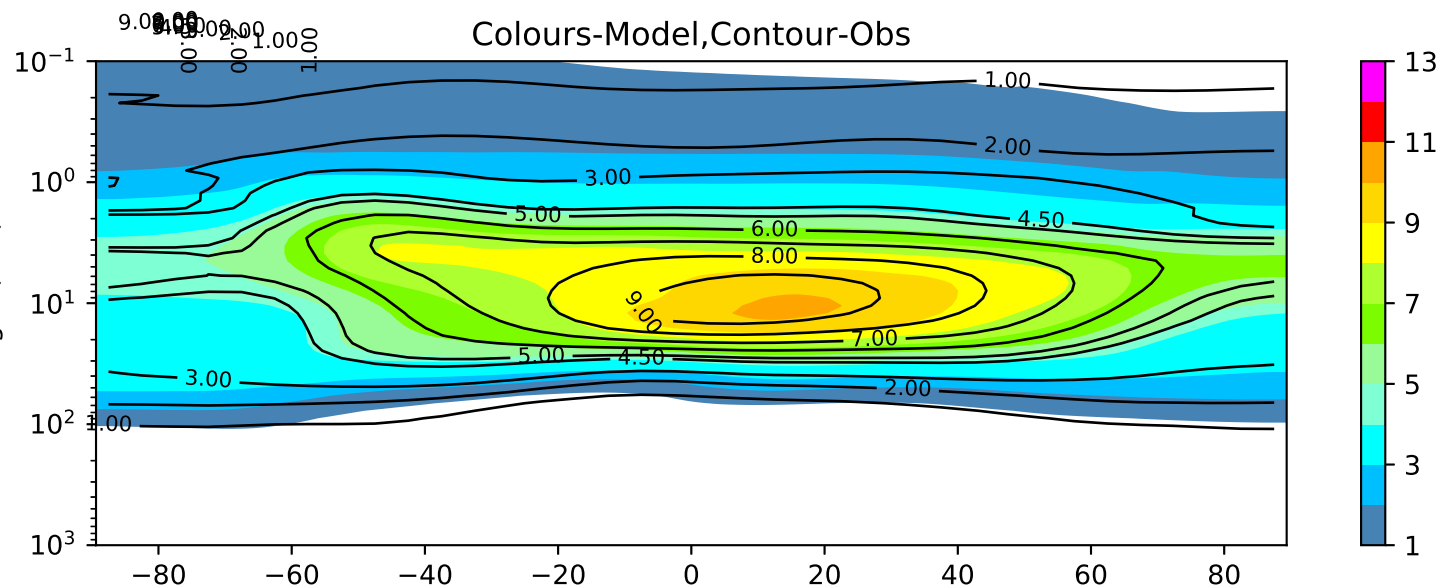
UKCA br633 vs NIWA-CCMVal:
O3 (ppmv) Jan



UKCA bt691 vs NIWA-CCMVal:
O3 (ppmv) Jan



UKCA br633 vs NIWA-CCMVal:
O3 (ppmv) Jul



UKCA bt691 vs NIWA-CCMVal:
O3 (ppmv) Jul

