

Time series analysis of GOMOS and OSIRIS O₃ and NO₂ profiles



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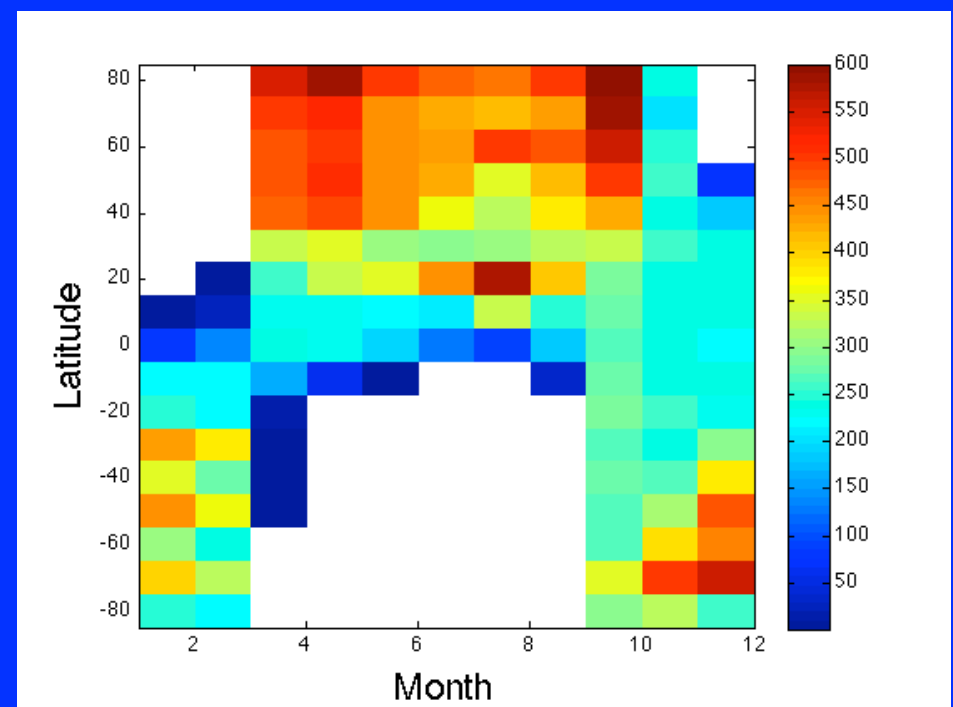
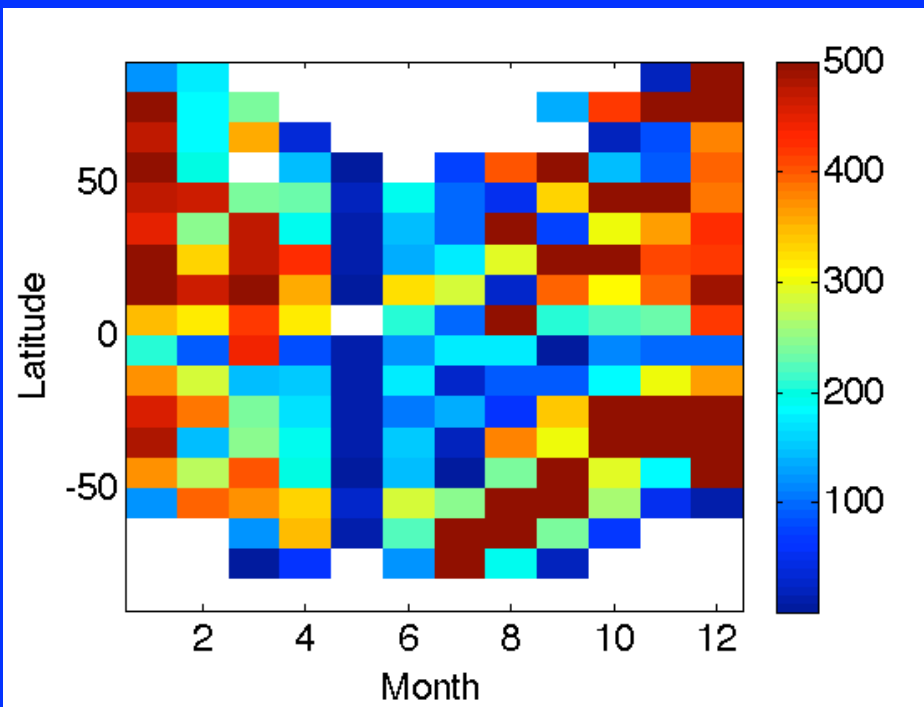
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GOMOS and OSIRIS

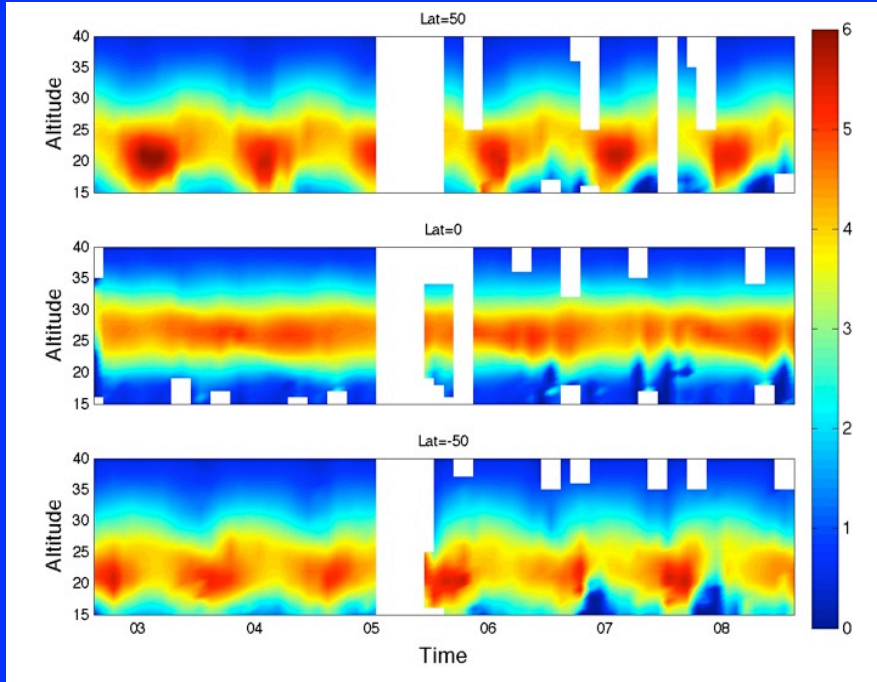
O₃ and NO₂ data for time series

- O₃ vertical profiles: 15-100 km with 2-3 km resolution
- NO₂ vertical profiles: 20-50 km with 4 km resolution
- Nighttime data: O₃, NO₂
- Relative measurements: Stable in time
- 7 years of data: 270 000 (nighttime) measurements

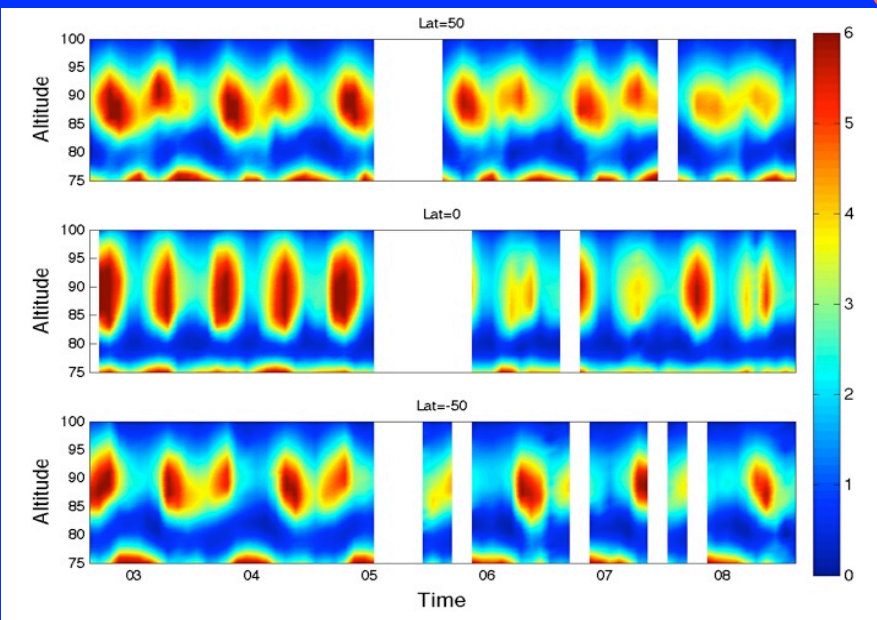
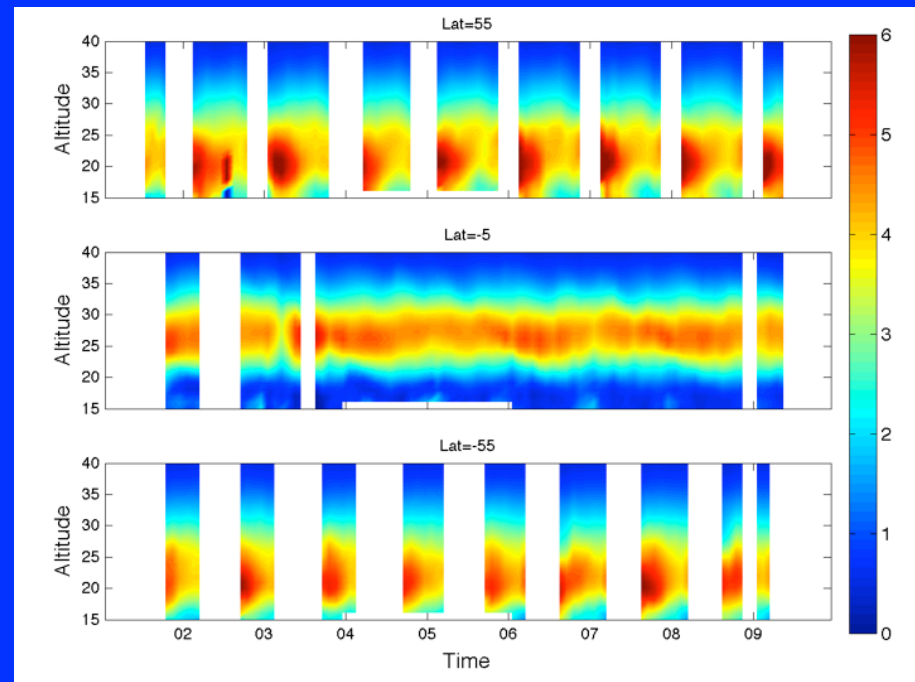
- O₃ vertical profiles: 15-60 km with 2-3 km resolution
- NO₂ vertical profiles: 20-50 km with 2-3 km resolution
- Daytime data: O₃, NO₂
- 8 years of data: 470 000 (daytime) measurements (4.5. 2009)



GOMOS



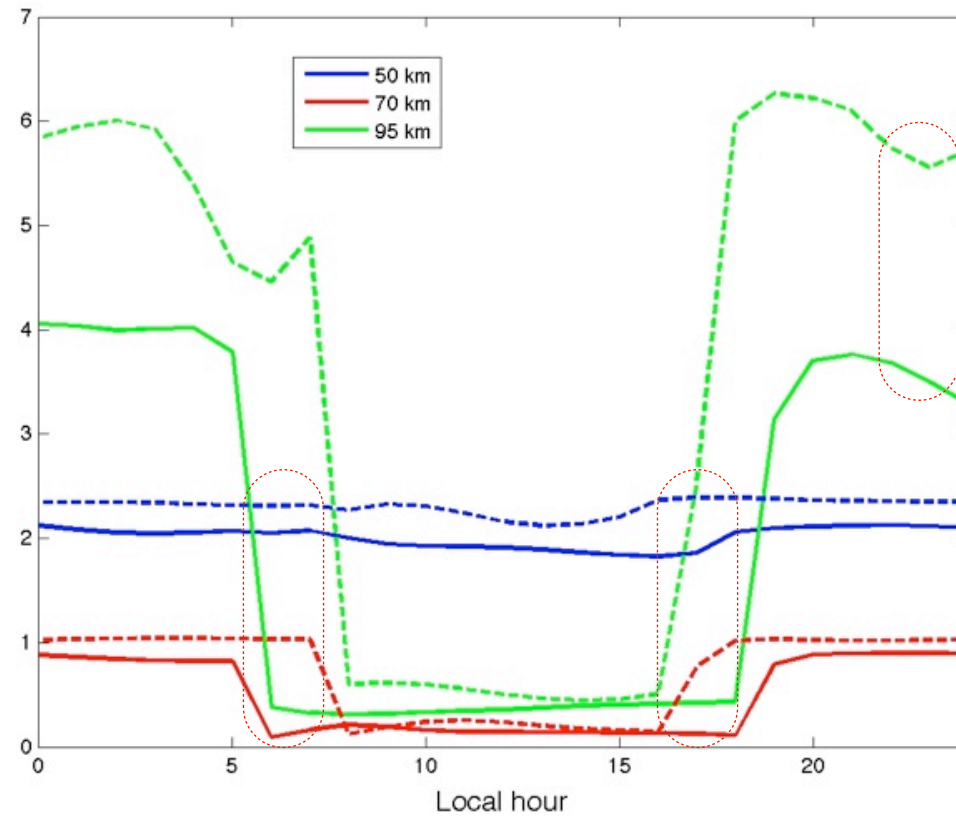
OSIRIS



**Stratospheric ozone
number density (10^{12} cm^{-3})**

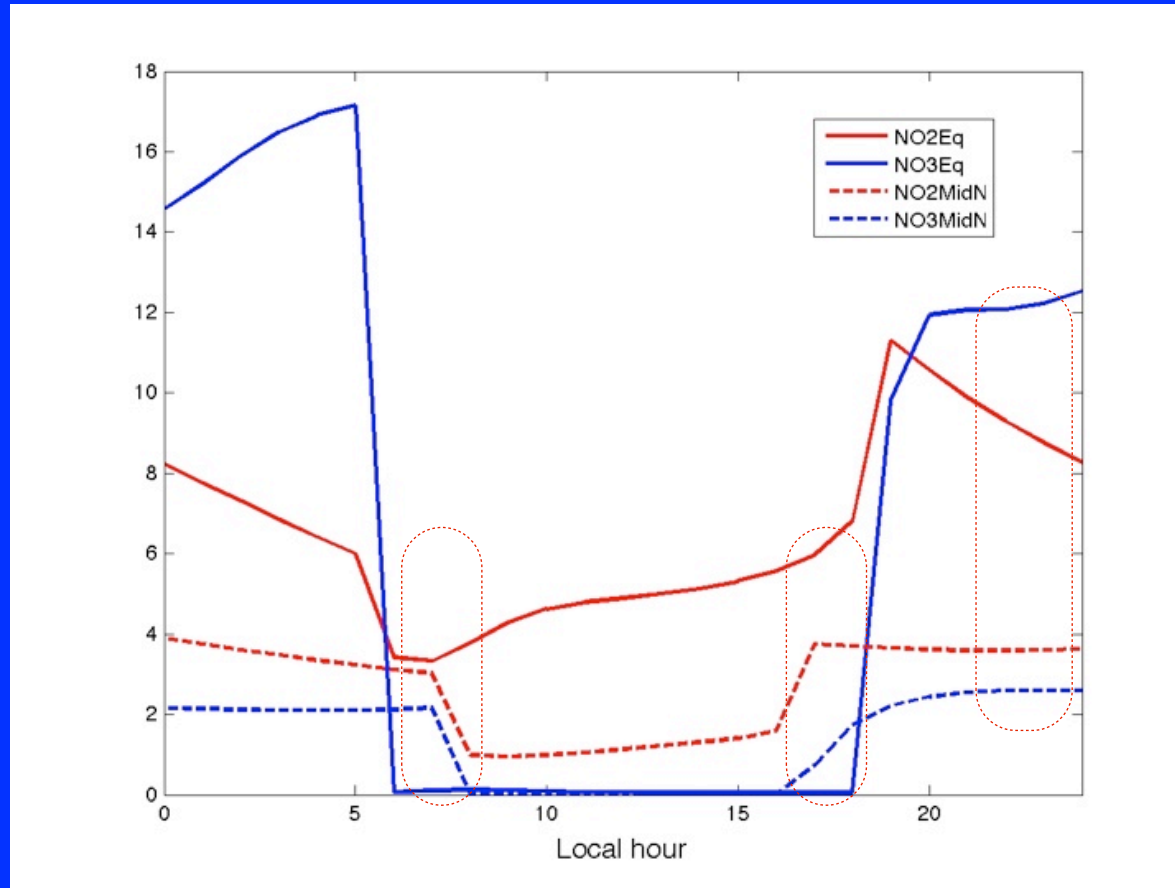
**MLT ozone
number density (10^8 cm^{-3})**

Diurnal variation: O3



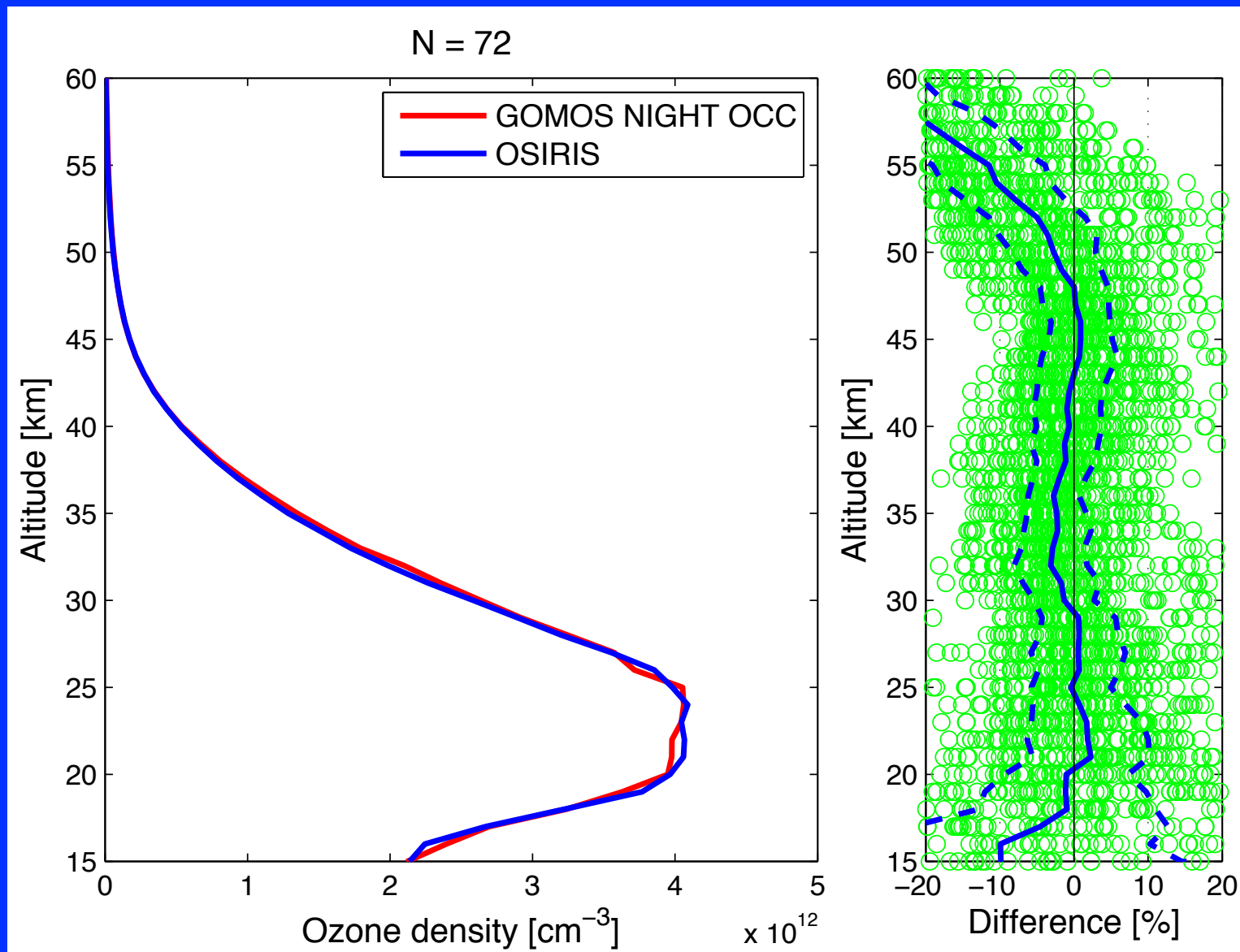
NCAR ROSE model

Diurnal variation: NO₂ and NO₃ at 34 km

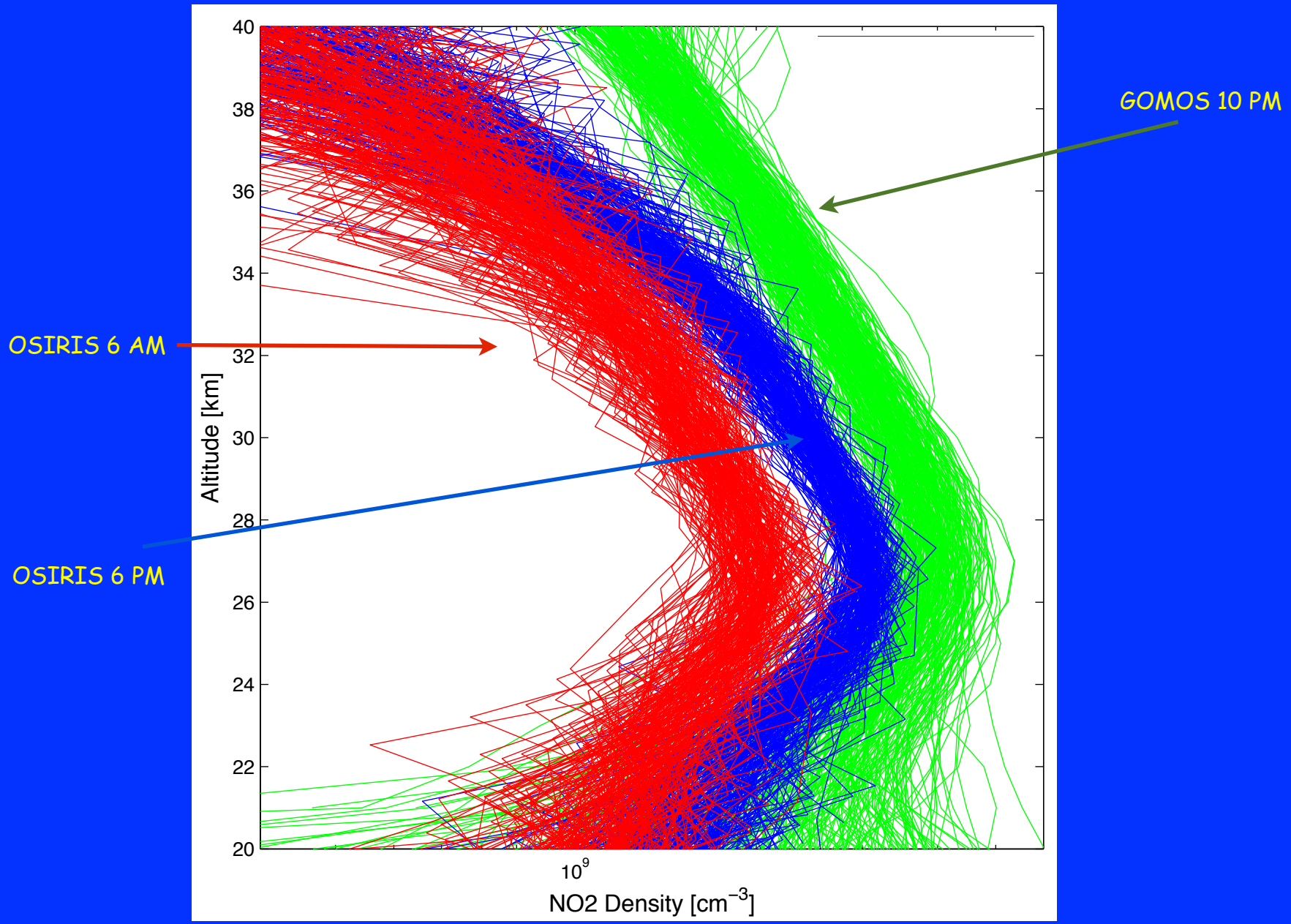


NCAR ROSE model

GOMOS vs OSIRIS OZONE



GOMOS vs OSIRIS OZONE



Time series fitting

$$\rho^{fit}(z, t) = c(z) + s(z)F_{10.7}(t) + q_1(z)F_{qbo}^{10}(t) + q_2(z)F_{qbo}^{30}(t) + \sum_{n=1}^2 (a_n(z) \cos(nwt) + b_n(z) \sin(nwt))$$

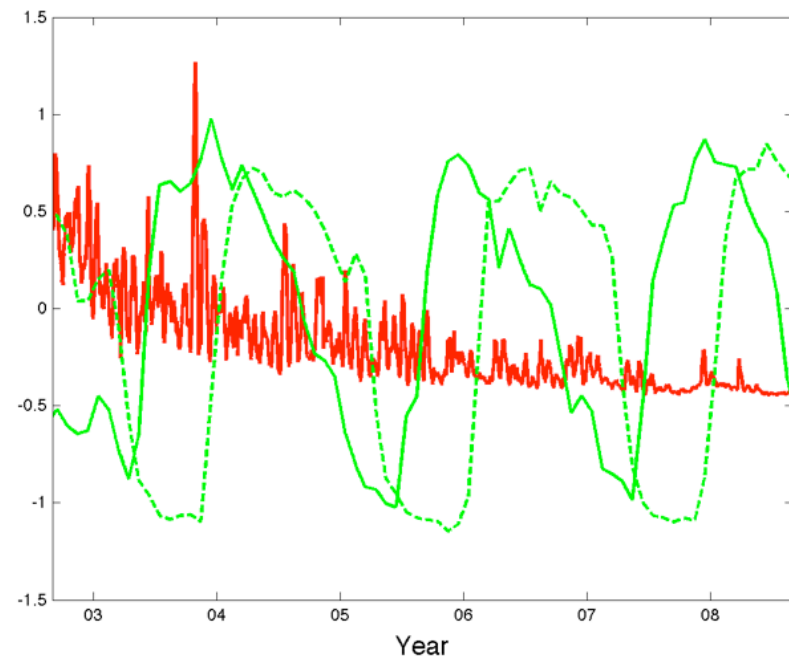
**Latitude belts 50S-40S,...
10S-10N, 40N-50N**

**1 km vertical grid, 1 day
medians, errors, quality control**

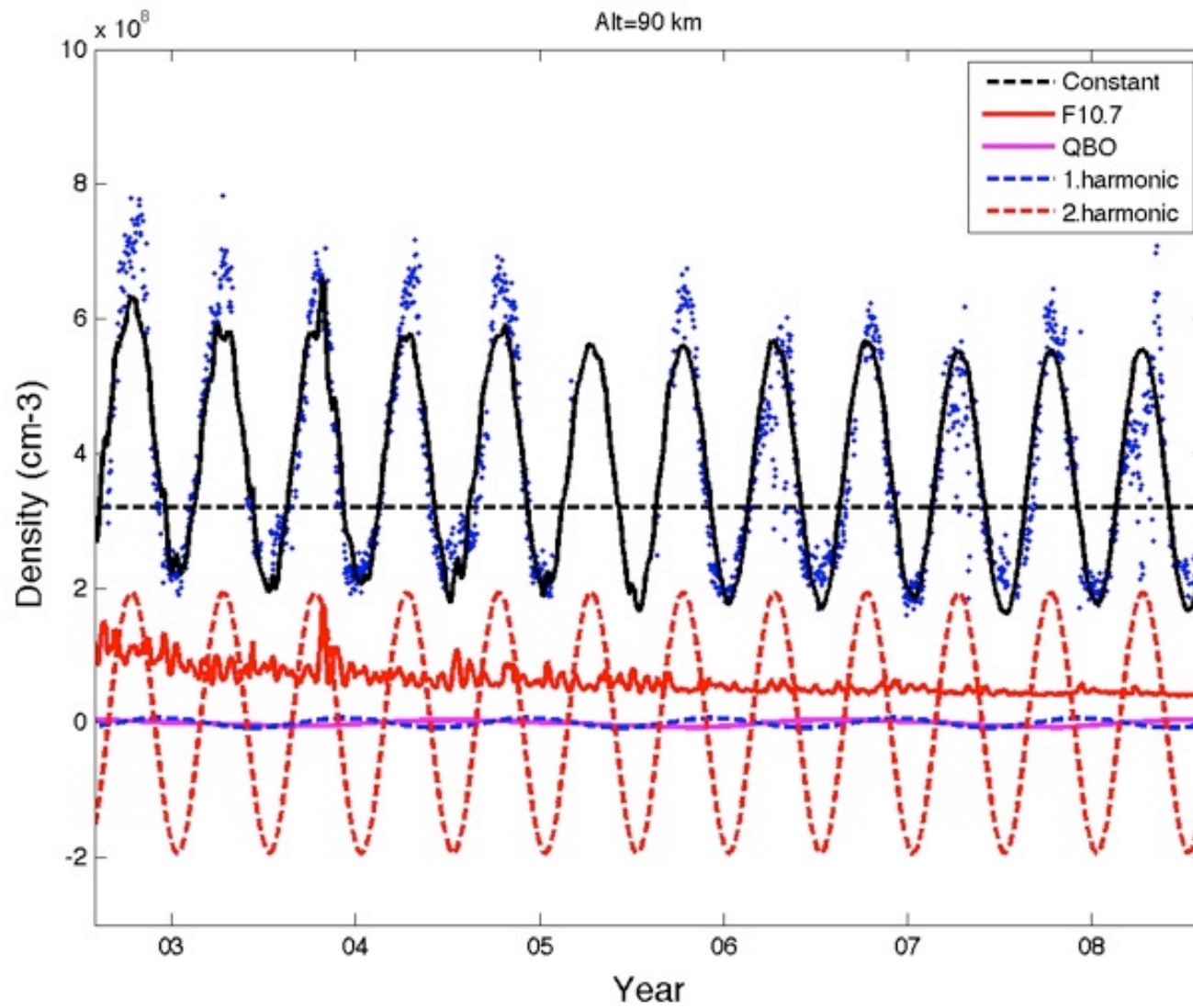
**Number densities at geometrical
altitudes.**

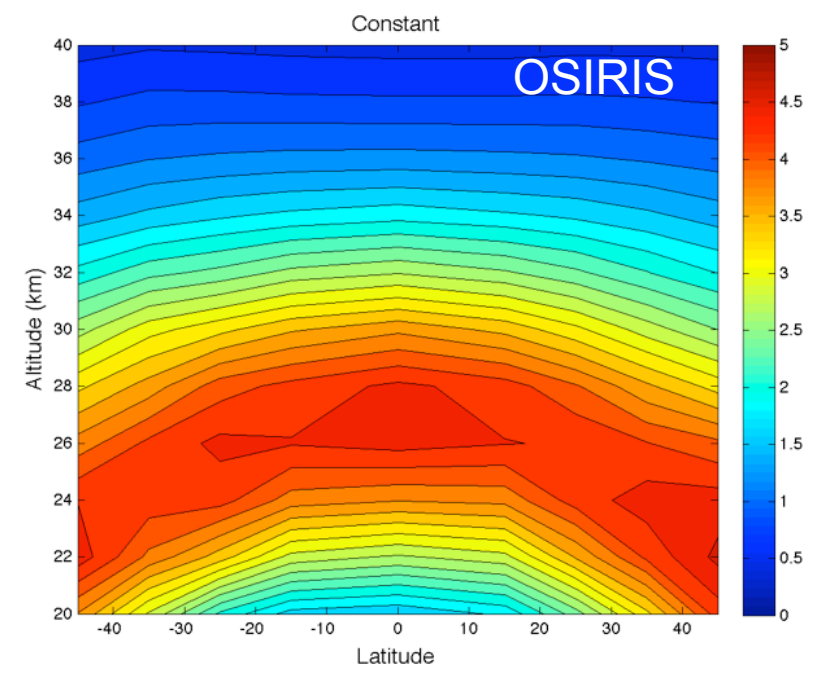
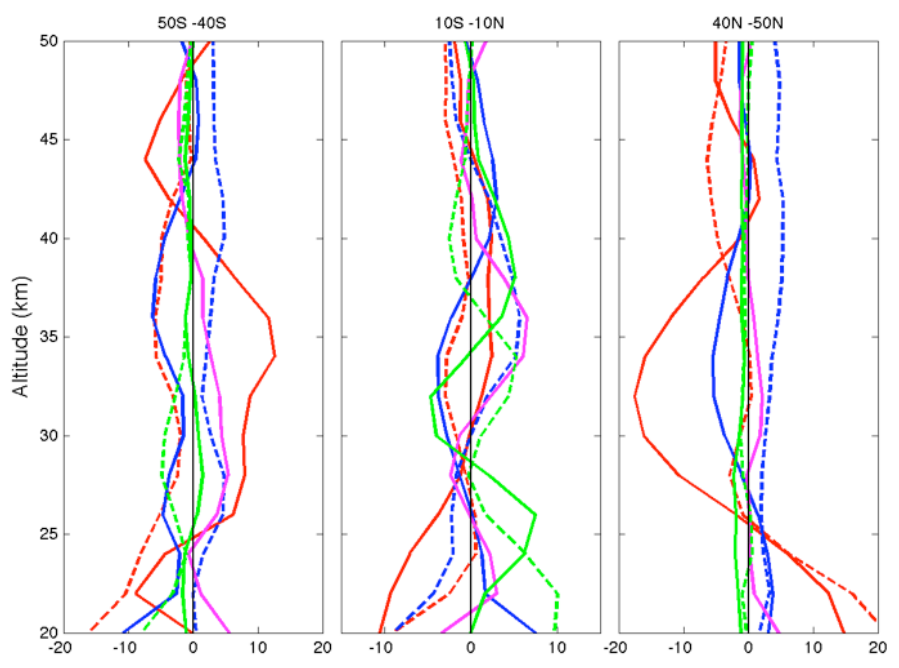
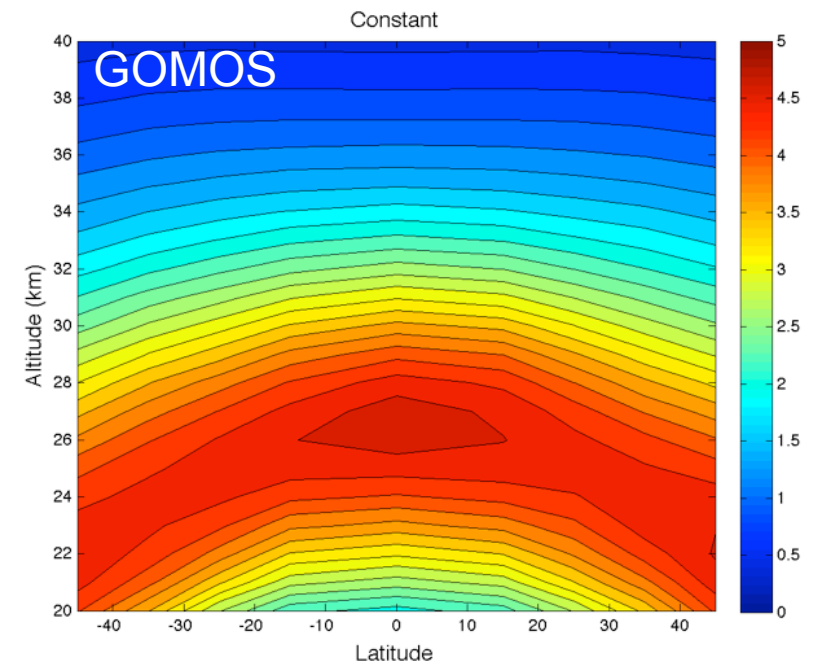
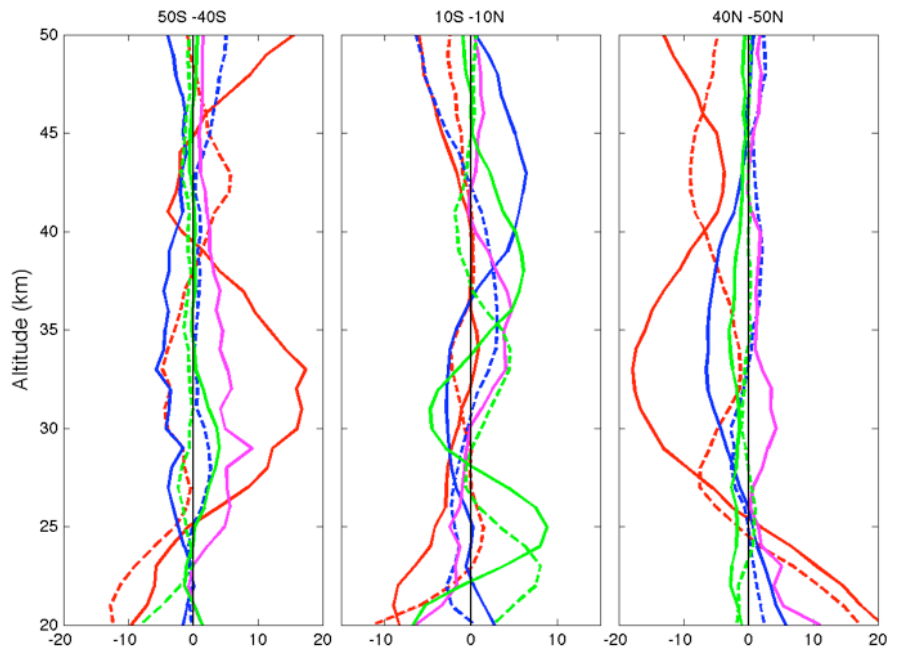
Fitting by linear weighted LSQ

R2, Chi2, error estimates

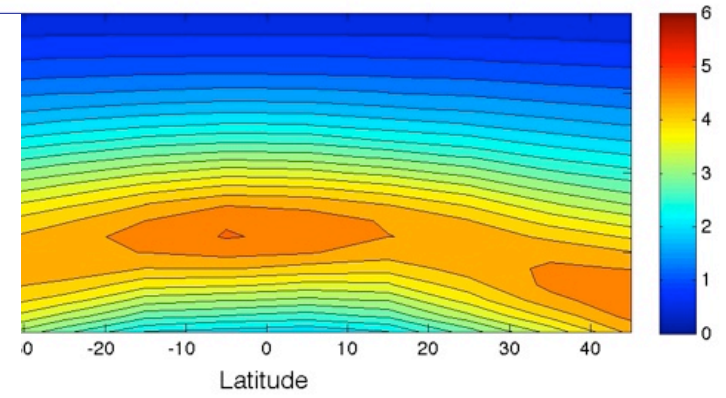
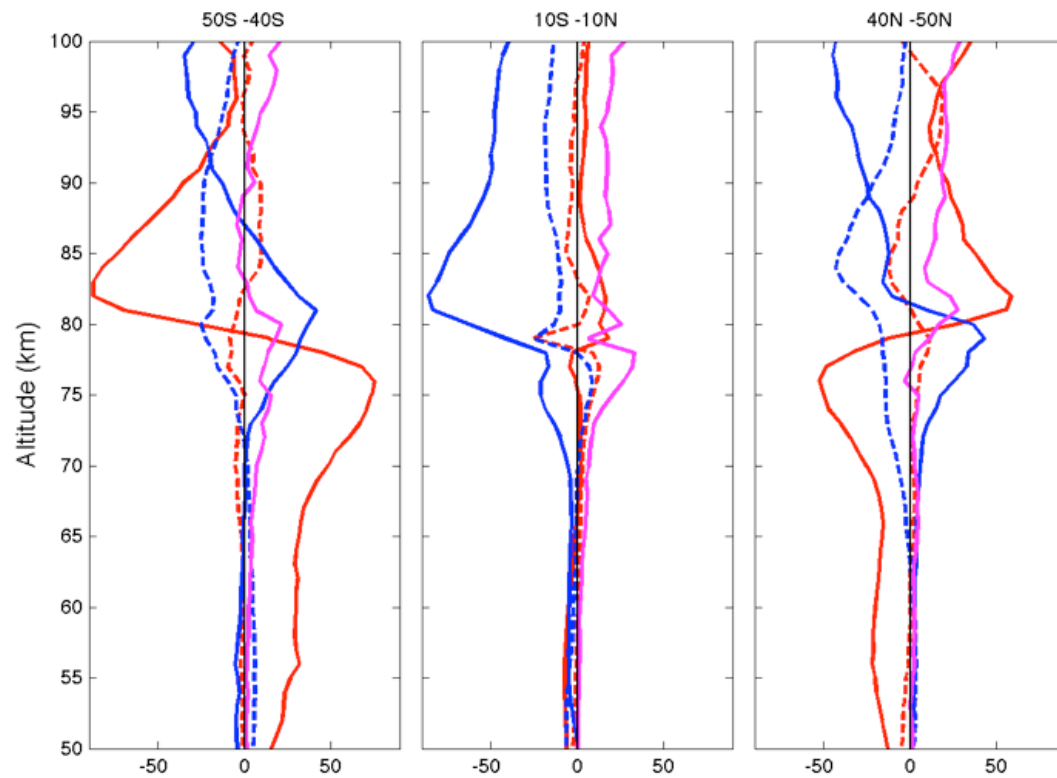
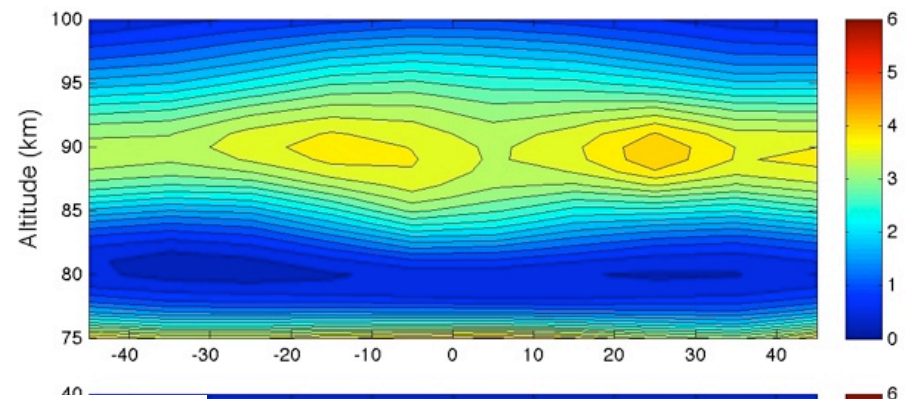


Ozone at 90 km in Equator

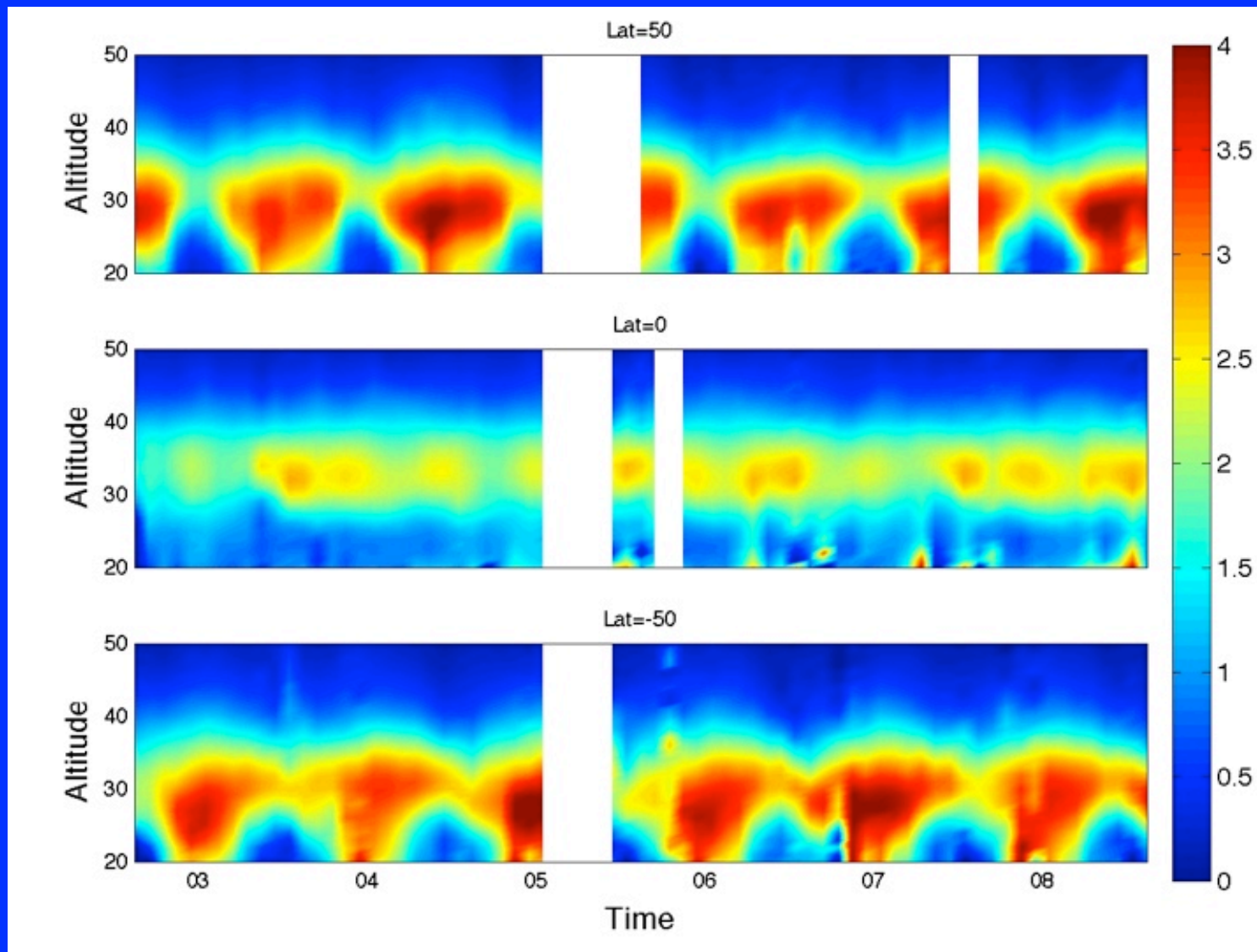




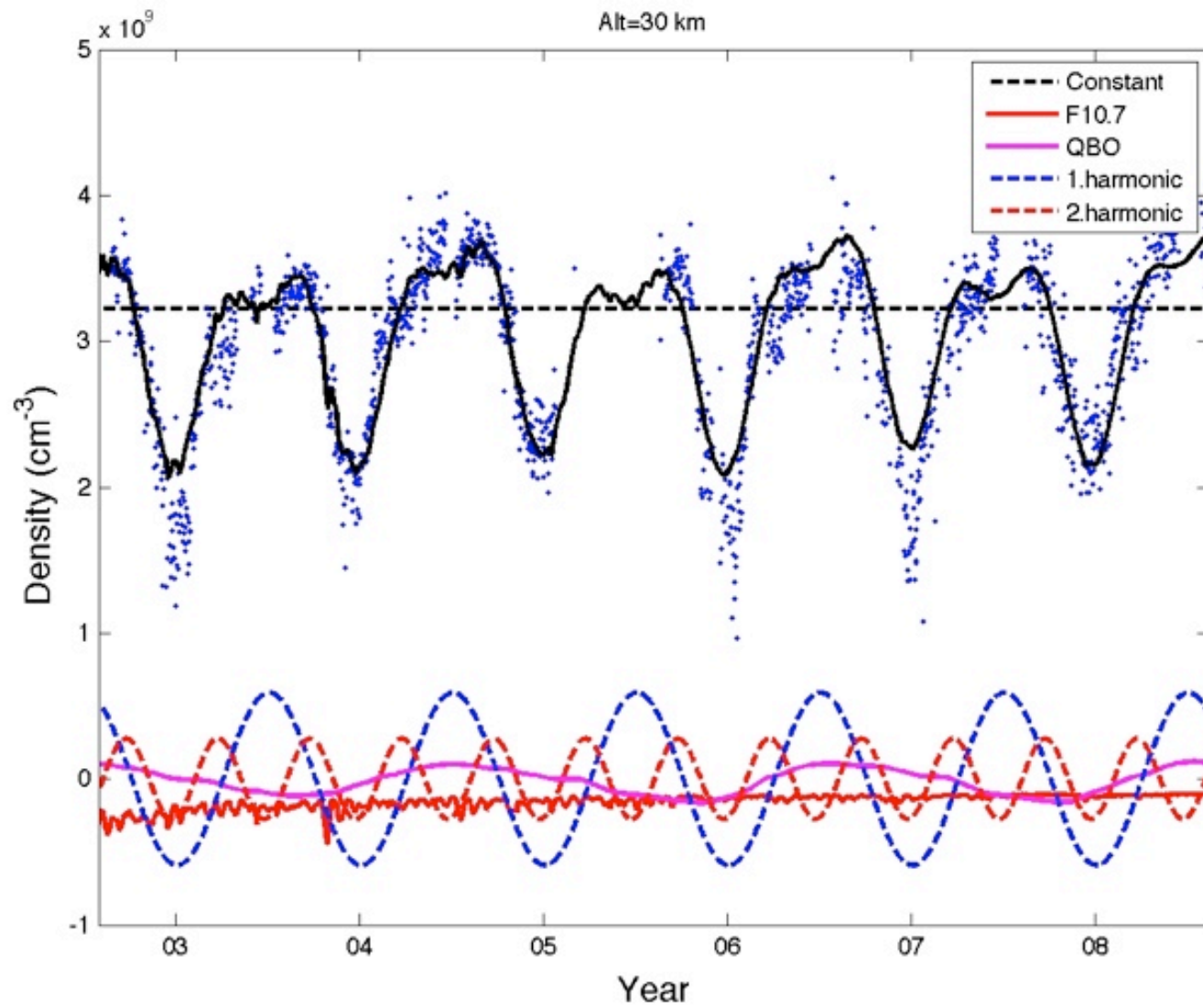
Contributions vs altitude in MLT: GOMOS

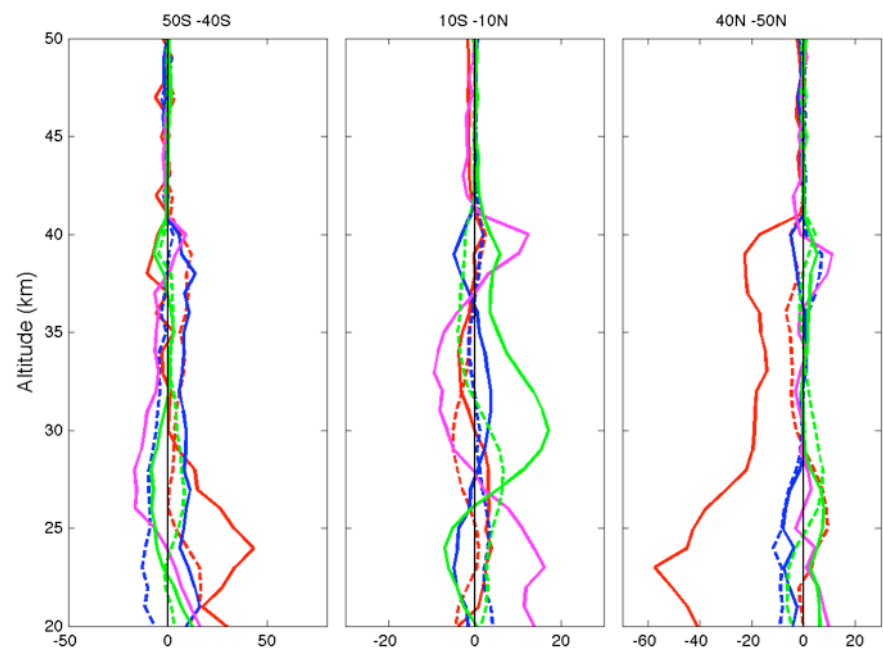
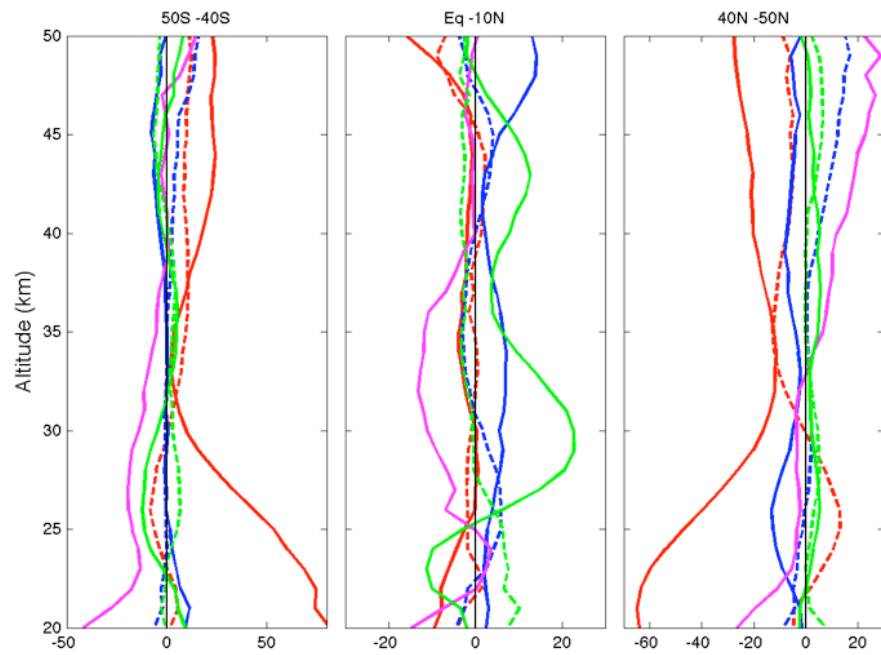
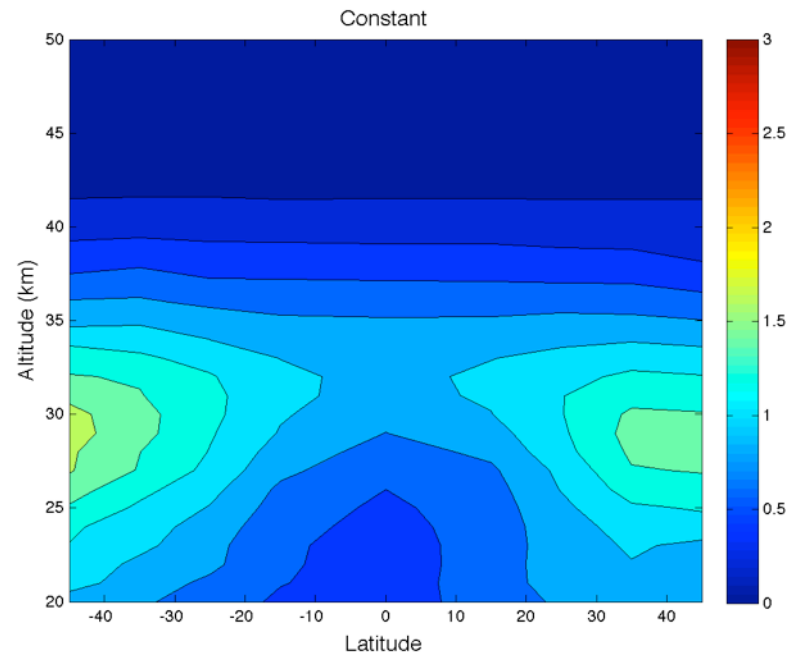
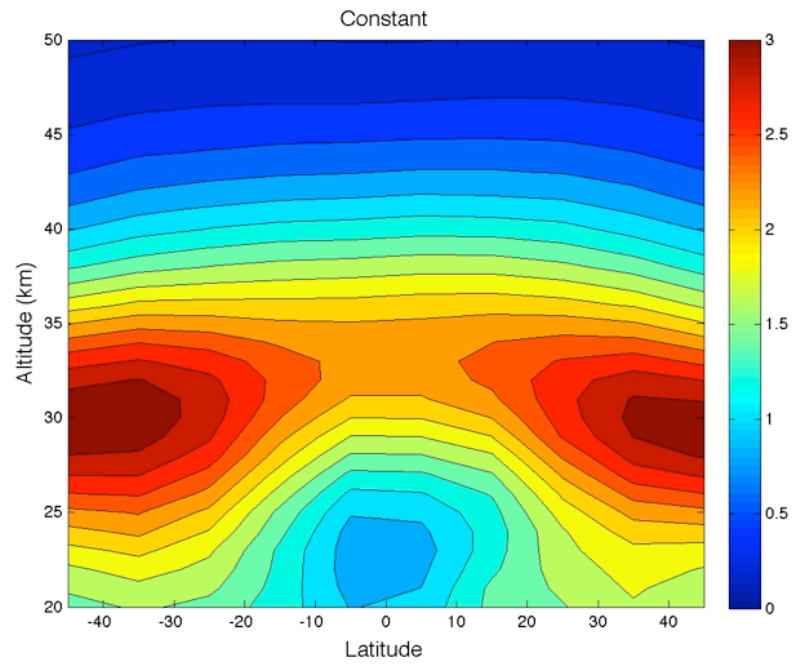


Stratospheric NO₂ number density (10⁹ cm⁻³): GOMOS 10 pm



NO₂ at 30 km in 40N-60N





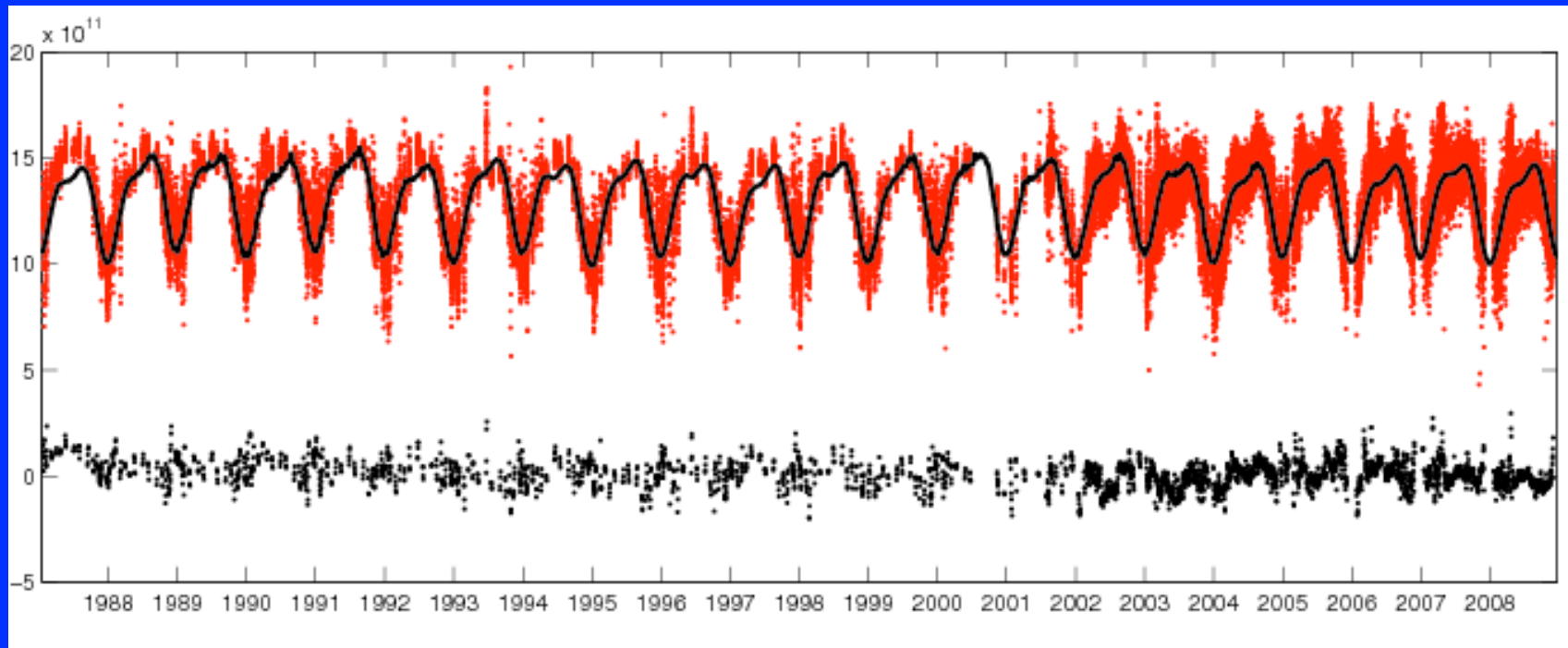
Conclusions

GOMOS and OSIRIS 2002-2008 time series allow determination of annual and semi-annual cycles of ozone and NO₂ profiles.

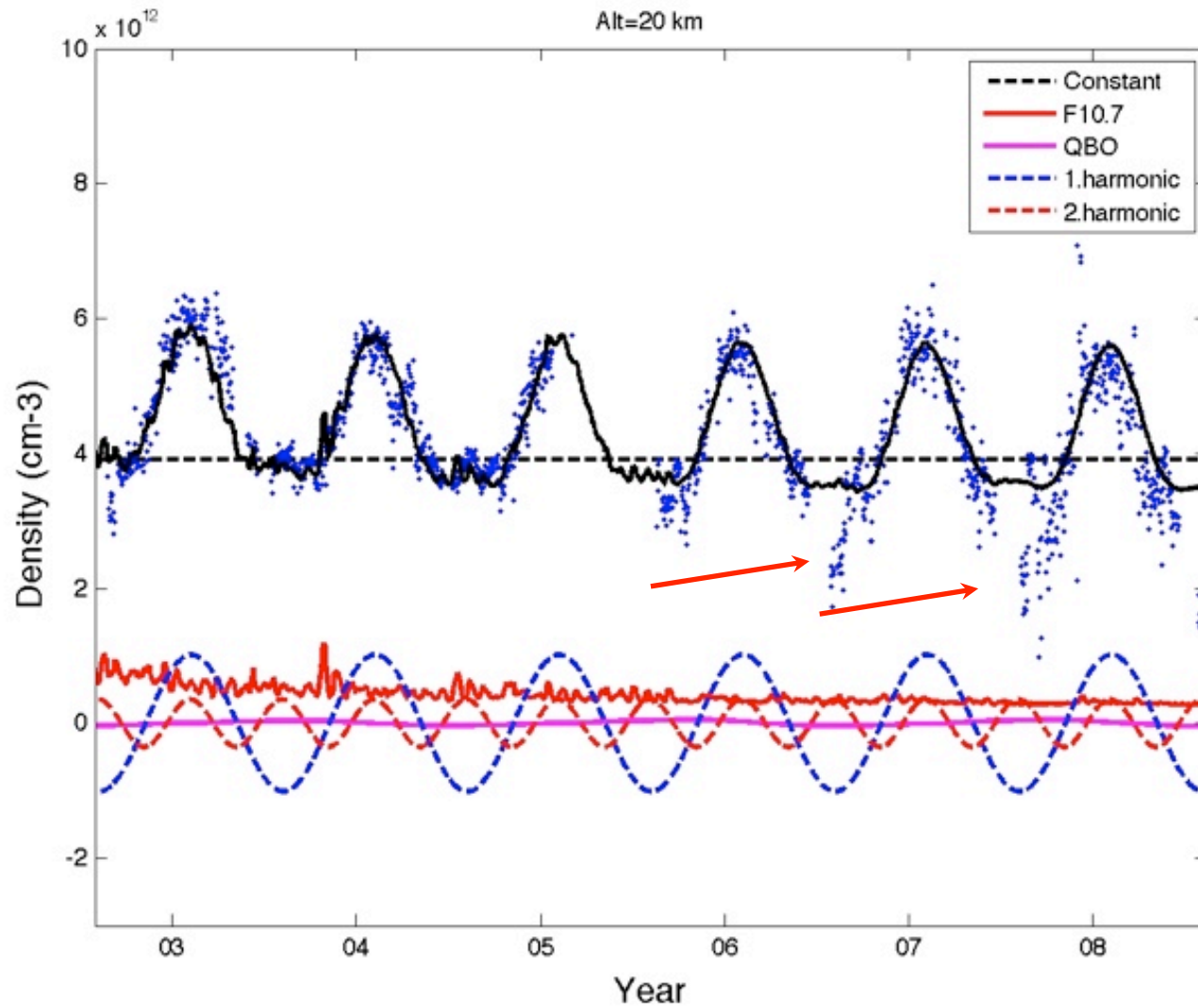
QBO can be determined in the equatorial region (GOMOS and OSIRIS)

Solar variation can be determined in the MLT (GOMOS)

Future: GOMOS, OSIRIS, SAGE



Ozone at 20 km in 40N-60N

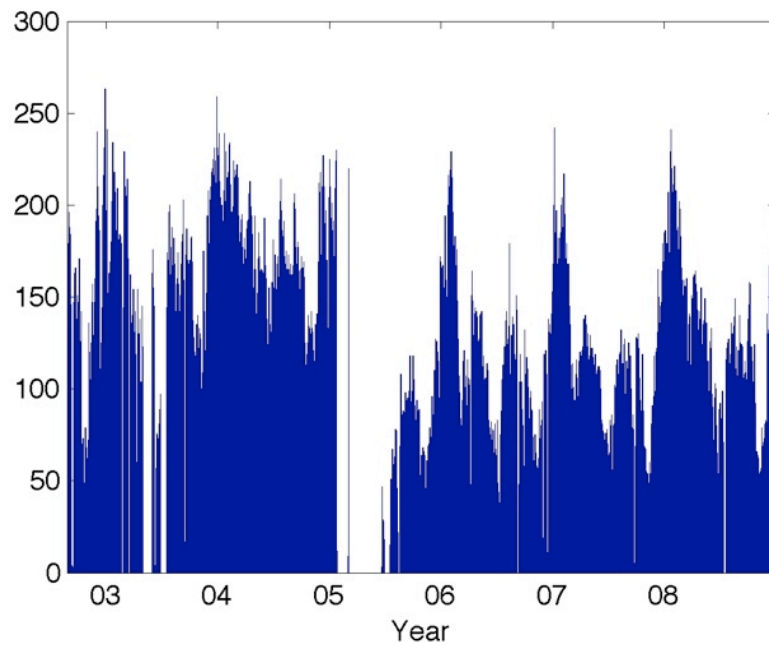


O3 and NO2 data for time series

GOMOS

OSIRIS

Number of daily night measurements



Number of daily day measurements

