



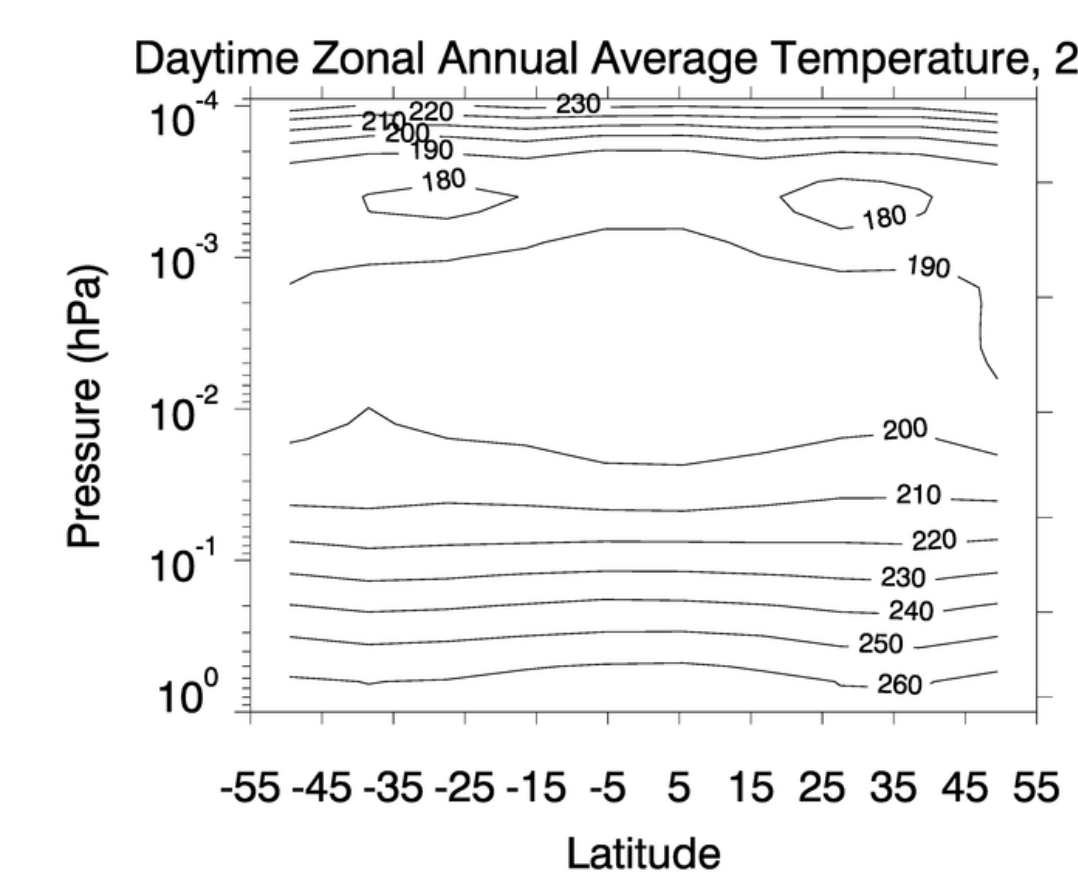
# Solar Cycle Dependence of Temperature, Odd-Oxygen, Odd-Hydrogen, and Ozone in the Mesopause Region Observed by SABER

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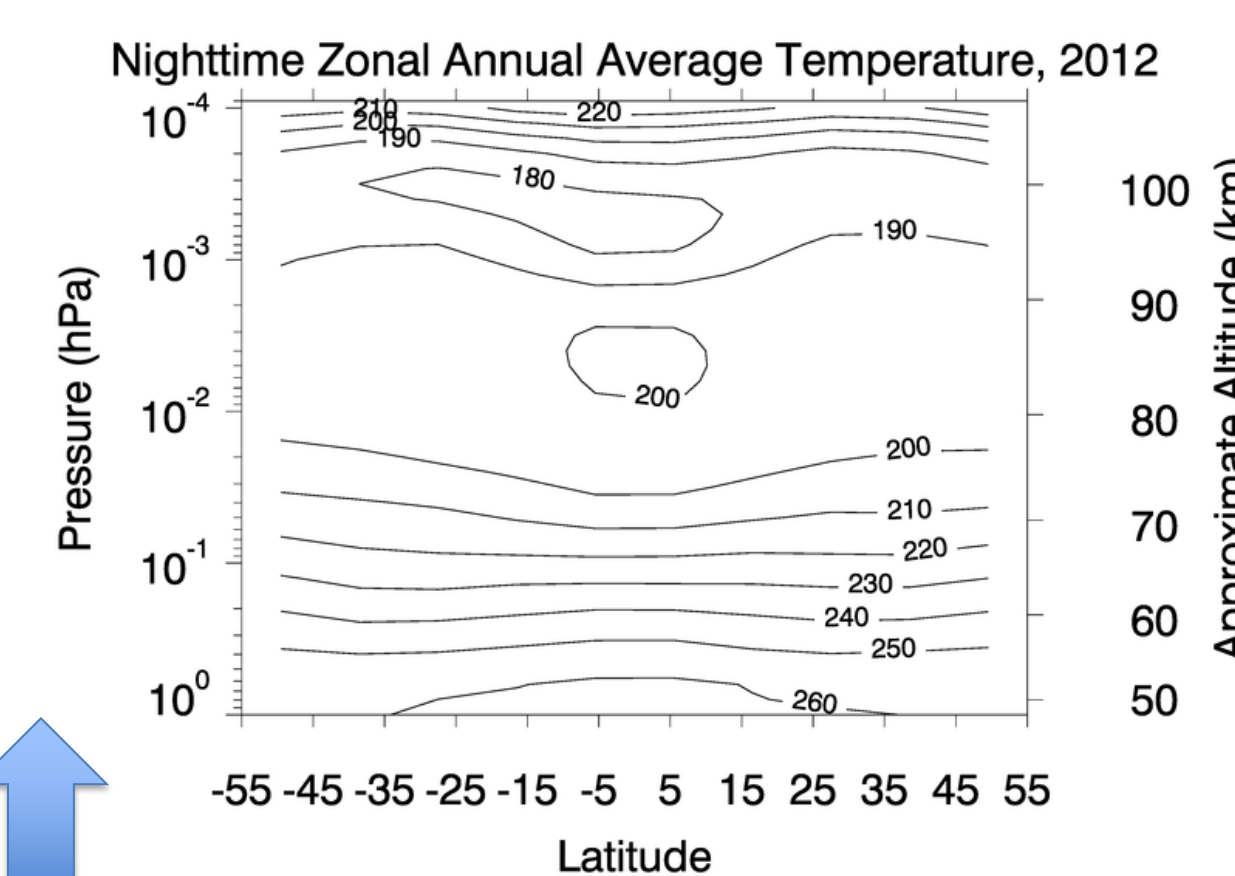
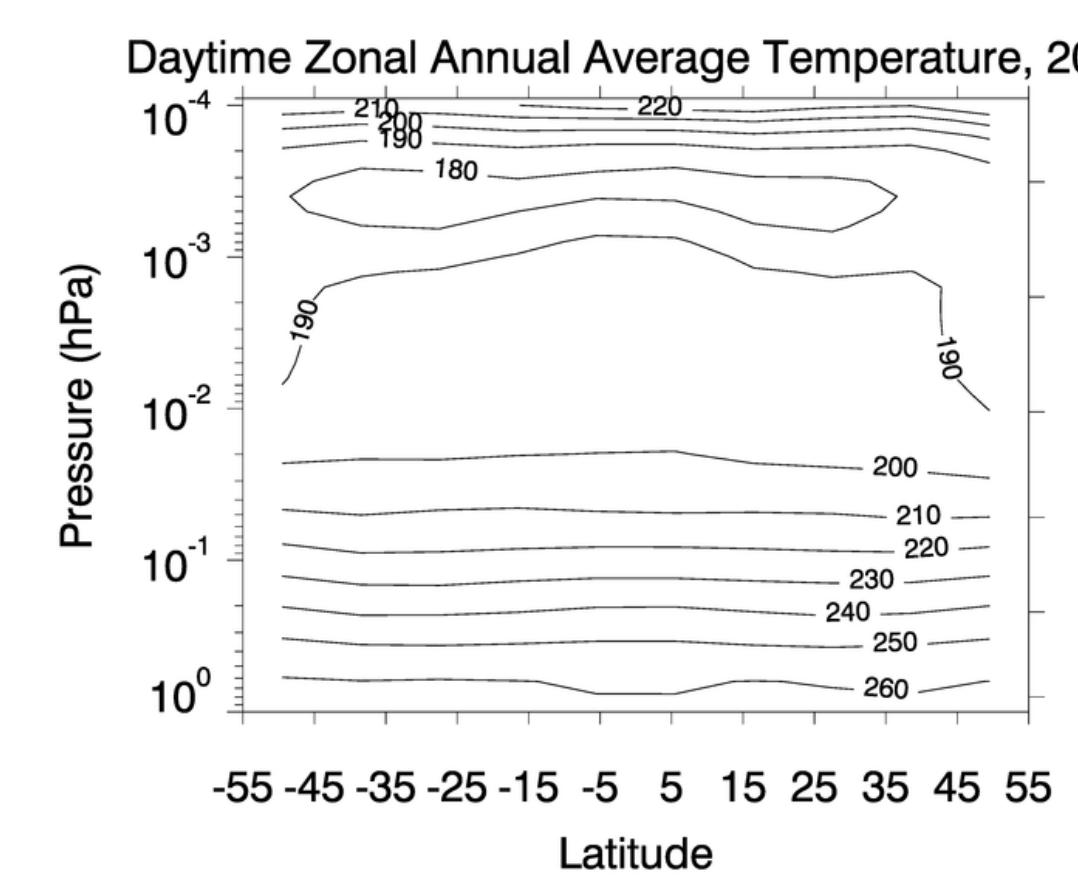
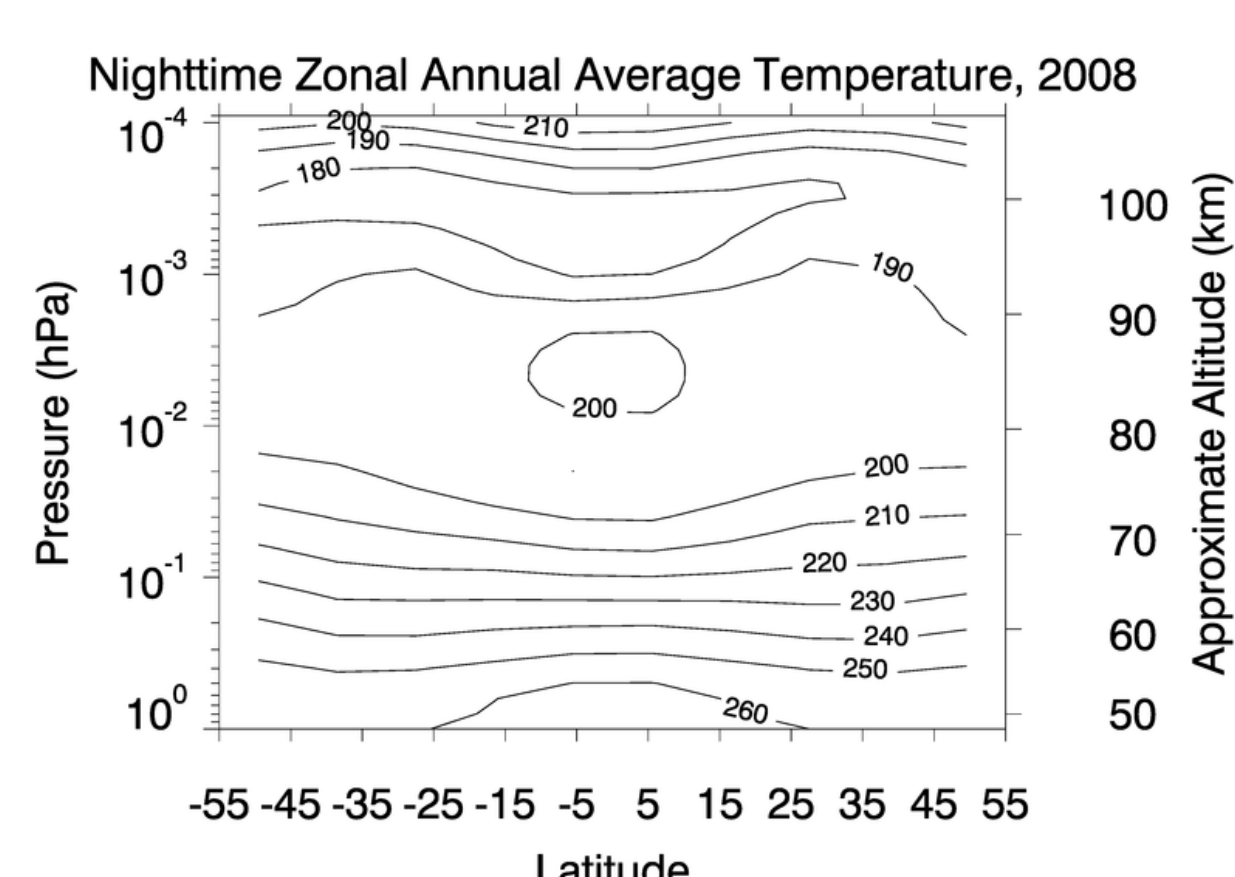
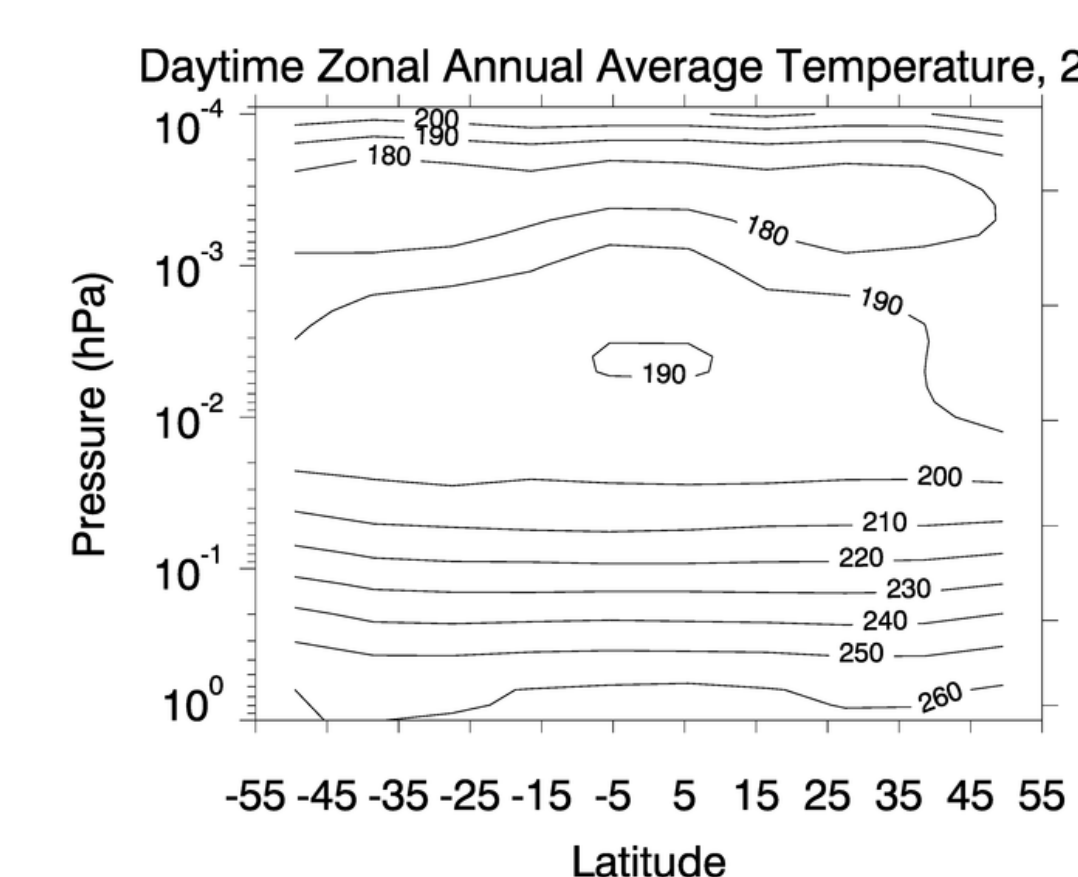
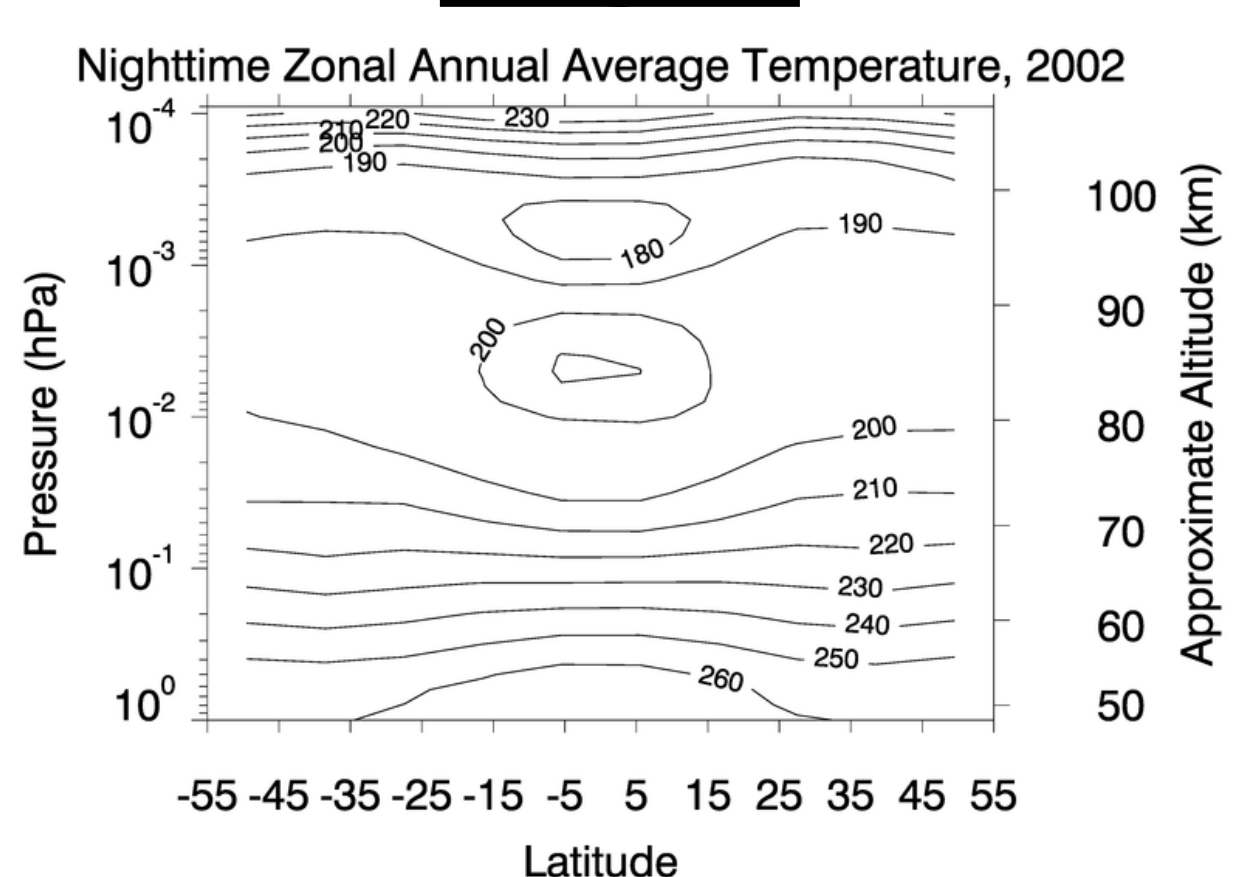
<sup>1</sup>SSAI; <sup>2</sup>NASA Langley Research Center; <sup>3</sup>GATS, Inc.; <sup>4</sup>Hampton Univ.

## Temperature

### Day

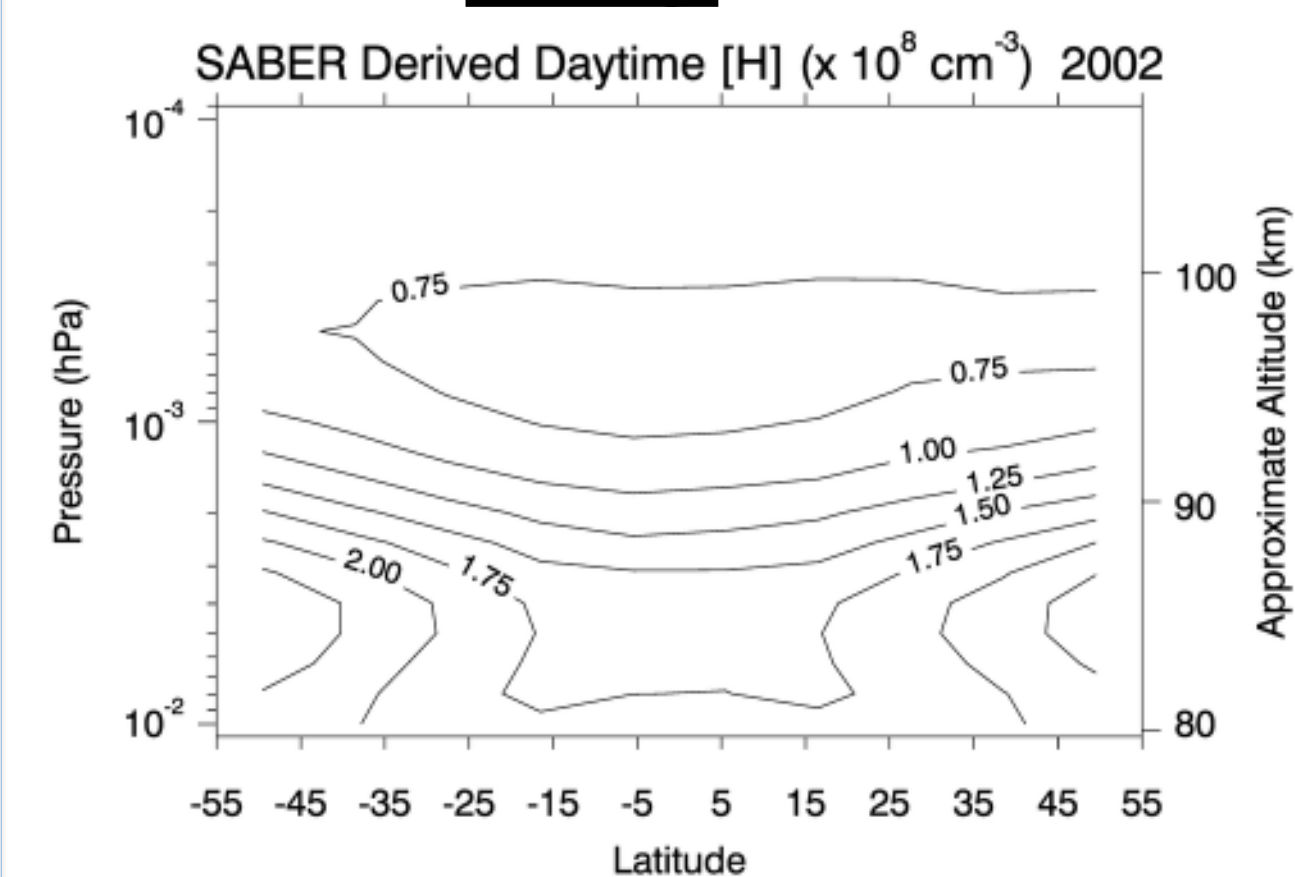


### Night

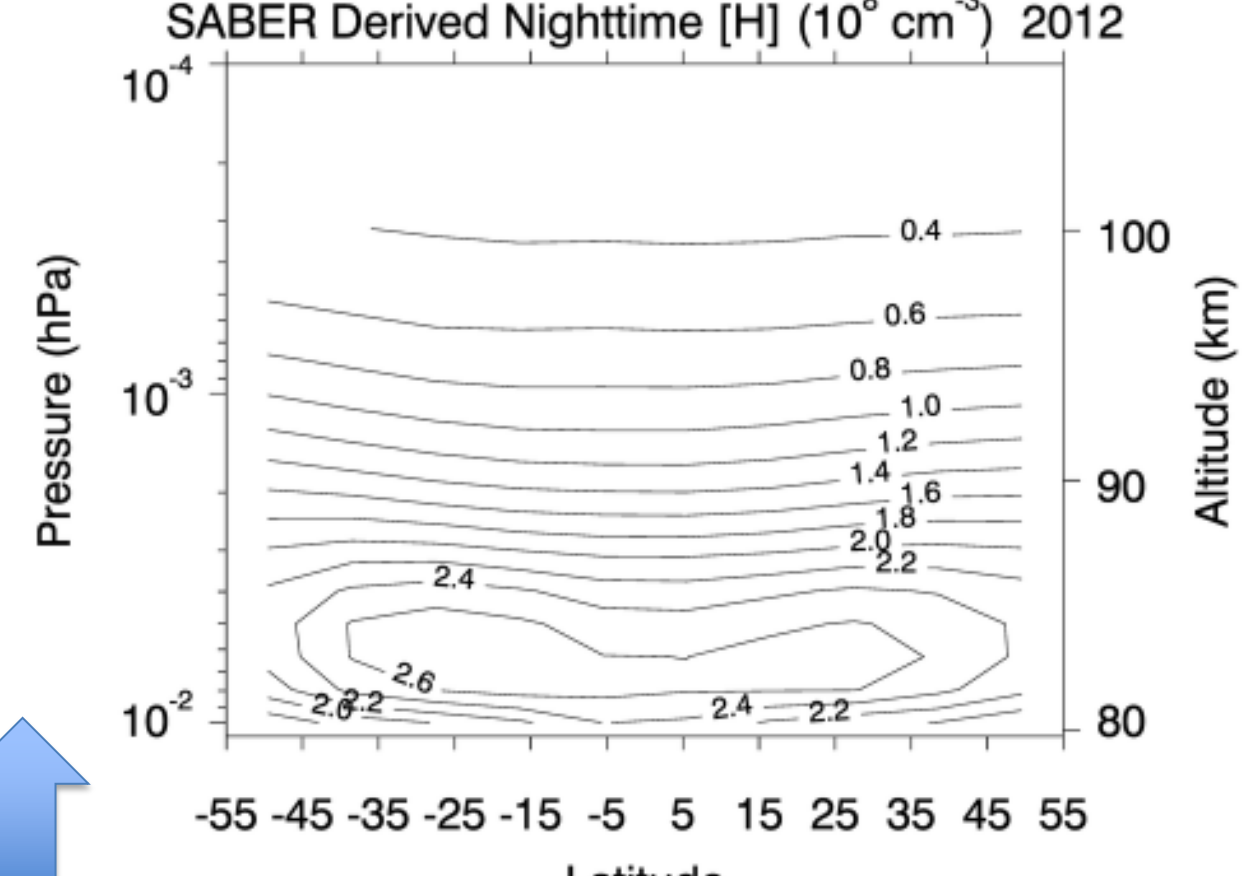
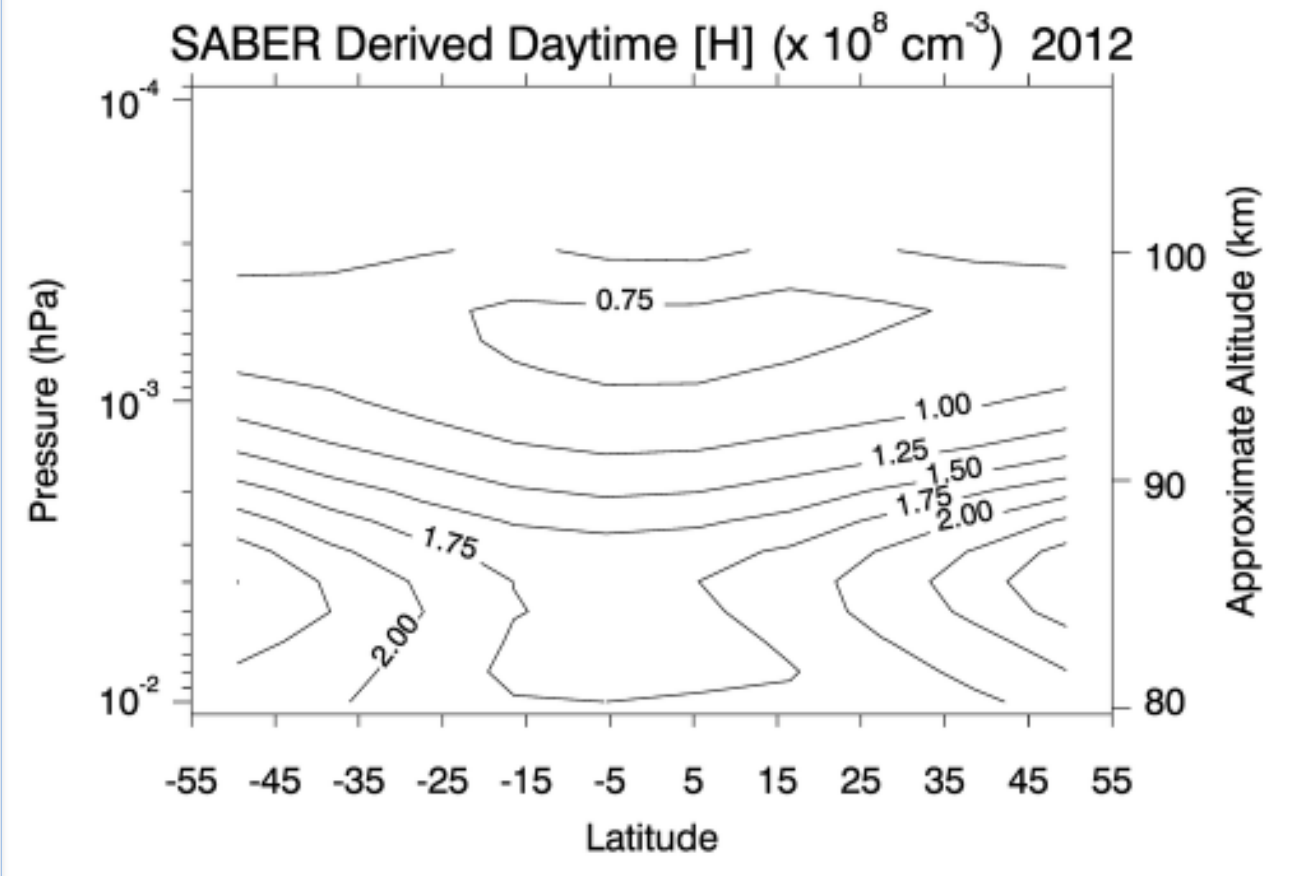
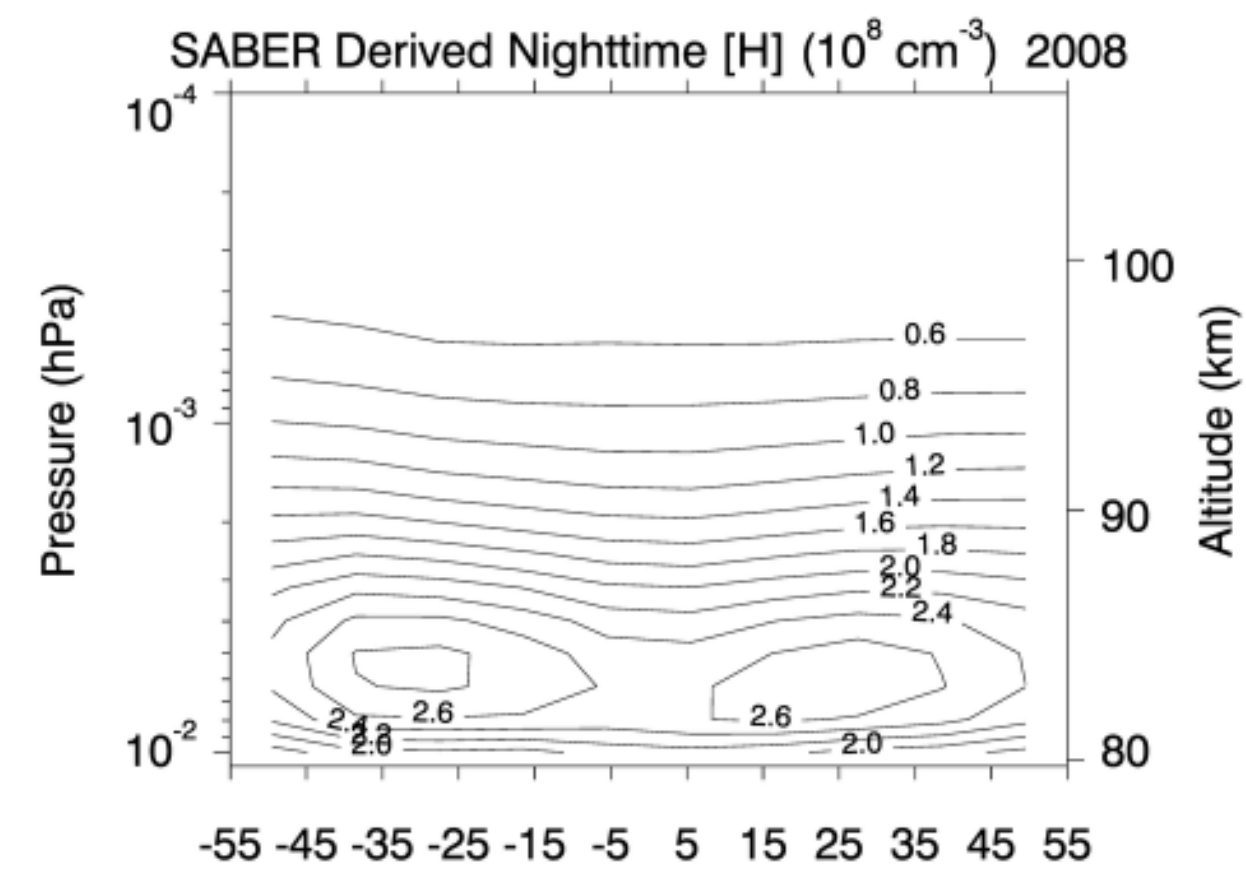
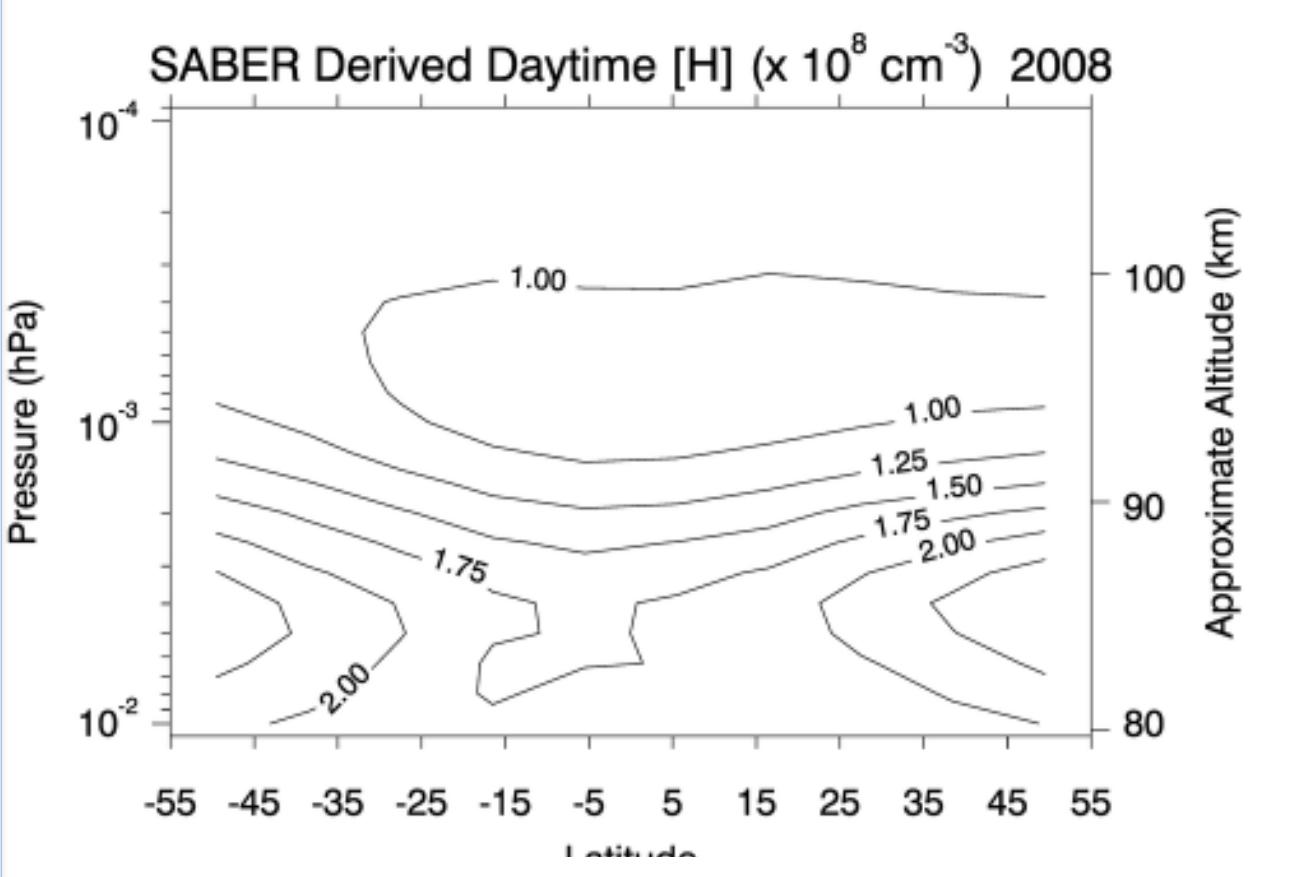
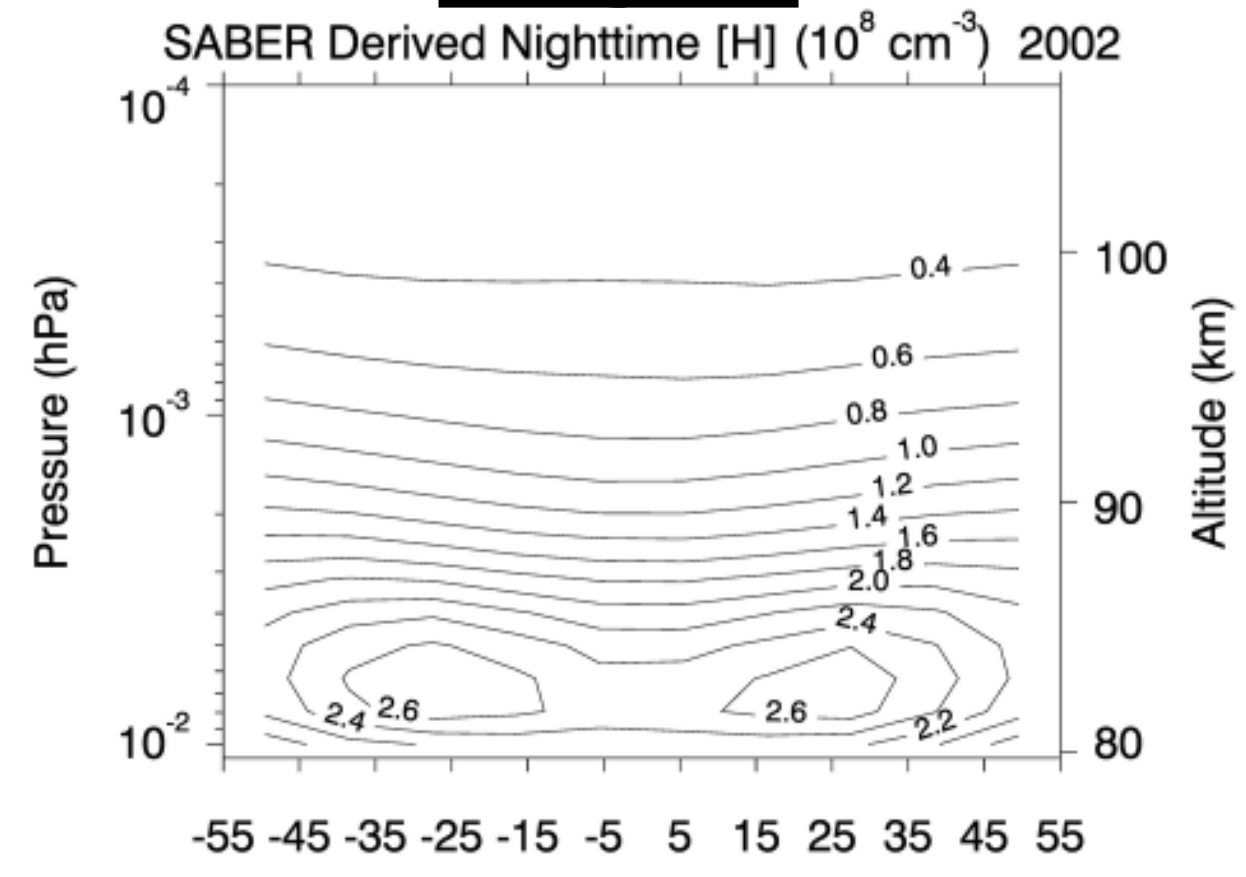


## Atomic Hydrogen

### Day

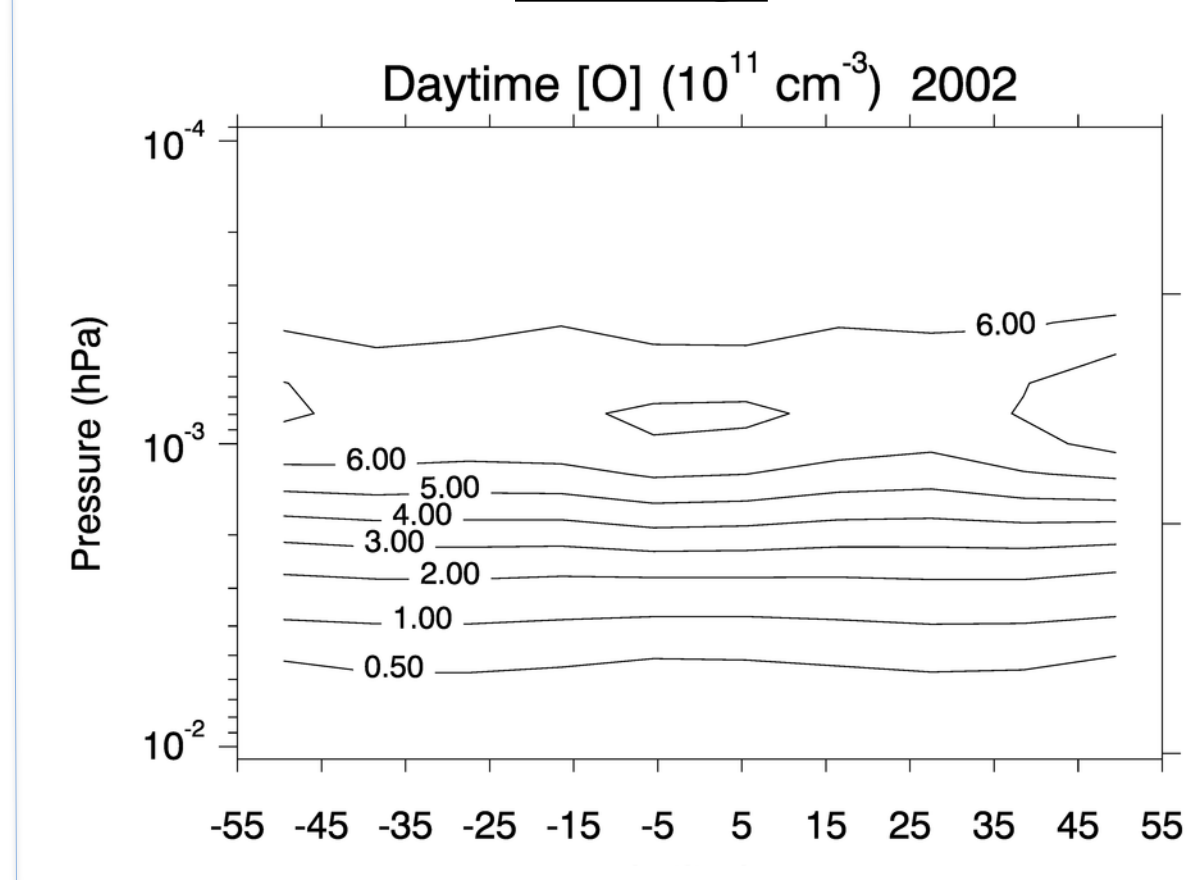


### Night

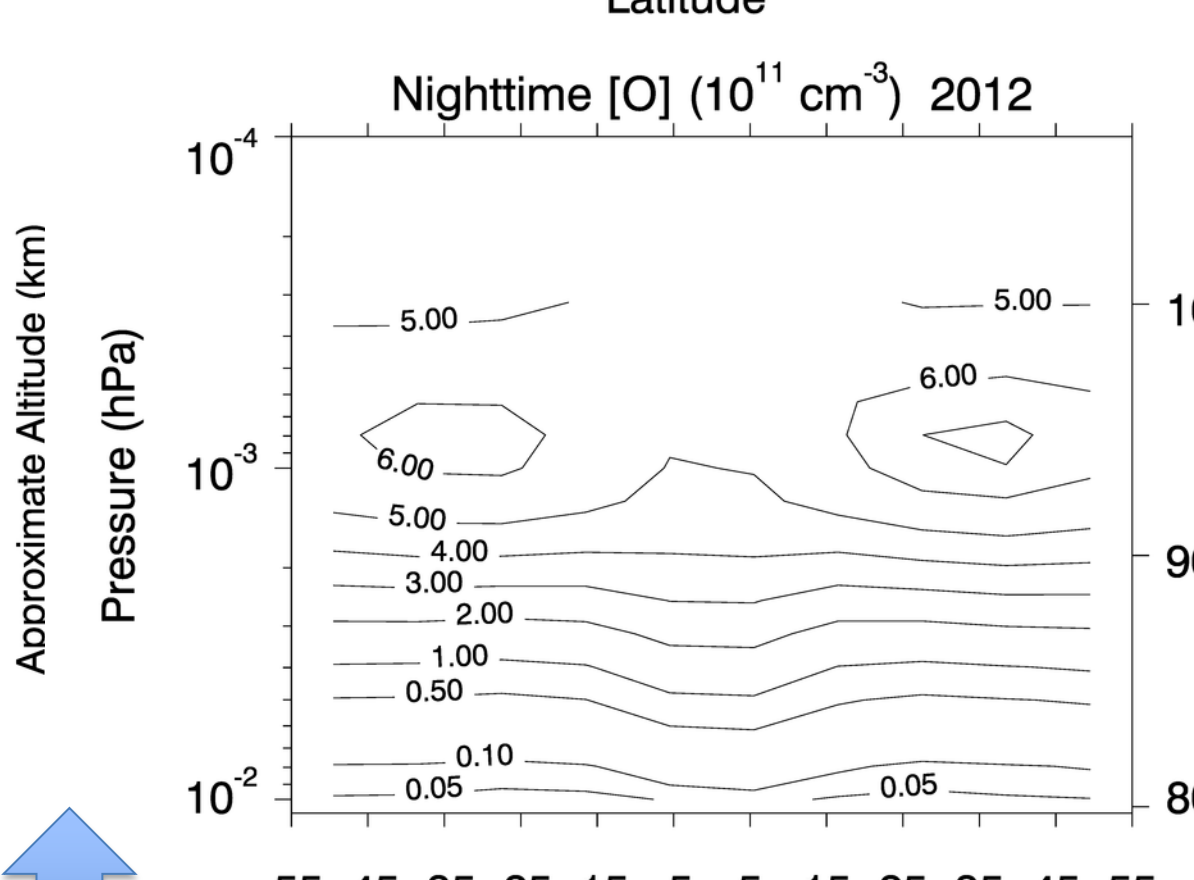
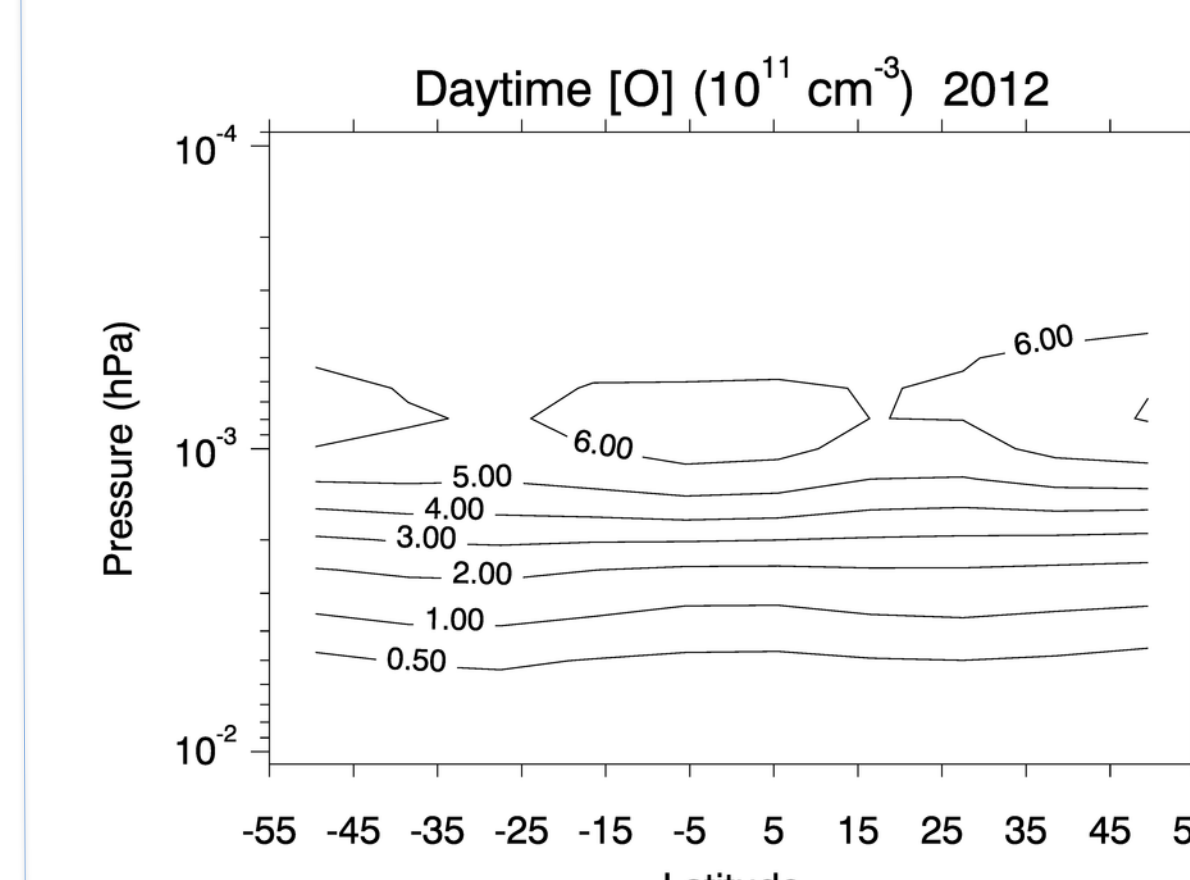
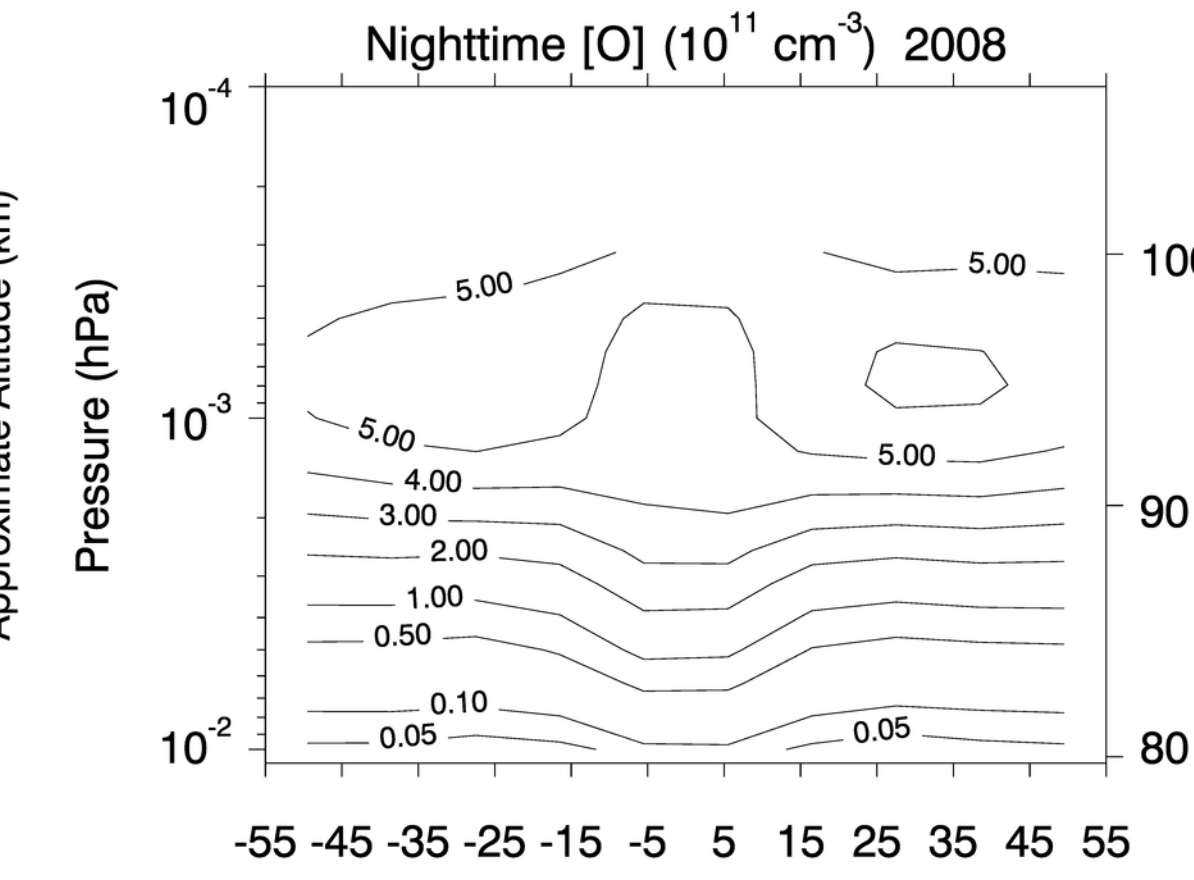
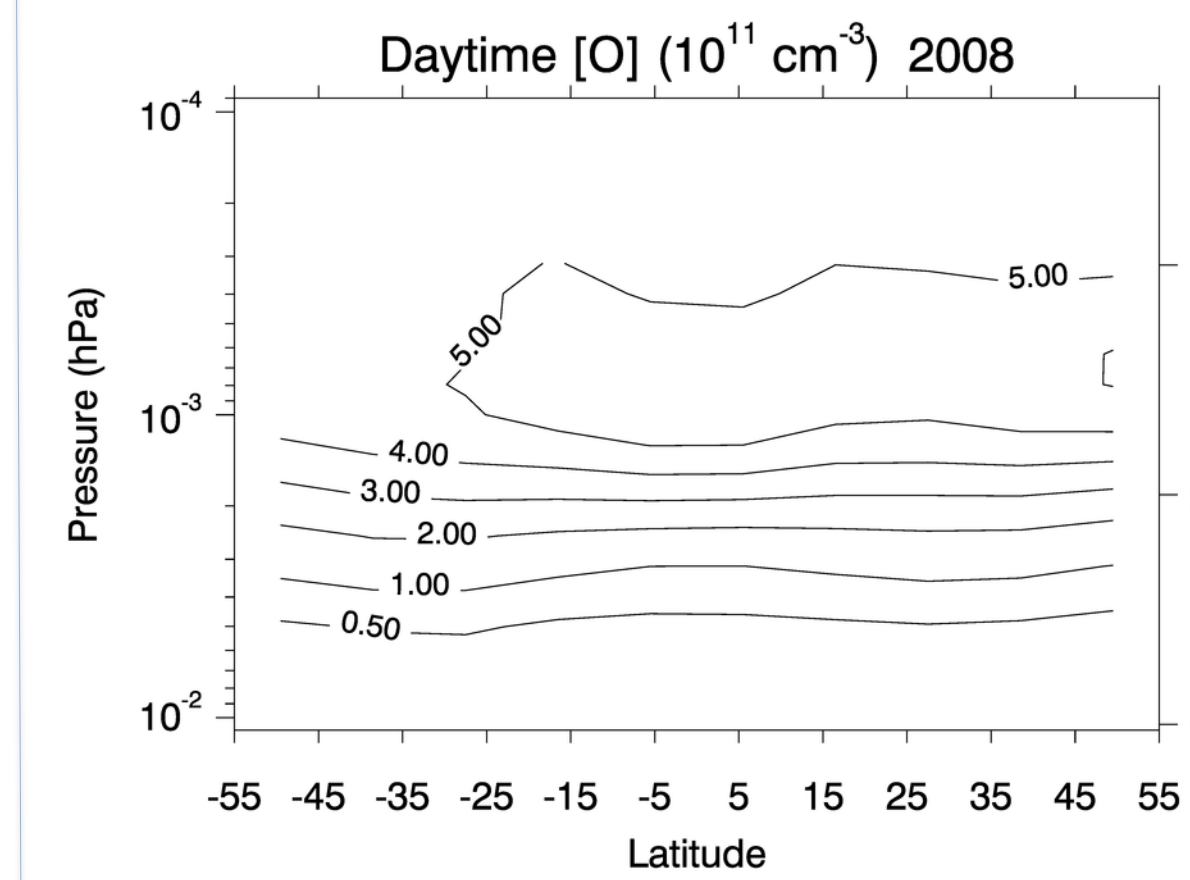
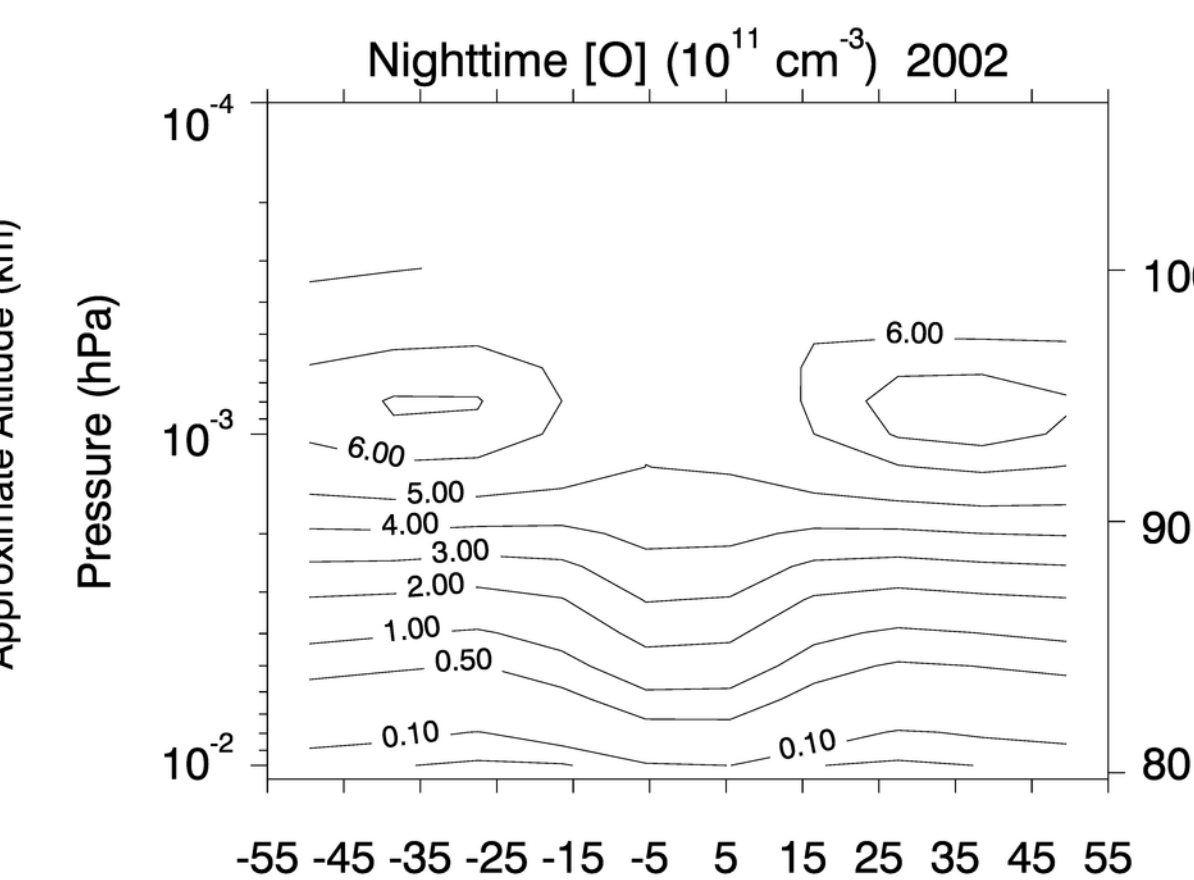


## Atomic Oxygen

### Day

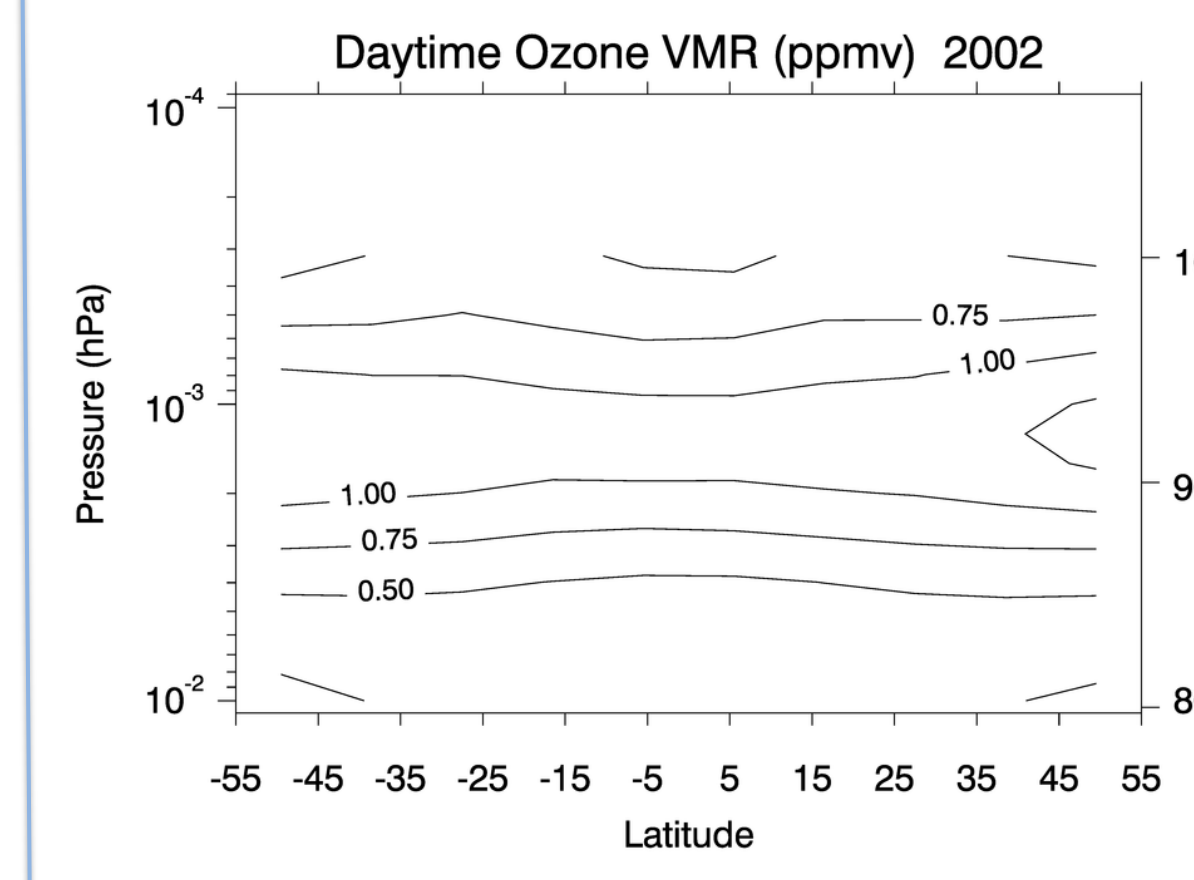


### Night

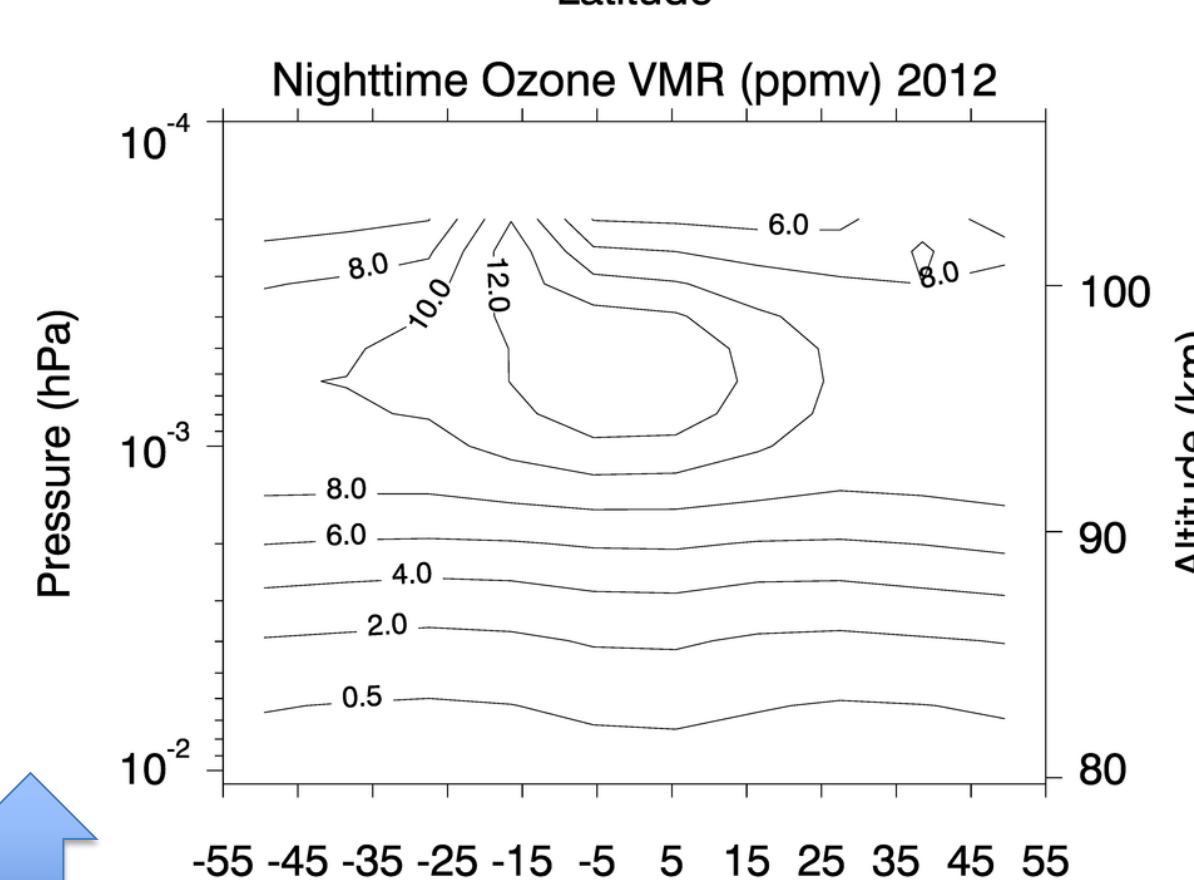
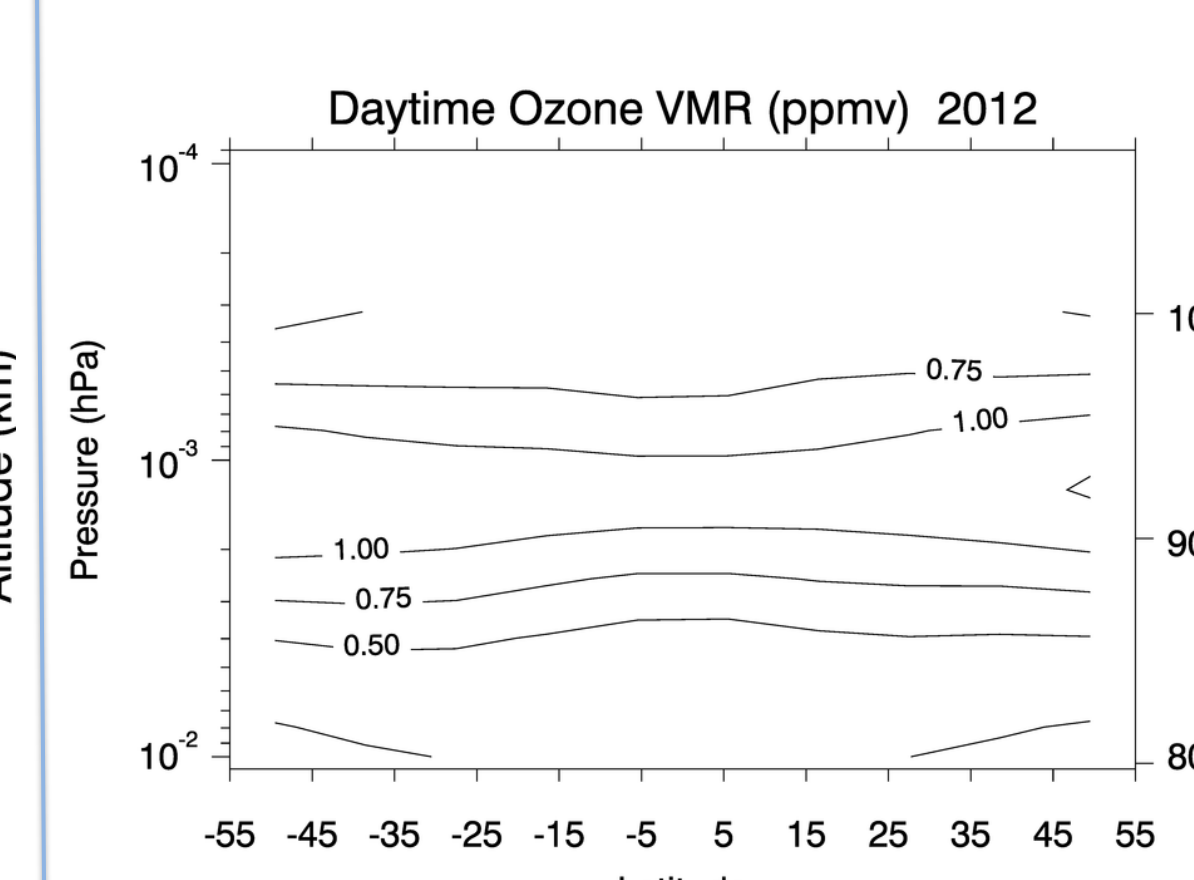
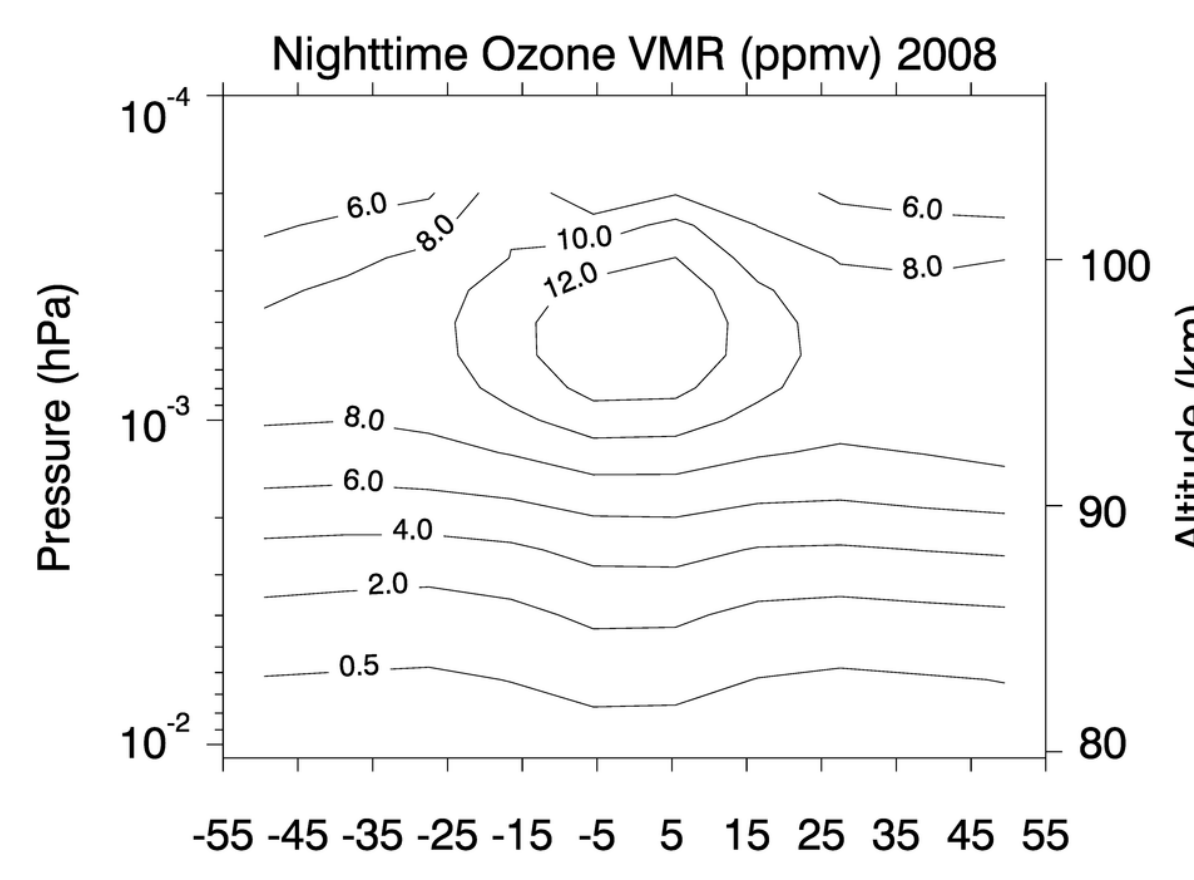
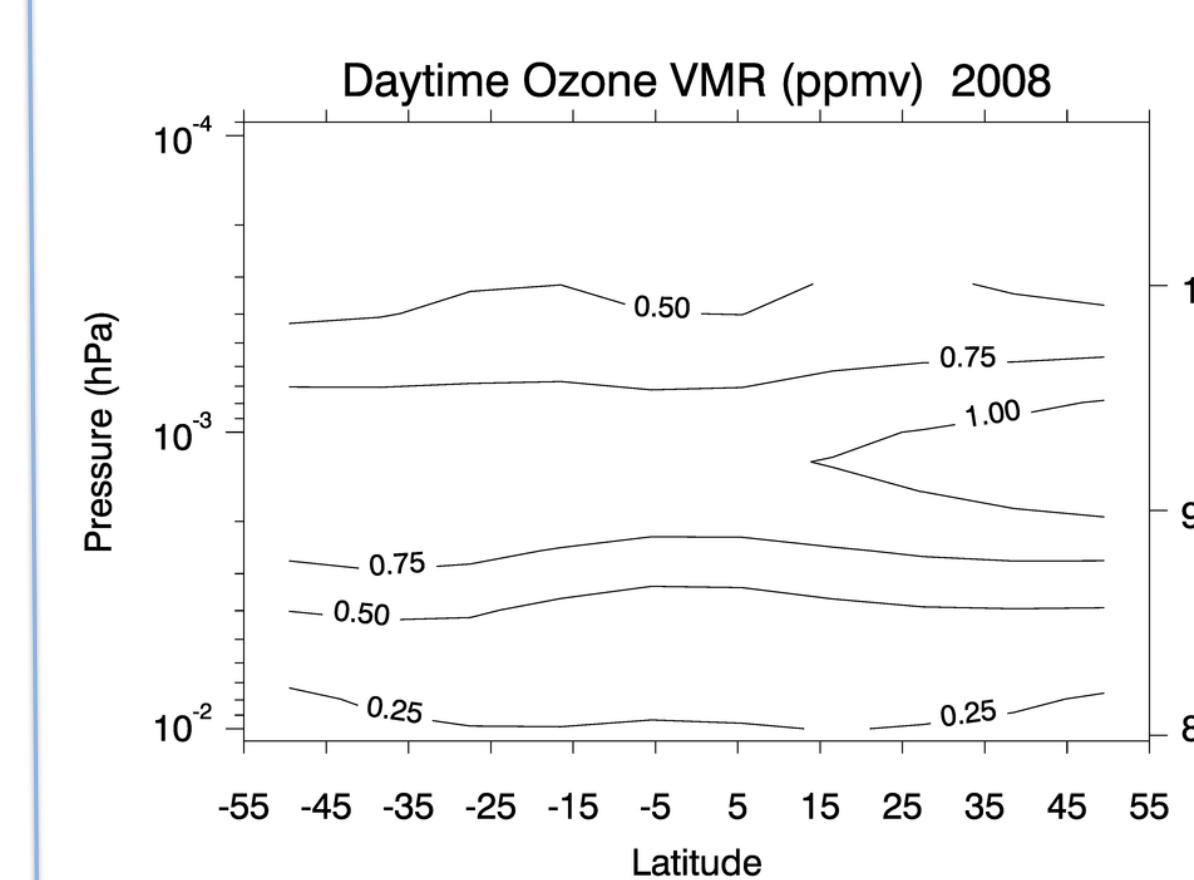
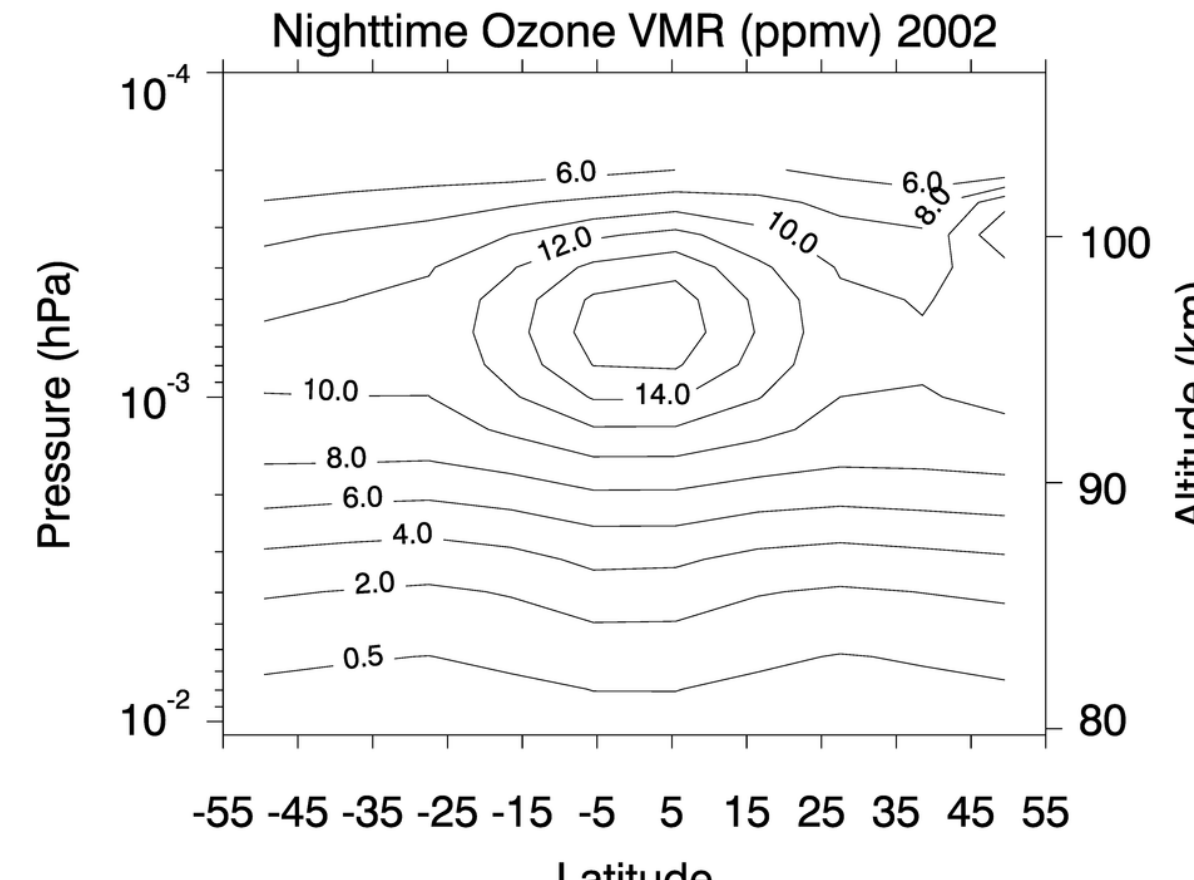


## Ozone

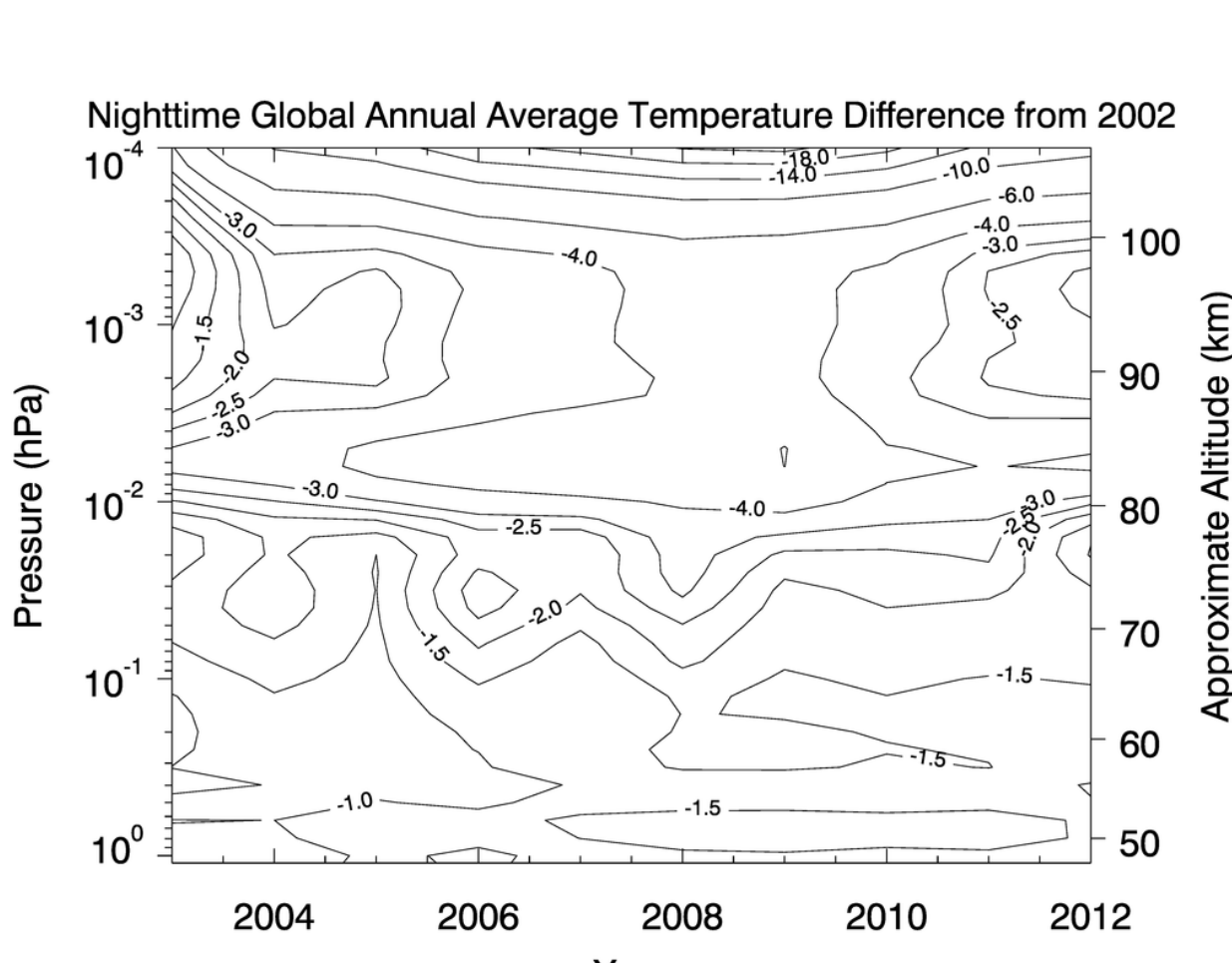
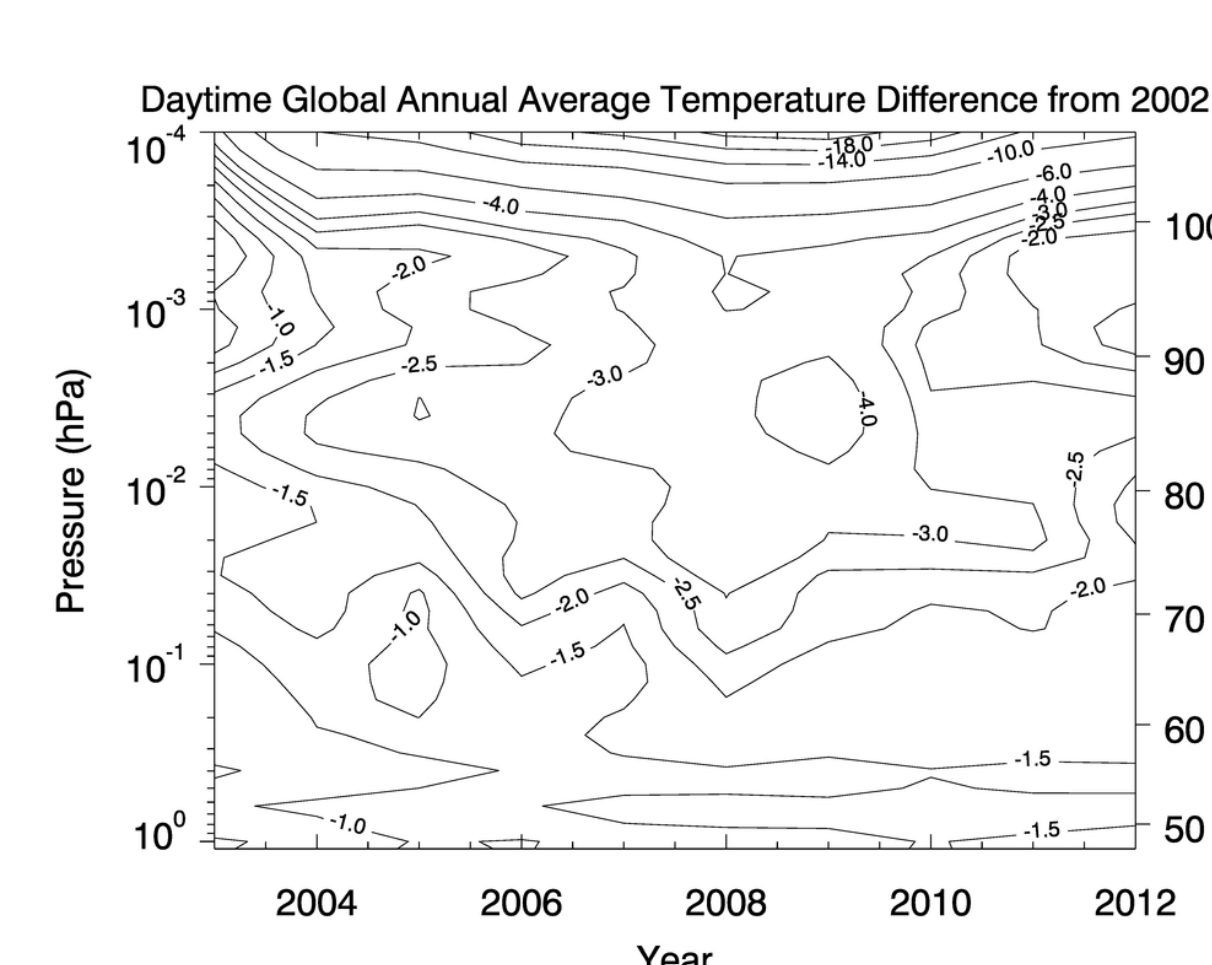
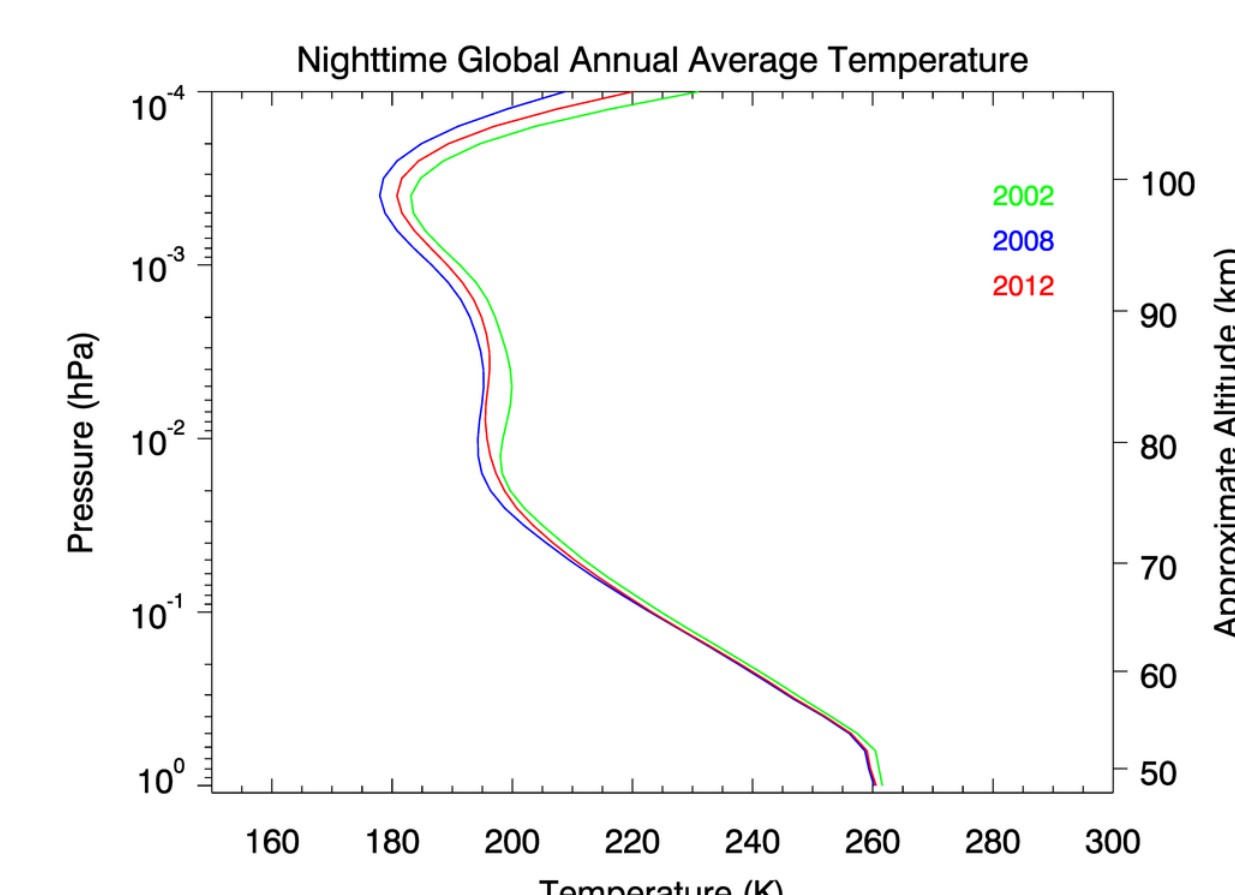
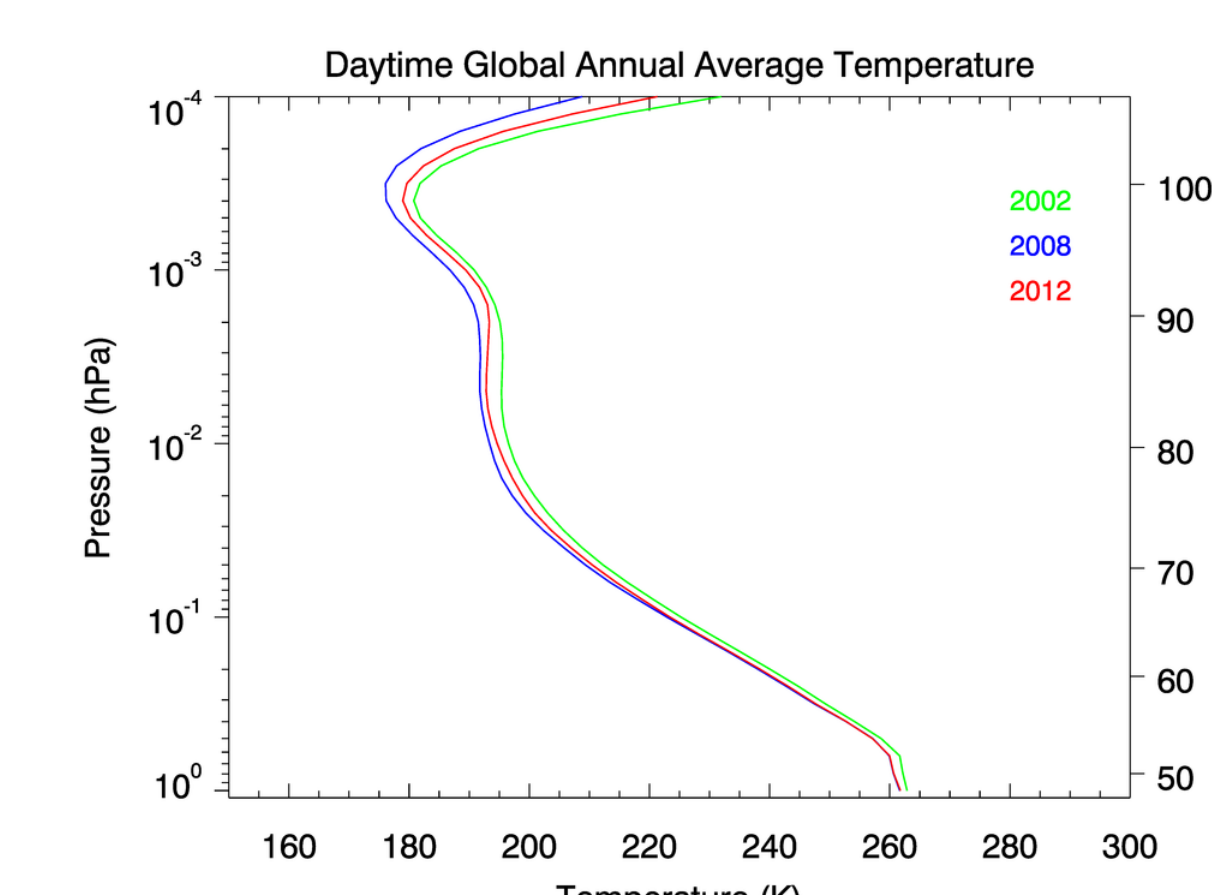
### Day



### Night

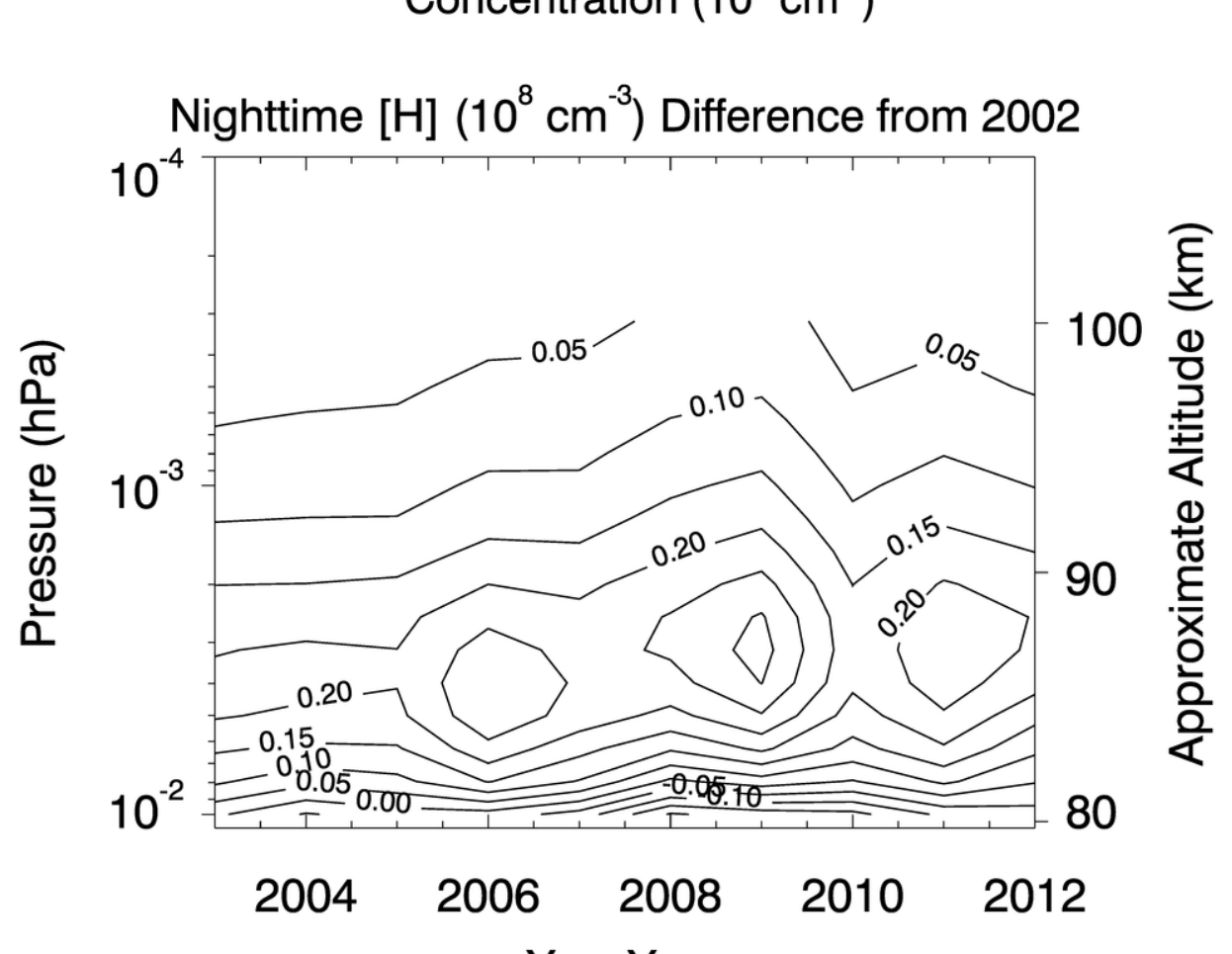
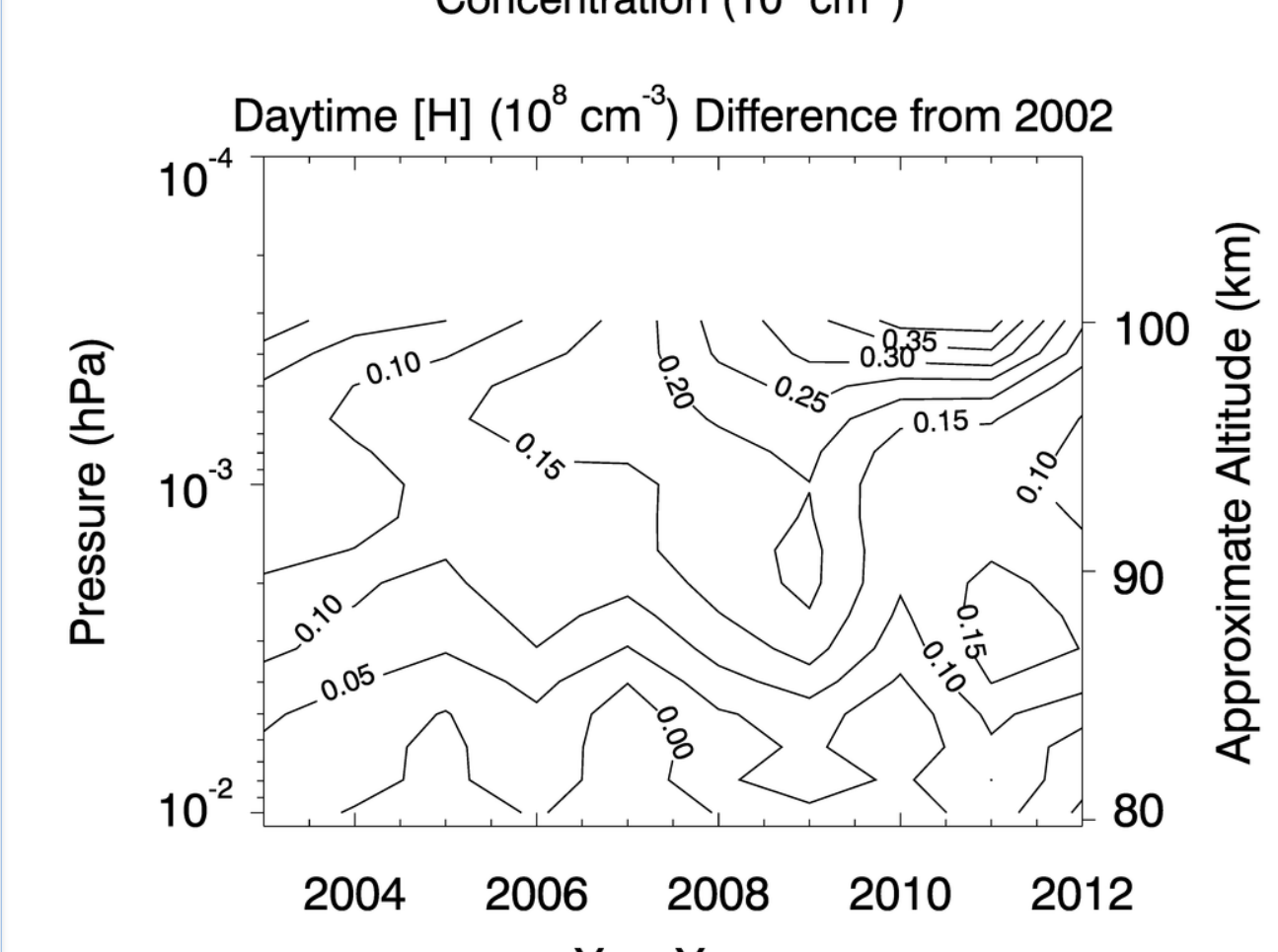
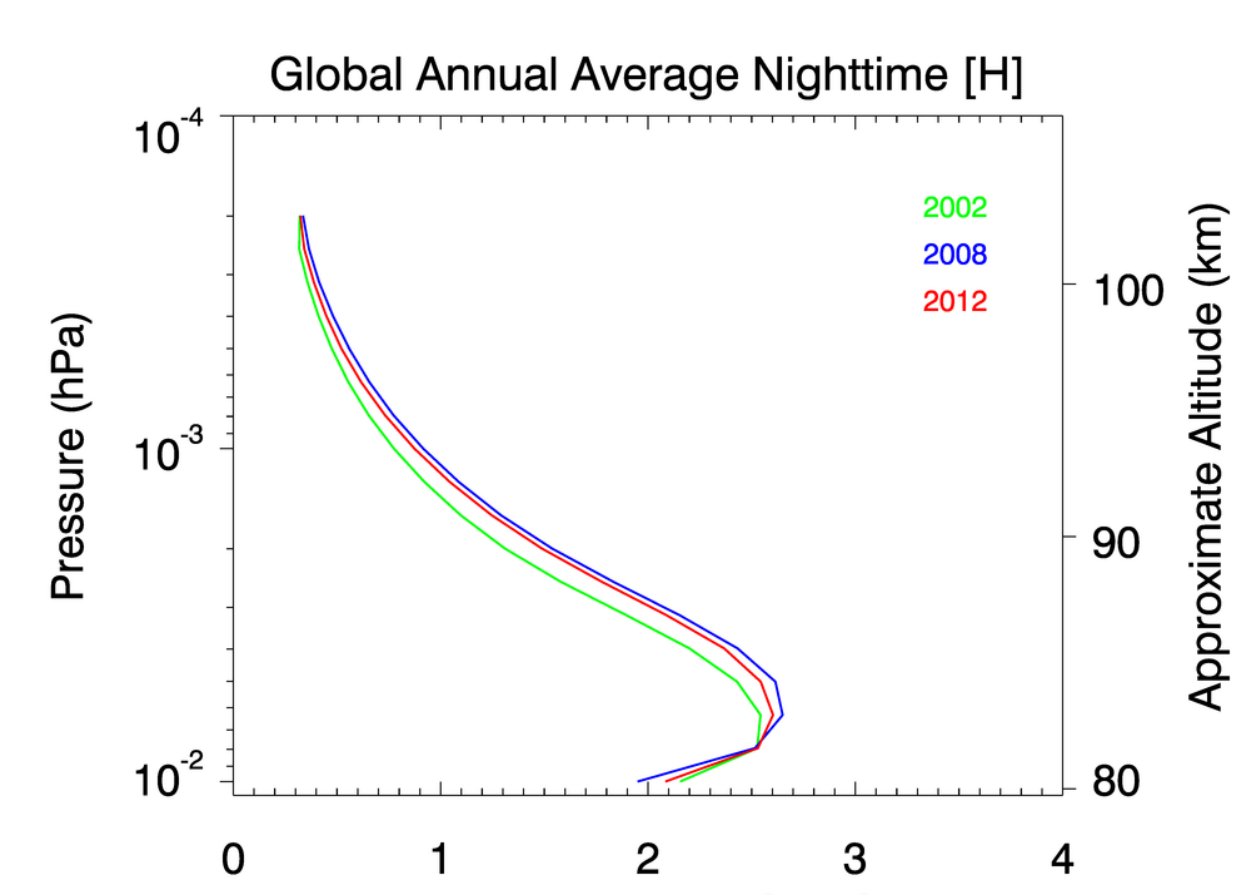
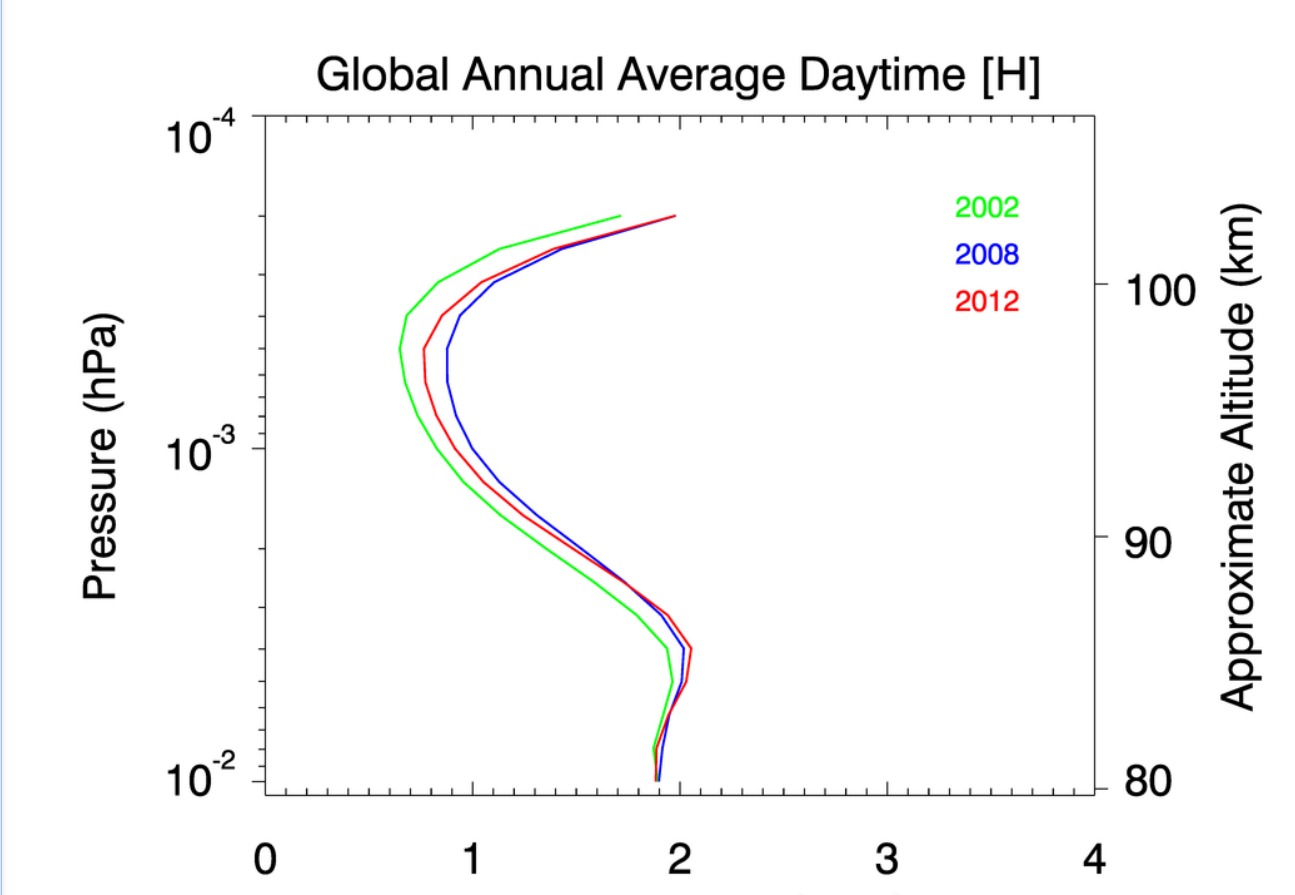


**Influence of solar cycle on T evident throughout depth of M/LT**



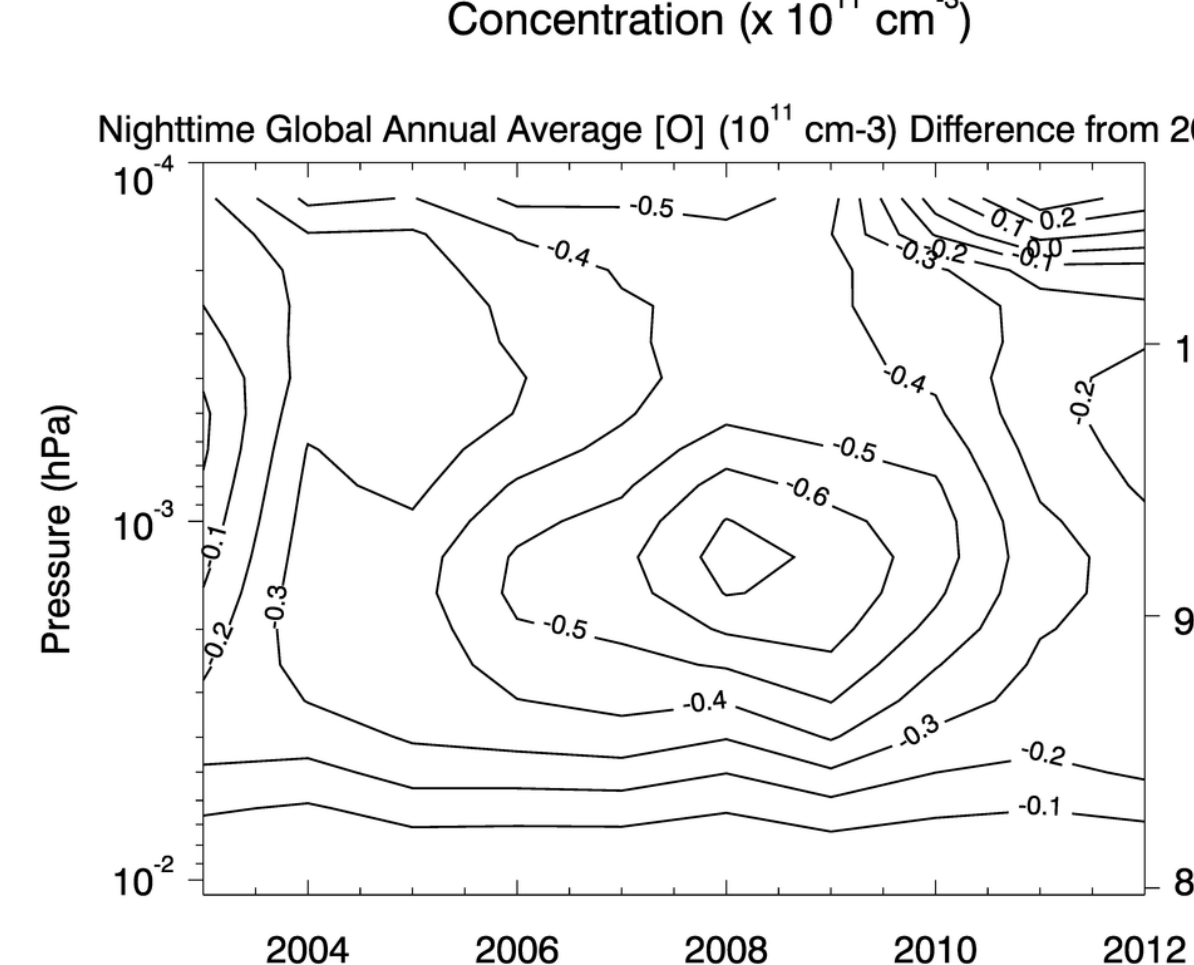
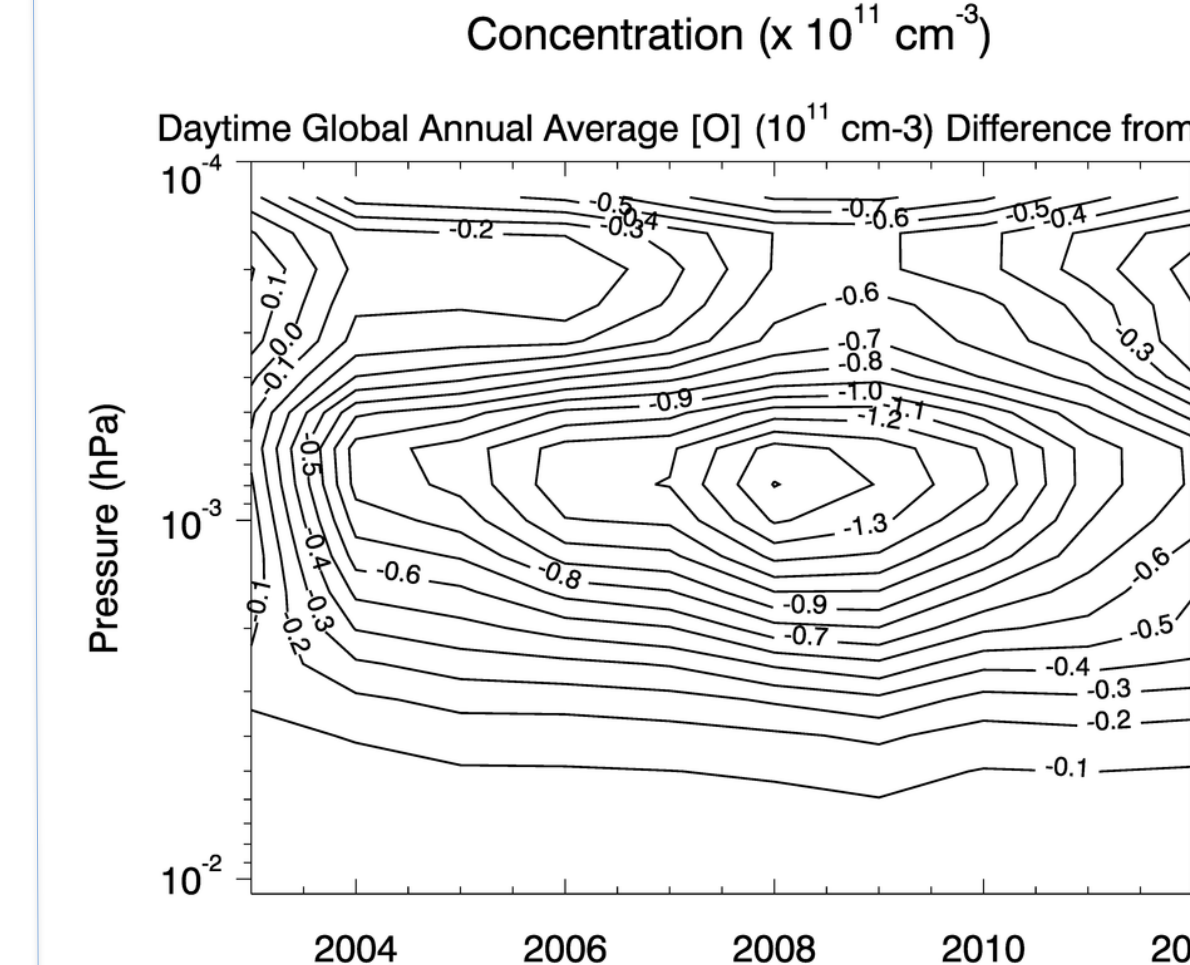
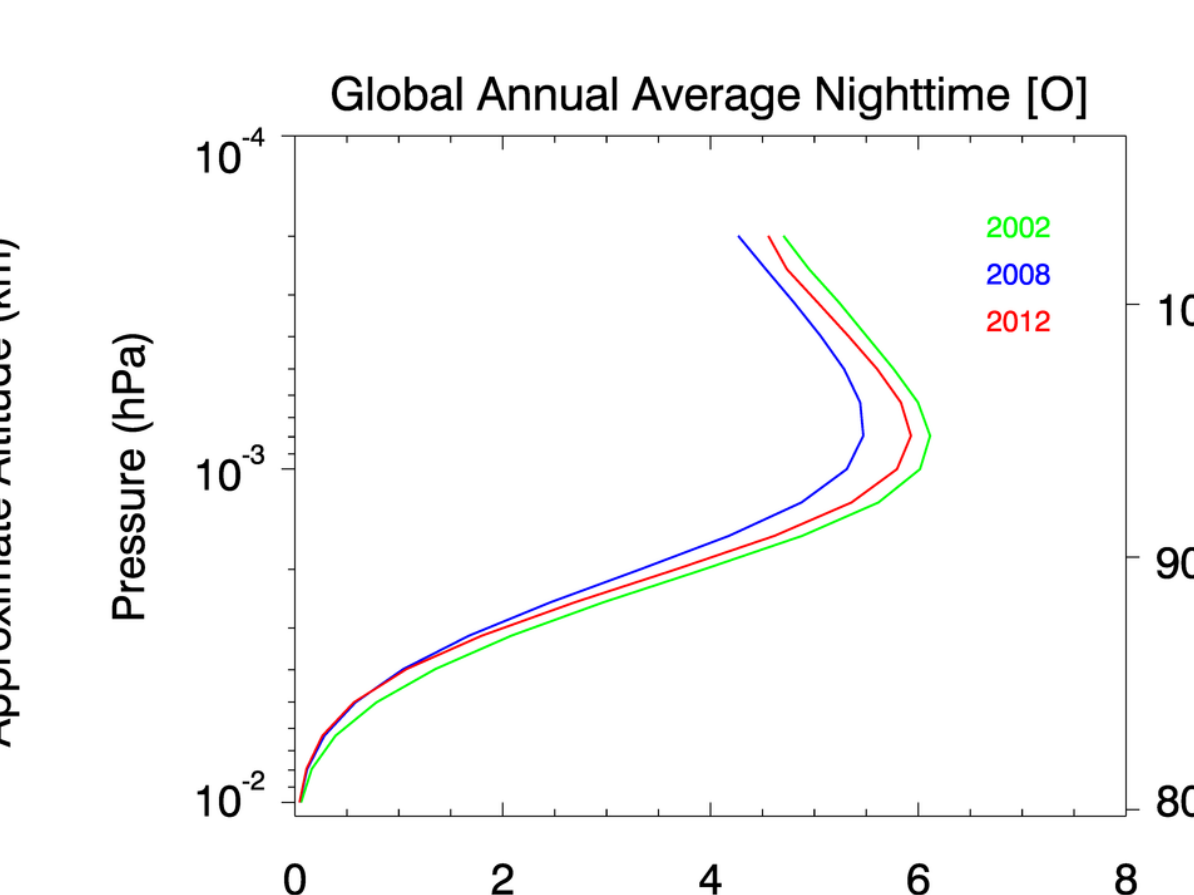
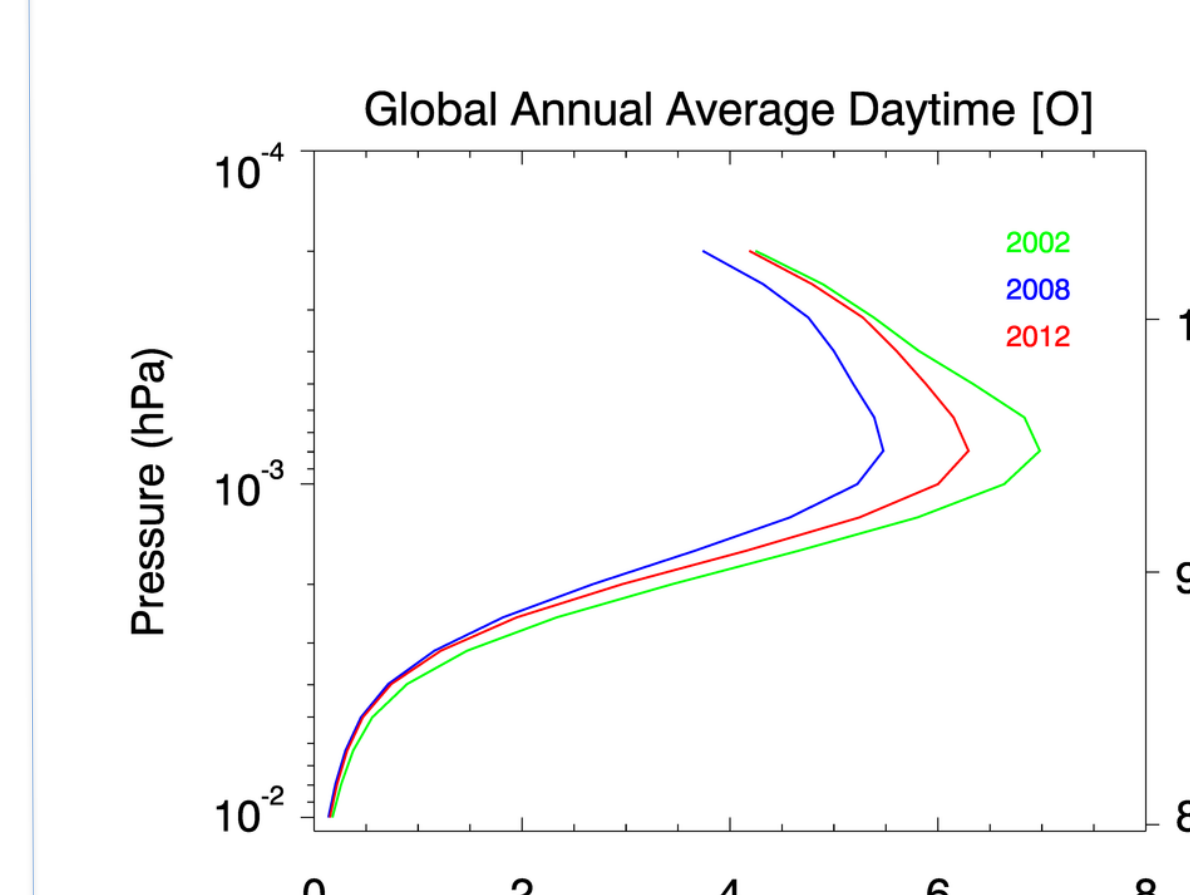
**Mesopause region (80-100 km) cooled by ~ 4 K over solar cycle**

**Atomic hydrogen varies inversely with strength of solar cycle!**



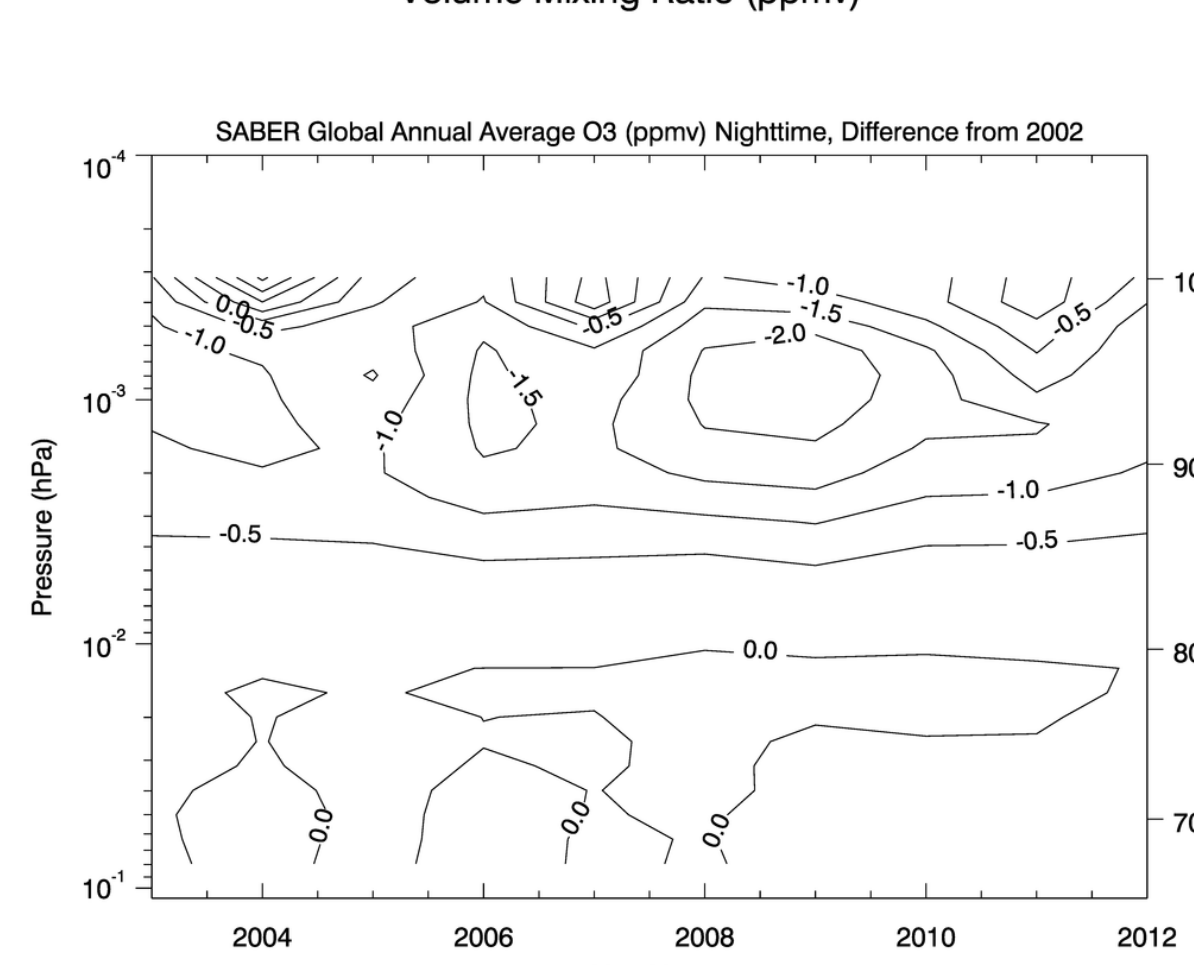
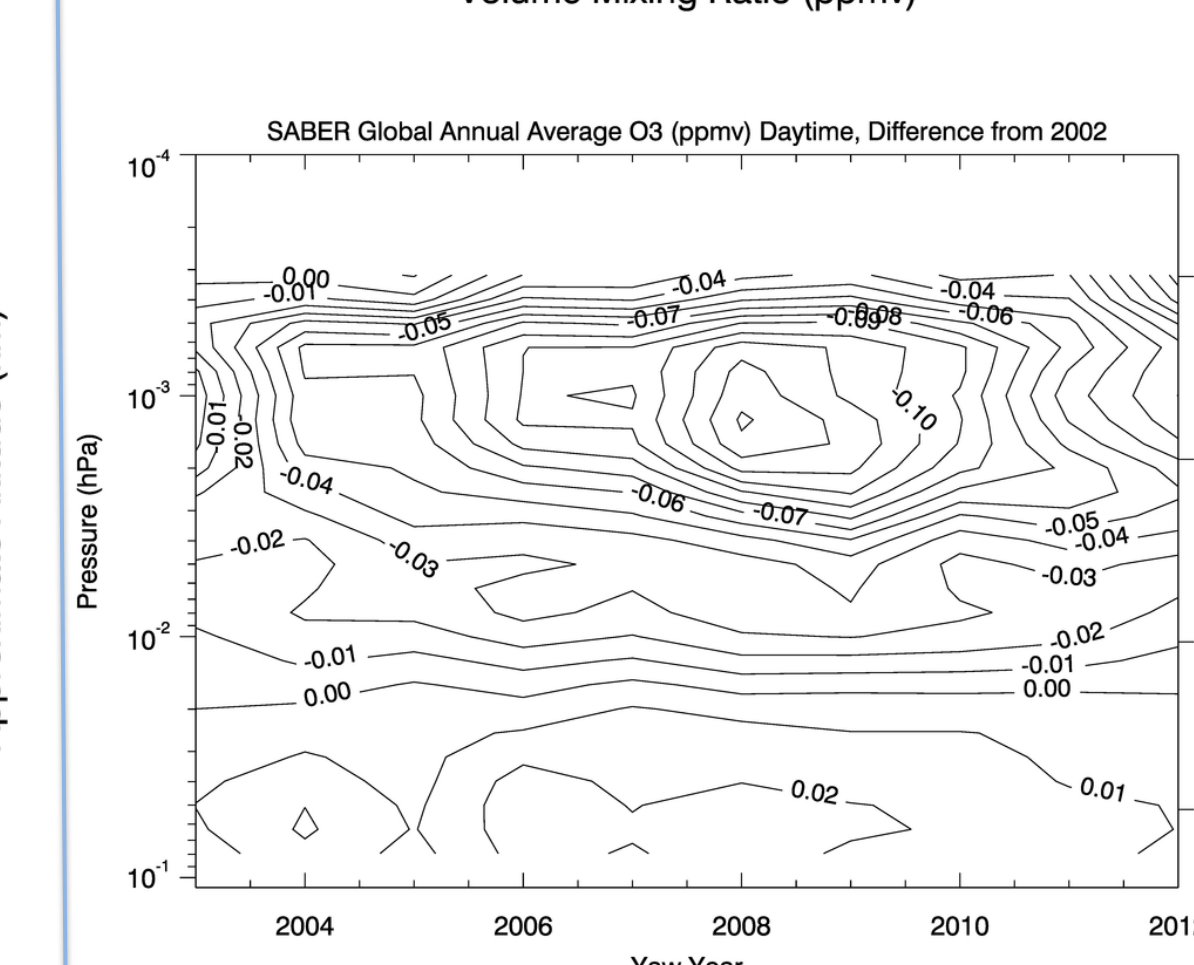
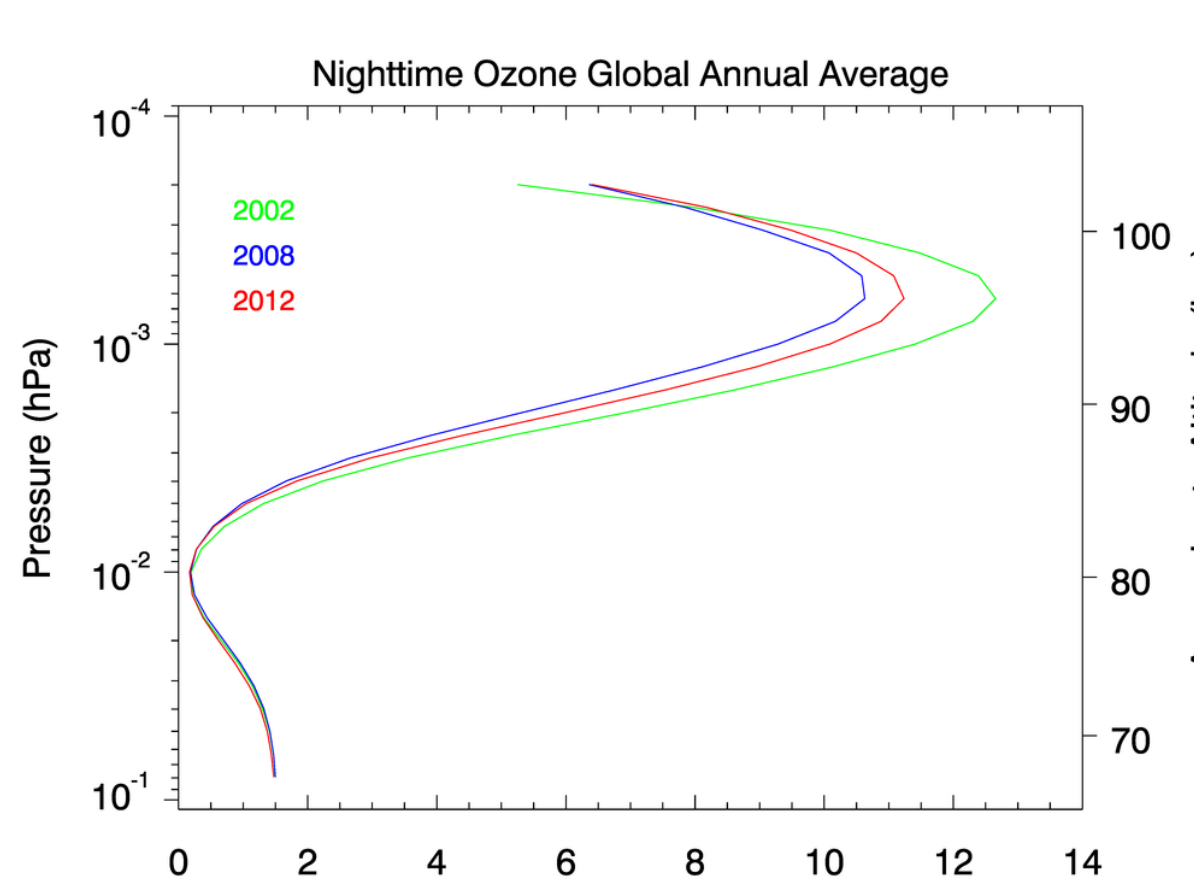
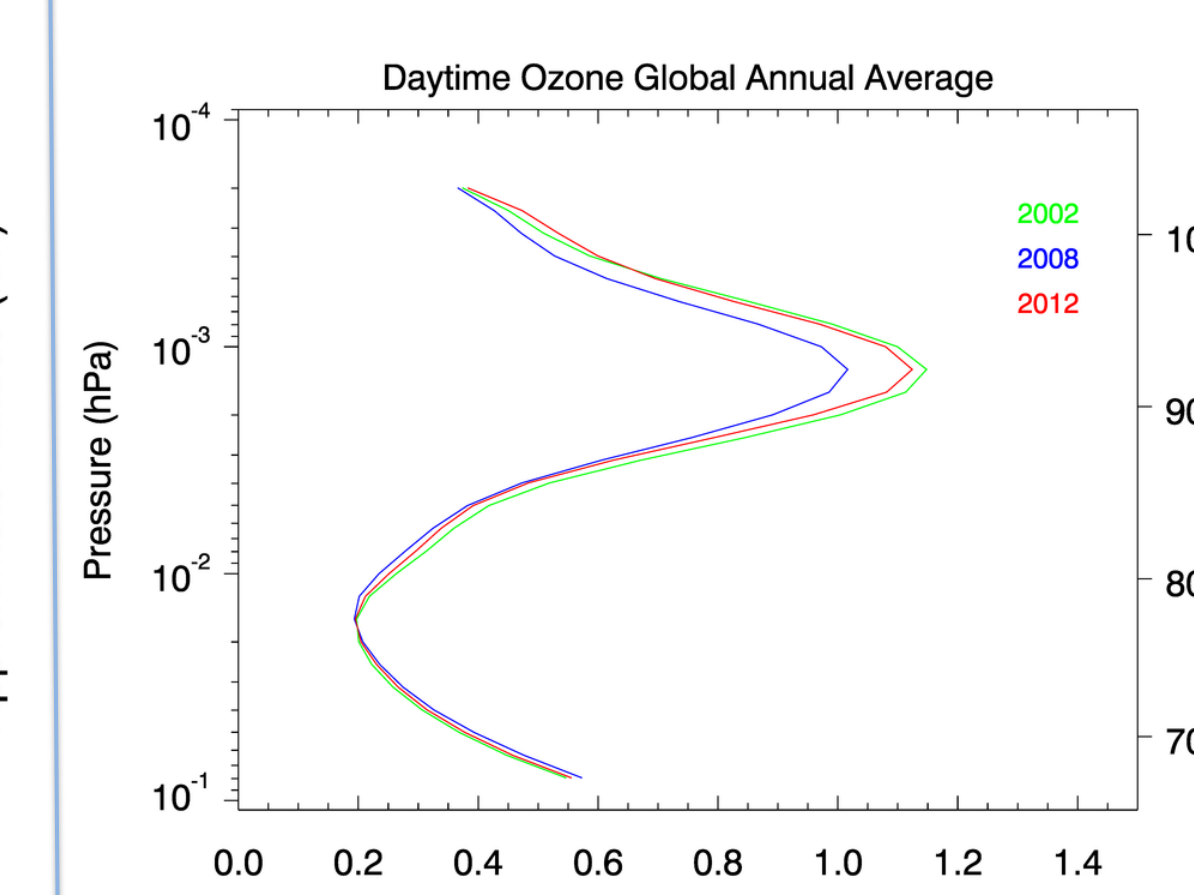
**Inverse relation due to T dependence of odd-H, odd-O rate coefficients**

**Solar cycle evident in day and night atomic oxygen 2002 - 2012**



**Day [O] appears to have larger solar cycle variability than night**

**Night O<sub>3</sub> shows evidence of thermal or tidal influence**



**Larger absolute solar cycle change in O<sub>3</sub> vmr at night than day**

*SABER data are the first consistent set of T, Odd-H, Odd-O, (and energetics) in M/LT over a solar cycle.*

*SABER data are essential to the study of the influence of the solar cycle on the dynamics of the atmosphere.*