Supplemental Figures

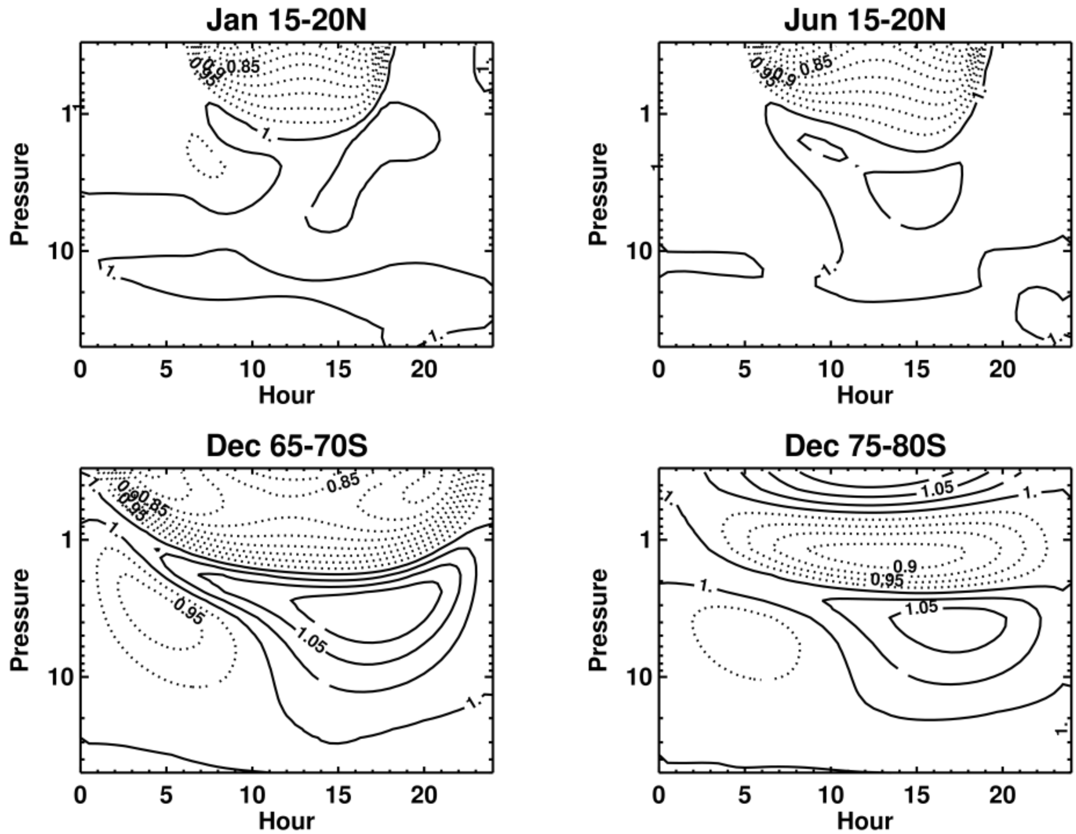

Figure S1. Same as Figure 1 but for January 15-20° N (top left); June 15-20° N (top right); December 65-70° South (bottom left); and December 75-80° S (bottom right). The top two panels are directly comparable to the diurnal cycle in Parish et al. [2014]. The bottom panels show the hemispheric symmetry of the polar summer signal as compared to the June Northern Hemisphere results shown in Figure 1.

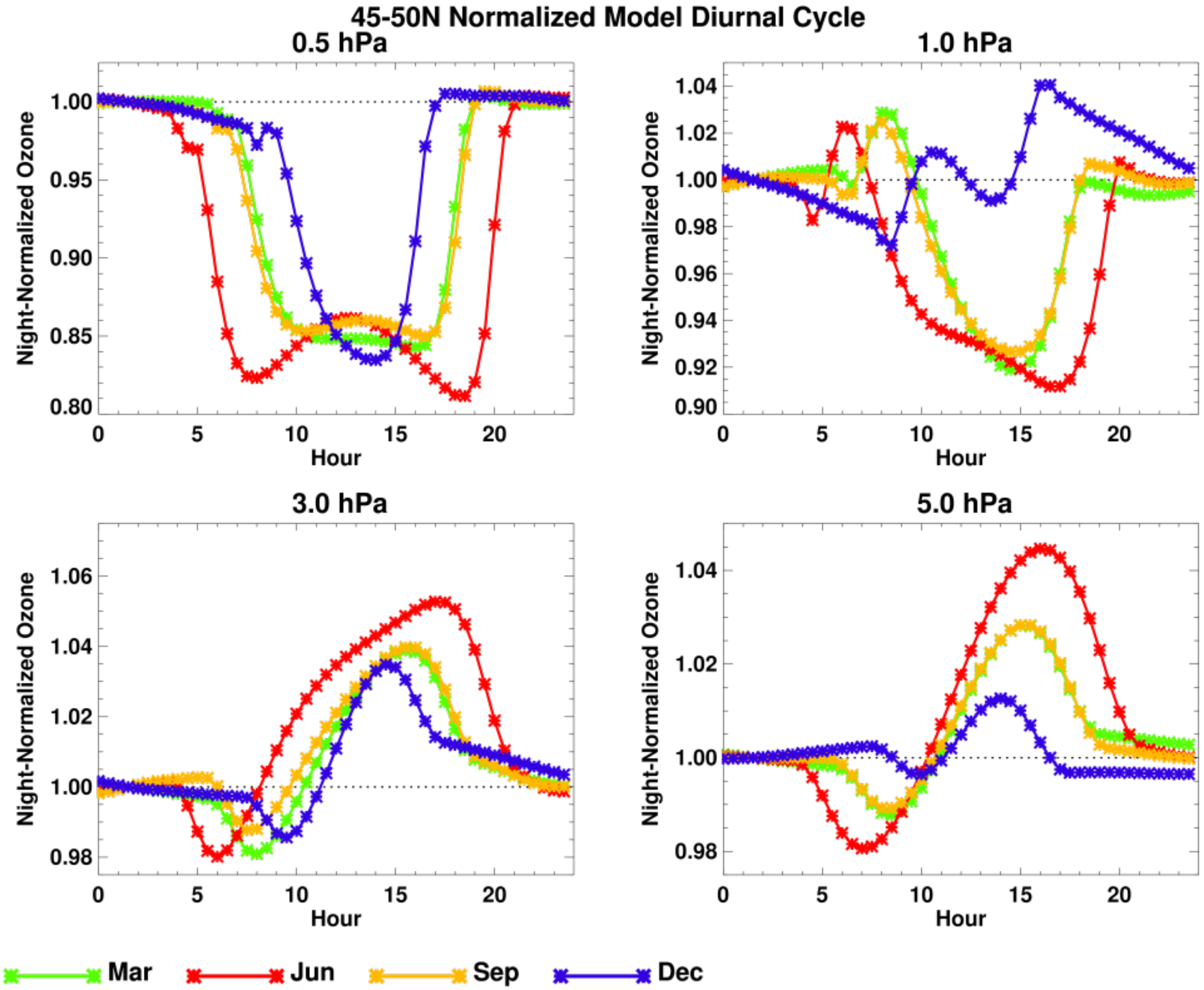

Figure S2. Same as Figure 2 but for 45-50° N. The 5 hPa result (bottom right panel) is directly comparable to Schanz et al. [2014; Figure 2].

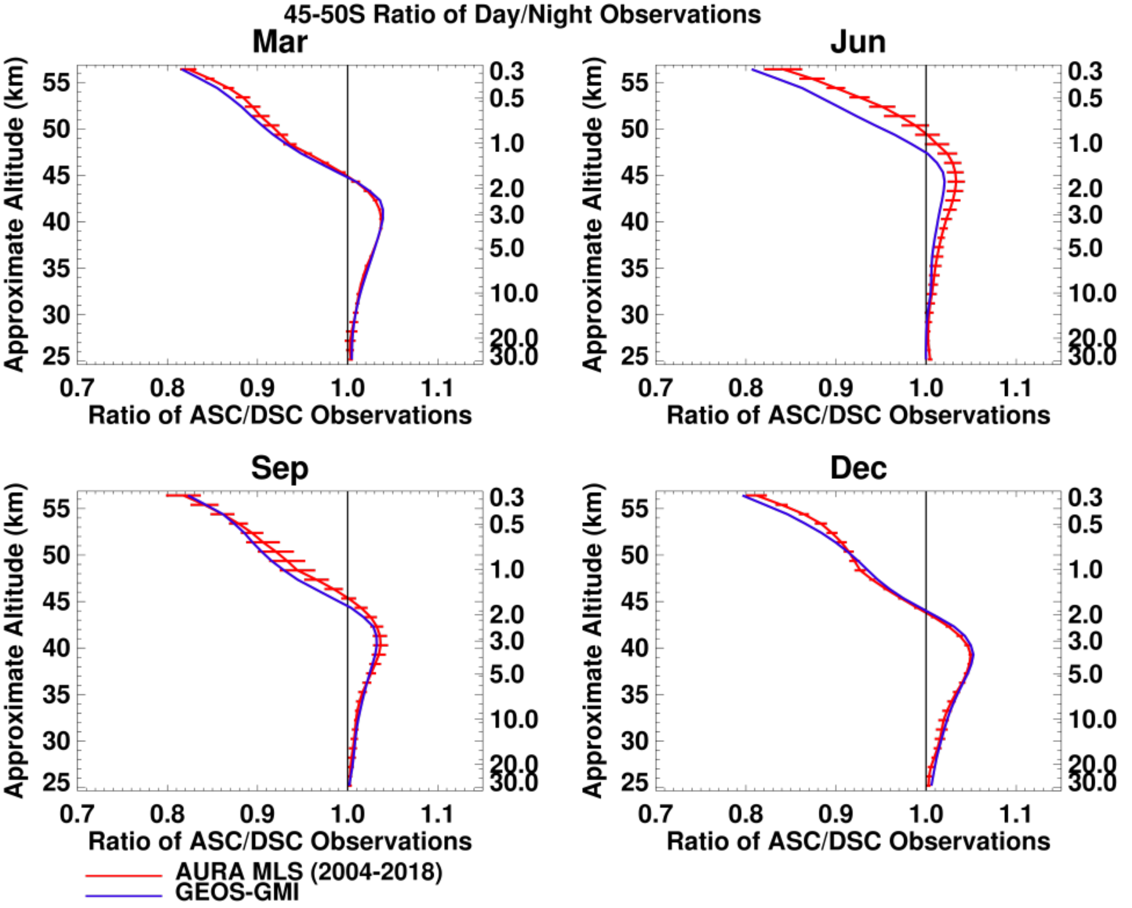

Figure S3. Same as Figure 5 but for 45-50° S.

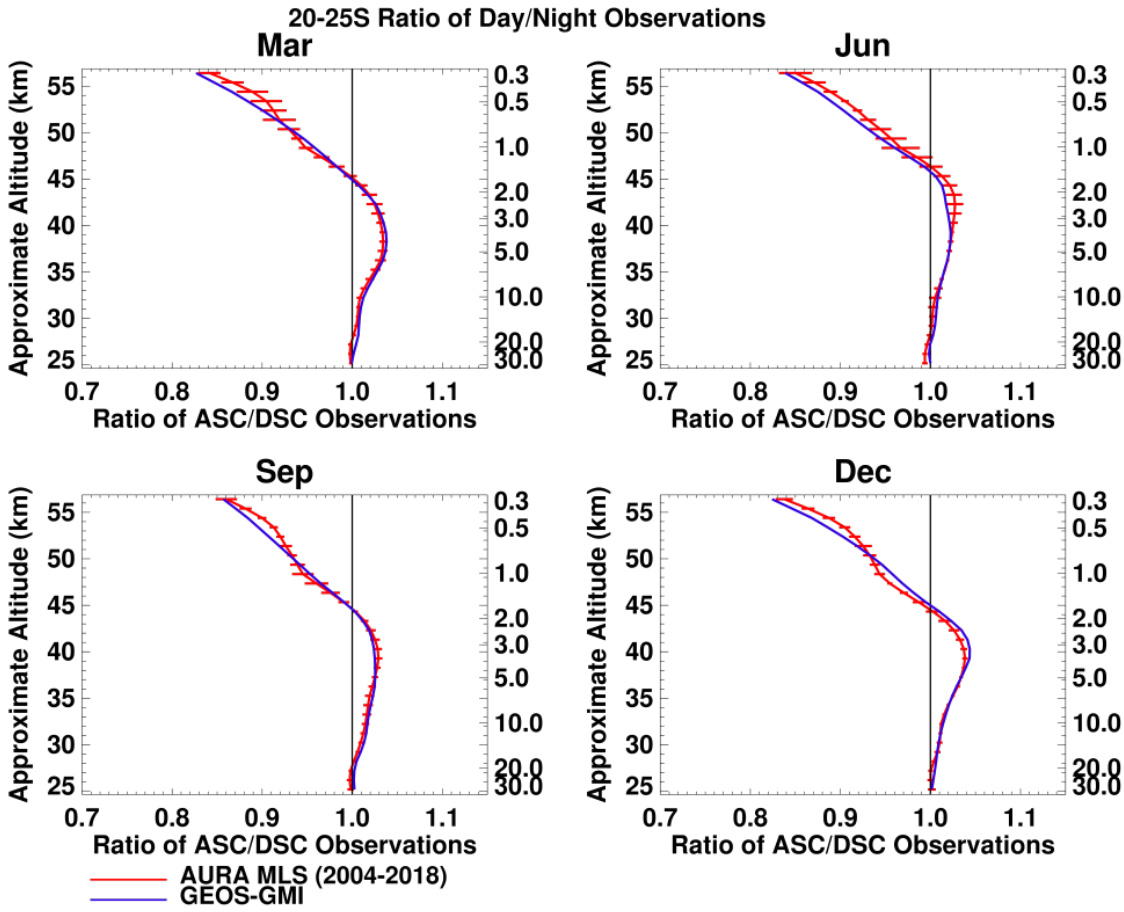

Figure S4. Same as Figure 5 but for 20-25° S.

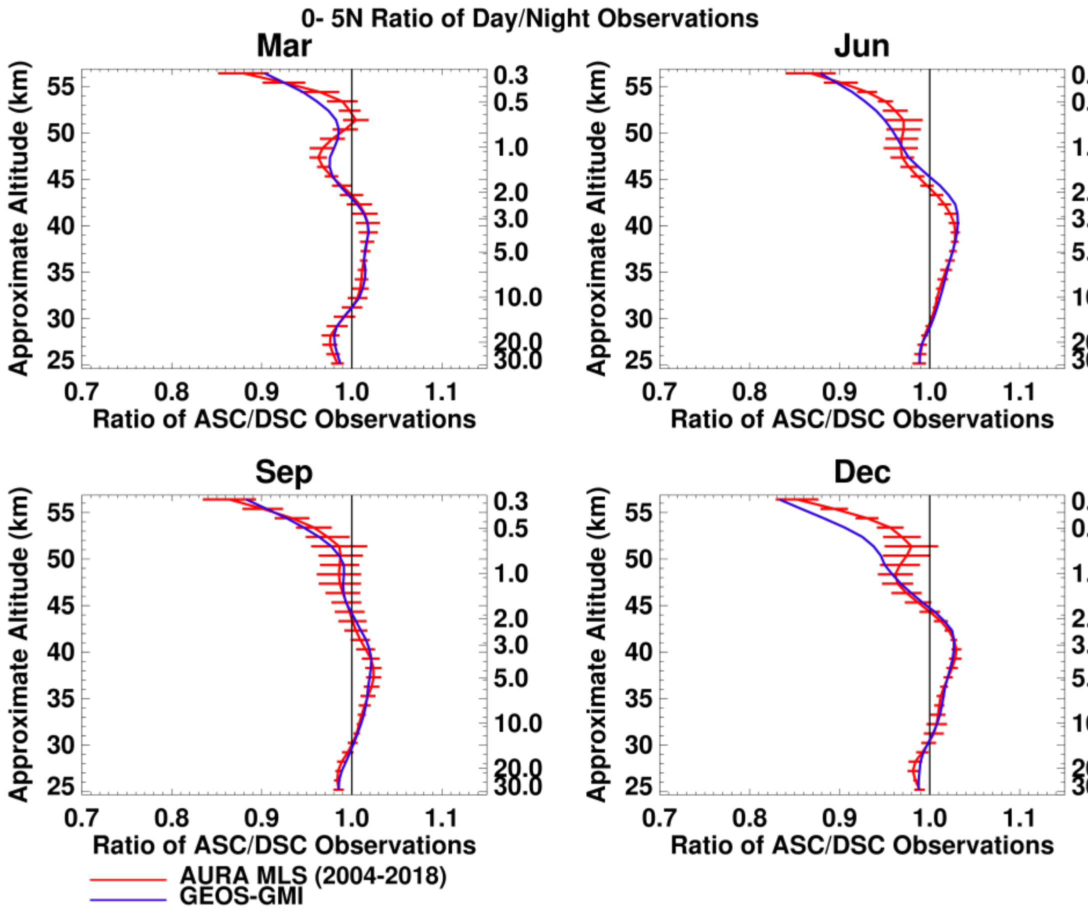

Figure S5. Same as Figure 5 but for 0-5° N.

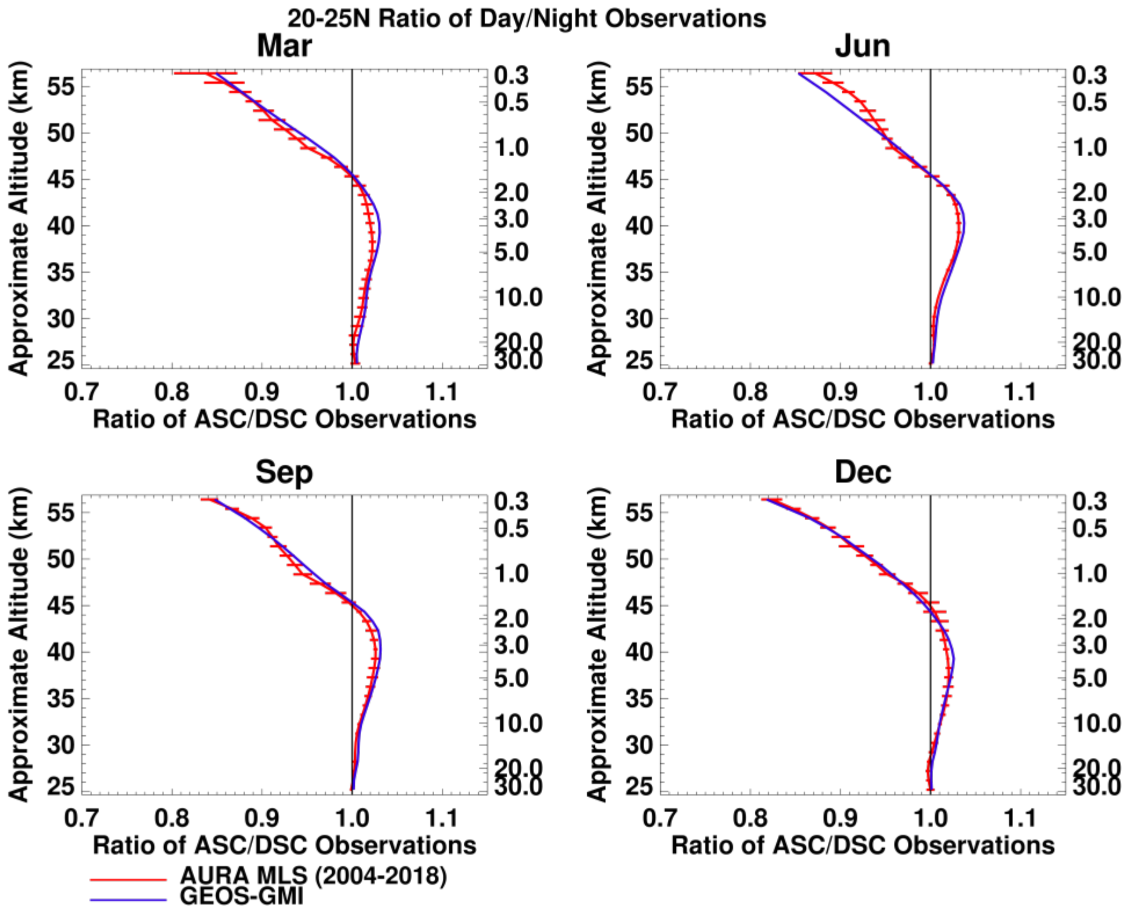

Figure S6. Same as Figure 5 but for 20-25° N.

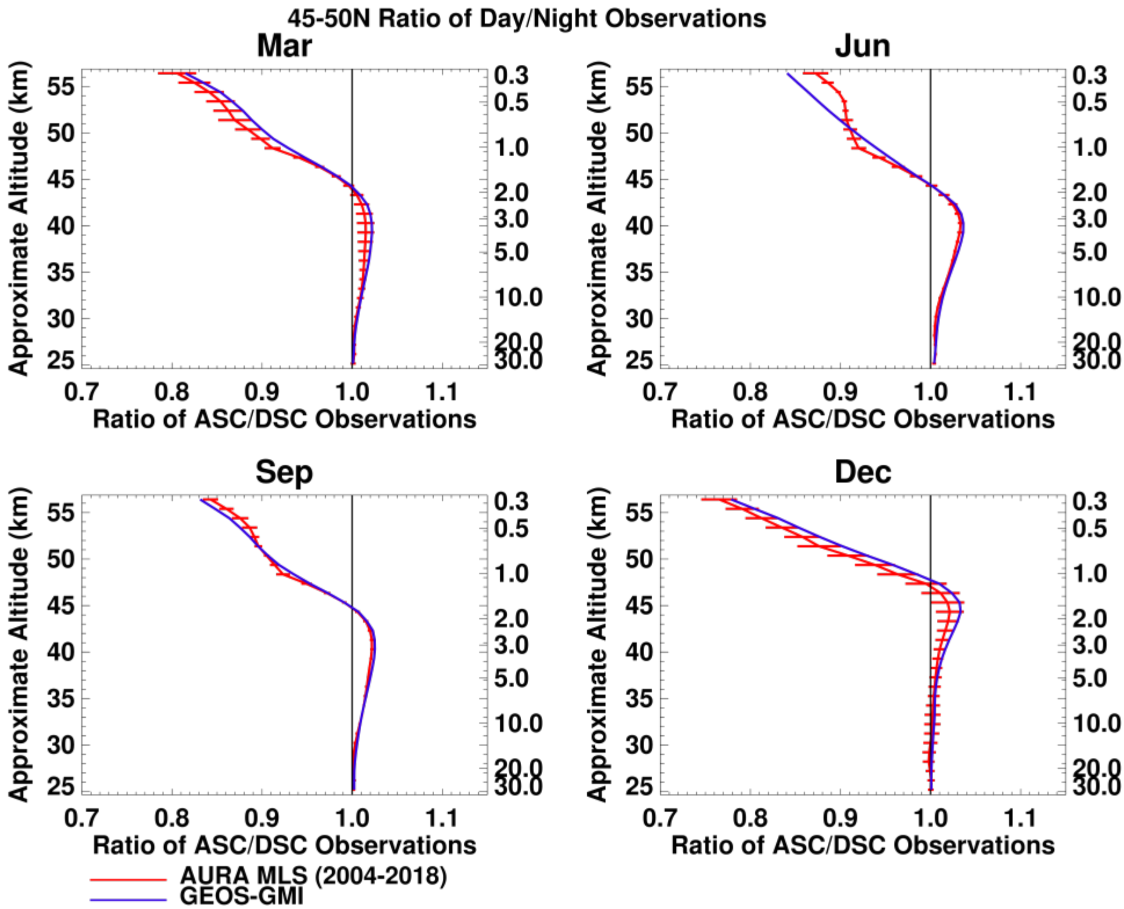

Figure S7. Same as Figure 5 but for 45-50° N.

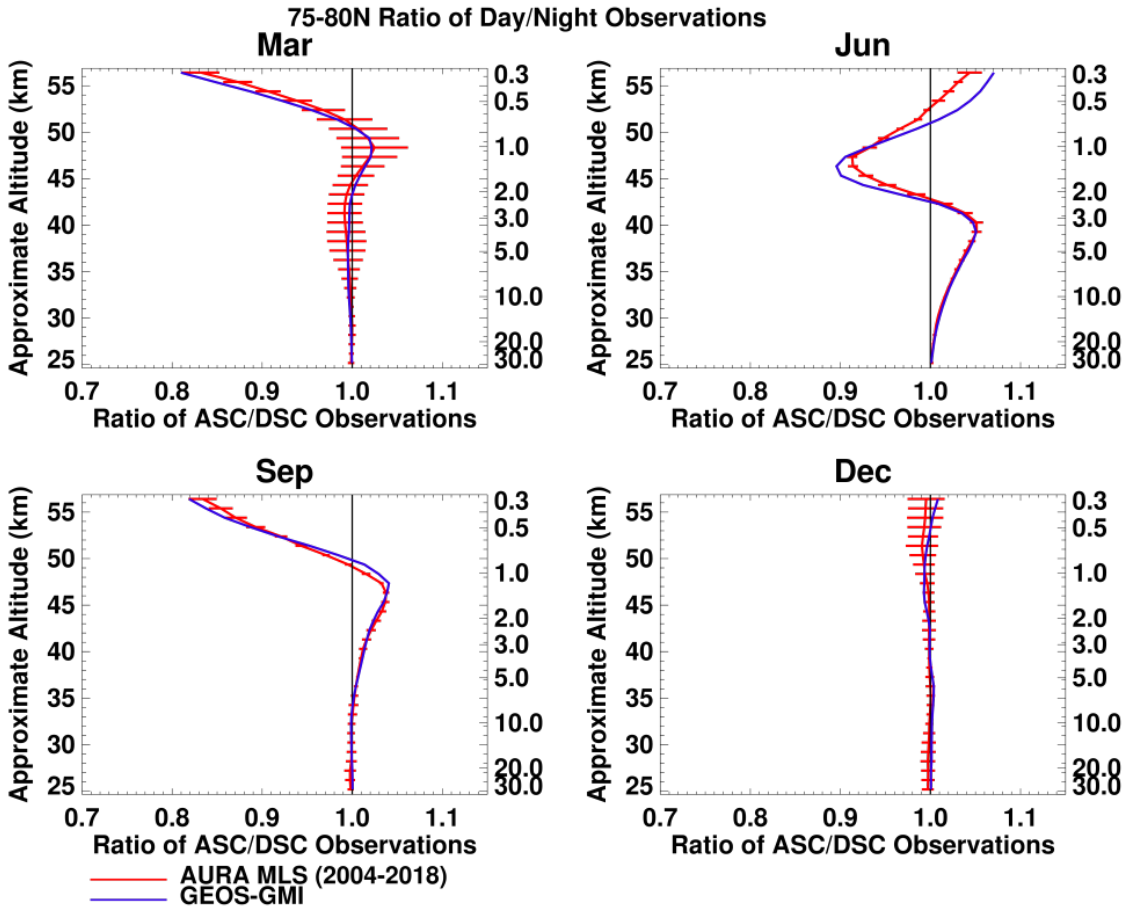

Figure S8. Same as Figure 5 but for 75-80° N.

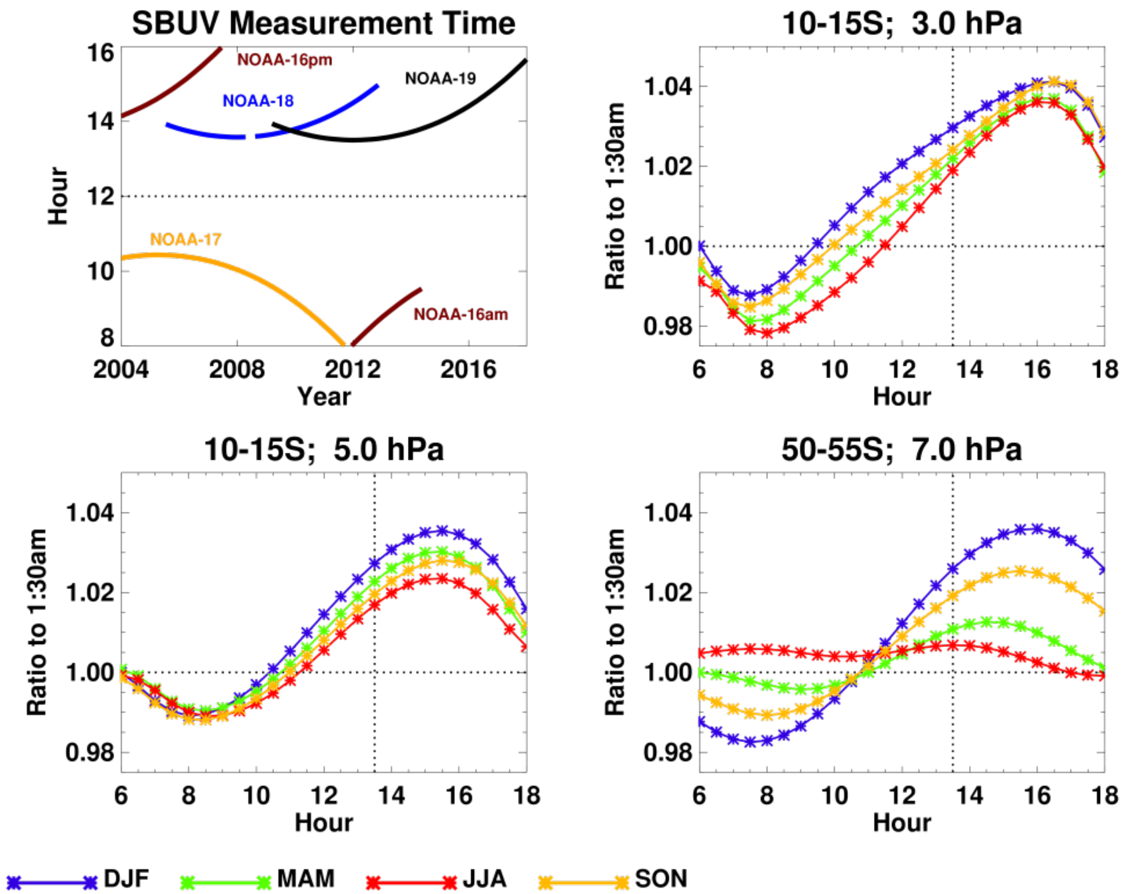

Figure S9. GEOS-GMI diurnal climatology (GDOC) as a function of month for the latitude range and pressure level of the SBUV time series comparisons relative to Aura MLS in Figures 9 to 11. The first panel shows the slow drift of the SBUV measurement local solar time as a result of satellite orbit drift. Measurements are taken primarily in the 2 to 4 pm time range and 8 to 10 am time range. In the upper right panel (10-15° S; 3 hPa) there is an offset between the morning and afternoon measurements as well as a gradient from 8 to 10am and 2 to 4pm, which translates to a diurnally-induced drift in the SBUV time series. In the lower left panel (10-15° S; 5 hPa) there is little variation between 8 to 10am and 2 to 4pm, but only an offset between the morning and afternoon measurements. Finally, in the bottom right panel (50-55° S; 7 hPa) there is little diurnal cycle in winter (JJA) but a strong diurnal cycle in summer (DJF), which imparts a diurnally-induced seasonal-scale variation in the SBUV record. Vertical dotted line indicates 1:30pm Aura MLS measurement time for reference.

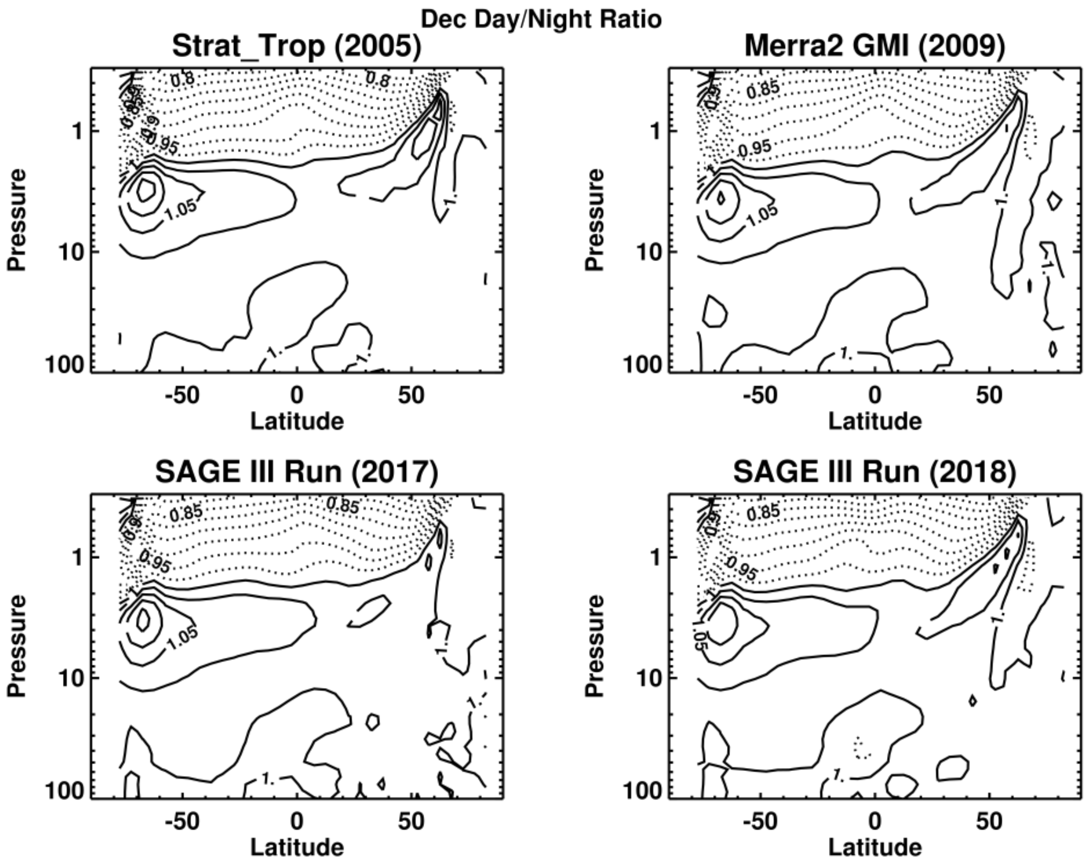

Figure S10. Contour plot of diurnal climatology as derived from four model realizations. The ratio of the day to night values corresponding to Aura MLS measurement times are shown with a ratio contour interval of .025 (2.5%). The day to night ratio of ozone is similar in all models, despite a number of model modifications and different year simulations. We note that the GEOSCCM simulation used in Parrish et al. [2014] is included here (Strat_Trop 2005) only to demonstrate that model improvements have not drastically changed the model diurnal signal, but that this particular simulation is outdated. The final climatology is the average of the SAGE III 2017 and 2018 output.