



Journal of Geophysical Research Atmospheres

Supporting Information for

The Effects of a 1998 Observing System Change on MERRA-2-based Ozone Profile Simulations

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Contents of this file

Figures S1 to S8

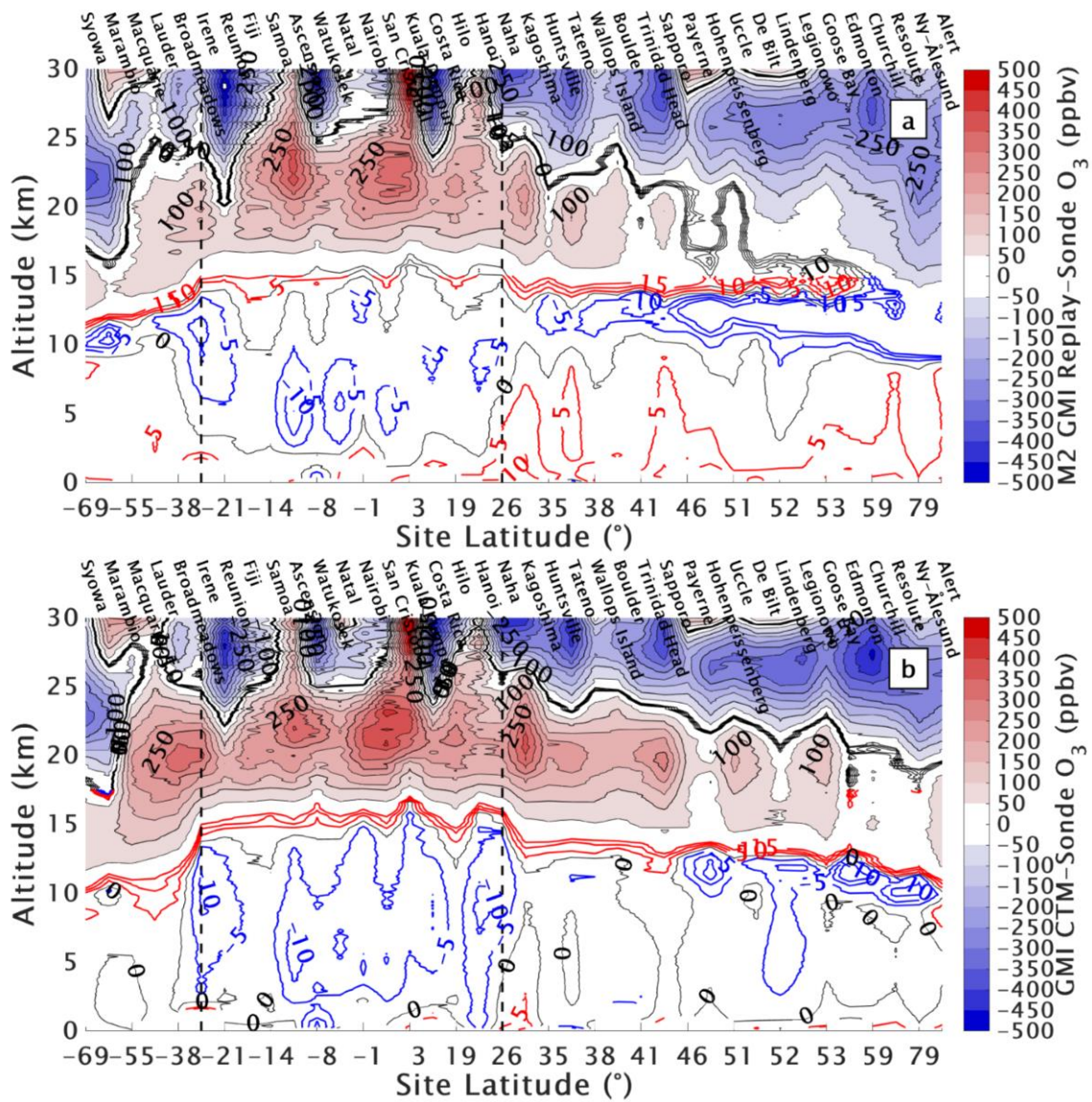


Figure S1. Latitude-height curtains of median O_3 mixing ratio differences between all ozonesonde profiles and coincident (a) M2 GMI Replay and (b) GMI CTM O_3 profiles from 1980-2016 (all available profiles during that time period). Latitudes of every other site are shown for clarity. Blue colors indicate that the simulated O_3 is biased low, and red colors indicate that the simulation is biased high. Colored contours every 5 ppbv from -15 to +15 ppbv are shown in the troposphere. The black dashed lines indicate $\pm 26^{\circ}$ latitude for subtropical and tropical sites. The site locations are listed at the top of the figures at their respective site latitudes.

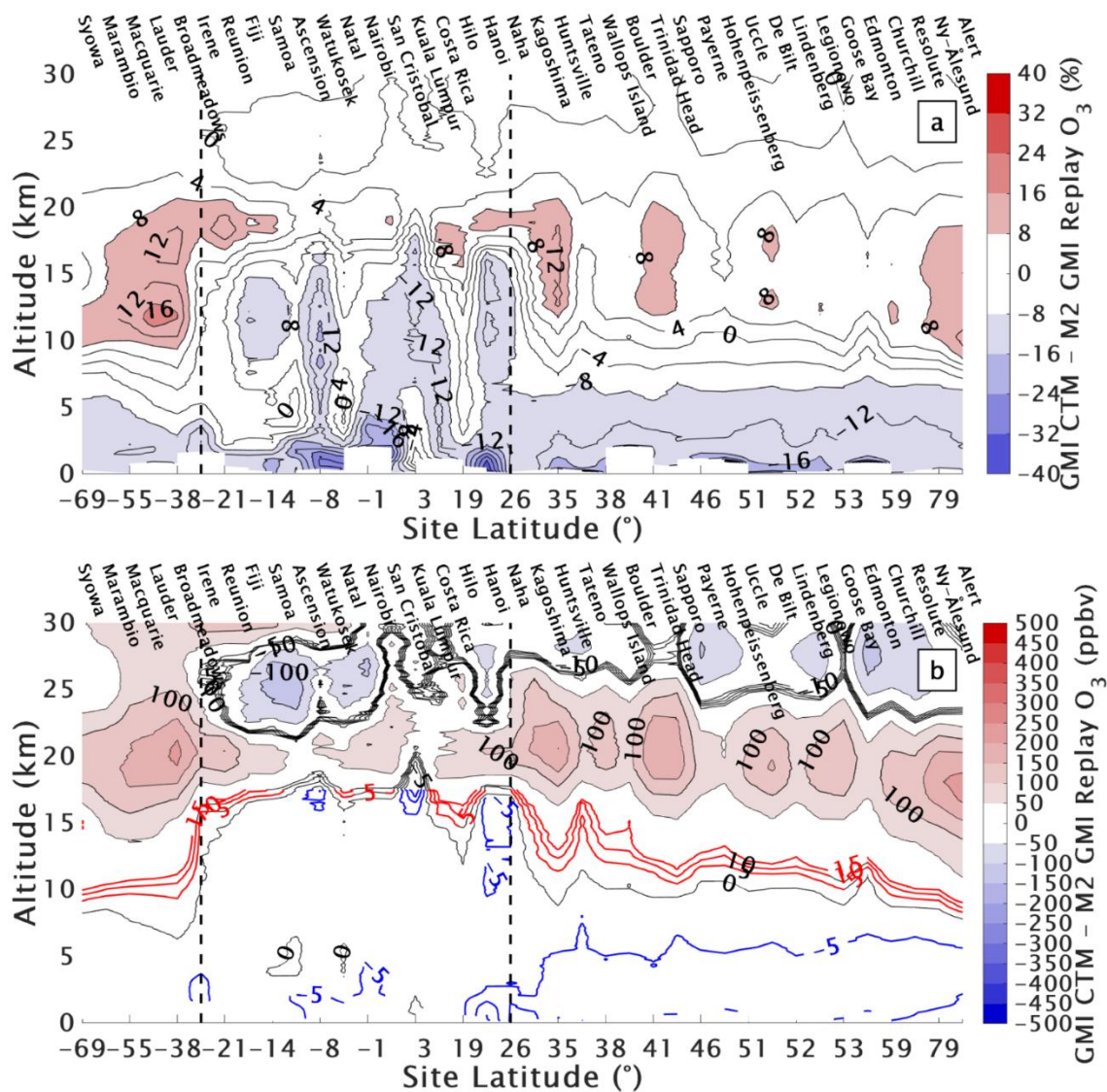


Figure S2. Latitude-height curtains of (a) median percent O_3 and (b) mixing ratio differences between GMI CTM and M2 GMI Replay O_3 profiles. Latitudes of every other site are shown for clarity. Blue colors indicate that the GMI CTM O_3 is lower than M2 GMI Replay, and red colors indicate that the GMI CTM O_3 is higher than M2 GMI Replay. Colored contours every 5 ppbv from -15 to +15 ppbv are shown in the troposphere on panel (b). The black dashed lines indicate $\pm 26^\circ$ latitude for subtropical and tropical sites. The site locations are listed at the top of the figures at their respective site latitudes.

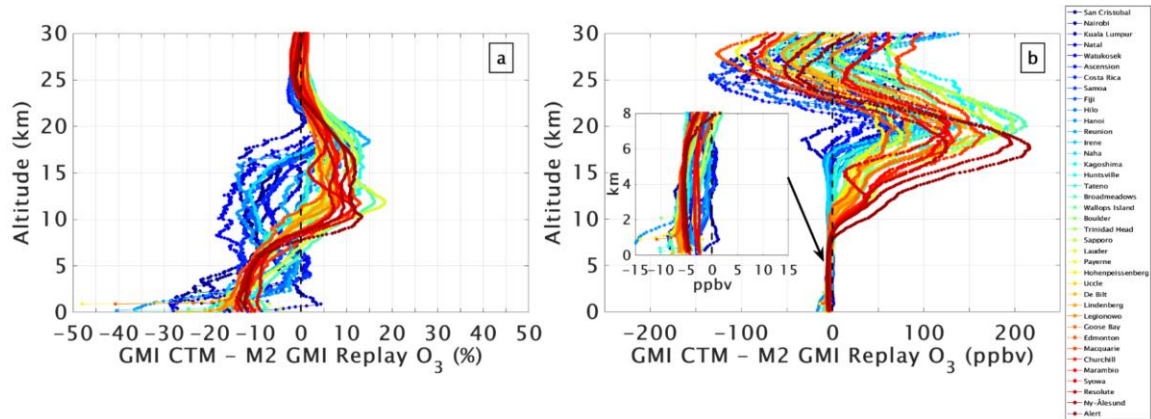


Figure S3. (a) Median percent O_3 differences and (b) O_3 mixing ratio differences between M2 GMI Replay and GMI CTM. The site locations are given in the legend, and are color-coded from blue (Tropical sites) to red (Polar sites). The inset panel on (b) shows a close up of the surface to 8 km differences in ppbv.

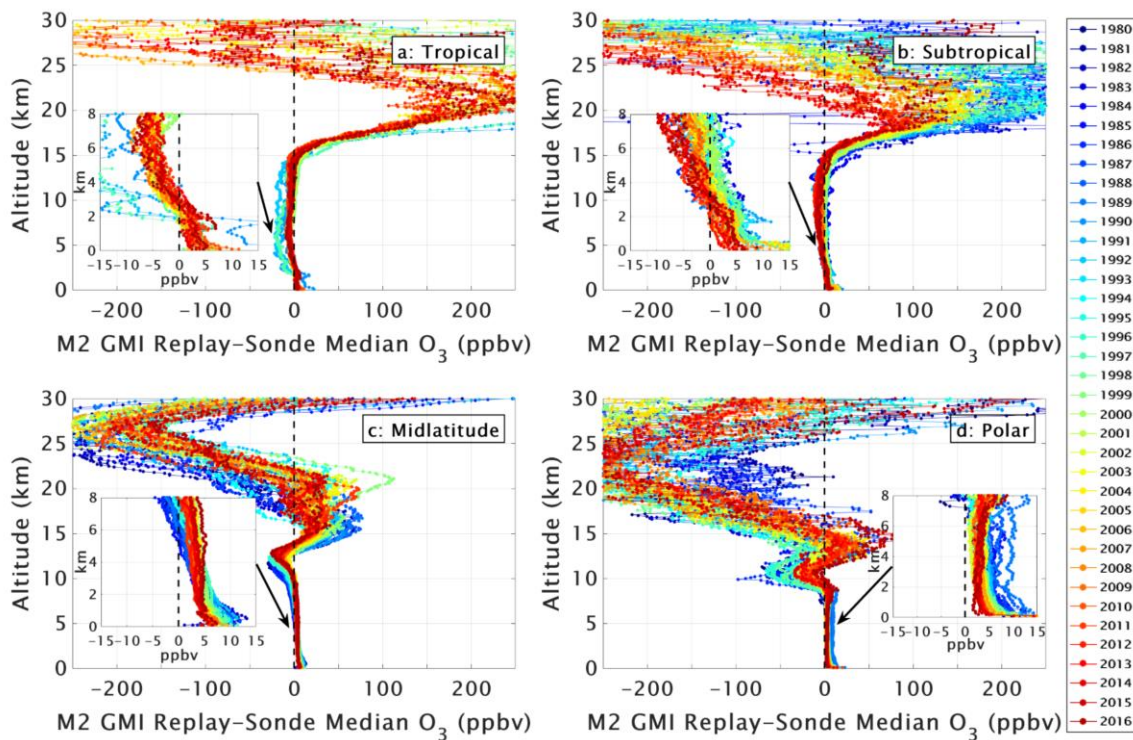


Figure S4. Median O₃ mixing ratio differences with altitude for M2 GMI Replay by year from 1980 to 2016 (colors). The panels show mixing ratios differences at (a) Tropical, (b) Subtropical, (c) Midlatitude, and (d) Polar locations. Most comparisons with Tropical sites begin in 1998. The inset panels show close ups of the surface to 8 km differences in ppbv.

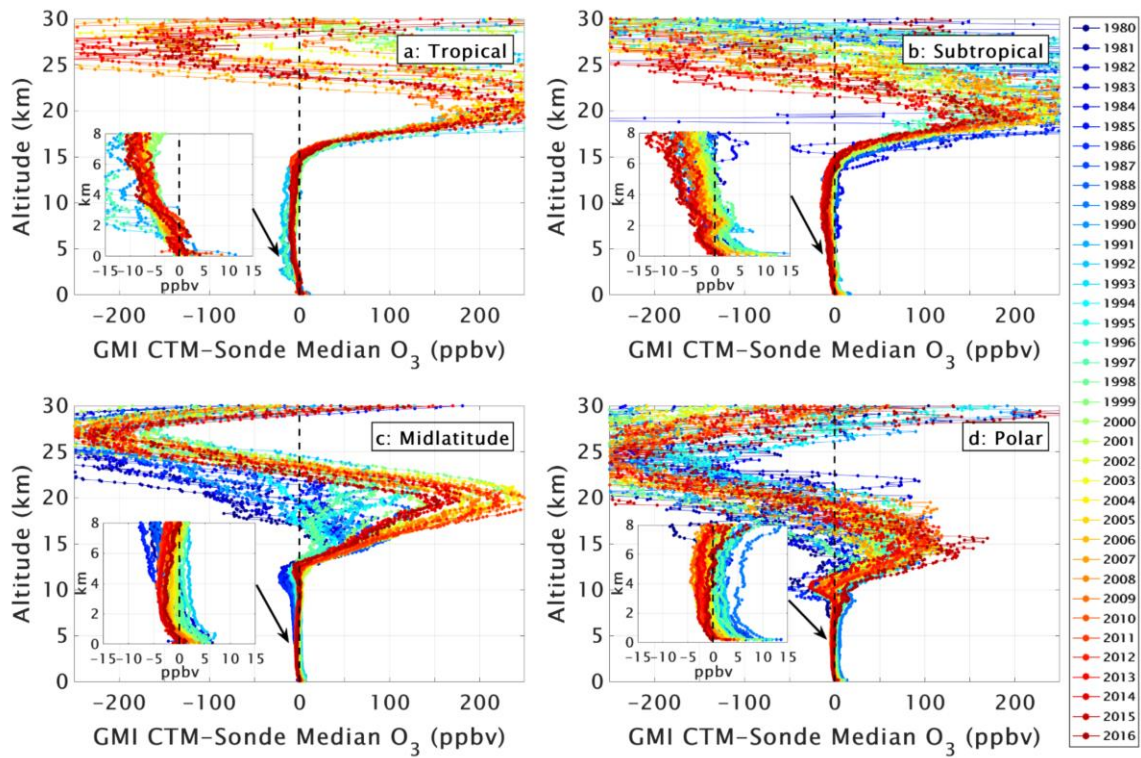


Figure S5. The same as in Figure S4, but ozonesonde/simulation O_3 mixing ratio differences are for GMI CTM.

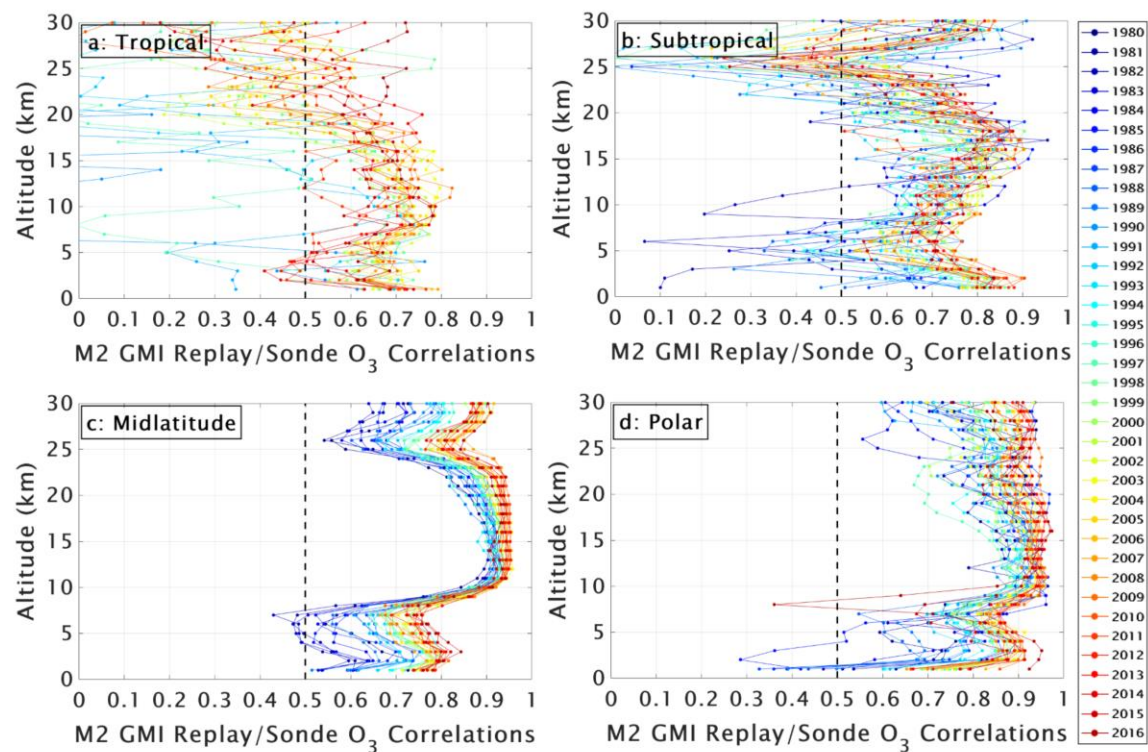


Figure S6. M2 GMI Replay/ozonesonde O₃ correlations with altitude by year from 1980 to 2016 (colors). The panels show O₃ correlations at (a) Tropical, (b) Subtropical, (c) Midlatitude, and (d) Polar locations. Most comparisons with Tropical sites begin in 1998. Very few Polar ozonesondes from 2016 were included, leading to the downward spike in correlation in 2016 at 8 km.

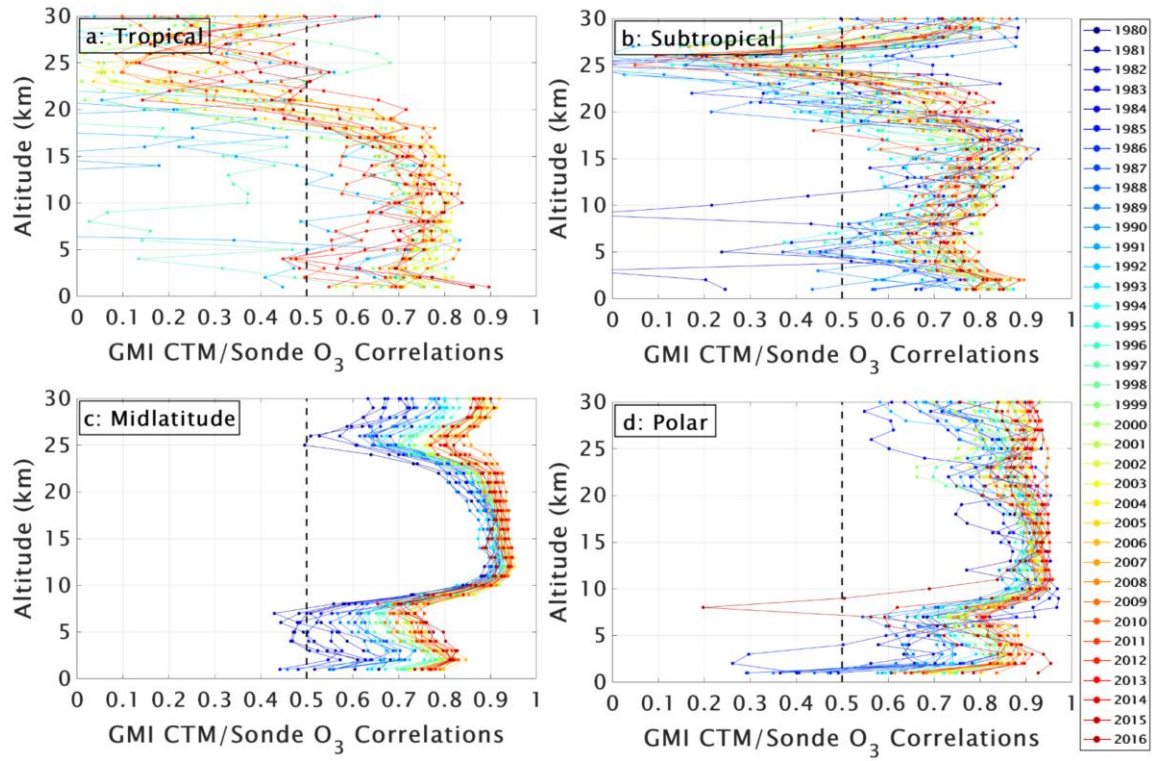


Figure S7. The same as Figure S6, but ozonesonde/simulation correlations are for GMI CTM.

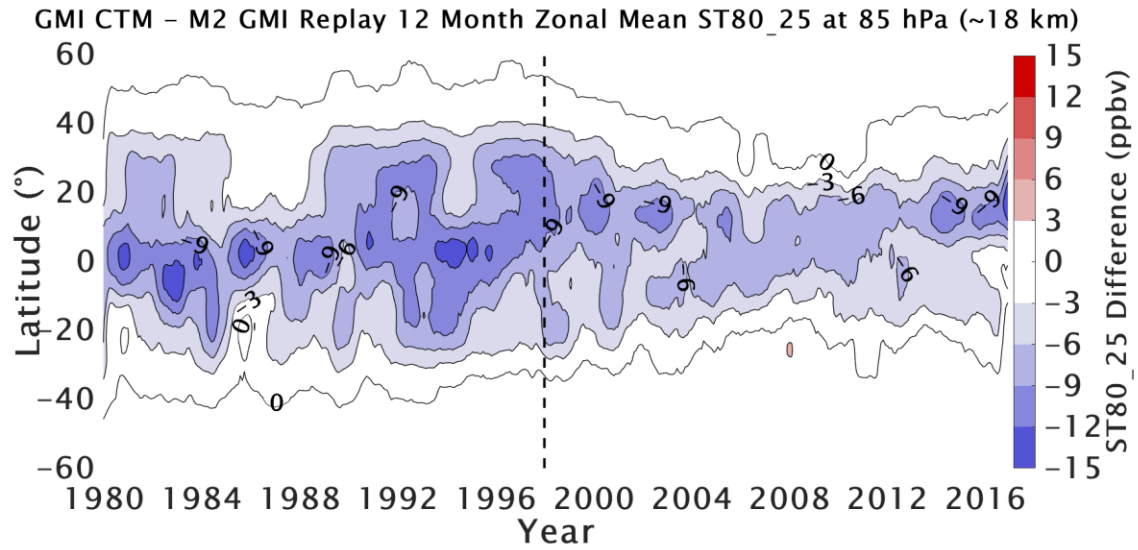


Figure S8. Running 12-month zonal mean differences in the GMI CTM and M2 GMI Replay ST80_25 stratospheric tracer at the 85 hPa model level (~18 km altitude). Blue colors indicate that the GMI CTM tracer mixing ratio is less than in M2 GMI Replay, and red colors indicate that the GMI CTM tracer mixing ratio is greater than in M2 GMI Replay. The black dashed line indicates the year 1998.