Supporting Information for "What contributes to the inter-annual variability in tropical lower stratospheric temperatures?"

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Introduction The supplementary information contains figures that show the same data as the main paper but on different pressure levels or latitudes. It also includes difference plots. Please refer to the main text for a description of the methods.

Contents of this file

1. Figure S1: Time series of ozone interannual variability averaged between 30°N − S
2. Figure S2: Time series of water vapour interannual variability averaged between 30°N − S
3. Figure S3: Difference between ERA5 temperatures and IEFDH calculation
4. Figure S4: IEFDH calculation at 90 hPa
5. Figure S5: Ozone POP time series averaged between 10°N − S
6. Figure S6: IEFDH calculation for QBO ozone at 90 hPa
7. Figure S7: Radiative relaxation rates, α.

8. Figure S8: Enhancement in dynamical heating, β

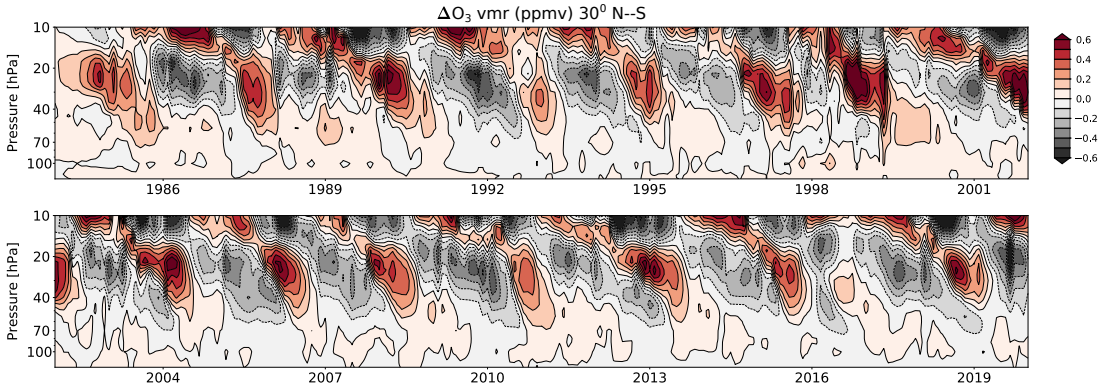

Figure S1. Time series of interannual variations in ozone (in ppmv) from the SWOOSH dataset averaged between 30°N – S.

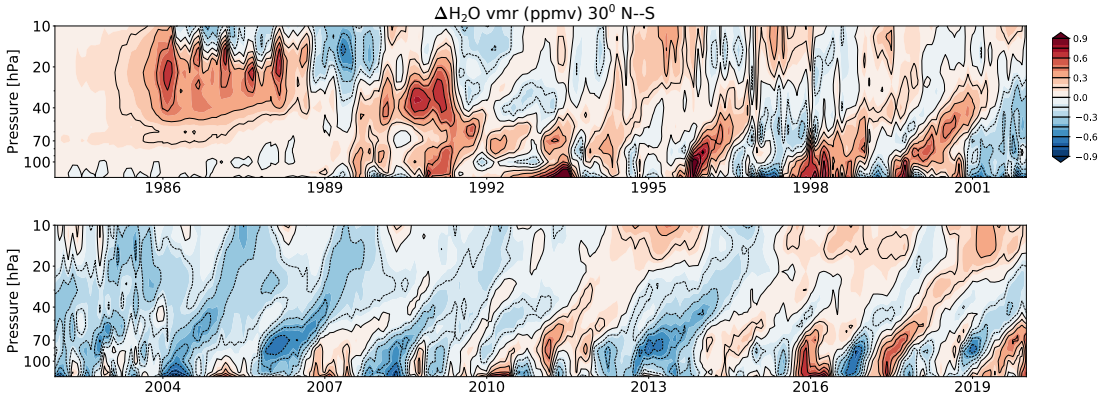

Figure S2. Time series of interannual variations in water vapour (in ppmv) from the SWOOSH dataset averaged between 30°N – S.

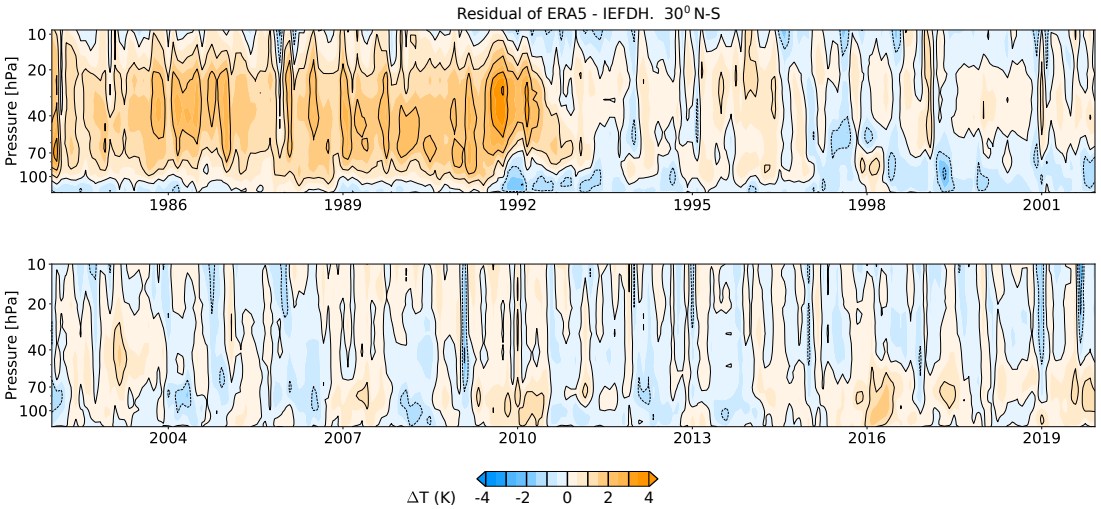

Figure S3. Difference between ERA5 temperatures, Figure 1(a) and IEFDH calculation, Figure 1(b). Values are averaged between 30°N − S.

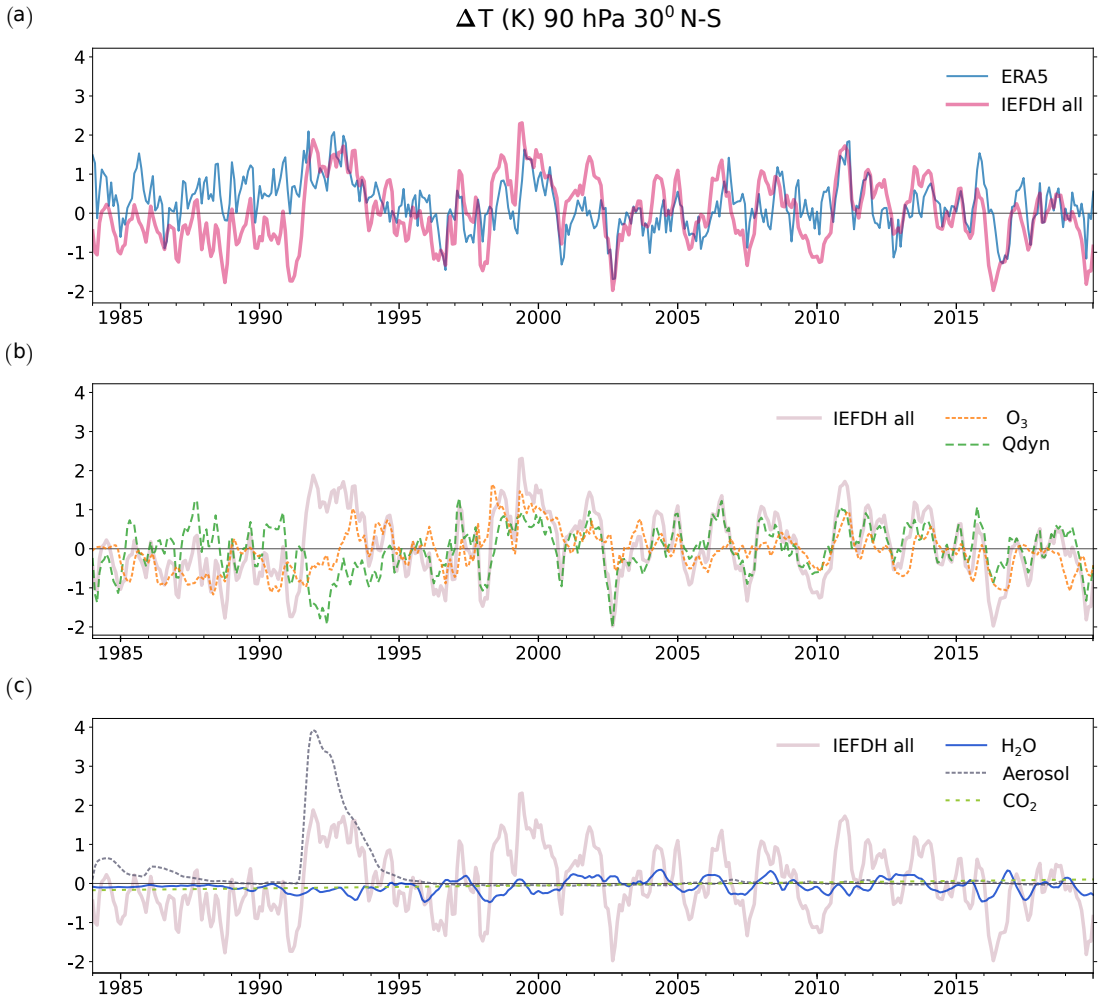

Figure S4. Similar to Figure 2 but at 90hPa. Interannual variability in temperature averaged between 30°N − S, evaluated with respect to the reference period 2002–2010 for (a) ERA5 (cyan line) and the IEFDH all perturbations radiative calculation (thick pink line). The individual contributions to the total are broken down into the those from (b) ozone (orange dotted line) and dynamical heating (green dashed line) and (c) water vapour (blue solid line), aerosol (dotted grey line) and carbon dioxide (green dashed line). In (b) and (c), the IEFDH all perturbations temperature change from (a) is plotted again as the thick pale pink line.

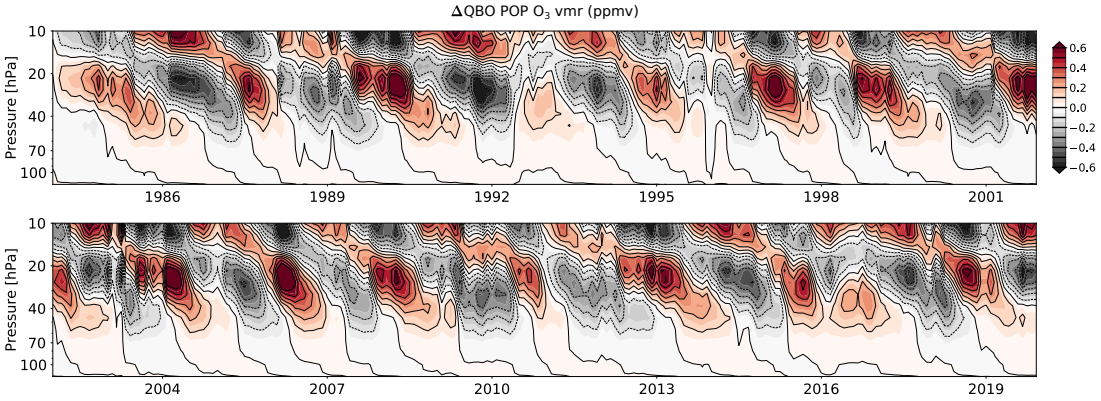

Figure S5. Time series of ozone (in ppmv) associated with the main QBO ozone POP averaged between 10°N − S.

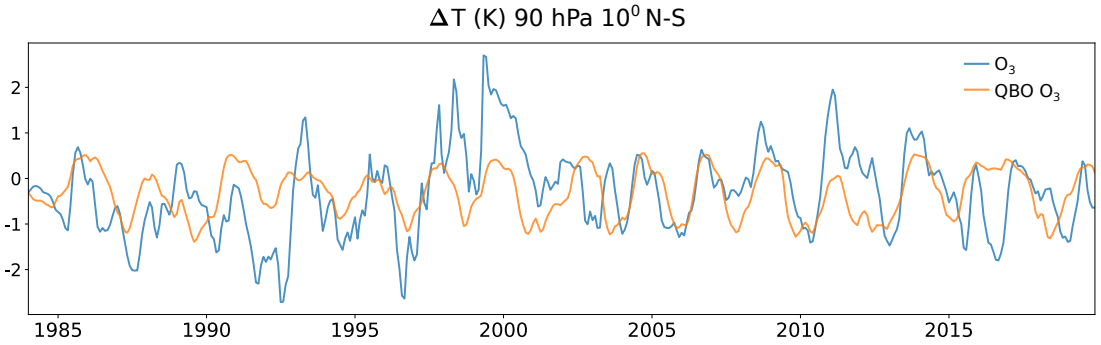

Figure S6. Similar to Figure 3(a) but at 90hPa. IEFDH temperature change (K), averaged between 10°N − S, from interannual variability in ozone and from the leading QBO ozone principle oscillation pattern time series.

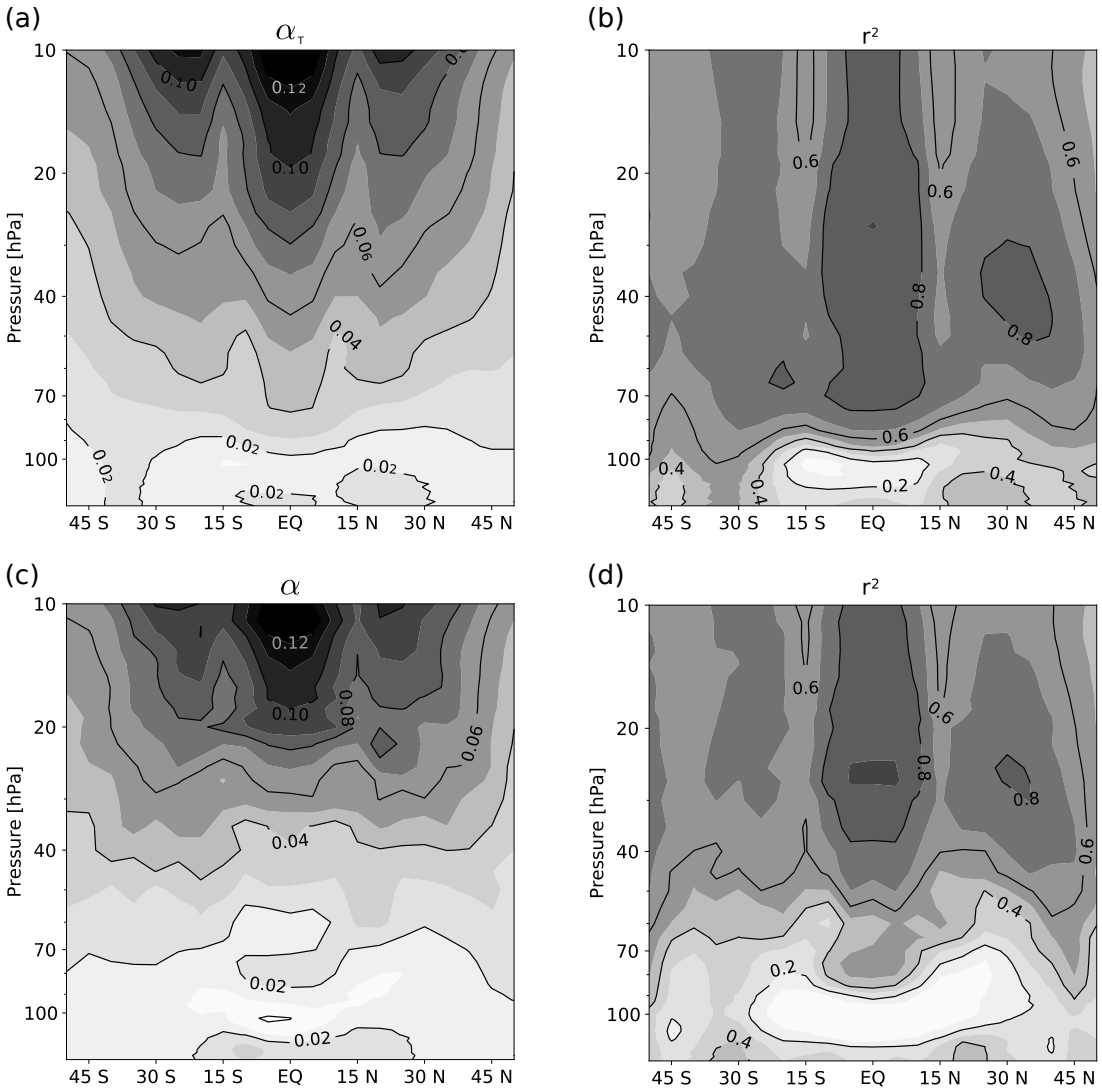

Figure S7. (a) Similar to Figure 6(b) (solid blue line) but showing the variation in latitudes for α_{T}. (b) Similar to Figure 6(c) (solid blue line), showing the corresponding r^2. (c) Similar to Figure 6(b) (dashed orange line) but showing the variation in latitudes for α. (d) Similar to Figure 6(c) (dashed orange line), showing the corresponding r^2.

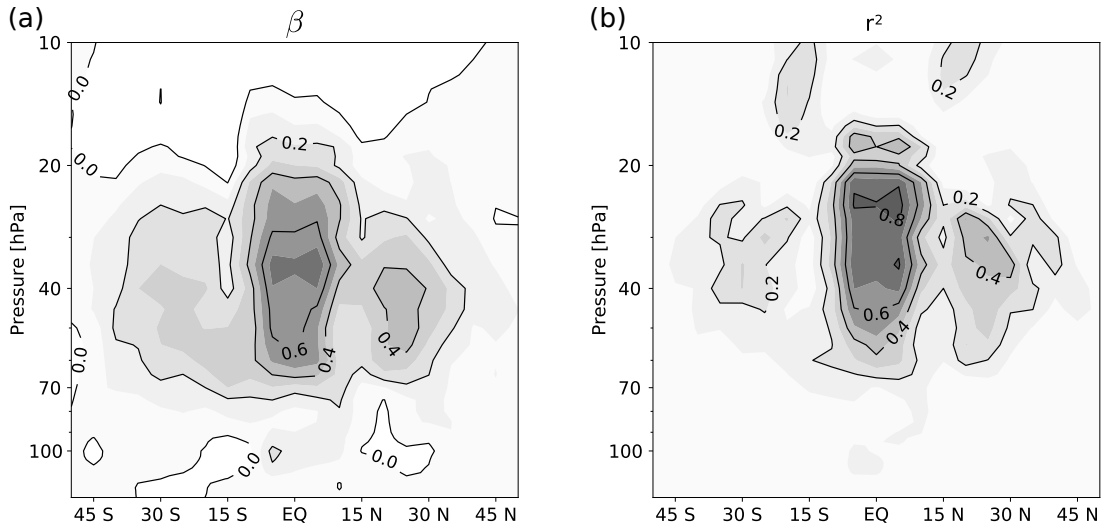

Figure S8. (a) Similar to Figure 7(a) but showing the variation in latitudes for β. (b) Similar to Figure 7(b), showing the corresponding r^2.