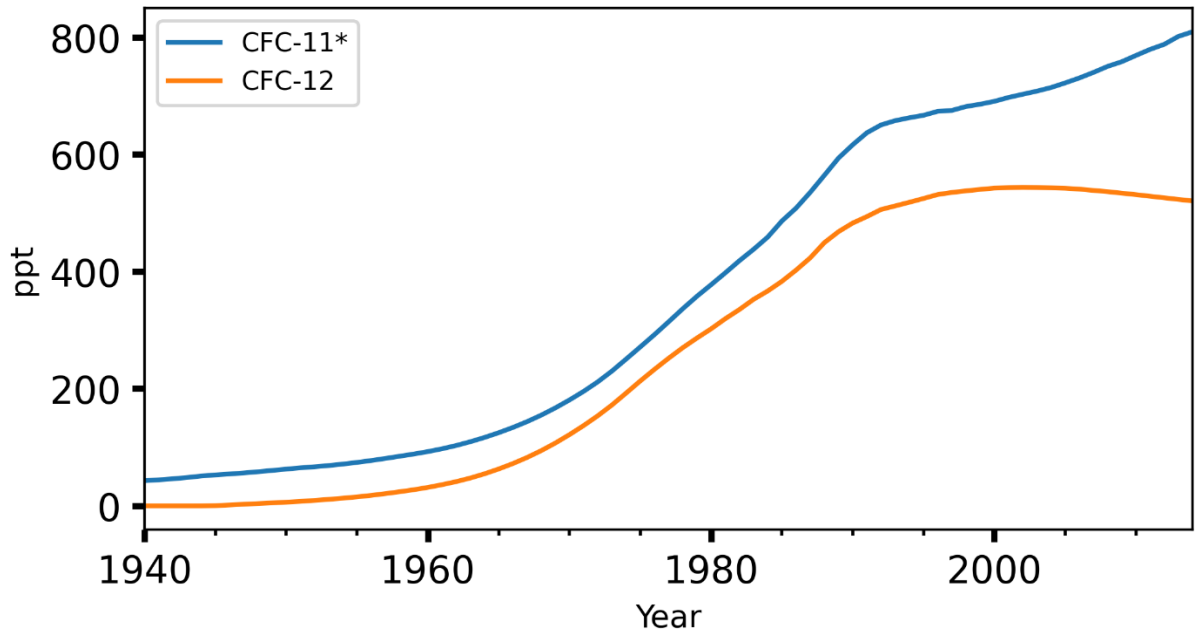
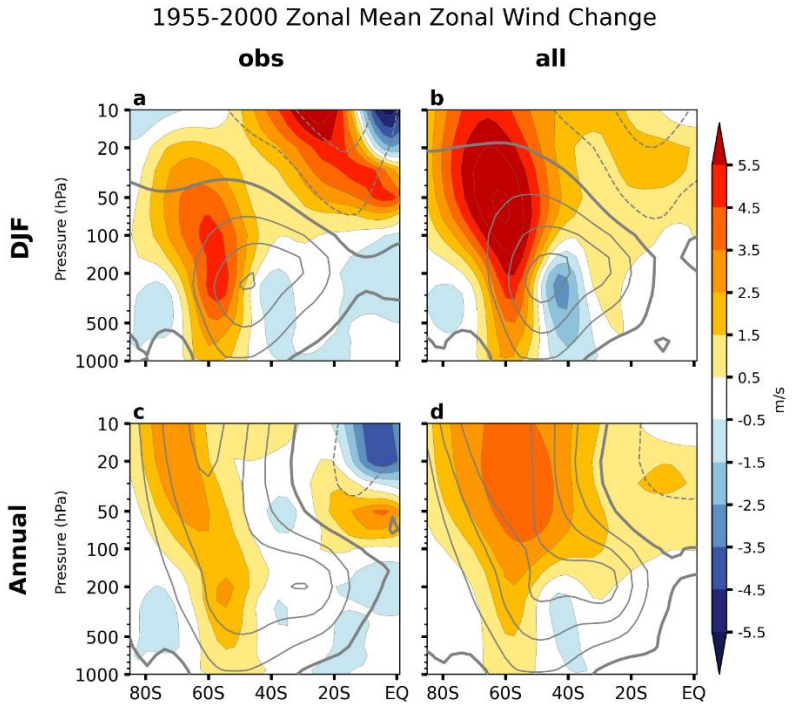
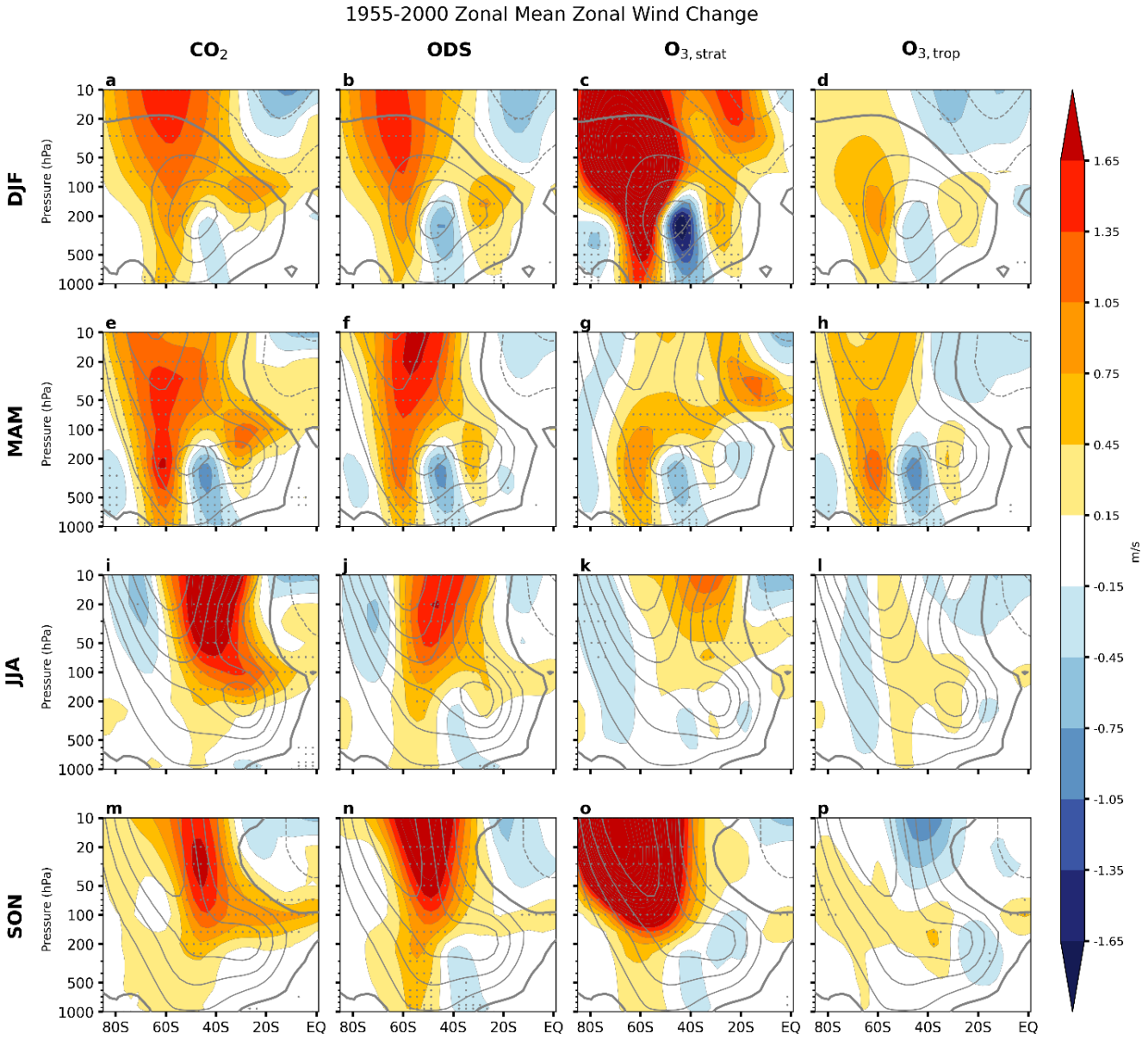
Supplementary Information to 'Large direct and indirect impacts of ozone-depleting substances on past Southern Hemisphere atmosphere-ocean trends' by Sigmond and Polvani



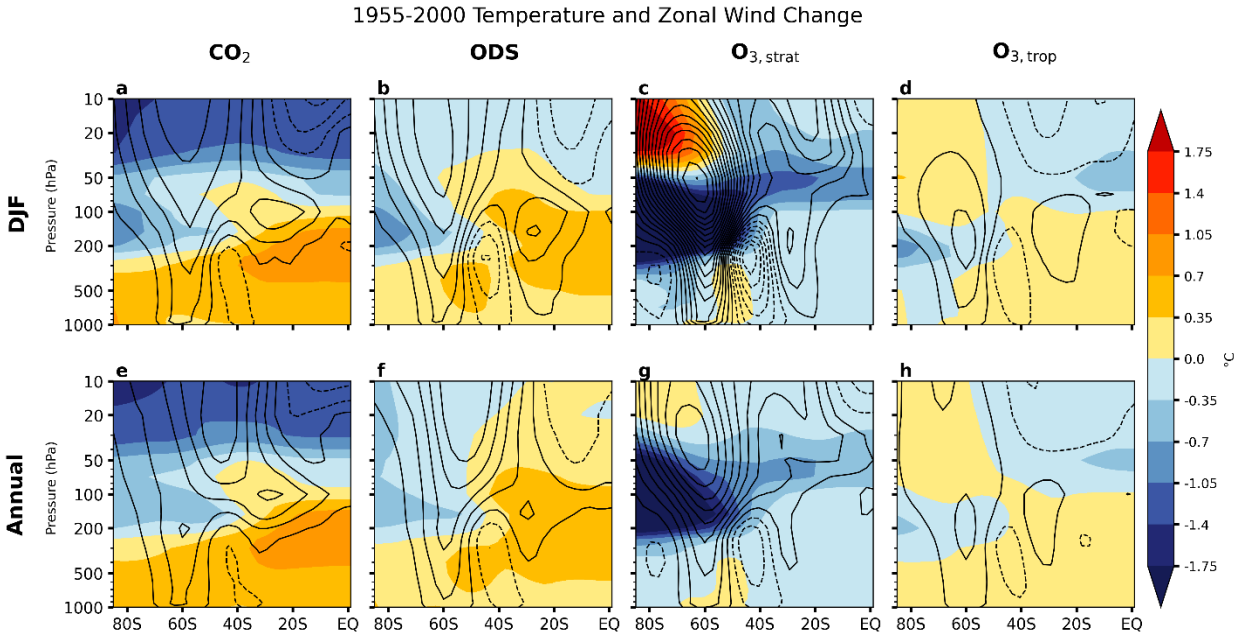
Supplementary Figure 1 | CMIP6 Timeseries of CFC-11* and CFC-12 prescribed to CanESM5. Note that CFC-11 peaked in the 1990s, and the continued growth of CFC-11* after the 1990s is due to the growth of other minor greenhouse gases that do not contribute to ozone depletion.



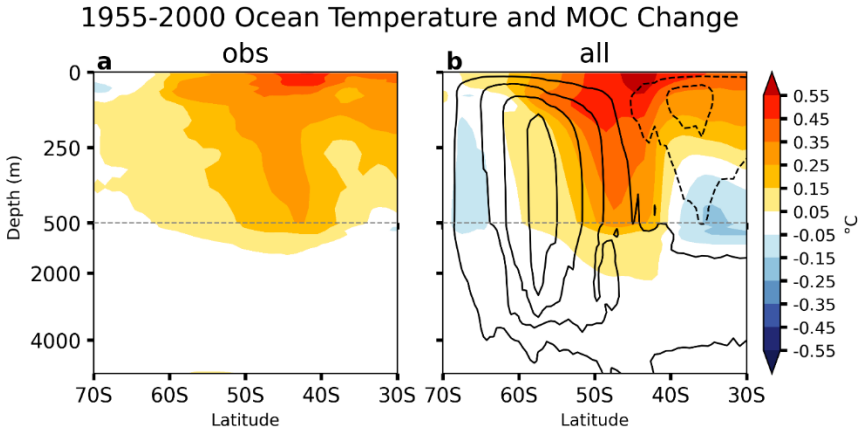
Supplementary Figure 2 | Zonal mean zonal wind change in observations and in CanESM5. a,b December-February (DJF) and **c,d** annual mean zonal-mean zonal wind change over the 1955-2000 period in **a,c** ERA5 and **b,d** simulated by CanESM5 in the historical (all forcing) simulations. The gray contours represent the climatological zonal-mean zonal wind (contour interval 10 m s^{-1}, with dashed contours representing negative values and the thick line the 0 m s^{-1} contour).



Supplementary Figure 3 | Zonal mean zonal wind response to individual forcings for all seasons. As Figure 2, with **a-d** representing December-February (DJF) means (copied from Figure 2), **e-h** March-May (MAM), **i-l** June-August (JJA), and **m-p** September-November means.



Supplementary Figure 4 | Temperature and zonal wind response to individual forcings. a-d December-February (DJF) and **e-h** annual mean (colors) zonal-mean temperature and (contours) zonal wind change over the 1955-2000 period due to **a, e** CO_2, **b, f** ODSs, **c, g** stratospheric ozone and **d, h** tropospheric ozone**.** The zonal wind responses are copied from Figure 2 (contour interval: 0.3 m s^{-1}, with dashed contours representing negative values).



Supplementary Figure 5 | Ocean temperature and Meridional Overturning Circulation change in observations and in CanESM5. a,b zonal-mean ocean temperature and **b** meridional overturning circulation change over the 1955-2000 period in **a** IAPv4 and **b** simulated by CanESM5 in the historical (all forcing) simulations. The contour interval for the MOC is 1 Sv, with dashed contours representing negative values.