This documents presents some plots to support the ones shown in the paper.

In Fig. S1 longitudinally resolved drifts of the merged anomalies time series with respect to MLS anomalies are shown, i.e. altitude vs latitude linear changes in all the longitude bins. Only in few bins mainly above 40 km the drift is found to be significant. We also notice a longitudinal asymmetry in the values above 30 km: mostly non-significant negative values are found in the [0°, 80°] longitude band, whereas positive trends are detected within [80 °, 240 °] longitude and close to zero values elsewhere.

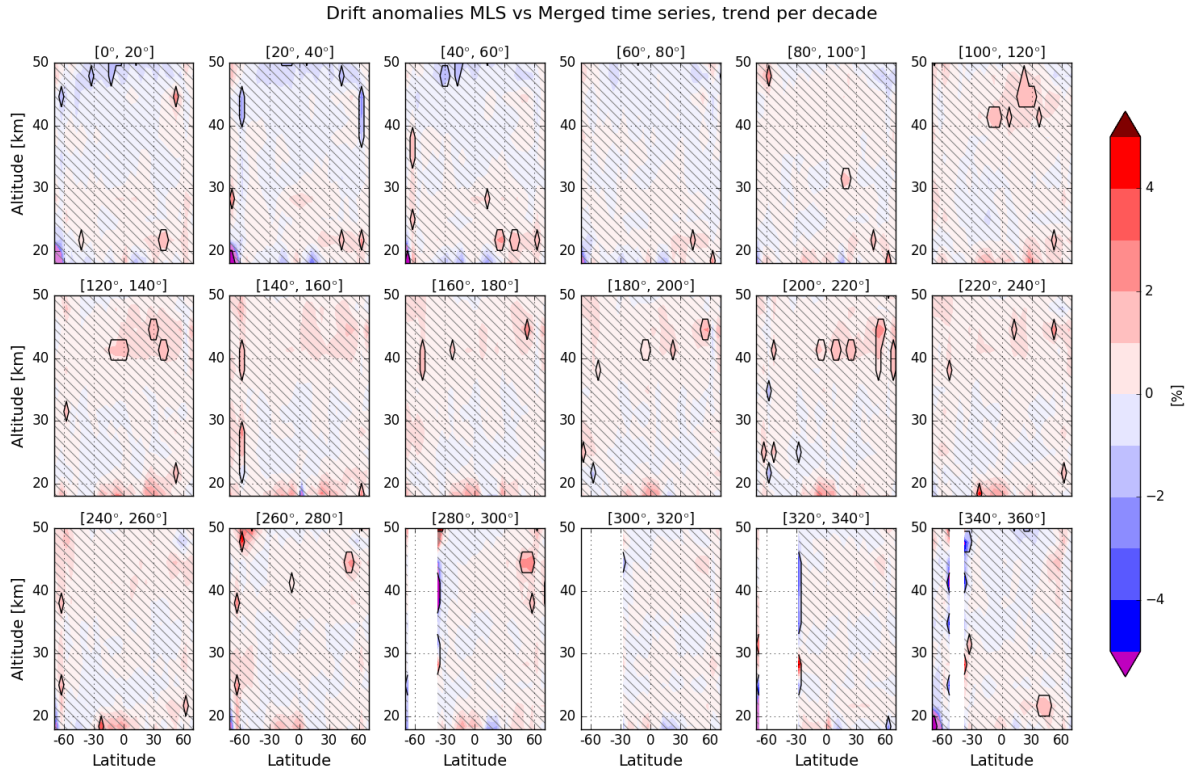

Figure S1: Longitudinally resolved drifts of the merged time series with respect to MLS over 2005–2016 as a function of latitude and altitude. Dashed areas indicate non-significant trends. The title of each sub-plot indicates the longitude bands over which the profiles are averaged.

In Fig. S2 longitudinally resolved ozone trends are shown, i.e. altitude vs latitude linear ozone changes in all the longitude bins. The hemispheric asymmetry in this plot is more evident than in the Fig. 6 of the paper, especially around 40 km, where in some longitude bands the positive trends are reduced at southern mid-latitude with respect to the northern hemisphere. In the lower tropical stratosphere negative trends are significant only in few longitude bins.

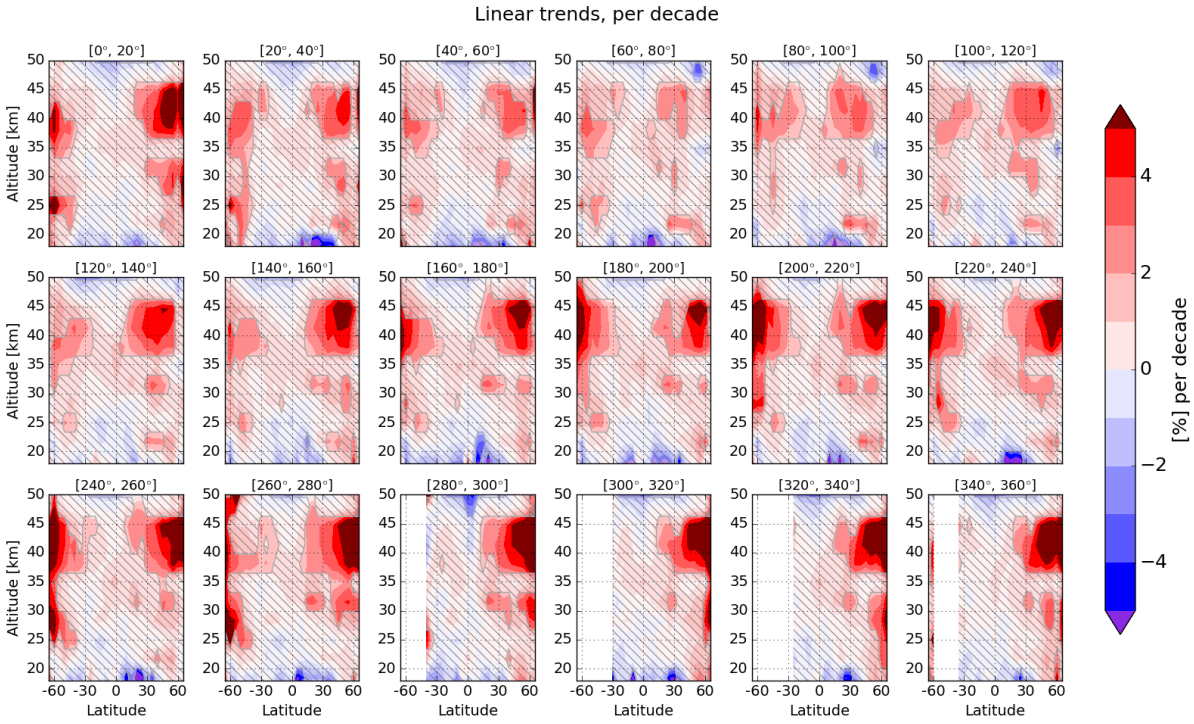

Figure S2: Longitudinally resolved linear long-term ozone variations over 2003–2018 as a function of latitude and altitude using the plain-debiased data set. Dashed areas indicate non-significant trends. The title of each sub-plot indicates the longitude bands over which the profiles are averaged.

In Fig. S3 and Fig. S4 longitudinally resolved ozone trends are shown at 21 and 35 km respectively. At the lower altitude, we notice the negative trends in the tropics and positive at mid-latitudes, in both cases mostly non-significant. This is a possible indication of the speed-up of the BDC, which transports more efficiently ozone towards higher latitudes. At 35 km we recognize a similar distributions of the values as at 38 km, with significant trends only in the southern hemisphere. At northern mid- and high-latitudes a kind of two-cell structure is found, featuring positive values over Europe and Canada and negative over Russia.

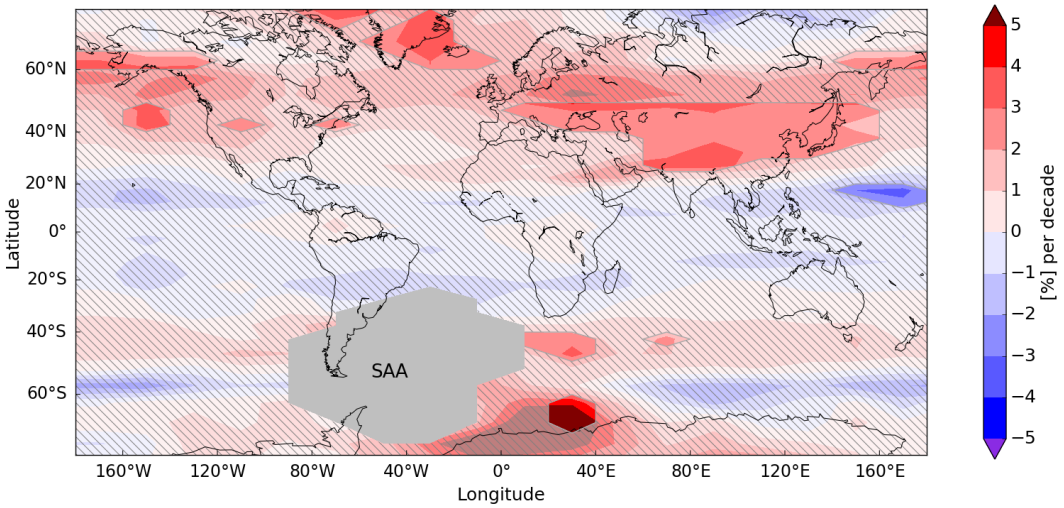

Figure S3: Longitudinally resolved linear long-term ozone variations 2003–2018 at 21 km. Dashed areas indicate non-significant trends.

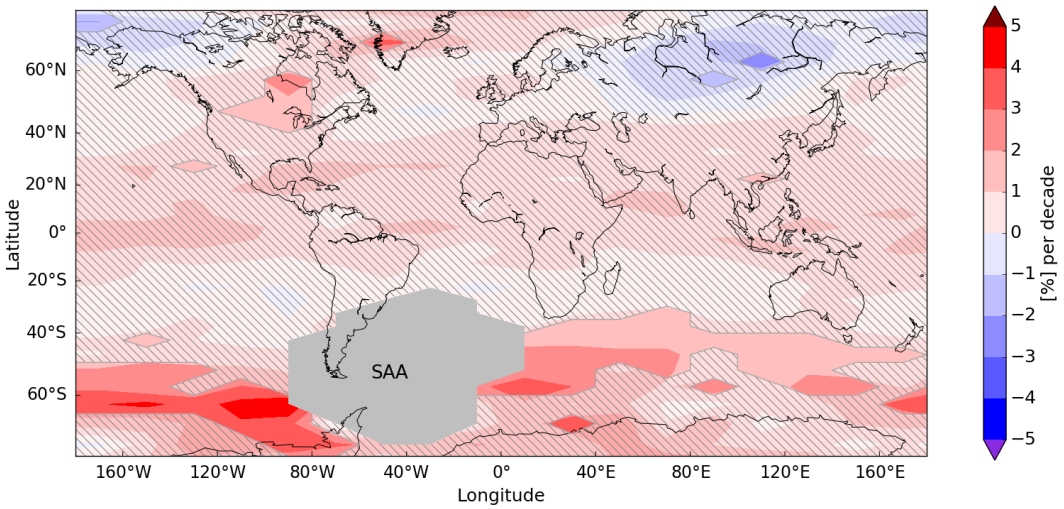

Figure S4: Longitudinally resolved linear long-term ozone variations 2003–2018 at 35 km. Dashed areas indicate non-significant trends.