Atmos. Chem. Phys., 14, 913–937, 2014
www.atmos-chem-phys.net/14/913/2014/
doi:10.5194/acp-14-913-2014

Atmospheric Chemistry and Physics Open Access

A global climatology of stratosphere-troposphere exchange using the ERA-Interim data set from 1979 to 2011

B. Škerlak, M. Sprenger, and H. Wernli
ETH Zurich, IAC, Universitätstrasse 16, 8092, Zürich, Switzerland

Correspondence to: B. Škerlak (bojan.skerlak@env.ethz.ch)

Supplementary material

	STT M	TST M	STT O3	TST O3
TP	−0.76	−0.87	−0.77	−0.85
400 hPa	−0.58	−0.78	−0.56	−0.75
500 hPa	−0.50	−0.68	−0.48	−0.64
600 hPa	−0.48	−0.61	−0.45	−0.58
700 hPa	−0.48	−0.59	−0.44	−0.57
800 hPa	−0.49	−0.59	−0.45	−0.57
PBL	−0.50	−0.60	−0.46	−0.58

Table 1: Parameters κ from the power-law fit ($c \cdot \tau^{\kappa}$ with some constant c) to globally integrated fluxes of mass and ozone.

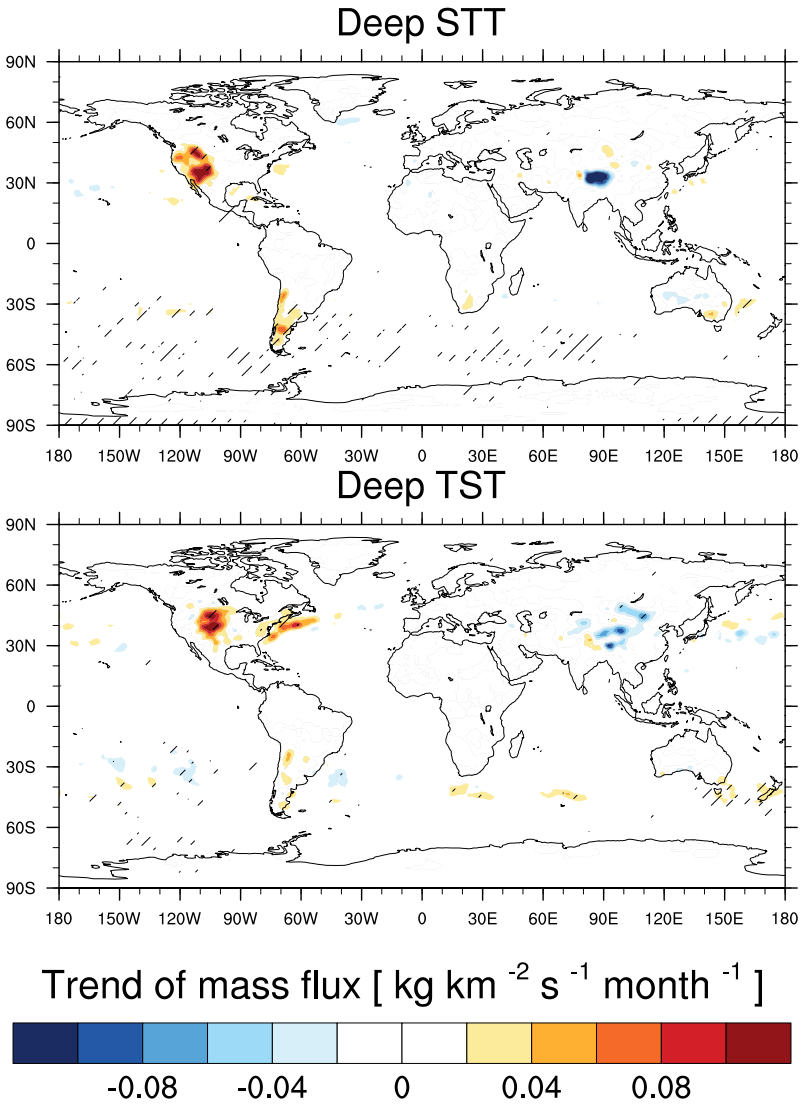

Figure S 1: Trends of deep STT mass flux into the PBL (top) and deep TST mass flux out of the PBL (bottom) from 1979 to 2011. Linear regression is applied to monthly averages at every grid point and regions where the trends are significant on a 1 % level are dashed. The trends in western and central North America are approximately 0.13 kg km^{-2} s^{-1} month^{-1} and 0.16 kg km^{-2} s^{-1} month^{-1} for deep STT and deep TST, respectively. The trend in deep STT over the Tibetan Plateau is approximately -0.19 kg km^{-2} s^{-1} month^{-1} but is only significant at a small number of grid points and does thus not appear as dashed region.

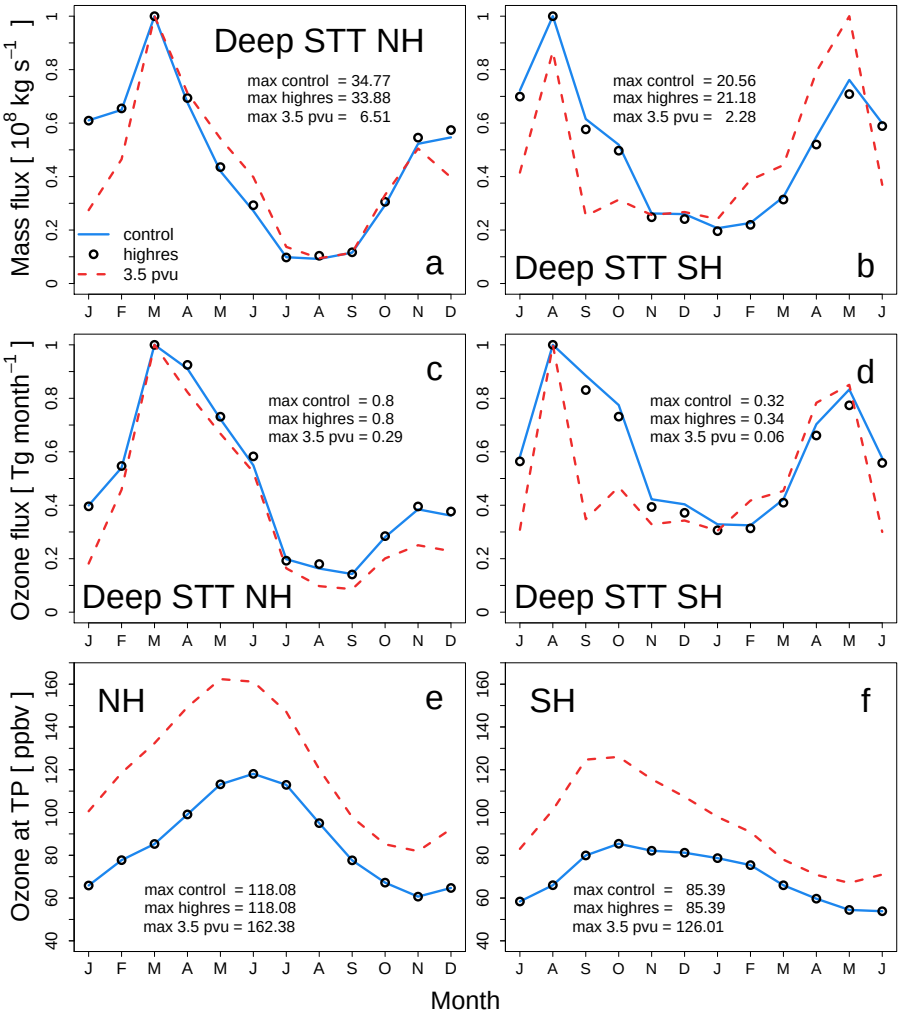

Figure S 2: Seasonal cycles of hemispherically integrated deep STT fluxes of mass (top) and ozone (middle) in the NH (left) and the SH (right) for the year 2010. The three different data sets ("control", "highres" and "3.5 pvu") are described in Sect. 5 of the manuscript. The seasonal cycles are scaled to their maximum values shown within the individual figures, facilitating the comparison of amplitude and shape of the cycles. The bottom row shows the seasonal cycles of ozone mixing ratios at the corresponding control surfaces.

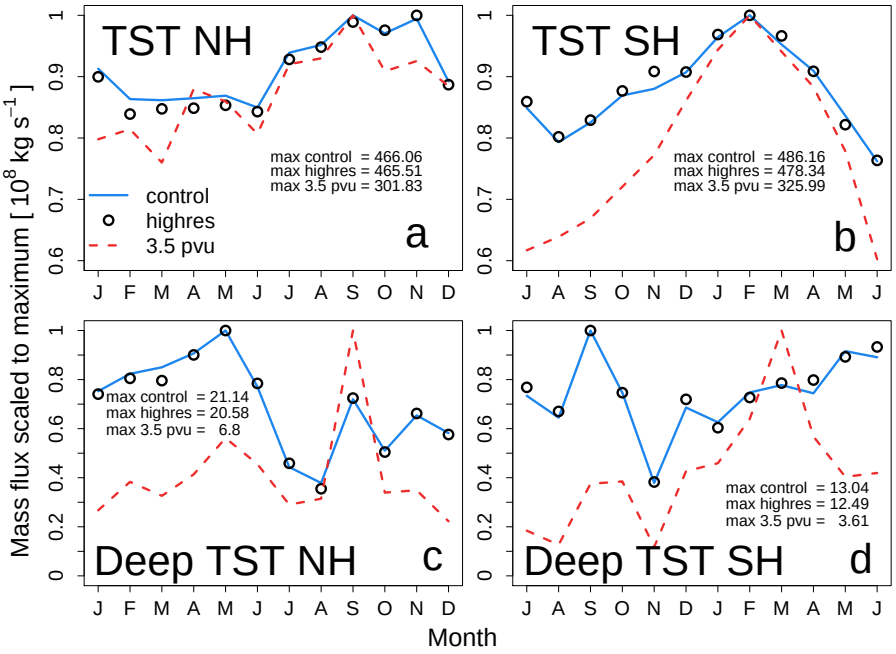

Figure S 3: Seasonal cycles of hemispherically integrated TST mass fluxes for all exchanges (top) and deep exchanges only (bottom) in the NH (left) and the SH (right) for the year 2010. The three different data sets ("control", "highres" and "3.5 pvu") are described in Sect. 5 of the manuscript. The seasonal cycles are scaled to their maximum values shown within the individual figures, facilitating the comparison of amplitude and shape of the cycles.

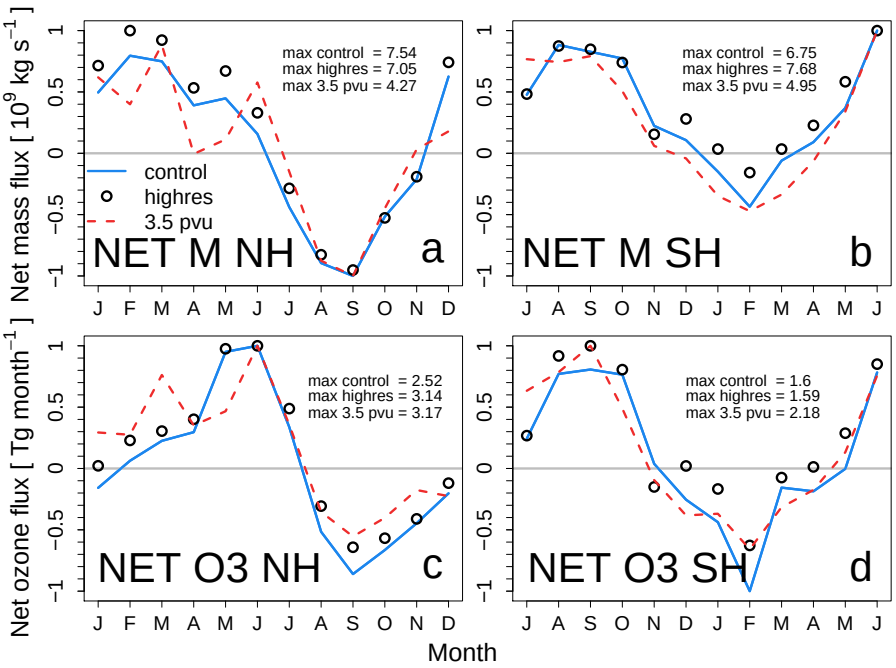

Figure S 4: Seasonal cycles of hemispherically integrated net (STT-TST) fluxes of mass (top) and ozone (bottom) for the year 2010. The three different data sets ("control", "highres" and "3.5 pvu") are described in Sect. 5 of the manuscript. The seasonal cycles are scaled to their maximum values shown within the individual figures, facilitating the comparison of amplitude and shape of the cycles.

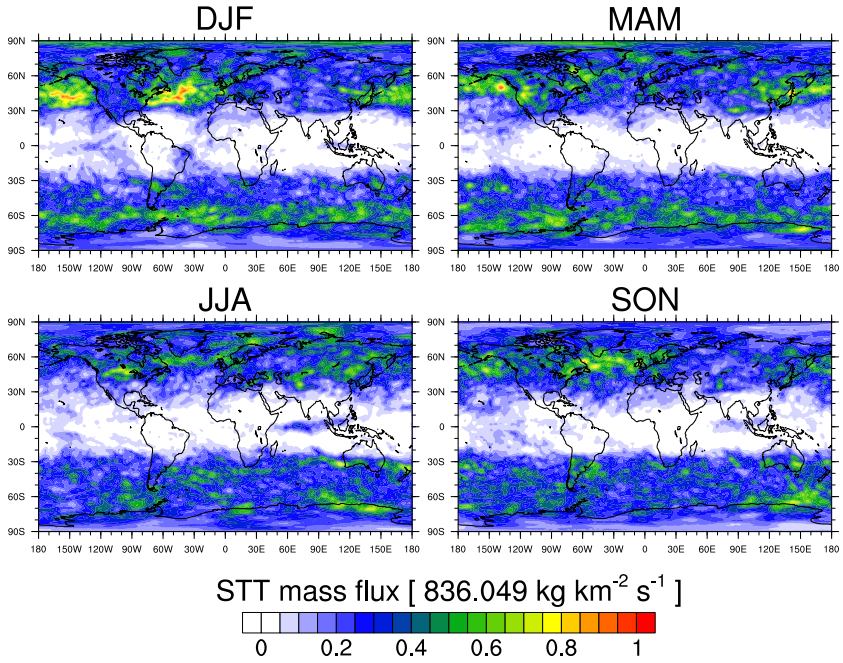

Figure S 5: Scaled STT mass flux for 2010 in the "control" setup as described in Sect. 5 of the manuscript.

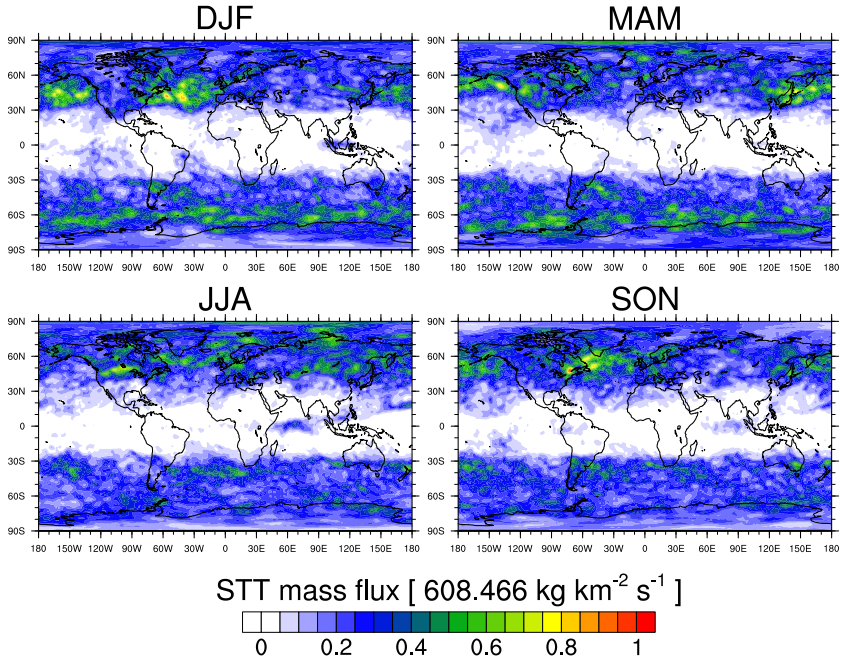

Figure S 6: Scaled STT mass flux for 2010 in the "3.5 pvu" setup as described in Sect. 5 of the manuscript.

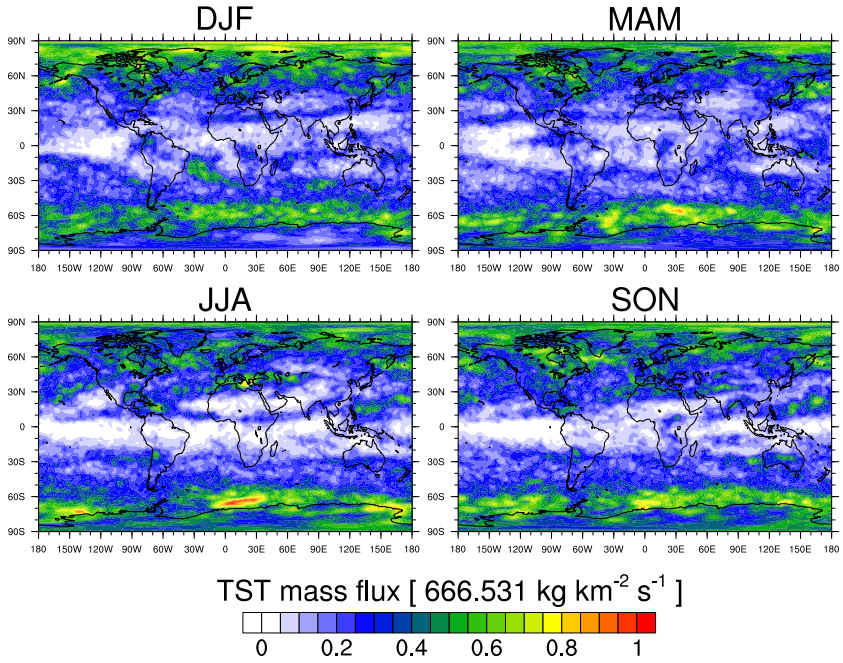

Figure S 7: Scaled TST mass flux for 2010 in the "control" setup as described in Sect. 5 of the manuscript.

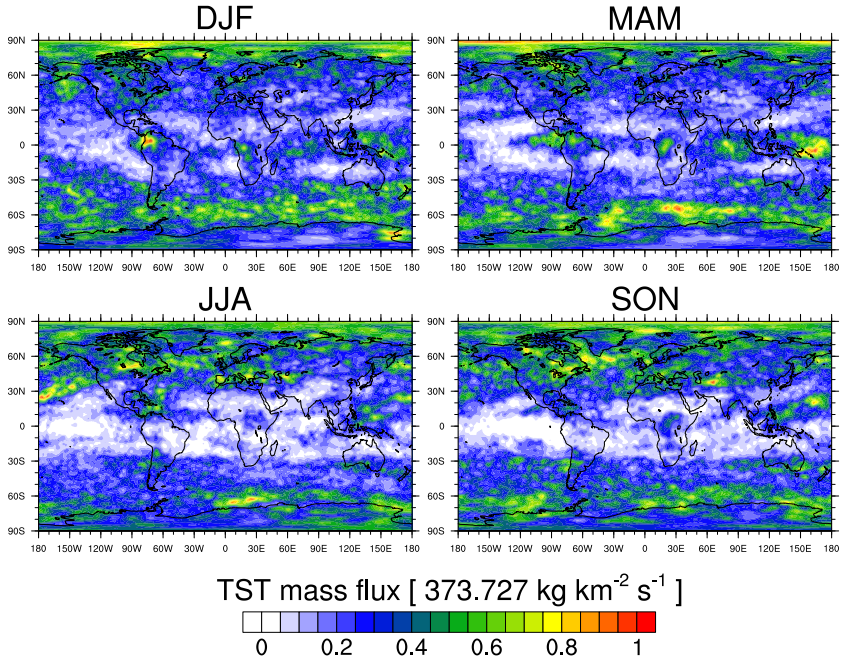

Figure S 8: Scaled TST mass flux for 2010 in the "3.5 pvu" setup as described in Sect. 5 of the manuscript.

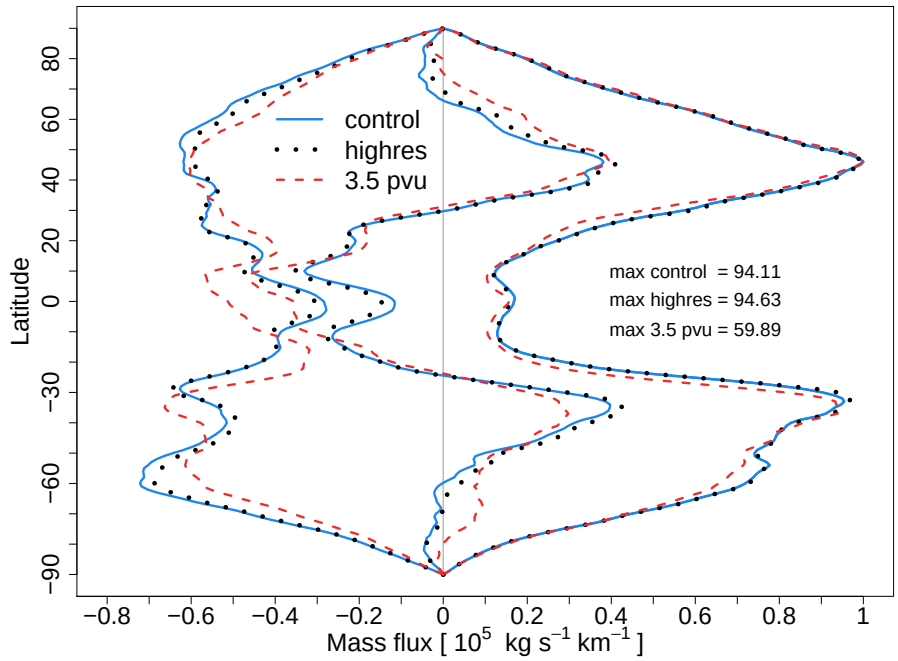

Figure S 9: Zonally integrated STT, TST and net(STT-TST) mass fluxes for the three data sets "control", "highres" and "3.5 pvu" as described in Sect. 5 of the manuscript. All curves are scaled to the maximum STT mass flux.

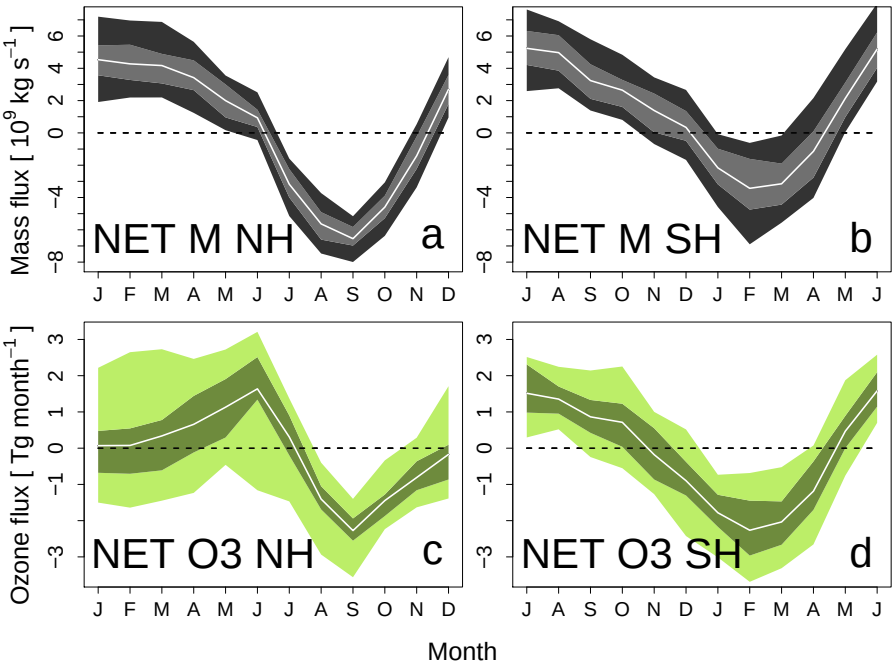

Figure S 10: Seasonal cycles of the net(STT-TST) fluxes of mass (top) and ozone (bottom) in the NH (left) and SH (right) averaged from 1979 to 2011. The shaded areas show 5 % and 95 % (light) as well as 25 % and 75 % (dark) quantiles of the monthly values. The white lines show the mean values of the 33 yr. The horizontal dashed lines are shown for visual guidance.