Atmospheric
Chemistry
and Physics

Supplement of

Reassessment of MIPAS age of air trends and variability

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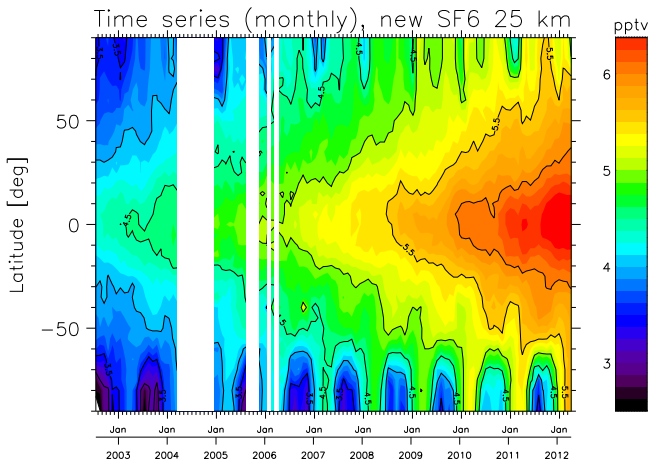*Correspondence to:* F. J. Haenel (florian.haenel@kit.edu)

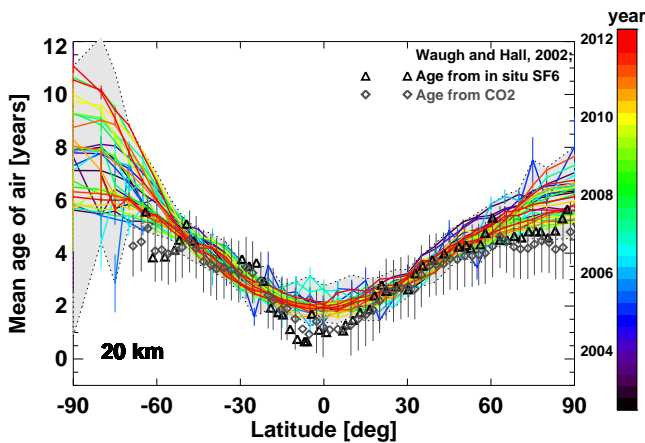**Figure S 1.** Timeseries of SF_6 monthly zonal means at 25 km.

Figure S 2. Comparison of MIPAS AoA latitude cross-sections at 20 km altitude (coloured curves and shaded area) with AoA derived from earlier airborne SF_6 (black triangles) and CO_2 measurements (grey diamonds with error bars) as published in Waugh and Hall (2002) and Hall et al. (1999). The shaded area represents the range of all MIPAS monthly mean AoA observations, while the coloured curves show AoA latitudinal dependence for every third month. The colour code provides the time of measurement.
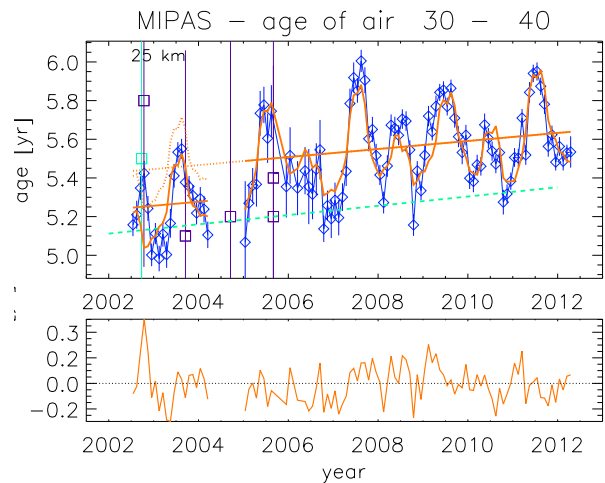

Figure S 3. Example of the fit (in orange) of the regression model to MIPAS AoA monthly means (in blue) at 25 km for 30 to $40°$ N with consideration of autocorrelation and model errors. The error bars represent the standard error of the mean (SEM). The orange line is the derived trend, squares represent the measurements by Engel et al. (2009) and green dashed line their estimated trend. Underneath the residual of the fit is shown.

References

Engel, A., Möbius, T., Bönisch, H., Schmidt, U., Heinz, R., Levin, I., Atlas, E., Aoki, S., Nakazawa, T., Sugawara, S., Moore, F., Hurst, D., Elkins, J., Schauffler, S., Andrews, A., and Boering, K.: Age of stratospheric air unchanged within uncertainties over the past 30 years, Nature Geosci., 2, 28–31, doi:10.1038/ngeo388, 2009.

Hall, T. M., Waugh, D. W., Boering, K. A., and Plumb, R. A.: Evaluation of transport in stratospheric models, J. Geophys. Res., 104, 18815–18839, 1999.

Waugh, D. W. and Hall, T. M.: Age of stratospheric air: theory, observations, and models, Rev. Geophys., 40, 1010, doi:10.1029/2000RG000101, 2002.
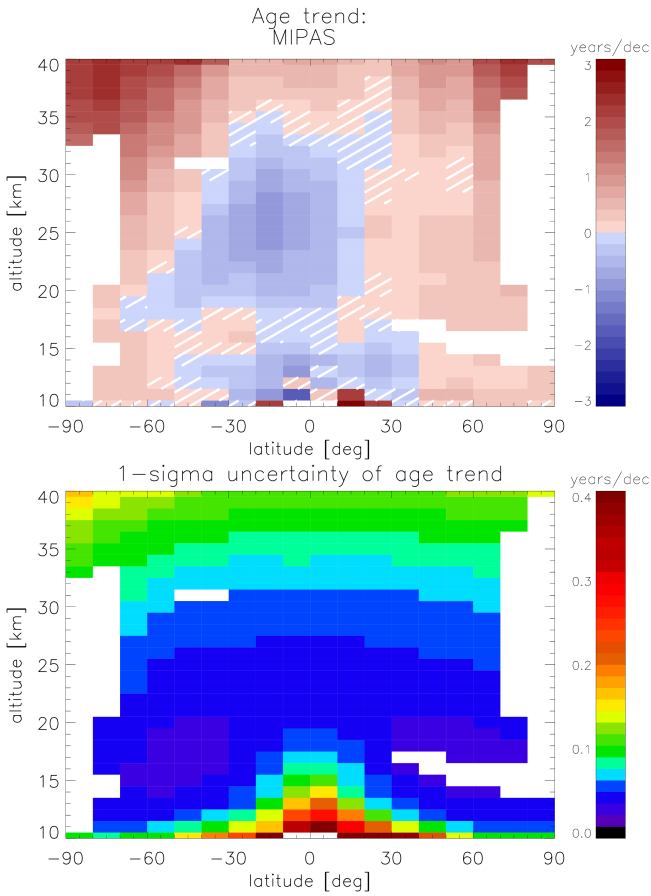
Figure S 4. Altitude–latitude cross-sections of the MIPAS age of air linear increase/decrease over the years 2002 to 2012 without consideration of autocorrelation and model errors (top), together with its 1σ uncertainties (bottom). White areas indicate where residuals between measurements and regression model get too large ($\chi^2 > 30$). Hatched areas indicate where the trend is not significant.
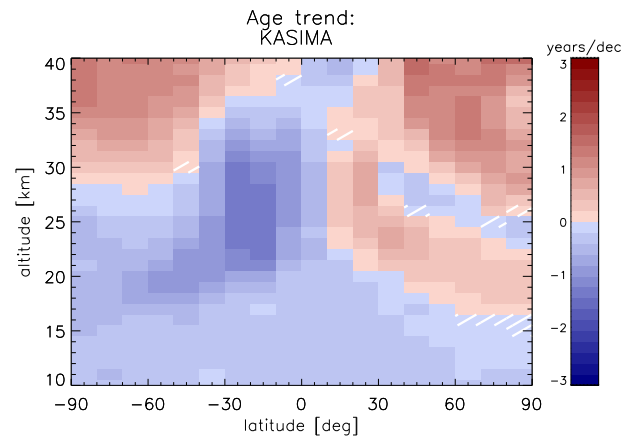

Figure S 5. Altitude–latitude cross-sections of the KASIMA age of air linear increase/decrease over the years 2002 to 2012 without consideration of autocorrelation and model errors. Hatched areas indicate where the trend is not significant.