Atmos. Chem. Phys. Discuss., 12, C6225–C6227, 2012
www.atmos-chem-phys-discuss.net/12/C6225/2012/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Age of stratospheric air in the ERA-Interim" *by* M. Diallo et al.

Anonymous Referee #2

Received and published: 27 August 2012

The paper of Diallo et al. analyzes stratospheric transport in the ERA interim data set using statistical backward trajectories over integrated over 10 years. Calculations are performed using diabatic as well as kinematic vertical velocities and are performed over the whole ERA interim period. The results are compared to in-situ as well as satellite observations from MIPAS. Spatial and temporal dependencies are inferred from multiparameter fit to resolve the dependencies of mean age to the QBO, ENSO and to look for linear trends. The paper addresses some very important topics of the stratospheric circulation by using the information of the full ERA Interim period. The methods are valid and (where available) the data are compared to observations, which however are sparse. The Figures are clear, which also holds for the text over most sections, however, some language editing would ease reading (see e.g. title). Overall I find the paper very valuable for the scientific community and recommend it for soon publication with only minor revisions.

Specific comments: p.17095, l.26: I'd prefer to distinguish between 'transit time tau' and the 'mean age' as given by the integral over the PDF of transit times (or the age spectrum). F(tau) is rather a PDF of transit times (of single trajectories) than a PDF of 'age'. Does the value of b depend on the underlying driving data set?

p.17098, l.18: What is the error of the satellite derived ages (not the statistical error of the means?). What are the uncertainty ranges given by Stiller et al?

p.17099, l.1: Is there a seasonal bias? Diurnal or weekly sample biases would not show up, due to the long lifetime of SF6.

p.17099, second paragraph: The finding that kinematic trajectories produce larger ages than diabatic is interesting. If recirculation between the TTL and the extratropical lowermost stratosphere affects this, there should be significantly younger air in the extratropical lowermost stratosphere in the kinematic scenarion (and older air in the tropical tropopause region below 380K). Did the authors check for this?

p.17100 and Fig.5: Are only diabatic age profiles are shown? How do kinematic profiles compare to this (see previous commment)

p.1702, l.1: If the oscillations are the product of a seasonaly varying Brewer-Dobson circulation, why are they not visible in Fig.5 as significant age differences between summer and winter?

p.17104, Fig.8: How does the strong gradient of phases in Fig.8 between the tropics and the extratropics between 17km and 22 km form? What is the reson for this? Did the authors consider a seasonally varying phase lag? It would be interestin to see the mean phase lag for late spring and early autumn separately.

Fig.12 and discussion: could you give potential reasons for the asymmetry between the northern and southern lower stratosphere? Is the difference related to differences in the downwelling of aged vortex air? Changes of this should be stronger in the SH?

Figs.13 and 14.: Given the importance of significance for trend analyses I recommend

to clearly indicate in the captions of Figs. 13 and Figs.14, in which cases the deduced trends are significant.

The following is not a complete list:

Title: 'Age of stratospheric air in the the ERA-Interm data set' OR 'Age of stratospheric air in ERA-Interim' ?

p.17088, l.16: Maximu'm'

p.17088, l.22: The - age - trend

p.17088, l.23: 'under' 40N? Please specify: Below a level? At lower latitudes?

p.17089, l.1: 'excepted' ? —> except

p.17089, l.20: paritcle —> particle

p.17093, l.8: damp'en'ed

p.17094, l.18: Better use the term 'first moment of the distribution' instead of 'average'

p.17095, l.6: envelop'e' (several)

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 17087, 2012.