

Interactive comment on “Stratospheric dryness” by J. Lelieveld et al.

J. Lelieveld et al.

Received and published: 7 December 2006

We thank Dr. Tuck for the constructive comments, and for drawing attention to the work of Sparling (2000) who used satellite data to calculate PDFs of stratospheric tracers to characterize transport regimes. Tuck et al. (2003) similarly used PDFs based on aircraft observations. We apply this statistical method somewhat differently by comparing model computed and collocated satellite observed parameters to test our atmospheric chemistry general circulation model. Sparling (2000) and Tuck et al. (2003) convincingly show the potential of this method in studies of mixing and transport processes over a range of dynamical conditions. We have planned similar statistical studies, and furthermore combine model results with satellite data. We expect the method could also be useful to study chemical processes.

The recent article by Richard et al. (2006) presents measurement data in support of the conclusion by Tuck et al. (1997) that air is recirculated between the tropical stratosphere and upper troposphere. Our model reproduces this phenomenon, at least

qualitatively. We are currently studying tracer-tracer correlations to verify if our model is quantitatively correct. First results will be presented on the 2006 AGU Fall meeting.

Our model results support the conclusion by Richard et al. (2006) that dehydration can continue above the thermal tropopause. Unfortunately, our model is unable to calculate ice particle size distributions and explicitly account for ice sedimentation. In our model this process is parameterized based on empirical sedimentation velocities. The idea of Richard et al. (2006) that the smallest ice particles are ablated by intense solar radiation, leading to distillation of water vapour from the smallest to the larger particles, is quite interesting. It might be practical to first test this mechanism in a detailed ice cloud microphysical model.

Jos Lelieveld

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 11247, 2006.

Interactive
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper