
Interactive
Comment

Interactive comment on “Solid particles in the tropical lowest stratosphere” by J. K. Nielsen et al.

S. Fueglistaler

stefan@atmos.washington.edu

Received and published: 24 October 2006

The observations presented by Nielsen et al. are highly interesting, as they may be evidence of convective moistening of the stratosphere. I have a few comments and ideas that may be of interest to the authors. To me, the important question is not so much whether such events may occasionally occur, but what their global mean impact on the stratospheric water vapour budget may be. I agree with the authors that a global 'upscaling' is highly uncertain, but it certainly remains the ultimate task. The main argument of Fueglistaler et al. [2005] and Fueglistaler and Haynes [2005] is that not only time-mean, but both seasonal and interannual variations of entry mixing ratios are well explained by their calculations that do not include convective moistening; and thus conclude that other processes (e.g. convective moistening) are probably of secondary importance. Because of the non-linear temperature dependence of the water vapour pressure, it is not so easy to get the correct variations (rather than just time-mean,

Interactive
Comment

where it is still possible that neglected processes simply mutually cancel) unless one has identified the main driver of the variations. Therefore I would argue that other processes are constrained to modify the entry mixing ratio budget by less than, say, order 0.5ppmv. Finally, one would expect a strong (water) isotopic signature from such convective injections into the stratosphere - perhaps this is something that could help to constrain the contribution from direct convective injection?

References —

Fueglistaler, S., M. Bonazzola, P.H. Haynes, T. Peter, Stratospheric water vapor predicted from the Lagrangian temperature history of air entering the stratosphere in the tropics, *J. Geophys. Res.*, 110 (D8), D08107, doi:10.1029/2004JD005516, 2005.

Fueglistaler, S., P.H. Haynes, Control of interannual and longer-term variability of stratospheric water vapor, *J. Geophys. Res.*, 110 (D24), D24108, doi:10.1029/2005JD006019, 2005.

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 6, 9003, 2006.

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)