

Interactive comment on “A study of polar ozone depletion based on sequential assimilation of satellite data from the ENVISAT/MIPAS and Odin/SMR instruments” by J. D. Rösevall et al.

R. Mueller

ro.mueller@fz-juelich.de

Received and published: 24 October 2006

Several methods have been developed to estimate chemical ozone loss at the poles and a variety of data sets has been used. Each method and each data set has its particular advantages and disadvantages.

It is good to see the ODIN/SMR data being employed for such a study. A good coverage of the polar region is certainly a very strong advantage of the ODIN measurements. Nonetheless, in my opinion, it is an overstatement to say that “the method outlined in Rex et al. (1998) suffers on the other hand from low temporal resolution as well as from low spatial coverage since the number of balloon sondes is limited”. In some winters,

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

e.g. 1994/94 there was a rather good temporal and spatial coverage of the vortex by ozone sondes (Rex et al., 1999). Further, using ozone tracer correlations (Proffitt et al., 1993) there is no need in principle of “sampling the entire polar vortex at once . . .”. Again, there are examples when the available measurements (ADEOS/ILAS) allowed a rather good coverage of the Arctic vortex (Tilmes et al., 2003a). Indeed, one could use the ODIN/SMR measurements themselves to follow the development of the ozone-tracer relations within the vortex.

The authors are clearly aware of the fact that the neglect of diabatic descent in the polar vortex in their analysis leads to an underestimate of the chemical ozone loss. However, I recommend that this issue is dealt within the paper in somewhat more depth. For example it is not clear how the magnitude of this effect (5%) for the results in Fig. 12 has been estimated.

Finally, I would suggest to compare the ozone loss estimates deduced from ODIN/SMR with previous estimates for the analysed winters (e.g., Tilmes et al., 2003b, Tilmes et al., 2006, Christensen et al., 2005, Streibel et al., 2006).

Minor issue: Figure 6 and 7 seem to have identical figure captions.

References

Christensen, T., Knudsen, B. M., Streibel, M., Anderson, S. B., Benesova, A., Braathen, G., Davies, J., Backer, H., Dorokhov, H. D. V., Gerding, M., Gil, M., Henchoz, B., Kelder, H., Kivi, R., Kyrö, E., Litynska, Moore, D., Peters, G., Skrivankova, P., Stübi, R., Turunen, T., Vaughan, G., Viatte, P., Vik, A. F., von der Gathen, P., and Zaitcev, I.: Vortex-averaged Arctic ozone depletion in the winter 2002/2003, *Atmos. Chem. Phys.*, 5, 131–138, 2005.

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

Rex, M., von der Gathen, P., Braathen, G. O., Reid, S. J., Harris, N. R. P., Chipperfield, M., Reimer, E., Beck, A., Alfier, R., Krüger-Carstensen, R., De Backer, J., Balis, D., Zerefos, Z., O' Connor, F., Dier, H., Dorokhov, V., Fast, H., Gamma, A., Gil, M., Kyrö, E., Rummukainen, M., Litynska, Z., Mikkelsen, I. S., Molyneux, M., and Murphy, G.: Chemical Ozone Loss in the Arctic Winter 1994/95 as determined by the Match Technique, *J. Atmos. Chem.*, **32**, 1–34, 1999.

Streibel, M., Rex, M., von der Gathen, P., Lehmann, R., Harris, N. R. P., Braathen, G. O., Reimer, E., Deckelmann, H., Chipperfield, M., Millard, G., Allaart, M., Andersen, S. B., Claude, H., Davies, J., Backer, H. D., Dier, H., Dorokov, V., Fast, H., Gerding, M., Kyrö, E., Litynska, Z., Moore, D., Moran, E., Nagai, T., Nakane, H., Parrondo, C., Skrivankova, P., Stübi, R., Vaughan, G., Viatte, P., and Yushkov, V.: Chemical ozone loss in the Arctic winter 2002/2003 determined with Match, *Atmos. Chem. Phys.*, **6**, 2783–2792, 2006.

Tilmes, S., Müller, R., Grooß, J.-U., Höpfner, M., Toon, G. C., and Russell, J. M.: Very early chlorine activation and ozone loss in the Arctic winter 2002–2003, *Geophys. Res. Lett.*, **30**(23), 2201, 10.1029/2003GL018079, 2003a.

Tilmes, S., Müller, R., Grooß, J.-U., McKenna, D. S., Russell, J. M., and Sasano, Y.: Calculation of chemical ozone loss in the Arctic winter 1996-1997 using ozone-tracer correlations: Comparison of Improved Limb Atmospheric Spectrometer (ILAS) and Halogen Occultation Experiment (HALOE) results, *J. Geophys. Res.*, **108**, 4045, 10.1029/2002JD002213, 2003b.

Tilmes, S., Müller, R., Grooß, J.-U., Spang, R., Sugita, T., Nakajima, H., and Sasano, Y.: Chemical ozone loss and related processes in the Antarctic winter 2003 based on Improved Limb Atmospheric Spectrometer ILAS II observations, *J. Geophys. Res.*, **111**(D11S12), 10.1029/2005JD00626, 2006.

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

Interactive
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper