Atmos. Chem. Phys. Discuss., 10, C6147–C6149, 2010
www.atmos-chem-phys-discuss.net/10/C6147/2010/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Three-dimensional model evaluation of the Ozone Depletion Potentials for n-propyl bromide, trichloroethylene and perchloroethylene" *by* D. J. Wuebbles et al.

Anonymous Referee #1

Received and published: 6 August 2010

In this article the authors present calculations of atmospheric lifetimes and ozone depletion potentials (ODPs) for n-propyl bromide (nPB), trichloroethylene (TCE) and perchloroethylene (PCE) derived from runs with the MOZART 3D chemistry transport model. The study is interesting and topical for ACP and is publishable after some minor revisions.

1) The most important question I have is regarding the performance of the utilized model with respect to vertical transport which is crucial when dealing with very short-lived substances (VSLS). Whether these species are able to reach the stratosphere and contribute significantly to ozone depletion or not is highly dependent

on the speed of the vertical transport and therefore on its implementation in the model (see other recent VSLS modeling studies, e.g., Gettelman et al., 2009; Aschmann et al., 2009; Hossaini et al., 2010). I am aware that the MOZART-3 model is often used and well established in the community so that tedious repetition of implementation details is not necessary here but I think this aspect deserves a little more attention since it is most relevant for this study.

Also the authors state that the MOZART-3 model has been extensively evaluated with observations (p. 17895) but the studies that were cited only contain comparisons with long-lived species like ozone or water vapor that are less affected by the vertical transport velocity. Perhaps it is possible to include references to studies which actually show that MOZART-3 is able to reproduce also realistic distributions of shorter-lived substances?

2) General remark regarding the structure of this paper: I would suggest to introduce subsections into section 2 and 3. Both sections contain a lot of information and additional paragraphs would increase clarity and readability. Moreover it would be appropriate to add a "Discussion and conclusions" section to summarize the work and concentrate the discussion of the results in one place.

3) p.17897, section 3: "Each CTM perturbation is run to steady state, ...". It would be interesting to know how long it takes to reach the steady state for your model experiments.

4) Emission rates for nPB, TCE and PCE: Are these values arbitrarily chosen? I realize that the magnitude of these fluxes is most likely irrelevant for the calculation of the ODPs but I wonder especially in the case of TCE and PCE whether you don't use the values of the Reactive Chlorine Emissions Inventory you cite at p. 17900.

5) Typo in the references for Pan et al. (2007): "extratropical"

References:

Gettelman, A., Lauritzen, P. H., Park, M., and Kay, J. E., Processes regulating short-lived species in the tropical tropopause layer, J. Geophys. Res., 114, D13303, doi:10.1029/2009JD011785, 2009.

Aschmann, J., Sinnhuber, B.-M., Atlas, E. L., and Schauffler, S. M.: Modeling the transport of very short-lived substances into the tropical upper troposphere and lower stratosphere, Atmos. Chem. Phys., 9, 9237-9247, 2009.

Hossaini, R., Chipperfield, M. P., Monge-Sanz, B. M., Richards, N. A. D., Atlas, E., and Blake, D. R.: Bromoform and dibromomethane in the tropics: a 3-D model study of chemistry and transport, Atmos. Chem. Phys., 10, 719-735, 2010

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 17889, 2010.