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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Linkages between ozone depleting substances, tropospheric oxidation and aerosols" *by* A. Voulgarakis et al.

Anonymous Referee #2

Received and published: 21 November 2012

This paper details the impacts of changes in Ozone Depleting Substances (ODSs) on tropospheric budgets of sulfate aerosols and methane. Five scenarios are examined including one which assumes no Montreal protocol and two future scenarios. In the assumed case of no Montreal Protocol there are significant changes (20-50%) in surface concentrations of sulfate aerosols in highly populated N.H. mid-latitude regions and global increases in methane radiative forcing ($\sim$0.5 W/m2). Changes in methane radiative forcing are from 6-23 mW/m2 in the other simulations. Changes in sulfate radiative forcing are more modest. The paper does not consider the impacts of climate variations.

With relatively minor revisions this paper should be ready for publication. It is short, to the point and gives some first results on the importance of coupling between the strato-

sphere and the troposphere on the tropospheric budgets of aerosols and methane.

Major Comments:

1) An evaluation of the aerosol distribution in the newest model version (Shindell et al., 2012) has evidently not been published. Have the authors evaluated the aerosols in this new model version? Is the aerosol evaluation similar to that published by Koch et al (2006) and Shindell et al. (2006). The authors should show in a supplement or otherwise convince the reader that their aerosol distribution in the new model formulation is reasonable. It is not clear the extent to which the evaluations by Koch and Shindell published in 2006 apply to the newest version of the model.

Minor Comments:

1) p2555,l14: Please give tropospheric methane lifetime.

2) p2555,l25: Please give Lightning NOx emissions averaged over present day.

3) p2555,l26: Please give isoprene emissions averaged over the present day.

4) p2555,l18: The soil NOx emissions seem very low, at least compared with the Jaegle estimates. Please provide a reference for the 2.7 TgNyr-1.

5) p25556,l9: Please state at the onset of this paragraph that the simulations assume present day climate.

6) P25558,l18: I believe the additional experiment discussed here included the WACFC scenario for ODS. Please make this explicit when initially describing the experiment.

7) P25559, l3:"and to more". Please clarify.

8) P25559,l22: "climate changes due to CFCs". Maybe better to say circulation changes rather than climate changes?

9) P25559: "changing future emissions and climate change. . ." This is a rather complex subject involving changes in stratospheric ozone, changes in STE and changes

in tropospheric chemistry. Some of these other changes are discussed in the following paragraph. Nevertheless, the statement that changes in future emissions and climate augment the changes in ODS could be made more coherently.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 25551, 2012.