Atmos. Chem. Phys. Discuss., 9, C7302–C7303, 2009
www.atmos-chem-phys-discuss.net/9/C7302/2009/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Global atmospheric budget of acetaldehyde: 3-D model analysis and constraints from in-situ and satellite observations" *by* D. B. Millet et al.

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Received and published: 19 November 2009

The authors discuss the acetaldehyde yield from the MVK + O_3 reaction. They correctly state that this yield in MCMv3.1 is 10%. However, they state that in MIM2, a reduction of MCMv3.1, no acetaldehyde source is included from MVK + O_3. This is not the case. In fact, the yield from this reaction is exactly the same as in MCMv3.1 (see electronic supplement of Taraborrelli et al. (2009)).
Furthermore, MIM2 is reported computing an acetaldehyde yield of 2% from isoprene oxidation in the context of yields calculated with a box model. This is somewhat misleading as in Taraborrelli et al. (2009) a global annual average yield for ac-

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etaldehyde was computed with the use of a 3D atmospheric model. The method of computation used (Butler (2009)) and dry deposition of acetaldehyde precursors may have played a role in decreasing the yields from box model simulations with MCMv3.1. In this respect, it would be interesting to know the global annual average yield of acetaldehyde from isoprene in GEOS-Chem.

It would also be interesting to know what causes the GEOS-Chem acetaldehyde yield from isoprene to go from 2.5% under high-NO_x to 6.9% under low-NO_x. The authors state that under low-NO_x conditions the OH concentrations are a factor of two lower and reactions with O_3 play a larger role. However, efficient OH-recycling routes in isoprene oxidation have recently been discovered (Lelieveld et al. (2009); Paulot et al. (2009); Peeters et al. (2009)). As a consequence, OH levels are also sustained under low-NO_x conditions. Moreover, although MCMv3.1 has a too high acetaldehyde yield from MVK + O_3, the overall acetaldehyde yield goes from 4.7% under high-NO_x to 4.3% under low-NO_x. This is significantly different from GEOS-Chem. Where do the differences between MCMv3.1 and GEOS-Chem arise from? Different propene yields? This discrepancy may be partially resolved if the GEOS-Chem yield under low-NO_x was erroneously taken from the model output. In fact, from Figure 2 this yield seems to be about 4% instead of 6.9%. If confirmed, the estimate of 19 Tg/yr of acetaldehyde from isoprene oxidation under low-NO_x should be reduced to about 11 Tg/yr.

References

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Interactive comment on Atmos. Chem. Phys. Discuss., 9, 24225, 2009.