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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Consistent simulation of bromine chemistry from the marine boundary layer to the stratosphere – Part 2: Bromocarbons" *by* A. Kerkweg et al.

Anonymous Referee #1

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General comments:

Bromine chemistry is important in both troposphere and stratosphere. This article as part of a series study addresses one of the dominant natural sources of reactive bromine: bromocarbons, in a GCM model by using a recently published emission dataset. A wider comparison with measurement is done which is helpful for further improvement of the emissions. In addition, the analysis of each bromocarbons contribution to Br production from boundary layer to the stratosphere also gives a useful picture about their relative importance in Br supply at different altitude. Generally, the model results match well with observations, except bromoform (Fig. 4), as observed

CHBr3 mixing ratios mostly decrease towards high altitude, whereas most simulated profiles increase towards the tropopause. The authors concluded that this is a consequence of the overestimated emission flux. However, from Warwick et al. (2006a) figure 4 (scenario 5, which is the emission scheme used in this study), I can not see a big discrepancy between their CTM result and the PEM-TROPICAS measurement. Since this comparison in Warwick et al. paper is just for a specific latitude (at 2S), I am not sure if there is a similar result/conclusion to this study. So I suggest a further comparison/discussion with Warwick et al. model results. In addition, I find the CHBr3+OH reaction rate listed in the supplementary file, which is G7404=4.E-12exp(-1470./temp), is wrongly cited from Yang et al. (2005) paper, which is =1.60E-12exp(-710/temp). Is it just a typo? If not, then the discrepancy between your model result and measurements could be understood. As the rate from G7404 is only 1/5 of the Yang et al. rate at T=300K, and will be about 1/20 at T=200K, which means a much slower oxidation rate used in upper layer. In case this happens, all discussions in section 3.1 and part in section 4 need to be rewritten.

Special comments:

p 9490, line 19: are you sure that 'algae falling dry during low tide' is the most likely explanation for that? If so, please give a reference. Is it due to the much higher primary productivity in coastal region where there is more nutrient supplied?

P9490, line 20-21: could you supply some information of why there is a decrease trend of measured CH3Br between 1998 and 2003?

P9492, line 12-13: How did you derive the conclusion that 'the lifetime of CH3Br is up to a factor of two larger than previous estimations (WMO, 2007)'? In Table 2, the WMO CH3Br lifetime is 255 days, and your figure is 386 days. I can only get a ˜50% increase, how can you derive a factor of two?

P9493, line 10-14: the much higher Br produced from bromoform need to be confirmed by checking the rate used in the model.

ACPD

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Interactive Comment

P 9493, line 16-17: I do not think the usage of a fixed height of 100 hpa is a good way to do discussion here. Actually, it introduces confusion. Remove it.

P9494, line 25: can you give a coarse estimation about halons contribution in stratospheric Br (reference)? Or simply make a comparison with CH3Br in Br contribution?

Minor comments:

P9489, line 24: change 'sofar' to 'so far'

P9493, line 23 change 'neglible' to 'negligible'

P9527, Figure 22: add Y-axis title

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 9477, 2008.