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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Recent trends in atmospheric methyl bromide: analysis of post-Montreal Protocol variability" *by* S. A. Yvon-Lewis and E. S. Saltzman

Anonymous Referee #2

Received and published: 7 May 2009

General comments:

I enjoyed reading this paper. It is a study of the tropospheric budget of methyl bromide, opportunistically examining recent changes in the atmospheric concentration which result from known emissions reductions and environmental changes, in order to illuminate the known uncertainties in the budget. The main conclusions of the paper are 1) while there is room in this analysis for a small quantity of previously unaccounted-for agricultural emission, the bulk of the budget imbalance is from a different source; 2) known variations in anthropogenic sources and in El-Nino-influenced processes can account for most of the observed interannual variability, and 3) the 'missing source'

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is most probably constant in an interannual sense. The missing source is assigned a seasonality in this study in order to provide the best fit to the model, however the seasonality and distribution are not emphasized as discussion points, because the model is not geographically detailed enough to provide the necessary constraints.

I found particularly interesting the point from Figure 5, that in response to the decline in atmospheric concentrations, the summer open oceans are now expected to produce a net source of CH3Br. This would be worth exploring with measurements in a future study.

The material is generally very clearly laid out and explained, with plentiful and appropriate references. The Figures are much improved after the changes made in response to Reviewer #1's comments.

I would like to see one more sensitivity simulation, exploring the ability of the ITCZ to affect the amplitude of the seasonal cycle in each hemisphere in this model. I think such a simulation could convert this very good paper into an excellent one.

Specific comments:

I agree with reviewer #1 that the limitations of the 2-box atmospheric model preclude too much weight being given to changes in the seasonal amplitude of the CH3Br mixing ratios. I would like to see a further model run (probably based on Scenario 8), which assumes that the 'missing source' is confined to the tropics, and distributes it seasonally into the northern and southern hemispheres based on the mean location of the ITCZ. This would be a sensitivity test, since the exact distribution of the missing source is not known, and it is not possible to redistribute the other tropical sources in this way. It would probably be illuminating to discuss the results of such a test as part of the discussion of what constraints the seasonal amplitude places on the lifetime of CH3Br.

The text describing scenario 7 (pg 6525) does not make clear that the lifetime is in-

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creased, as in scenario 6. Please add a brief note to this effect.

pg 6526, line 18: I don't recall any previous discussion of elevated CH3Br concentrations in 2005, only of increased QPS emissions. A comment explaining the 2005 elevated concentrations would be in order here.

Conclusions, line 22: The assertion that there is no evidence from this study that the anthropogenic contribution to the budget has been underestimated seems to contradict what was said in line 6, namely that it is likely that up to 20% of the missing source is due to underestimation of fumigation emissions. So, which is true?

Table 1: I found the (60% ag) notation in Table 1 a little confusing the first time I came to the table. It might help to indicate in the text (p6518) that the pre-phaseout sources and sinks are in the first column of Table 1, and explain the (60% ag) notation in the footnotes or header for Table 1.

Technical corrections:

Table 1: Caption says '2005', table says '2007'

Table 1 top line, delete extra 'Best'

pg 6522 line 5, "an increase in the atmospheric burden of CH3Br."

pg 6522 line 14, delete extra 'CH3Br'

pg 6523 line 11, "combined increase in biomass"

pg6525 line 9, "As in scenario 6"

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 6515, 2009.