Atmos. Chem. Phys. Discuss., 5, S1820–S1821, 2005
www.atmos-chem-phys.org/acpd/5/S1820/
European Geosciences Union

Atmospheric Chemistry and Physics Discussions

ACPD

5, S1820–S1821, 2005

Interactive Comment

Interactive comment on "New insight into the atmospheric chloromethane budget gained usingstable carbon isotope ratios" *by* F. Keppler et al.

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Received and published: 28 July 2005

The paper presents updated information on the atmospheric budget of chloromethane with the emphasis on 13CH3Cl as additional constraint. Although the use of isotope ratios to constrain budgets is not new and has been, as mentioned by the authors, previously used to gain insight into the budget of chloromethane and other methyl halides, the newly emerging information on atmospheric sources and sinks of chloromethane justifies a new look at the budget. Since chloromethane is an important atmospheric trace gas the paper clearly merits publication. One of the merits of the paper is an up to

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date summary of the known sources and sinks of chloromethane, including their carbon isotope ratios. Based on this information the authors present three different scenarios for the atmospheric CH3Cl budget. These scenarios are very useful for identifying gaps and limitation of our current understanding of the atmospheric CH3Cl budget and can be very useful for identifying further research needs. Nevertheless, I would have liked to see a more rigorous approach to the isotopic budget of atmospheric CH3Cl. In combination with a conventional budget using equation (4) would allow calculation of the combined effect of all unknown sources and sinks. For this purpose the budget equations simply have to be separated into known and unknown sources and sinks. This gives the isotope ratio and magnitude for the sum of all unknown sources and sinks. Based on this and the corresponding uncertainties, which can be derived from the budget equations using simple Gaussian error propagation, it should be possible to identify the range of plausible solutions for the unknown magnitude of the abiotic leaf litter source and bacterial sink of CH3Cl. A similar approach has already been used in the cited paper by Thompson et al., although with limited success due to the at this time very sparse information on isotope ratios for atmospheric sources and sinks of CH3Cl. There is another point which merits some further discussion. The uptake by soil due to microbial activity and the production from leaf litter are treated as entirely independent processes. However, they may very well to some extent occur simultaneously within the soil. In this case the impact on the atmosphere would be a combined effect from both processes. One example where such combined production and loss processes are very important is methane emissions from wetlands. This has important consequences. Measured emissions (rates and isotope ratios) as well as the response of the atmosphere towards changes in source strength or removal rates will be different. Furthermore, the atmospheric life time of CH3Cl will depend on the actual deposition rates, but not on soil internal turnover. This is important for understanding the variability of the atmospheric mixing ratios and isotope ratios of CH3Cl.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 3899, 2005.