Atmos. Chem. Phys. Discuss., 5, S1837–S1838, 2005
www.atmos-chem-phys.org/acpd/5/S1837/
European Geosciences Union

Atmospheric Chemistry and Physics Discussions

ACPD

5, S1837–S1838, 2005

Interactive Comment

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

J. Kaiser

kaiser@princeton.edu

Received and published: 1 August 2005

1) It is worth noting that equation (4) assumes steady state, which is probably justified over the relatively short atmospheric lifetime of chloromethane (about 1 year).

2) A small correction is required to equation (4) that is common to a number of publications in the field. I think it therefore justifies this short comment. I derive the amount of the correction in the following, step by step:

If the isotopic budget is at steady state, then the (weighted average) isotopic composition of the sources must equal that of the chloromethane being lost in the sinks, i.e.

Full Screen / Esc
Print Version
Interactive Discussion
Discussion Paper

EGU

$\delta^{\text{source}} = \delta^{\text{sink}}$.

Note that I am simplifying this and the following equations by not explicitly including the calculation of weighted average isotopic compositions and isotope effects. The isotopic composition of the chloromethane being lost is given by the atmospheric composition and the (weighted average) isotope effect of the sinks, i.e.

$\delta^{\text{sink}} = (1 + \delta^{\text{atm}})/\text{KIE} - 1$,

if KIE is defined as the rate constant of the lighter isotopologue divided by the rate constant of the heavier isotopologue (inverse to the definition of the isotope ratio). Introducing the fractionation constant (isotope effect) ϵ as in equation (3) of the paper and solving for δ^{atm}, then gives

$\delta^{\text{atm}} = \delta^{\text{sink}}(1 + \epsilon) + \epsilon$.

Assuming steady state this gives

$\delta^{\text{atm}} = \delta^{\text{source}}(1 + \epsilon) + \epsilon$.

This differs in the factor $(1 + \epsilon)$ from equation (4) in the paper. The correction will be of the order of a few %.

3) There seems to be a minor typographical problem with the superscript "sink": It appears as "sin k", i.e. the sinus of k.

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