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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Centennial evolution of the atmospheric methane budget: what do the carbon isotopes tell us?" *by* K. R. Lassey et al.

Anonymous Referee #1

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Centennial evolution of the atmospheric methane budget: what do the carbon isotopes tell us? K. R. Lassey, D. M. Etheridge, D. C. Lowe, A. M. Smith, D. F. Ferretti Atmos. Chem. Phys. Discuss., 6, 4995-5038, 2006

General

This is an extremely valuable reassessment of the evolution of the methane source inventory over the 20th century. The paper is important, both for its historic perspective and for its forward implications. I strongly recommend publication with only very minor revision.

The paper is both novel and important. It uses mathematical analysis to match bottom-up source budgets to top-down atmospheric data, and makes full use of both mixing

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ratio and isotopic data. The conclusions are indeed of substance and very worthy of publication. As far as I can tell the methodology is correct: this comment is made with the proviso that I have not been through the mathematical analysis in detail and have not reproduced the calculations myself.

As to the other questions asked of ACP referees, the authors properly cite other work, title is appropriate, and the abstract is suitable, informative and representative. Possibly the abstract could dwell a little less on radiocarbon (which is the subject of the parallel paper) and more on other aspects of this work. The language good and the paper of appropriate length and no part should be reduced. I would ask that the mathematical symbols and abbreviations be tabulated.

Overall, this is a very important paper in the field and I suspect it will be well-cited. It should be published subject to the most minor revision.

Specific comments.

Page 4 second para uses the wretched word "impacted" as a verb. This word is not meant in its ballistic sense but merely suggests the authors don't/can't distinguish between 'affected' and 'effected'..- use "Affected" or else "influenced".

Page 5 - a more substantive comment - middle para last few lines. The last sentence needs more expansion and discussion. The SOURCE history construction is vital.

Page 6 and 7 - tabulate variables.

Page 9 Keppler et al - needs rather more discussion. Also in this para could mention the meteorological impact (here I use the word as a noun!) on apparent CH4 budget (Warwick et al. Geophysical Research Letters Vol 29, No. 20 (Oct 2002) - see also sink discussion on base of page 9. Global change means changing meteorology, which mens changing sources, which means global change...

Page 11 - the chlorine sink discussion is very interesting.. might be expanded a little?

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Interactive Comment

EGU

Page 13 - here I'd like to see more on the vexed problem of tropical and southern hemisphere grass fires. African Sahel and southern savanna, S. American cerrado, Indonesia etc. These are C4 grasses - heavy. Also burning maize waste. There should also perhaps be more discussion on coal emission: China?; former Soviet Union?

Page 15 bottom - swing in d13C source ? - end of Soviet coal and sharply increased efficiency in Chinese mining? (I should add as an aside that Siberian natural gas is probably close to atmospheric d13C when you allow for the KIE and so emission changes are not very relevant here)..

Radiomethane budget - overlap with other paper is limited and reasonable. Maybe there could be a slight reshuffle of discussion between two papers but each is usefully stand-alone so this is not a matter of importance.

Page 23. I suspect (admittedly on no quantifiable basis) the grassfire contribution is undervalued, which will have budget (sink) implications.

Conclusions: need a powerful last paragraph.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 4995, 2006.