

Interactive comment on “Perfluorocarbons in the global atmosphere: tetrafluoromethane, hexafluoroethane, and octafluoropropane” by J. Mühle et al.

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Please note that we provide our replies in bold after each comment from J. Marks (received and published: 1 April 2010).

p1 Table S.1 - I don't think that UNFCCC Annex 1 country data on PFC emissions (some of which as presented in the table is derived data) is relevant to global emissions measurement comparisons. Much, in some cases the majority, of the PFC emissions result from non-Annex 1 countries.

We agree and have pointed out in Sections 5.1, 5.2, and 5.4 that UNFCCC data are (as expected) substantially lower than actual global emissions due to the

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importance of emissions from non-Annex I countries. However, we believe that it is critical to visualize and discuss these large differences to point out the need for global emission reporting and verification.

p2 line 22 - Statement starting "Until recently IAI..." is factually incorrect. I recommend the following as replacement.

"Chinese producers have only recently begun to participate in the IAI anode effect survey. Until the mid 2000s Chinese primary aluminum production was dominated by Horizontal Stud Soderberg (HSS) technology. Though the mid 2000s a transformation occurred in the Chinese industry. By the end of 2005 the China Non-Ferrous Metals Industry Association (CNIA) reported that all Chinese primary aluminum was produced by Point Feed Prebake technology."

We thank the commentator for the insights and have corrected the text accordingly. As detailed below, we now only apply the correction for the higher Chinese PFPB emission factor from 2006 to 2008.

p2 line 29 - While I recognize the strong interest in having some comparative data with the emissions data calculated from the atmospheric measurements I question the usefulness of the information in Supplement 2. It's based on long reach assumptions from which estimates of high uncertainty are made. There are a couple of problems of fact (I've made a cut at offering more accurate statements).

p3 line 31 (Table S.2) - I don't recognize some the data reported here even though it is referenced to IAI AE reports. I don't know if all the time series reported in line 1 represents updated IPCC 2006 methodology.

The CF₄ emissions are based on information from recent and older IAI Anode Effect surveys. They might differ slightly from the unpublished CF₄ and C₂F₆ emission data which are the basis for the aggregated PFC (CF₄ plus C₂F₆) CO₂-e emissions given in recent surveys. However, as discussed in Section 5.3, the

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CO₂-e equivalent sum of the CF₄ and C₂F₆ emissions which we estimated from IAI surveys agrees well with PFC CO₂-e emissions directly published in recent IAI surveys. To allow direct comparisons with atmospheric observations of CF₄ and C₂F₆ IAI should resume publishing separate CF₄ and C₂F₆ emissions and/or emissions factors as IAI has done in the past.

Of more value would be a table of detailed estimates of CF₄ emissions from the electronics/semiconductor industry over this same time period to supplement the data available from IAI.

We agree with the commentator, but we are only aware of the data given in the EDGAR v4 database (shown in the Figures) and the limited information given by WSC, as discussed in the revised paper.

p3 Table S.2 (line 34) - The logic behind the data in lines 4 and 6 is flawed from 1999 through 2004. CNIA only reported that by the end of 2005 all aluminum production had been turned over to PFPB. Before that time Chinese production was a mix of technologies. It's erroneous to calculate Chinese emissions based on a constant factor times the PFPB CF₄ emissions factor.

We thank the commentator for the insights and now only apply the correction for the higher Chinese PFPB emission factor from 2006 to 2008. This results in a reduction of our Al production related CF₄ emissions estimated from IAI Anode Survey reports of ~0.4 Gg/yr from 1999 to 2005 and a corresponding increase in the CF₄ emission gap. All calculations have been repeated with the new estimates and all numbers and figures in the manuscript have been updated accordingly. The conclusions remain unchanged.

p 3 line 36 - See note regarding line 34.

See previous comment.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 6485, 2010.

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