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Comment

## ***Interactive comment on “Significant non-linearity in nitrous oxide chamber data and its effect on calculated annual emissions” by P. C. Stolck et al.***

**P. C. Stolck et al.**

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From the comment of Referee #3 we concluded that the focus of this paper was not clear enough in the first version of the paper. In the reaction below we further clarify the aims and main results of our study.

Although studied for a long time, there is still no common agreement what regression method to use for calculation of N<sub>2</sub>O fluxes from chamber data. Non-linearity in chamber data has long been recognized as a potential problem for chamber flux measurements: linear regression does underestimate the flux in these cases. Various non-linear regression methods are available that give a more reliable flux if non-linearity occurs. On the other side linear regression has one less regression parameter than non-linear regression, which makes it better suited to distinguish random measurement errors from true non-linearity. For N<sub>2</sub>O chamber data with only three or four concen-

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tration measurements this is an important aspect to take into account. Both linear and non-linear regression have their advantages and are applicable, but under different circumstances. In most studies linear regression is used, potentially underestimating the flux.

To our knowledge our study is the first to present a methodology where a regression method is chosen for each individual N<sub>2</sub>O chamber measurement, based on a statistical comparison of the goodness of fit of linear and non-linear regression methods. In contrast with other studies we do not a priori choose a regression method for the whole dataset, nor do we try to determine which regression method is best for general use.

The impact of this new methodology on the annual fluxes is presented based on a two year dataset with semi-continuous chamber data. The results of our study show the impact of applying our methodology compared to using only linear or non-linear regression: both the magnitude of the individual annual flux estimates and the inter-annual variability of the flux estimates are affected.

We believe that our methodology can contribute to future measurement projects in calculating more reliable fluxes. In our opinion this is especially important when comparing fluxes measured under different circumstances, which is in general the case when comparing different sites and measuring over longer periods.

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Interactive comment on Biogeosciences Discuss., 6, 115, 2009.

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