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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Technical Note: Characterisation of a DUALER instrument for the airborne measurement of peroxy radicals during AMMA 2006" *by* D. Kartal et al.

Anonymous Referee #1

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This paper presents the development and characterisation of a dual-channel PERCA instrument with a novel low pressure pre-reactor stage for the airborne measurements of peroxy radicals. The instrument was deployed during the AMMA campaign and the authors discuss a method for the calculation of the NO_2 detector sensitivities with ozone measured in-flight. This paper is within the scope of ACP, and I would recommend that it be published after the authors have answered the following questions:

1. In section 2.2 the authors state that a correction of the chain length due to humidity is not required under the conditions encountered during AMMA, as $T_{ambient} < T_{reactor}$ and $P_{ambient} > P_{reactor}$, and they reference a Ph.D. thesis (Kartal, 2009). Ph.D theses

are not always the easiest to get hold of, and without having read it I don't follow why this is the case. It would be useful here to add a couple of lines explaining this. Also, are the inlet systems heated at all? If they are, (and given the use of the pre-reactor), is $T_{ambient} < T_{reactor}$ and $P_{ambient} > P_{reactor}$ not always true, and not just under AMMA conditions? How does humidity affect the chain length under other conditions?

2. In section 3.1 the authors note that the NO_2 detector sensitivity degrades along the experimental series, and explain that this is due to filter ageing. This would seem to be rather a rapid phenomenon – how often are the filters changed and could this affect the measurements performed over the course of a flight?

3. In section 3.3 the authors present the different eCL obtained for HO_2 and CH_3O_2. It could be imagined that under the conditions present during AMMA many larger and more complex biogenic RO_2 might be present. Do the authors have any thoughts on how the relative measurement efficiencies might vary for these?

4. In equation 10 the mean values of the calculated sensitivities (A_{Det} and B_{Det}) for a particular time period are used, rather than the individual values of $a_{(k)}$ and $b_{(k)}$. What variability is typically seen in these values? If the detector sensitivity were to change midway through the period, would there be any advantages to using different averaging periods?

5. Could the authors expand on what causes the measurement of negative RO_2 concentrations in figure 15?

Minor points:

6. Page 18273 lines 1 and 2 (and possibly elsewhere): "amount" is not a good word, "concentration" would be better here.

7. Page 18273 line 14 would read better without the first "The", and "measurements" should be singular.

8. Page 18278 line 22: "till" should be replaced by "until the".

9. Page 18290 line 5: “which spite of their chemical meaningless” would better read as “which despite being chemically meaningless”.

10. The labelling of figure 3 is not clear (especially item labels 1 and 3), and I cannot find item label 4 on the figure at all.

Kartal, D.: Characterization and optimization of a dual channel PERCA for the investigation of the chemistry of peroxy radicals in the upper troposphere, Ph.D. thesis, University of Bremen, Germany, 2009.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 18271, 2009.