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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Technical Note: Formal blind intercomparison of HO_2 measurements in the atmosphere simulation chamber SAPHIR during the HOxComp campaign" *by* H. Fuchs et al.

Anonymous Referee #3

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This paper presents results from a formal blind intercomparison of several instruments designed to measure ambient HO_2 concentrations using three different laser-induced fluorescence instruments. This is an important contribution to the atmospheric community as it provides additional information on the ability of the LIF technique to accurately measure HO_2 radical concentrations in the atmosphere. The campaign included both an intercomparison of ambient measurements as well as an intercomparison of measurements made inside the SAPHIR chamber. It is clear from the paper that not all interferences have been identified and that the agreement between the different LIF instruments for HO_2 measurements is not as good as the agreement associated with measurements of OH during this campaign as discussed in the similar Schlosser et al.

ACP paper. Unfortunately, unlike the OH intercomparison that involved absolute measurements of OH concentrations using DOAS, this intercomparison did not benefit from a reference measurement of HO_2 to give insights into the sources of the discrepancies between the LIF instruments.

I recommend publication after the authors have addressed the following comments.

Although the general technique for measuring HO_2 using LIF by these instruments is similar, there are significant differences between the instruments. Table 1 lists some of these differences, and other differences are summarized in the text in Section 2.2. It would be useful if Table 1 included all important aspects of each instrument's operation and performance, including nozzle size, flow rate, sampling cell pressure, laser power as well as repetition rate, the OH transition used, water quenching correction and each instrument's limit of detection and instrument precision. In addition, it would be useful to provide more information on the instrument calibrations. How often were calibrations performed? How much did the calibration factors change for each instrument during the course of the campaign, and what was responsible for any changes? Did the groups exchange calibration sources to see if there were any systematic differences, or did the design of the individual calibrators prevent this?

The measurements from the MPI instrument appear to by systematically higher during the ambient measurements as well as during the high ozone experiments in the chamber. In addition to being the only multipass instrument, the MPI instrument is the only one where HO_2 is measured downstream after OH detection. As a result, the airstream is exposed to the OH laser beam prior to reaching the HO_2 detection axis. Did the MPI group measure HO_2 without exposing the airstream to the OH laser to see if the OH laser is causing an interference in the HO_2 measurements?

Additional points

Page 21196, line 19: To reduce solar scatter in the FRCGC-LIF instrument, a black aluminum disk coated with hydrocarbon wax was placed above the inlet. How far from

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the inlet nozzle was this disk placed? Were measurements done with and without the disk to insure that it did not interfere with the HO_2 measurements?

Page 21204, line 18: During the ambient measurements, the nighttime data during the second night showed a significant discrepancy than during the first night, and the manuscript states that "the nighttime data are discussed separately." However, there is no further discussion of the ambient nighttime data in the paper.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 21189, 2010.