Atmos. Meas. Tech. Discuss., 4, C769–C771, 2011
www.atmos-meas-tech-discuss.net/4/C769/2011/

Atmospheric Measurement Techniques Discussions

Interactive comment on "Detection of HO_2 by laser-induced fluorescence: calibration and interferences from RO_2 radicals" *by* H. Fuchs et al.

H. Fuchs et al.

h.fuchs@fz-juelich.de

Received and published: 1 June 2011

We thank the reviewer for his/her comments and the strong support for publication of this paper. Here are our responses to the specific comments:

Comment: As raised by both Dillon and Whalley in their Interactive Comments, higher alkanes (>C3) also rapidly convert in the presence of NO and generate HO2. This should be mentioned in the paper, which suggests that there is no interference for "small" alkanes. In response to the Interactive Comment from Mainz, an RO_2 to HO_2 conversion via a Peeters' type mechanism may not be discernible from HO_2 generated as a result of an RO_2 interference during the detection of HO_2, if the RO_2 species itself is detected with a similar efficiency to HO_2.

Response: In the revised manuscript we will specify "small alkanes" that were tested in this study in the abstract and conclusion. Furthermore we will mention the results that were reported by the Interactive Comments on page 1282, line 7: "After publication of the discussion paper of this study two groups (Max Planck Institute for Chemistry, MPIC, and University of Leeds) reported in Interactive Comments to the paper that their LIF instruments suffer from the same interference observed here, if instruments are operated at conditions with a high HO_2 conversion efficiency. They also investigated RO_2 radicals from larger alkanes ($>C_3$) that were not investigated here and found an interference."

Comment: In the abstract it is noted that there are unlikely to be interferences in "clean air". This is confusing and possibly a bit misleading, as a low NO_X environment, such a remote rainforest, where there are high levels of isoprene, and therefore potentially an interference in HO_2 measurements, would be considered by many people as a "clean" environment. "Remote clean environment with no significant emissions of biogenic VOCs" would be better.

Response: We will change the abstract as suggested by the reviewer.

Comment: Page 1261, line 24, the authors should mention the impurities in the NO that lead to artificial signals and are removed by Ascarite.

Response: We will add statement on page 1261, line 24: "Ascarite removes gaseous nitrous acid (HONO) which can be photolyzed to OH by the 308 nm laser radiation and leads to an artificial laser-generated OH signal. With purification of NO, the interference can be neglected."

Comment: Page 1263, line 9, Creasey et al (GRL, 2000) also measured the absorption cross sections for O_2 for a variety of lamps, and for H_2O vapour.

Response: We will add the reference accordingly.

Comment: Page 1265, line 12, "proves" rather than "proofs"

Response: We thank the reviewer for finding the typo.

Comment: Page 1272, line 15, 1x10(8) was used in the model, earlier it is stated that 7x10(9) are typical radical concentrations used. Perhaps the initial modelled concentration is not critical, but some further statement needed?

Response: We will add a statement on page 1272, line 15: "The results of the model are independent of the initial concentration, because the much larger concentrations of the major reactants (NO, O_2) are virtually constant and radical-radical reactions play no role at the given concentrations and time scale."

Comment: Page 1273, line 11. Creasey et al (Appl. Phys. B. 1997) also showed that for a 0.2 mm (flat) nozzle, the rotational temperature had reached room temperature by about 40-50 mm downstream of the inlet nozzle.

Response: We will add on page 1273, line 11: "This was also shown for another LIF instrument 40-50 mm downstream of a flat inlet nozzle with a 0.2 mm orifice (Creasy et al., 1997)."

Comment: Page 1283, second bullet point line 16-19, "small" should be defined more carefully, as other studies seem to indicate that there is an interference for larger alkanes.

Response: We will change this statement and specified the particular alkanes that were tested.

Comment: Page 1284, line 5, "at the expense of" would be better than "on the cost of"

Response: We will change the text as suggested by the reviewer.

Interactive comment on Atmos. Meas. Tech. Discuss., 4, 1255, 2011.