Atmos. Meas. Tech. Discuss., 7, C224–C226, 2014
www.atmos-meas-tech-discuss.net/7/C224/2014/

Atmospheric Measurement Techniques Discussions

Interactive comment on "Characterisation of an inlet pre-injector laser induced fluorescence instrument for the measurement of ambient hydroxyl radicals" *by* A. Novelli et al.

Anonymous Referee #3

Received and published: 21 March 2014

This manuscript describes a newly developed inlet pre-injector (IPI) coupled with an OH detecting instrument HORUS based on the laser-induced fluorescence technique designed with multiple optical path alignment. The IPI enables chemical modulation to correct for the instrumental background OH, which is indistinguishable from ambient OH with wavelength modulation. The loss of OH on the internal surface of the injector is unavoidable and the loss rate is taken into account when ambient OH concentrations are calculated. The performance of the IPI was demonstrated during the three field campaigns with different chemical characteristics, including cases where the interference from the background OH was dominant and other cases where the signal

from the ambient OH was larger. The manuscript is well organized, within the scope of the AMT journal, and contains important information. However at certain points this manuscript needs clarification, especially on the design of the IPI system and on the determination of the factor F, which is used in Equation (3) but left unmentioned in section 3.1. I recommend publication after adequate revision.

Specific comments:

1. page 820, line 22. IPI instead of inlet-pre-injector

2. page 821, line 6. Replace "more than 90%" with "a large fraction."

3. page 828. Have the authors performed fluid dynamics simulation on designing the IPI system to minimize the wall loss rate? Was the internal surface coated with halocarbon wax?

4. page 828-830. Can the authors determine the loss rate of OH on the IPI surface using more stable and clean external source of OH (e.g., photolysis of water vapor with clean nitrogen carrier gas), in addition to the tests with ambient air as described here? I understand that the large volume flow will make the test difficult. But I also believe that the test, likely with lower background signal, should provide clearer determination of the loss rate currently estimated to be 34+/- 15%.

5. page 830, line 3. The detection limit of the instrument should also be discussed in addition to the increased uncertainty.

6. page 831 line 10. Do the authors mean 0.1%?

7. page 831, line 10. So far the factor F in Equation (3) should have been determined by considering (1) loss of OH on the IPI internal surface and (2) scavenging efficiency. The authors should conclude which F value was used for correction.

8. page 832. Can the Criegee intermediate, simultaneously produced via the ozonolysis of propene, influence the background OH level?

9. pages 831 and 832. Text mentions Figure 7 earlier than Figure 6.

10. page 833, line 20. I did not understand "ageing detector"

11. page 834. What is the systematic uncertainty in the OH concentrations determined with CIMS?

12. page 838, line 7. The authors should rather mention that Crounse et al. (2011) found that the proposed recycling was much slower than originally proposed.

13. page 838, lines 19-23. It is not logically valid that agreement between observation and model indicates no interference.

14. Have the authors tested if the background OH signal is always linearly dependent on the laser power?

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 819, 2014.