Review of the ACPD-manuscript entitled

„OH and HO_2 Radical Chemistry during PROPHET 2008 and CABINEX 2009 - Part 1: Measurements and Model Comparison" by S.M. Griffith et al.

General comments

The authors present measurements of OH and HO_2 radicals conducted above the canopy in a deciduous forest environment using a laser-induced fluorescence (LIF) technique. The measurements are compared with a chemical zero-dimensional box model in order to evaluate the current understanding of atmospheric oxidation pathways incorporating the Regional Atmospheric Chemistry Mechanism updated by the Mainz Isoprene Mechanism (RACM-MIM).

As discussed in the manuscript, previous observation-to-model intercomparisons in forested environments marked by low NO_x levels and high emissions of isoprene as the predominant biogenic volatile organic compound (BVOC) have unveiled serious lacks of understanding of the underlying processes. In contrast to this, the observed OH concentrations in this study could be reproduced by the box model reasonably well.

Even though the radical observations presented in this manuscript might suffer from recently reported potential interferences in both OH and HO_2 measurements by LIF (Mao, 2012 and Fuchs, 2011) which is considered by the authors in the discussion of their results, this paper is valuable to improve the current understanding of the atmospheric oxidation capacity in forested environments and suitable for publication in ACP after the authors have addressed the following comments and technical corrections.

Specific comments

(P33174, L5/Supplement S2)

The authors state a "still measureable interference in the IU-FAGE instrument" by laser-produced OH equivalent to 8500 (+/-800) molecules cm^{-3}, normalized on 1ppbv of ozone, 1% of water, and 1mW laser power, which was negligible for the above canopy measurements presented due to the low laser power available at the detection cell. At higher laser power such an interference will get significant and therefore characterization in laboratory is important as presented in supplement S2. It is not clear to me how the authors prevent from OH production by photolysis of water vapor, while producing ozone with a mercury lamp. A significant contribution of the interference signal in laboratory test could originate from externally produced OH and not being laser-induced. This would lead to an overestimation of the interference by laser-photolysis of ozone in the IU-FAGE instrument and might cover in ambient measurements (Figure S2) the effect of an additional interference.

(P33175/Supplement)

The authors do a careful job on examination of possible interferences in their LIF-FAGE measurements. From tests at the PROPHET site they have no evidence that the measurements of hydroxyl radicals suffer from an interference related to the oxidation of biogenic VOCs (Mao et al., 2012). However, the OH measurements during PROPHET 2008 (Figure 5) peak around 3 pm coincident with the maximum temperature. The OH is not following the radiation as the predominant

primary source. At lower temperatures associated with less biogenic emissions during CABINEX 2009 this is not the case. Is not this indicating such an interference or how can it be explained?

Technical corrections

(P33172, L28)

"…(~5.5-9.9hPa). using two" → please remove superfluous period.

Please correct format of the following reference

- Poschl et al. 2000 → (should be "Pöschl" → please fix "Umlaut" typos)

Reference

Mao, J., Ren, X., Brune, W. H., Van Duin, D. M., Cohen, R. C., Park, J.-H., Goldstein, A. H., Paulot, F., Beaver, M. R., Crounse, J. D., Wennberg, P. O., DiGangi, J. P., Henry, S. B., Keutsch, F. N., Park, C., Schade, G. W., Wolfe, G. M., and Thornton, J. A.: Insights into Hydroxyl Measurements and Atmospheric Oxidation in a California Forest, Atmos. Chem. Phys., 12, 8009–8020, doi:10.5194/acp-12-8009-2012, 2012.