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Interactive comment on "Atmospheric photochemistry of aromatic hydrocarbons: OH budgets during SAPHIR chamber experiments" *by* S. Nehr et al.

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We thank Michael E. Jenkin for his comment. In the discussion section we added some references and revised our statements regarding the HO_2 + RO_2 reaction:

"The differences of the ratios could also be caused by additional OH recycling via HO_2 + RO_2 reactions that gain importance under low-NO conditions. Such radical-radical reactions that are usually thought to produce non-radical products can lead to enhanced OH recycling as shown by recent laboratory studies for reactions of carbonyl-containing RO_2 radicals with HO_2 (Hasson et al., 2004; Jenkin et al., 2007, 2008, 2010; Dillon and

Crowley, 2008; Hasson et al., 2012; Gross et al., 2014). Recently also OH formation for the reaction of HO_2 with bicyclic peroxy radicals from aromatic precursors was proposed with a rate constant k_9 as used in the previous section. This rate constant corresponds to an OH yield of about 0.5 (Birdsall et al., 2010; Birdsall and Elrod, 2011) in agreement with a conservative upper limit of 0.5 estimated previously for bicyclic peroxy radicals from benzene (Jenkin et al., 2007). However, this upper limit may have to be scaled down further in view of recent results (Jenkin, 2014) and consequently the importance of this OH source is highly speculative. In our present work, the influence of the HO_2 + RO_2 reactions could only roughly be quantified in P_{OH} by using the measured total RO_2 concentrations and the estimated rate constant k_9 from the literature. Despite these uncertainties the small effects were found to have the right magnitude and to go in the right direction. Our data are therefore not in contradiction with the proposed additional OH recycling but cannot confirm it quantitatively. In any case, RO_2+ HO_2 reactions played a minor role for the OH budget even under the low-NO conditions of this work."

The short comment by Jenkin, 2014 is cited to support the statement that the upper limit of 0.5 is probably too great.

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