

Dear Christa,

Thanks for your comments! According to your suggestions, we tested the importance of ROOOH on the degree of disagreement between measurement and model in this study by integrating the reactions of OH with all RO<sub>2</sub> species except for CH<sub>3</sub>O<sub>2</sub> with a rate constant of  $1.5 \times 10^{-10} \text{ cm}^3 \text{ s}^{-1}$  in our model, and adding a loss process for ROOOH with a rate of  $10^{-4} \text{ s}^{-1}$ , corresponding to a lifetime of around 3 hours as suggested by Fittschen<sup>1,2</sup>, to represent an upper limit of ROOOH formation.

As shown in Figure 1, the modelled ROOOH concentration peaked around 14:00 with the peak values on the order of  $10^9 \sim 10^{10} \text{ cm}^{-3}$ , which were comparable to the modelled values by Fittschen, et al.<sup>2</sup>. However, the correlation of modelled ROOOH with the ratio of observed to modelled OH and the difference between observed and modelled OH showed little relevance ( $R^2=0.01$  and  $0.03$ , respectively on daytime basis, Figure 2). It indicated that the ROOOH interference was not able to explain the disagreement between measurement and model in this study. Besides, the modelled ROOOH concentrations were high on the day when the chemical modulation tests were performed (7<sup>th</sup> June, Figure 1). If ROOOH did cause significant OH interference in our FAGE system, it would also cause significant OH interference on that day, which however, was not discovered in the chemical modulation tests. It was also worth noting that incorporating the additional reactions of RO<sub>2</sub>+OH into the existed reaction mechanism had little influence on the modelled OH, HO<sub>2</sub>, and RO<sub>2</sub> concentrations. Nevertheless, ROOOH could be an OH interference in FAGE system, but as pointed also by Fittschen, et al.<sup>2</sup>, the occurrence of this interference is highly dependent on the design and measurement conditions of different FAGE instruments. This interference was not the reason for the disagreement between model and measurement in our FAGE system at least for this campaign.

Thanks again for your insightful comments, and we will add some discussions and references as you mentioned.

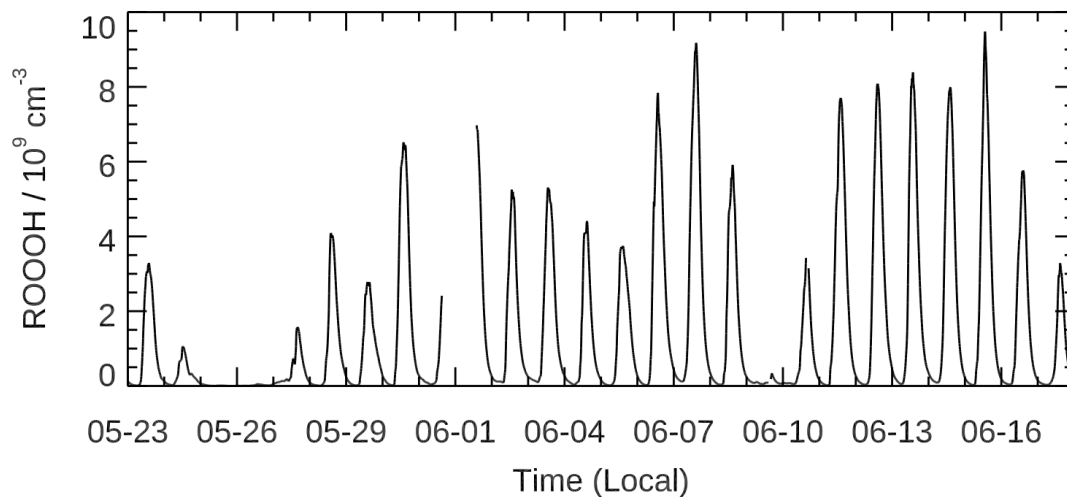


Figure 1. Time series of modeled ROOOH concentrations during EXPLORE-YRD campaign in 2018.

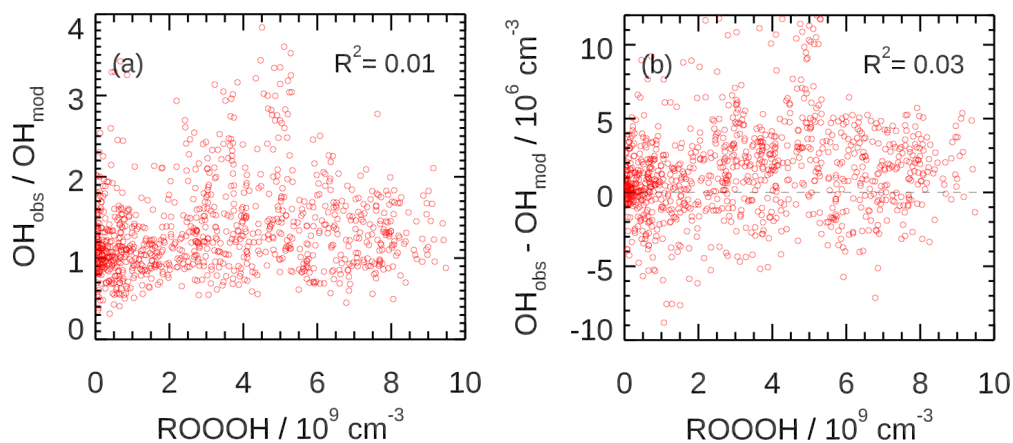


Figure 2. Dependences of the ratio of observed to modeled OH (a) and the difference between observed and modeled OH (b) on the concentration of ROOOH during daytime periods (08:00-16:00)

- 1 Fittschen, C. The reaction of peroxy radicals with OH radicals. *Chem Phys Lett* **725**, 102-108 (2019).
- 2 Fittschen, C. *et al.* ROOOH: a missing piece of the puzzle for OH measurements in low-NO environments? *Atmospheric Chemistry and Physics* **19**, 349-362 (2019).