

Interactive comment on “What effect does VOC sampling time have on derived OH reactivity?” by H. Sonderfeld et al.

H. Sonderfeld et al.

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We are grateful to the referee for their insightful comments and we have responded in full to them viz

P2 L12: “: : it sinks are manifold: : :” should read “: : OH sinks are manifold: : :”

Fixed.

P5 L9: Was the Kore PTR-ToFMS equipped with an ion funnel? It seems so since the study of Barber et al. (2012) is cited. It should be clearly stated in the text and the authors should indicate, if relevant, how the ion funnel impacts the PTRMS response (sensitivity, humidity effects: : :).

For ClearLo the PTR-ToF-MS was not equipped with the ion funnel. Barber et al.

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(2012) was cited here, because is the standard apparatus as described in this paper. The citation has been changed to make this distinction clearer:

A PTR-ToF-MS (Series I; Kore Technology Ltd., UK) (see standard PTR-MS apparatus in Barber et al. (2012); Thalman et al. (2015))

P5 L13-14: “For background measurements a hydrocarbon trap was employed”. Please provide details about this hydrocarbon trap. How efficient was it to scrub hydrocarbons.

How were background measurements performed for OVOCs? How often were the background measurements recorded?

Details were added to the manuscript p.5, l21 - 23:

“For background measurements a hydrocarbon trap (activated carbon filter by Grace Alltech) was employed once during the time period investigated here. Its efficiency was in the range of 87% - 96 %.”

P5 L17-18: “The stability of the instrument during the campaign was monitored with a bromobenzene internal standard”. Could the authors indicate how stable it was during the campaigns? Was there a need to correct for a drift in sensitivity? If so, how was it done?

During the period analysed here, the instrument was stable and no correction needed to be applied.

Information added, P5, l27:

“Based on these measurements no correction needed to be applied.”

P5 L25-26: Was an ozone scrubber used for the GC measurements?

The samples analysed by the instrument passed through around two metres of stainless steel tubing which was heated to 80 °C. This destroys ozone present in the sample.

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P5,L26-27, sentence added: "Stainless steel tubing heated to 80°C was used as sampling line destroying ozone present in the sample."

P18 L10-11: "A sampling time of only five minutes can cause a deviation of more than 25%. Accordingly, this would then artificially contribute to missing OH reactivity." This reviewer does not agree with the last sentence, which should be rephrased. The deviation will either lead to a positive or negative bias and will not always appear as missing OH reactivity. This deviation should be discussed as an additional source of errors to account for when measured and calculated OH reactivity values are compared.

The sentence has been rephrased as followed:

Accordingly, this would then artificially contribute to a deviation in OH reactivity, whether it causes a positive or negative bias. Thereby, it is an additional error source when comparing measured total OH reactivity to OH reactivity calculated from GC data.

P18 L21: ":(cf. Figure 4): : " Wrong figure.

Fixed.

P23 L5-10: "As can be seen in Table 9 at 20min still 2.78% of the ClearLo data exceed their hourly mean. At 30min all data lie within the range of the standard deviation. Therefore, a sampling time greater than 20 min would be required to represent the hourly mean. The random data reach a comparable level of data exceeding the hourly mean by 2.80% for averaging over 5min only. Here, sampling for only 10 min would be sufficient for representing an hour worth of data." It should be clearly stated that sampling periods of 5-20 minutes would be fine for these specific dataset but that longer sampling periods may be necessary for other environments, especially for measurement sites close to different types of emission sources (e.g. industries).

Lines added with regard to the comment:

The required sampling times mentioned here correspond to the VOC variability of the analysed data sets. Likewise, longer sampling times could be necessary for repre-

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senting hourly OH reactivity in other environments such as measurements closer to industrial sources. For example, Gilman et al. (2009) have shown, that a much broader range of OH reactivity of VOC with a high degree in variability can be found in the proximity of heavily industrialised areas like the Houston and Galveston Bay area in Texas, USA.

Fig. 5: Please indicate what "bvf" and "bvfo" mean in the caption. Done.

Fig. 9: As indicated in the main text P18 L19-22,

Fig. 9 displays "consecutive 5 min averaging periods within the hour", i.e. 12 independent periods of 5 min. Since the deviation observed depends only on missing VOC variability for the 5-min calculations, shouldn't an average of the 12 residual slopes be zero? It is obviously not zero for each panel of Fig.9.

Based on this observation, the different regression models are analysed/compared further on (see Figure 10 and Table 8). On average over all 12 consecutive 5 min intervals, only the linear least square fit and the ratio are close to zero. This is not an issue of the sampling technique as it occurs also in the log-normal randomized data set.

Fig. 12: Please indicate in the caption what the error bars are.

Done. The error bars in Fig. 12 and also in Fig. 13 are the lower and upper limit of the fitted slopes.

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2015-963, 2016.

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