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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Ozone production in remote oceanic and industrial areas derived from ship based measurements of peroxy radicals during TexAQS 2006" *by* R. Sommariva et al.

Anonymous Referee #3

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This paper presents new measurements of total peroxy radical measurements during TexAQS 2006 around the Gulf Coast and in the Houston/Galveston region. The measurements are used to calculate the net production of ozone in several different chemical regions ranging from the relatively clean ocean to the more highly polluted Houston area. The paper is generally well written and the results appropriate for publication in ACP. I have a few minor comments that the authors should consider before final publication.

1) It has been well documented that the PERCA technique generally requires a correction due to a water dependence of the chain length. As a result, it is surprising that the

data presented here did not require a humidity correction. The authors appear to base this conclusion on measurements of the chain length for CH_3O_2 in dry air that were similar to measurements of the chain length for $CH_3C(O)O_2$ measured in humid air. Was the chain length measured as a function of relative humidity? How was the water dependence minimized? More details on the instrument calibration as a function of relative humidity are needed to give the reader more confidence in the measurements.

2) The measured total peroxy radical concentrations show a large variability as shown in Figure 4, and much of this variability is due to the different NOx and VOC concentrations encountered during the measurement period. Although the diurnal profiles are shown with the NOx profiles for each location in Figure 5, it would be useful to include a time series of NOx and perhaps VOC concentrations in Figure 4 to better illustrate the influence of NOx and VOCs on the day-to-day variability, and especially the high nighttime values shown in this Figure.

3) The calculation of the net production of O_3 requires a knowledge of the concentration of HO_2 and OH, and the authors state that they used values based on the results of a box model based on the MCM. What are the values of [OH], [HO_2], and [HO_2]/[HO_2 + RO_2] used for this calculation in each region, and how do these calculated values compare to any available measurements from TexAQS 2000 or in other similar environments?

4) The plot of P(O_3) as a function of NOx in Figure 10 does demonstrate that ozone production measured in 2006 is NOx limited. However the authors also claim that the measured and calculated values of HO_2, HO_2 + RO_2 and P(O_3) from 2000 and 2006 agree very well, but this is not clear from Figure 10. Although difficult to read, it appears that the measured HO_2 + RO_2 from 2006 is significantly lower than 2x HO_2 measured in 2000. A plot HO_2 + RO_2 vs. 2x HO_2 binned for different NOx concentrations would provide a clearer comparison of the agreement, which could then be quantified. Similar plots for the remaining comparisons in this Figure would also allow for a more quantitative comparison of the agreement between the measurements and model.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 23109, 2010.