

Interactive
Comment

Interactive comment on “Carbon monoxide measurements onboard the CARIBIC passenger aircraft using UV resonance fluorescence” by D. Scharffe et al.

Anonymous Referee #3

Received and published: 7 May 2012

This manuscript presents the onboard CO measurements equipped on the CARIBIC passenger aircraft. The authors describe the experiment details including onboard CO instrument and the corresponding modifications made. The CO data quality of seven-year measurements is also discussed. The method and produced dataset presented in this paper will be of great interest for atmospheric scientists. In general the paper is well written and organized. I thus recommend minor revisions before publication in AMT. The detailed comments are listed below:

General comments:

It is mentioned that the instrument of CO measurements in this study is a modified

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version of that in Gerbig et al. 1999. Unfortunately, I did not see improvements for CO measurements based on this modified instrument regarding the precision, accuracy, and response time etc if we compare with those in Gerbig et al. 1999. So why did you modify the instrument? Also, I could not get a big picture of how the final CO measurements were affected by the uncertainties from different aspects such as zero signal variation, drift of calibration gas etc. from the paper. Both of these should be clarified in the paper.

Specific comments:

P 2687 L 2-6: Where is that calibration gas contamination of the first two cycles from? Is it from the stainless steel regulator? But how?

P 2687 L 9: add "of water vapor" after "mixing ratios"

P 2687 L 19-20: Would the photolysis of CO₂ and produced CO be a problem if you flush with 2.5% CO₂ in Ar?

P 2687 L 25-26: Does this mean the Sofnocat cannot remove all the CO at ambient temperature?

P 2688 L 24-25: What does the 4% variation of zero signal mean? How many ppb is equivalent to this 4%?

P 2689 L 12-13: The sensitivity in Gerbig et al. 1996 is 6 cps/ppb. The sensitivity in this study (105 cps/ppb) is not 50 times higher than that in Gerbig et al. 1996. Moreover, the sensitivity in Gerbig et al. 1999 increased to 70 cps/ppb.

P2689 L 18: The precision in Gerbig et al. 1999 is 1.5 ppb at 100 ppb and 1 s. In this study, the precision is around 1.7 ppb at 100 ppb and 1 s (1.0 ppb plus 0.7 ppb). It seems that the modifications do not improve your precision.

P 2691 L 1-2: Fig 3 shows that the replacement of MgF₂ also changes the zero signal. What will this affect your CO measurements?

P 2691 L 12-13: What is the reason for the anti-correlation between ozone and CO?

P 2691 L 21: should be $0.3 \pm 0.5\%$

P 2692 L 20: "the lamp did ignite"->"the lamp did not ignite"

P 2693 L2: From this section, I still have not got the idea of the exact accuracy for your CO measurements.

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 2681, 2012.

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