Atmos. Meas. Tech. Discuss.,
doi:10.5194/amt-2019-285-RC1, 2019

Atmospheric Measurement Techniques Discussions

Interactive comment on "Quantification of nitrous acid (HONO) and nitrogen dioxide (NO_2) in ambient air by broadband cavity-enhanced absorption spectroscopy (IBBCEAS) between 361–388 nm" *by* Nick Jordan and Hans D. Osthoff

Anonymous Referee #1

Received and published: 30 August 2019

General comment: This paper presented a newly developed IBBCEAS system for measuring ambient HONO and NO2. The subject is within the scope of the journal, but the IBBCEAS techniques is not a new technique for measuring HONO and NO2. There are several papers with the same topic had been published in AMT recently (like Min et al., 2016; Duan et al., 2018). The authors should make it clear that what is new in this work. The authors also should be more conservative, especially when using the statement like "state-of-the-art". Compared with the previous instruments mentioned before, this instrument (HODOR) does not have the best detection capacity in fact. The

following comments should be addressed.

Specific comments: 1. The fitting results showed in Fig. 4 have some problem, especially the fitting range from 365 to 370 nm. It seems that the measured HONO absorption coefficient (orange line) is quite similar to the unconvoluted cross section from Stutz et al., 2000 (may be the convolution is not so good). The author should give some explanations of the large residual. I also suggest the authors show the spectral fitting results from ambient measurement or the lab result of relatively low NO2 and HONO, which would be more representative. 2. The insert plot of Fig. 5b showed that the zero only had one point in each cycle. The author should check the transient time of mode changing from sampling mode to zero mode to make sure the zero mode without HONO. 3. Figure 5. The blue region represents lab sample and grey region represents zero, so what is the white region mean (Line 284, text indicated the indoor ambient air)? Why TD-CRDS only has such short measurement time period? As the authors mentioned that GNOM suffered with interference of high NO2. I do not think the inter-comparison of HODOR with GNOM is appropriate to prove the measurement capacity of HODOR in measuring HONO. 4. Allen deviation only used to study the system stability, the instrumental limit of detection should be characterized by the standard deviation. Figure 6 showed that the zero measurement results (here time resolution is 1 s?), and the LOD can be derived from the data. According to the result from Figure 6, the LOD for measuring HONO may be several hundred ppt (1 sigma). 5. Line 110. How about the temperature control of CCD in the operation?

Minor comments: 6. Line 160. Temperature sensor and pressure sensor mentioned are missed in Fig. 1. 7. Line 103. Please add the manufacturer information of the spectrometer. 8. Line 125-130. The purity of N2 and Ar should be given. 9. Is the "cell length" the same as "cavity length" in the text, please unify. 10. Unify the font size of the title of Section 3.4 11. Line 356. pppv correct to pptv

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2019-285, 2019.