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Atmospheric Measurement Techniques Discussions

Interactive comment on "Characterizing a Quantum Cascade Tunable Infrared Laser Differential Absorption Spectrometer (QC-TILDAS) for measurements of atmospheric ammonia" *by* R. A. Ellis et al.

Anonymous Referee #2

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The paper describes the characteristics of a pulsed QC-TILDAS system for ambient measurements of ammonia. Special emphasis is paid to the design and characterization of the inlet system, since NH3 is a rather sticky molecule that tends to adhere strongly to surfaces. Additionally, gas phase measurements of ammonia are prone to suffer interference from particulate matter containing ammonium. The inlet described developed for the QC-TILDAS is capable of separating particles from the gas phase, thus avoiding the need for particle filters. The suitability of the instrument and its in-

let are demonstrated by laboratory and field intercomparisons with a classical TDLAS and a commercial NH3 instrument, respectively. Overall the paper is well written and deserves publication in AMT after some minor changes/additions:

The detection limit of the QC-TILDAS is estimated from plots of the Allen variance of standard measurements at rather high concentrations (ppbv range). As pointed out in the manuscript this is a technique suitable for conditions that are dominated by random noise, but Fig. 7c nicely shows that most probably this is not the case. Instead, background drifts are limiting precision and detection limit of the instrument. Have you checked the detection by other methods performed at low concentrations, i.e. noise level at low ambient concentrations of the reproducibility of zero gas background measurements?

Although, you give numbers for the precision and the detection limit of the instrument, you should also provide an estimate for the total uncertainty of ambient NH3 measurements, including effects such as instrument drifts, inlet transmission and memory effects, and accuracy of standards.

The discussion of Figure 6 should include some information on the nature of the correlation fir (single- or double sided fit) and fit errors to slope and offset to allow the reader to judge on the significance of differences between the two instruments. Here again, a measure for the total uncertainty would help.

Interactive comment on Atmos. Meas. Tech. Discuss., 2, 3309, 2009.