

Interactive
Comment

Interactive comment on “Open-path, quantum cascade laser-based sensor for high resolution atmospheric ammonia measurements” by D. J. Miller et al.

Anonymous Referee #1

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The paper is well written, presents useful results and should be published with minor modifications. The requested modifications are mostly in the area of extrapolation of measurement capabilities.

Mass and power: The open path configuration allows operation without a pump, the element that usually is the main power consumer in closed path systems. 50W power consumption is impressive. The laptop computer power is not included in the 50W. Is the laptop essential for operation? If so, what is its power requirement?

The total mass of 5 kg also is impressive. The photograph in Figure 1 does not indicate

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that the instrument has been field hardened. How much would the authors expect the mass to change with such hardening?

Regarding 10 Hz measurements: [Abstract, Section 2.3, Section 6] Do the 10 Hz NH₃ measurements use 10 Hz water vapor measurement? Water vapor introduces a significant interference, which is included in the retrieval [Section 2.3] via a separate (1 Hz) measurement. Please comment on how the measurement at 10 Hz for, e.g. eddy correlation, might be accomplished with water vapor measured separately, and somewhat remotely from the NH₃ measurement volume.

Calibration and Zero Offset: An ingenious scheme for calibration is reported, wherein a low-pressure ethylene absorption line from an in-line absorption cell is monitored at the 8th harmonic of the modulation frequency, while the ammonia is measured at the 2nd harmonic. Could the authors remind us why the 8th harmonic is preferred? Higher harmonics seem somewhat "fragile".

The authors should say more about continuous baseline offset measurement. The "zero-level" stability is especially important in the measurement of a gas with near zero background levels. Great pains were taken in laboratory measurements of zero levels. How can those techniques be transferred to continuous measurements?

Autonomous field operation: Autonomous field operation is an attractive possibility, but has not yet been achieved [?]. What are some of the envisioned challenges to be overcome to achieve autonomous field operation?

Section 4, Field Measurements: How was sampled air delivered to the instrument in the mobile platform, and was there opportunity for losses at surfaces?

Section 6, Summary:

Line 11: No surface adsorption time constants? There are nearby surfaces, mirror supports and a baseplate in Figure 1.

Line 17: The open path system has "negligible sampling artifacts". Are the authors

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certain? No adsorption/desorption from nearby cell structures?

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 7005, 2013.

AMTD

6, C2683–C2685, 2013

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