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Interactive comment on “Atmospheric ammonia measurements in Houston, TX using an external-cavity quantum cascade laser-based sensor” by L. Gong et al.

L. Gong et al.

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The authors would like to thank Prof. Schwab for his valuable comments. Our point-by-point responses to the reviews and all relevant changes made in the manuscript are presented below.

1. P. 16340, lines 19-21: This sentence is awkward as written. It should be rewritten, perhaps as two sentences? To be quantitative, the authors may want to reference a 95% (exp [-3]) recovery from the peak signal, or some other metric of their choosing.

Answer: The sentence has been re-written based on the suggestion, and we re-describe the decay processes of big events according to a 90% recovery from the

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peak signal. Relevant changes have been made in the Section 2.1 (Page 16340, Line 19).

2. P. 16340, lines 22-27: Where does the Allan variance plot flatten out? Does it go to 1 hour (3600 s) or further before flattening? This relates to the other reviewer's question. If the detection limit for 5 minute data was 0.72 ppb, what averaging time was required to get the 0.1-0.2 ppb measurements presented in the paper? Were you justified in averaging for that long a time period based on the Allan variance plot?

Answer: The Allan deviation plot flattens out approximately after 300 seconds, so an averaging time of 5 minutes is the optimal selection in terms of the measurement accuracy in this study. Relevant changes have been made in the Section 2.1 (Page 16341, Line 2). In order to determine atmospheric concentration levels of NH₃, each acquired sample scan was compared with the 5 ppm NH₃ reference scan by implementing a LabView-based general least-square (LS) linear fitting algorithm. This procedure yields a fit coefficient value, which generally indicates to what extent each sample scan represents a reference scan; namely NH₃ concentrations are estimated purely based on fit coefficient values. However, the LabView-based general LS linear fitting algorithm does not take into account the minimum detection limit of the sensor, leading to observed values below the detection limit. Readers need to be aware that there is an error/uncertainty of 0.72 ppb (300 s averaging time) for NH₃ measurements in this study. Relevant changes have been made in the Section 2.1 (Page 16340, Line 12).

3. I do like Figure 6 much better with the outliers removed and different colors! Thank you.

Answer: Thanks for this constructive suggestion when we were preparing the discussion paper. It gave us a good opportunity to improve the manuscript.

Please also note the supplement to this comment:

<http://www.atmos-chem-phys-discuss.net/11/C8728/2011/acpd-11-C8728-2011->

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