Atmos. Chem. Phys. Discuss., 8, S4622–S4623, 2008
www.atmos-chem-phys-discuss.net/8/S4622/2008/

Atmospheric Chemistry and Physics Discussions

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8, S4622–S4623, 2008

Interactive Comment

Interactive comment on "Long-term field performance of a tunable diode laser absorption spectrometer for analysis of carbon isotopes of CO_2 in forest air" *by* S. M. Schaeffer et al.

Anonymous Referee #2

Received and published: 10 July 2008

This methodological paper demonstrates that TDL, and in fact all field-based trace gas measurements, must clearly present the method of estimation of precision and accuracy. The use of an "unknown" cylinder for QC is extremely valuable. This is an important contribution. There are some details that I questioned.

1. It seems misleading to state (page 9543, line 11) that your measurements are 1 second observations, when those are actually 1 second means of many observations per second. Can you clarify exactly how you are averaging up your data?

2. Same page, please explain why you are willing to toss out 4 of your one second observations but not 3 or 5. It seems arbitrary. This paper helps our science because it helps us take TDL QC away from arbitrary decisions, but this decision appears arbitrary. Also, why is one std deviation your cutoff? Why not 1.5 or 2.0 std dev? Also, (line 24, same page) why was this processing applied to the calculated CO_2 and δ^{13}C values rather than the isotopologues? This paper will be used as a methods reference in the future so clear explanation of how and why you made these choices will increase the value of the paper to future TDL users.

3. Page 9544, lines 10-15, this is a very nice explanation of why RMS error is a useful first-cut measure of bad performance but not of good performance.

4. It seems there can be debate about cut-offs for tossing data and for calculating precision. For example, choosing sigma10 cutoffs of 0.55 for CO_2 (fig. 2a,c) results in a somewhat low reportable precision but includes almost all of the data. Using a smaller value, e.g. 0.4 or 0.3, results in a higher reportable precision and tosses out more data. I would like to see more discussion and explanation for the basis of your decision beyond that 0.55 (for CO_2 in this case) is where the data flattens out. Is there an engineering or statistical basis for this? The same holds for the unknown cylinders (Figure 3). Why not toss more data by having a tighter threshold than 0.5 (difference from actual)? It could help the reader to understand the basis of these decisions and the background on what are the costs and benefits of choosing different values for cutoffs.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 9531, 2008.

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