

Interactive comment on “Atmospheric CO₂ monitoring with single-cell NDIR-based analyzers” by B. B. Stephens et al.

Anonymous Referee #1

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The manuscript describes two similar but not identical NDIR system set-ups for precise atmospheric CO₂ analysis that are operated at numerous monitoring sites. After a thorough description of the various components of the system the routine measurement, calibration and test procedures are outlined and a very careful analysis of effects that are potentially contributing to measurement error is given. The paper therefore perfectly fits scope of AMT. I very much appreciate the parallel description of two implementations of a similar analytical strategy. The system design is very elaborate and the manuscript provides an exemplary guideline of system testing and setting up a sound quality control system for the routine operation. Therefore, I highly recommend the publication of this manuscript.

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Still I have a few minor remarks that I would like the authors to comment on:

p. 4331 line 3: “Flow restrictions downstream of the LI-820 are minimal and sample cell pressure is closely tied to ambient”. According to Fig 1 the sample flow passes through each two mole sieve cartridges and Nafion driers and a 40 μm filter in the AIRCOA set up. Does this not cause any flow restriction?

line 23: . . . 1 min of data following the valve switch is ignored.. If with a flushing time of 2.5 min the first min is ignored this does not leave ≥ 100 s data averaging time.

p. 4337 section 2.4.4: A temperature variability of $0 \pm 1.3^\circ\text{C}$ between calibrations is specified and a temperature sensitivity of $0.1 \text{ ppm} / ^\circ\text{C}$ but an associated error of $0 \pm 0.07 \text{ ppm}$ for the uncorrected version. Why not $\pm 0.13 \text{ ppm}$?

Section 2.4.7: The empirical correction function to account for the memory effect due to incomplete flushing is probably only applied for a certain period of flushing time after the valve switch?

p. 4340/4353: Section 3.1, Fig 2a: If tests B-F are all similar, over which period of time have they been performed?

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