Interactive comment on “Atmospheric CO$_2$ monitoring with single-cell NDIR-based analyzers” by B. B. Stephens et al.

Anonymous Referee #1

Received and published: 14 September 2011

The manuscript describes two similar but not identical NDIR system set-ups for precise atmospheric CO$_2$ 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.

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 $\mu$m 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 $\geq$ 100 s data averaging time.

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