Atmospheric
Measurement
Techniques
Discussions

Interactive comment on "A mobile sensor network to map carbon dioxide emissions in urban environments" *by* Joseph K. Lee et al.

L. Golston

lgolston@princeton.edu

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I would like to add some comments to help strengthen the description of the DIYSCO2 system:

Appendix A1 is titled 'sensor precision', the first paragraph says accuracy is ensured by calibration but precision and linearity need to be tested, then the second paragraph says accuracy and linearity are tested, and the final paragraph concludes about linearity – please sort out the usage of each of these terms.

6/5 and Appendix A1: This at first glance suggests impressive linearity, however there is not enough information to evaluate this claim. As an extreme example, if five of the six tanks had a mixing ratio of 399.08 ppm and the sixth was at 503.77 ppm you could get a linear R^2 of 0.9999 even with a nonlinear sensor - please state the values of each

tank. It would also be helpful to know how the standard tanks were calibrated against CDML / NOAA traceable tanks as was stated.

Appendix A3 states a time response of 2.2 seconds for a 50% step change within the IRGA. This indicates that the effective number of samples is less than the 1 Hz that is stated, and could have an implication for the effective sampling density of measurements in the city. Please include a statement about whether the time response of the sensor being > 1 s affects the results.

Appendix A4 This is an interesting test, but the second paragraph is somewhat difficult to read and several things need to be clarified.

- What exactly is the difference between the tests in p26/L30 where good agreement was seen between the grouped inlets, and p27/L1 where the grouped inlets had relatively large spread? By higher CO_2 mixing ratios, does this mean this second results were for an area with direct traffic emissions?

- What about the results of the ungrouped test? Perhaps this is why p27/L3 says 88.85%, while p27/L1 says 81.16% were within 15 ppm?

- p27/L1 implies that slightly less than half of the 1-s data is within 5 ppm, contradicting the next sentence. I also disagree with the use of 'accuracy' and 'error' here, since there is no standard to compare against other than the mean value, and would recommend spread or variability instead.

If the authors move the appendices to a supplement per reviewer 2's comment, I would suggest retaining Appendix A since this would give a disproportionally large amount of space to the field results and comparison to inventory, in comparison to description of DIYSCO2 and the emission calculation methodology.

2/15: This says accuracy, but the value given in parentheses is the 1-s noise specified in the instrument datasheet, not its accuracy. The Li-820 manual gives accuracy specifications, based on mixing ratio range and cell pressure, as a percentage (%) of

reading

8/29: "In-situ calibration". This is a good thing to do, but should be called a comparison not a calibration since there is no standard used to calibrate against. Can also a comment also be made about whether this provided useful information? If this means parking five vehicles adjacent to one another, and given the variability described in Appendix A4, I imagine it might be difficult to detect drifts this way both for individual sensors and for the ensemble of sensors.

12/5: What is the meaning of "sample" in this section. Does one sample correspond to one 1 Hz measurement? If so, there should be some discussion about vehicle speed since that will affect the spacing of measurements.

Other:

* Spell out IRGA at first use

* p2/L14 and p8/L5: NB -> NE

* p9/L2: gridding

C3