

Atmos. Meas. Tech. Discuss., referee comment RC2
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Comment on amt-2022-65

Anonymous Referee #2

Referee comment on "Calibrating Networks of Low-Cost Air Quality Sensors" by Priyanka deSouza et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2022-65-RC2>, 2022

General comments

This paper is about calibrating low-cost sensors of particulate matter using many different models. The paper promises to give a set of best practices and to describe the transferability of the calibration to sensors not co-located with a reference measurement; however, there is so much data in the paper that these tangible conclusions are lost to me. Maybe some of my comments below will help bring clarity to the next version of this paper.

Also, in the conclusions, future work #2 is exactly what this paper was supposed to determine (based on what the abstract tells us). Thus, there may be a big problem with the overall scope of this paper and confusion over exactly what the take-home messages should be from this work.

For better readability of the final paper, consider breaking up the big tables into a few smaller ones with more focused information in them. It might be worth using color or shading to indicate the sensors or models that stand out and are talked about more in the text.

There are so many references to Supplemental figures, do some of these perhaps belong in the main paper? Maybe display data for a specific site or model and then have the rest of the sites and models in the Supplemental. But then, the reader gets more out of the main paper as a standalone manuscript.

Lines 333 and 453 - Which is it, 89 models or 21 models?

Is Section 2.3.1 (and really, all of Section 2.3) necessary? The way this section is presented, I'm not sure what value it adds to the paper (except for the equations). There are lots of statements about 'we report' and 'we display', but doesn't say where to find these.

Line 454 seems to be an important conclusion, but I don't see any good defense of this statement in the rest of the paper. How is the C2 correction better exactly? In fact, line 683 says that the C2 correction was significantly worse for the complex models (were complex and simple models clearly defined anywhere?). Lines 567 says that C1 and C2 corrections have no significant differences between them. These statements seem like contradictions to me and help lead to my confusion about the whole paper.

Line 670 - The statement here is not very certain; it seems to say that differences in meteorology "likely" matter. Can't this paper quantify the influence of meteorology? You have T and RH data at each sensor, so you should be able to better determine the effects of meteorology as compared to aerosol composition, where you have no measurements to use.

Line 704-705 If this is an important conclusion, then there should a figure in the main paper that supports this conclusion (I don't think there is).

Stylistically, much of the Discussion (Section 4) doesn't seem to add anything new; it's just repeating the conclusions from each of the figures presented earlier.

Line 730 - Can you really conclude this about Denver? Later, Line 779, you state that the network was over a "fairly small area". Was all of Denver covered, then?

Line 741 - Did you define or identify different pollution regimes somewhere?

There are a number of sentences throughout the paper which use "it" or "this" as the subject in the sentence, which can add confusion and ambiguity to those sentences. Consider rewording all of these instances.

Specific comments

Line 42 - Can you find a more recent citation and statistic? References says you last accessed the website almost 2 years ago.

Line 125-127 - What about sensor-to-sensor variability? Why is that not considered? Are these sensors all cross-calibrated in a lab prior to deployment?

Line 201 - Is this correlation for minute or hr time resolution?

Line 217 - What additional uncertainties? Be specific.

Line 330-331 - Figure S5 and S6 don't actually prove that there is a high correlation across sites.

Line 335 - Figure S9 seems pretty important to some conclusions stated later; I wonder if this should be in the main paper? Also, does this include all of the co-located sites or just some of them? (I think it must be all the reference monitor sites but just one of the LCS at those sites even though there may be multiple.). Be specific in the text and figure caption. Also, the colorbar is missing labels.

Lines 503-505 - I am confused about what the 1-minute data are being compared to to evaluate the LCS performance at this time resolution? The reference monitors do not report data this frequently I don't think.

Line 511 - Which models, specifically?

Line 529 - "appears to be" is qualitative and not useful; quantify the difference.

Line 549 - Why does Figure 2b appear to have a different shape to the box and whisker plots relative to the other parts of this figure?

Lines 553-554 - confusing sentence

Figure 2 caption - typos: no (d) or (e)

Figure 3 - Need better labels in the y-axis for the models; they are referred to as "Model 1, 2, ..." in the caption but differently on the figures themselves.

Line 625 - "It appears" is qualitative language and not helpful. Don't you quantify the variation later in the sentence? You should prove that these variations are significant and then leave no doubt to the reader what the conclusion should be.

Lines 626-627 - These max numbers look like they are all due to one specific model (there is one row and one column with dark green colors, while all other models are pink). If you take out this one model, does your conclusion hold? Why is the one model so different than the others?

Line 652 - Was "exposure assessment" used/defined earlier? I don't know if this is something new calculated from the PM concentrations or not.

Lines 705-707 - confusing sentence

Lines 745-746 - redundant wording

Technical corrections

Line 234 - missing space

Lines 283 and 333 - single sentence paragraph

Line 495 - 'correction'

Section 3.1 appears twice, all succeeding sections need to be renumbered.

Line 542 - this sentence is not needed

Line 546 - "LOBD"

Line 608 - inconsistent ways of referring to months

Line 692 - why the colon?

Misplaced or missing commas - Lines 684, 685, 702, 711, 751