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Discussions

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comment

Interactive comment on "A low-cost monitor for measurement of fine particulate matter and aerosol optical depth – Part 2: Citizen science pilot campaign in northern Colorado" *by* B. Ford et al.

Anonymous Referee #2

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Overview This paper is nicely written and presented, and shows really good systematic testing of the prototype AMOD sampler/analysers. This is a really exciting area! However the major drawbacks of the paper are that the authors only present a small fraction of the data collected (e.g. was only potassium, iron and black carbon analysed? Why is all the analytical data not reported or reposited elsewhere and cited?). Data is only presented in graphs and no attempt at detailed statistics on the data collected is shown. The authors refer repeatedly to their companion paper, but the comparison of the variability of data collocated with reference stations vs the citizen science sites

would add significant context to the paper. A really robust, self critical assessment of the successes and failures of the pilot study would make this a stronger paper. Major comments: 1) All chemical composition data and travel blank data should be presented 2) All reference data should be cited – which monitoring network are they in and where is the data reposited? 3) Masses measured on the filters with statistics including when PM mass <LOD should be presented 4) A diagram summarising the different time frames for the different measurements (24 hours, 48 hours, 3 days. . .) would aid the reader to understand (more my limitation than the authors, but a picture speaks a thousand words) 5) In the discussion section, the variability due to day of week are posited as reasons for changes in PM levels – which given that there are air quality networks in the area the authors could have looked at the local variation for those periods with the reference sensors rather than qualitatively discuss it. 6) Figure 6, it would be useful to split this into 2 plots and put the statistics fit of the data. It is quite hard to separate the blue dots from the orange to look at the distribution. Estimated x-y error bars on the plot would also help 7) I think some work needs to be done on the interpretation. Currently, the conclusions infer that the citizen science measurements are different because they are seeing different air masses and different emissions, however that is true for all measurements in different locations. A more specific question that the authors should attempt to discuss is whether the differences are quantitative and therefore valid, and what are the QA processes to filter out data when this is the case. The authors mention discarding some data and not others, what were the rules applied and what fraction of the data were included in the final data plots? 8) The authors state that these are low cost instruments, however I would ask the authors to check their economics: the capital cost is relatively modest, but what are the costs for chemical analysis/filter consumables/postage/data analysis/data cleaning/communication with citizen scientists? Development costs? It is mentioned in this paper and in the companion paper that sun tracking, GPS, cloud filtering etc. are being developed which also incur costs.

Minor comments: P1 "Furthermore, model resolutions are generally too coarse (tens to hundreds of km)": This is not completely true. Many atmospheric models are nested

to allow finer resolution modules to be used, down to 1 km or better. Perhaps revise text slightly. Which models are being referred to. P2 line 38 "Our companion paper (Wendt et al., 2019) describes the design and validation of the AMOD." This is a repeat of sentence in previous paragraph, similiarly on p 3 "A full description and validation of the AMOD sampler used for CEAMS is given in our companion paper, Wendt et al. (2019)." It is difficult to know how much to cite a companion paper, but a clear reason for referring to it at each point and directing to particular parts of it if necessary would be better.

Generally the paper could use an edit to remove repetition of both methods and discussion points and make it more concise, and allow more quantitative points.