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Interactive comment on "Mobile air monitoring data processing strategies and effects on spatial air pollution trends" *by* H. L. Brantley et al.

Anonymous Referee #2

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Overall, the manuscript is useful. Its apparent purpose seems to fall somewhere between a review paper and original research. As an original research contribution, however, it has only a few new insights; as a review paper, it has modest scope and depth. The manuscript is a struggle to read, due to several major issues in the writing style, please see also below. There are instances of jargon, undefined terms and poor paragraph structure and organization, and many sentences are unclear. I had to read them again and again in multiple places to get their meaning, and even then I needed to make some assumptions and guesses to arrive at a meaning. Because figures are very minimally captioned they help little. Insights and conclusions are mostly absent. Some points of confusion are outlined below but I beg the authors to go through the manuscript with a fine-toothed comb or otherwise find a way to improve the clarity

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throughout. Perhaps get a colleague who is a good writer but not so close to the work to read it and provide feedback.

The manuscript could be strengthened by including some discussion of the applicability of various approaches to various types of data. I also couldn't really understand where/what the "framework" the authors refer to was, unless it is embodied in Figure 1, but the framework in Fig. 1 is not new; it is implicit in many earlier papers–or possibly even explicit somewhere.

Referencing: the authors have a tendency to reference previous techniques and analyses sparingly, even though they may come up in discussion repeatedly. This is not the usual practice (or standard) of giving proper credit. Further, referencing more would make the manuscript clearer and easier to follow; sometime it is easier to remember a person's name than a term for an analysis approach–please say the name of the method and the reference every time you refer to them. Further It would further be helpful to the reader to use terms like "(modified Drewnick (2012) method)" (or whichever method is being improved) etc. where appropriate.

In summary, a solid if not exceptionally novel or exciting paper, should be published with major revisions as indicated above and below.

Specific comments page by page: 10448 We really need to know the instrument response time. Sampling rate and response time are often not the same, and if they are not it makes an enormous difference to the data interpretation.

10451 lines 8: what happens as a consequence of data being flagged?

10451 Lines 14 – 16, instead of "distance" I think you mean "measurement', if not, then distance of what?

10452 lines 1 – 2 this sentence is very confusing. Assuming I figured out what you mean, perhaps you should give your "new method" (not clear to me what it is) a name so that the reader can make that connection if it comes up again later?

10452 line 3 what is "This"?

10452 paragraph 2, please make a connection between the speed of the sampling vehicle and the smoothing intervals, if there is one.

10452 line 14 window should be windows.

10453 The "engineering method" (please rename for clarity) and the time correlation method both need references throughout, since they are from the literature.

10453 What happens if you just do time lag correlation and skip the "engineering method"; does that work for your data?

10453 line 20 etc. Please clarify how you are deriving emissions factors, and from what. Why are you calculating a 10s average, and of what? The 10 s average seems too long for the plumes of individual vehicles.

10454 The inquiry you carried out begs the question what sort of emission factor (again, not sure how you are using that term) difference you would get if you had sub-second data.

10455 Please explain what you mean by "or can be added to a model as a random effect".

10455 My understanding of a "rolling minimum" is something that selects minima of a moving window of some (usually constant) size. The stair step pattern shown seems to be what would result from moving a fixed window step by step in a way that each data point contributes only once to the min. Need to clarify/reword/etc.

10455/Fig. 7 This data is very spiky and populated by wide peaks, not clear whyâĂŤin-strument response time? Background? Need to discuss the efficacy of various meth-ods when you have different types of data/contribution of the background. For example, treatment of BC with 6% contribution from the background will be very different from treatment of CO_2 with an 85% contribution from the background.

10456 Para. 3. Do the meteorological conditions change significantly over the course of 2 hours? Can you back up your statement with data? I suspect there are other factors at play such as WD and upwind sources, etc.

10456 Para. 3 Why do CO and NO_2 behave differently than the other pollutants?

10456 line 18 within run SD of what? W/ or w/o the "standardization"?

10456 starting with "Kimbrough . . ." → end of paragraph: this discussion should be with your similar results and separated from this paragraph.

10457 line 1 "downwind measurements" in which study?

10458 Please explain why spatial smoothing increases correlations more than temporal smoothing and what the implications of this result are.

"ADTT" is never actually defined that I could find.

Table 5: add the instrument response times. Why do you expect/what is the insight from pollutants being be correlated on different length scales, and more so than on time scales? The flexible window method developed by the authors is a complex approach, potentially unnecessarily so. This approach involves picking the minimum values, and if there is no appropriate value, a process of picking a value related to the standard deviation of the lowest 10 percent value. These choices at least need to be accompanied by some justification. Further, there is no explanation of why two or three points in the sample trace, lower than all neighboring points, were not chosen as minimum points. Overall, the flexible window approach seems to produce results that are nearly identical to the two simpler methods to which it is compared, and thus does not offer an obvious advantage. Picking a baseline is an issue that is problem specific to the question at hand, and, at best, tricky. A clear statement of the intent of the baseline choice should be added.

Word choice: 1. Background "standardization"; a better word might be "normalization" 2. The "engineering method" doesn't tell the reader anything. Words to actually

describe what you are referring to would be much more effective.

Figures: Figures should have captions that make them understandable on their own without referring to the text. Please use their captions and legends to make clear what is being plotted. Figure 2. a. What data is this? A candle test of your instruments? Roadway data? b. It is standard to indicate the meaning of each panel in the caption, although in this case it is fairly obvious. c. The legend is a mystery. The same lines are indicated to mean different things -?? Both emissions events and roadway concentrations? d. What do you mean by emission event? c. Purple is barely differentiable from black. Figure 3. Not very interesting, but if you keep it, include a more complete description. Figure 5. That's not a transect. It's a route. "Green lines represent. . . . . .." Is referring to what? Figure 6. This figure needs the original data. Also the methods used need their literature/this work citations in in the legend, preferably (e.g., "—Mean (this work)" etc.) Figure 7. Indicate what the data are and what the gaps are. I am unclear how you can get the step function behaviour in b) from a running averageâĂȚthat would be expected from windows one after another–? Figure 8. The legend says points are percentiles and the caption says medians. Please clarify/correct. Figure 9. What is this data? What are the different panels trying to show? Figure 10. Needs more description in the caption.

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 10443, 2013.

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