**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Relationship between particulate matter and childhood asthma – basis of a future warning system for Central Phoenix" *by* R. Dimitrova et al.

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Received and published: 3 January 2012

Response: We sincerely thank the referee for useful comments and positive evaluation of the paper.

Response to some detailed remarks:

Introduction, last para - (clearer) definition of the objectives at the end of the Introduction instead of listing the merits of the current approach would be more appropriate formulation for the final paragraph

Response: The following sentence has been added to clarify the objectives of the

manuscript. "The goal of this study is to clarify the association of asthma incidents (primarily emergency department visits and hospital admissions with a diagnosis of asthma) with elevated concentrations of particulate matter 10 microns and smaller (PM10). "

2.2. Asthma data, first para 3rd row from end - statement that then change in the number of incidences as function of changing the washout period from 7 to 28 days is minimal would be more specific by stating what is the change between these upper and lower limits. Final selection of the shortest washout period is suspicious – if there is no substantial change, why did the authors use the most precautious washout period of 28 days?

Response: We added the number of rows for 7 and 28 day washouts. We used 7 days because it is common choice in studies such as this. This comment was added to the manuscript.

2.5 Methods: description of the terms - formulation of this part of the manuscript as a dictionary does not seem appropriate for a journal article.

Response: These were deleted, and the terms were briefly described as they were used in the narrative.

3. Results, 2nd -3rd rows - reference to 2- and 5-mile radii is not clear to a reader who has not read the methods section; please add "from the nearest monitoring station" to clarify

Response: Corrected, and as mentioned below, the 2-mile results are removed from the manuscript.

Table 2 - definition of lags: normally lag0 is considered the incident day mean concentration, lag1 the previous day etc. The table lists daily mean and then continues from lag2, which is confusing. Where is lag1 result?

Response: The notation was corrected to lag 1 and it is added. See the reply below

regarding a correction to the lag variables.

- all presented results from daily mean to lag6 are statistically significant (95%) or highly significant (99%) and lag6 returns to the highly significant level of p-value with also the highest coefficient of them all. This seems interesting as a finding if taken as such and would suggest that asthma is affected by longer term exposures certainly up to one week but for how much longer is then the question. If the authors believe that the results presented in Table 2 are correct, they have to add to the lag another week to see at which point the coefficient and the statistical significance starts to decrease.

Response: Although the results for our primary predictor are correct, we found an error in our code for the lag variables. The corrected results are shown in Table 2. There are now many fewer significant results for the lag days and they tend to decline with the lag, although there variability is the p-values. If one applied a Bonferroni correction for adjust the p-value for the nine multiple tests, one might require a p-value less than $0.05/9 = 0.0056$ and only the daily mean is significant. More directly, only the day of the event and the immediately previous day are significant at 99%. We have added these comments to the manuscript.

Figure 1 - formatting x-axis as Julian day is not acceptable. Seasonal variation is an interesting feature of both air quality as well as asthma, and therefore the months of the year have to be shown

Response: Figure 1 has been corrected and the x-axis shows month and year of observations.

Figure 2 - besides the 5-mile radius shown well in the graph also the 2-mile radius should be indicated with e.g. a darker shade

Response: As mentioned before, the 2-mile results were removed and this simplifies the results. Only asthma events within five miles of a continuous PM10 monitors were used.

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Figures 3-4 - unit of measurement for the shown parameters has to be included

Response: Unit of the PM10 concentration has been included in Figures 3-4.

Figure 5 - presentation of log (actually natural log) odds is not appropriate; it merely makes the interpretation of the results more difficult while in the shown range the relationship against non-transformed odds is almost linear; thus odds should be shown as such.

Response: The traditional assumption for a logistic regression model is linear relationship of the log odds to the predictor variables and our objective with this graph was to evaluate the assumption. A comment on the assumption/objective was added to the manuscript.

Figures 7-8 - presentation of the 2 and 5 mile radius results would be much better viewable if presented as a stacked column format in the same graph so that the 0-2 mile data would be the bottom part of the column and the 3-5 mile data stacked on it in another color. - however, looking at the graphs it also seems that the selection of the radius does not really affect the results much; why do the authors want to present both? To show that the results are not caused by artificial selection of the radius? Please clarify.

Response: Based on the comments, we agree there was little added by the 2-mile radius and these figures were removed. The manuscript is simpler with a presentation of only the 5-mile radius results.