

# ***Interactive comment on “Combining low-cost, surface-based aerosol monitors with size-resolved satellite data for air quality applications” by Priyanka deSouza et al.***

**Anonymous Referee #1**

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## General Comments:

In this manuscript, the authors present a technique to combine particle counts from low-cost, ground-based sensors with the additional information provided by MISR's size resolved AOD retrieval to infer PM<sub>2.5</sub>. With some modifications, I would recommend this manuscript for publication: the technique is novel and will be of interest with scientists seeking to balance the strengths and weaknesses of low-cost sensors.

That said, there are clear limitations to the current study that may limit broader application of their approach, although many of these shortcomings are already identified by the authors. Of particular concern, but as noted by the authors, is the inability to vali-

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date their results against reference-grade observations. Without such a comparison, it is difficult to determine the relative value of this combined approach compared to the uncertainties of its underlying assumptions.

With this in mind, whether or not this work is published I would strongly encourage the authors to continue to develop this approach in a location that allows direct validation.

#### Specific Comments:

Supplemental L192: I have some concerns that the GEOS-Chem simulation used to scale total column AOD to near-surface AOD is based on a simulation from 2012. The amount and relative influence of transported Saharan dust and biomass burning from the Congo on the vertical distribution of aerosol have significant annual variation and may impact the author's results. A plot comparing 2012 and 2016 monthly mean MAIAC AOD over Central and Northern Africa for October and December may provide some reassurance, or alternatively motivate the need for a more recent simulation (or perhaps such a simulation could be run).

Supplemental L264: How well correlated are these results when taken against total-column AOD instead of near-surface AOD? As given, the high  $r^2$  could be due to MISR AOD, even if the GEOS-Chem scaling was not working well. The change in correlation when using the total-column instead of near-surface AOD is more relevant to the quality of GEOS-Chem in this application.

Figure S5: Given the sampling shown in Table 1, it would be more useful to show the vertical structure of August and October.

What is the cause of the flat sections in the OPC PM2.5, shown in Figure S7?

At the author's discretion, it may be appropriate to mention the application of such a technique to the upcoming MAIA mission. I expect MAIA's multi-angular viewing will allow similar size-resolved information as MISR provides. If appropriate, this connection would help broaden the applicability of the author's work.

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